Anderson-Abruzzo International Balloon Museum

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Balloon Museum Reference Document

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Balloon Museum Docent Training

General Information

The ***Albuquerque International Balloon Museum*** opened in **2005** primarily with funding by two, Albuquerque businessmen and pioneering balloonists – **Ben Abruzzo** and **Maxie Anderson**. (More facts about museum in the ***Appendix***.)

Review with Bob in December 2018

I spent an hour with Bob after an orientation meeting. He gave me his docent tour of the front entrance and then the area immediately behind the front entrance.

It was all related to the early beginnings of ballooning.

Three types of balloons

- **Hot air** (*Montgolfiere*) – named after the Montgolfier brothers
  - Propane gas is used to heat the air inside the balloon
  - Only used for shorter flights due to limitation of how much propane gas that can be carried
  - Because gas is much lighter than air, a hot air balloon needs to be at least 3 to 3 times bigger than a gas one in order generate the same lift
- **Gas** (hydrogen or helium) – (*Charliere*) – named after Jacques Charles
  - Distinctive by the outer net around the balloon
  - Bottom is closed in order to prevent gas from escaping
  - Balloon is lowered by letting gas escape
  - Balloon is raised as gas expands when going higher
  - Balloon can also be raised by dropping ballast bags
  - 1000 cu ft of hydrogen weighs 5 lbs. 1000 cu ft of air weighs 75 lbs.
  - Helium is also much lighter but about twice as heavy as hydrogen
- **Combination of hot air and gas** (hydrogen or helium) – (*Roziere*) – named after Pilote de Rozier
  - Hot air balloon outer shell with separate gas balloon inside
  - These are used for the longer balloon flights
  - Uses heat of the sun by day to warm and expand the helim
  - Uses hot air from propane at night to warm the outer balloon which warms the helium as it cools and contracts during the night
  - Without hot air, ballast would have to be released each evening to slow descent, requiring more ballast, which means more weight and thus requiring a bigger gas balloon

What Makes A Balloon Fly

Caryn's (AAAA Pres) Presentation on 4/29/19

- **Albuquerque Aloft**. Friday before beginning of Fiesta. Balloons go to area schools. Also, Darth & Yoda are on display at the Balloon Museum.
- **Air Density**. That is what makes a balloon rise.
  - Molecules expand when heated and fill the balloon.
  - Once balloon and all the weight it is carrying is less than the weight of the air around it, the balloon rises.

Kid's Example:

Have 3 kids stand shoulder to shoulder. That is what happens when molecules are cold – they stay close together to share warmth.

Now have kids take a step apart. They do this when they get hotter to not share the heat any longer. They are now farther apart and take up more space. That is what happens when molecules expand.

Balloon Facts

- Typical sizes:
  - **Competition** balloons. Smaller in size (65K cu ft). Football shaped. 2 people.
  - Typical **sport** balloons. 77/90/105K cu ft.; 2-3 people
  - **Corporate logo** balloons. 125K cu ft
  - **Special shape** balloons. 200K+ cu ft
  - **Rainbow Ryder**. 275K cu ft.; 10-12 passengers
- Special Shapes. 2 types.
  - *Appendages* only: a standard balloon with ears, feet, etc.
  - Special shape like Airabelle and the Wells Fargo stagecoach

Notes from *What Makes a Balloon Fly* by Ted Horton

- Hot air balloons are open at the bottom to allow the heated air, as it expands, to push out cooler air through the bottom.
- 150-200° F. – temperature of the air inside. A **Pyrometer** at the inside top of the balloon measures the air temp inside the balloon.
- Wicker baskets are used because they are more flexible; absorb shock better during landings. Also lighter than other materials.

Balloon Museum Reference Document

Balloon & General Facts

- Cost: $10-15K for smaller balloons
  $20-40K for average balloon
  $200K or more for larger, special shape balloons
- Life: 300-400 hours for typical envelope
  Commercial balloon pilot flies up to 200+ hrs per year
  Sport pilot flies much less, envelopes last 6-8 years
- Size: 60' high, 55' wide, 77-105K cu ft
  600 lbs weight; 1400 lb lift capacity
  Uses 15-20 gal of propane per hour
- Speed Up/down speed up to max of 600'/minute
  Balloon Fiesta typically only 100-200'/minute
- Envelope construction
  Nylon or polyester. Coated on inside with polyurethane to help stop leaks
- Weight of Air/Hydrogen
  - Rule of Thumb: 1000 cu ft of air weighs 75 lbs
    1000 cu ft of helium weighs 10 lbs
    1000 cu ft of hydrogen weighs 5 lbs

  Note: Even though hydrogen is lighter than helium, they are the 2 lightest gases. Hydrogen is however both explosive and highly flammable.

- Layers of the Atmosphere
  - **Troposphere** goes up to 33,000'. Where weather occurs and commercial aircraft fly. Temps decrease as you get higher.
  - **Stratosphere** from 33,000-160,000'(30mi). Temps actually increase due primarily to the effects of ozone. Humans cannot survive without oxygen.
  - **100,000'+:** Beginning of conditions like space. 99% of the atmosphere is gone.
  - **Mesosphere.** From 30-110 miles. Temps begin to get colder once again.
    - **Space.** Begins at approx. 62 mi (320,000') above the Earth's surface. No more atmosphere remains. Completely weightless.
  - **Thermosphere/Ionosphere.** 50-400km (900mi)
  - **Exosphere.** >400km

Typical Questions

- ***Why is the Museum Building Named after Anderson & Abruzzo****?*
  - See reasons on page 18.
- ***Why usually only morning flights*** ?
  - Sun heats air later in day and stirs the air usually causing more wind
  - Balloons typically like to be back on the ground by 9AM
- ***Do balloons fly in winter*** ? Yes.
  - Pros: Less heat needed to expand cold air so less propane is used
    Envelope lasts longer because not exposed to as much heat
  - Cons: Propane tank pressure decreases in cold.
    Under 40°, propane needs to be pressurized and heated.
    Fuel valves leak more when cold
    Riders have to dress warmer!
- ***Do balloons fly in the rain*** ? Not typically.
  - Rain cools the envelope, harder to keep air heated
  - Rain makes the balloon weigh more
  - Hot air inside top of balloons can heat the rain on top of the balloon and make it very hot.
- ***How many crew are required, minimum*** ?
  - 2 to hold mouth of envelope open while filling
  - 1 to operate the inflator fan
  - 1 to hold the crown rope
- ***How high do balloons go*** ?
  - 5-10K feet off the ground (AGL – Above Ground Level)
  - Stay beneath the clouds because of visual only – no IFR like planes
- ***About Balloon Fiesta …***
  - See **Appendix I > Balloon Fiesta > Balloon Fiesta 2019 Facts**

Delivering a Tour

Introduction to Your Group

Questions to ask

- Find out where they are visiting from
    - Perhaps find out who came the longest distance
- What brings them to Albuquerque?
- Has anyone ever been up in a balloon or perhaps worked on a balloon crew?

Things to point out …

- Location of the rest rooms
- Let group know I won't be offended if they drop out of the tour and go off on their own, but I will be continuing with my talk with the people who stay with me

Welcoming Words

- First, welcome U.S. guests
    - **Welcome** to all my guests from all around the United States
    - **Bienvenidos** to all my Spanish speaking guests

- Second, welcome any non-U.S. guests
    - Is anyone here from outside of the United States?
    - **Welcome** them in their native language
    - If they say "**Thank You**",
        - Respond "**Your Welcome**" in their language

Delivery Tips

- Gather group together and get their attention before speaking
- Don't try to talk to the entire group while you are moving from one gallery to another
    - Okay to ask or answer questions from people who walk with you
    - Before beginning the next group discussion …
        - Wait until you get to the next gallery and pick out a spot which not disrupt other traffic
        - Gather your group around you and get their attention
        - Only then begin speaking
- Always try to first point out the **single, main concept/idea** that you would like your group to take away from your discussion
    - These ideas are listed under the discussion points for each gallery
- Speak about some universal concepts and how they relate to each display

    - ***Ex:*** When talking about early ballooning or during the DEII, ask kids how they would feel if they were going up in the balloon tomorrow? Scared, excited?
    - Then ask them how their PARENTS would feel if they were going up?
    - Explain that the two pioneers of ballooning – the Montgolfier brothers – never actually went up themselves in one of their balloons when it was not tethered to the ground.
        - Their father feared for their safety and would not allow it.
- For display items (such as the wooden camera) …
    - First ask audience to physically describe it.
    - Then guess at its purpose.
    - They tell them the story behind it.

Balloon Museum Reference Document

Why is the Museum Building Named after Anderson & Abruzzo

- Maxie **Anderson** & Ben **Abruzzo** were wealthy Albuquerque residents with a great interest in ballooning.
- The **Sandia Peak Tram** car was co-founded and built by Ben Abruzzo and Robert Nordhaus.
- **1978**: 1st transAtlantic flight in a gas (hydrogen) balloon (Charliere)
    - **Aug, 1978**. *Double Eagle II* flown by Ben **Abruzzo**, Max **Anderson** and Larry Newman.
- **1980, Kitty Hawk: Maxie and Kris(tian)** Anderson
    - Intended to travel from California to North Carolina but ended up in Canada's Gaspe Peninsula; Traveled across 9 states and 2 Canadian provinces
- **1981**: DEDV; 1st transPacific flight in a gas (helium) balloon (Charliere)
    - Nov, 1981. *Double Eagle V* flown by **Abruzzo**, Newman, Ron Clark and Rocky
- **1981-1982**, Jules Verne: Attempts by **Maxie Anderson** and **Don Ida**
    - First to attempt around-the-world flight. Used a hot air/gas (Roziere) balloon.
- **1983: Maxie Anderson** died while ballooning over Germany with co-pilot **Don Ida**
    - They didn't want to land in East Germany or Czecholslovakia so he tried to release the gondola from the balloon when it touched down. However, the explosive bolts failed to fire, the balloon rose again and when the explosive bolts did fire, he and Ida fell to their deaths.
- **1985**: Ben **Abruzzo** died on Feb 11, 1985 with his wife and 4 others in a crash of their Cessna airplane near Albuquerque
- **2004: Ben Abruzzo's** son **Richard** also died in a ballooning accident, along with his co-pilot, **Carol Davies**, on a flight over France, Spain and Italy in 2004.

Balloon Museum Reference Document

Balloon Docent Training - begun 1/15/2019

Lighter Than Air Ballooning History

I spent an hour with Bob after an orientation meeting. He gave me his docent tour of the front entrance and then the area immediately Balloons Go To War

Reference Documents

- *Lighter than Air* by Tom Crouch. An illustrated history of ballooning.

Related Stories

- What does a duck say? AFLAC

Interesting facts

- The Montgolfier brothers never flew untethered in any of their balloons, although Etienne did leave the ground on a few occasions while the balloon was still tethered. Their father would not allow untethered flight, thinking it too dangerous for them.
- One of the two, first men to fly in a balloon, Jean Pilotre de Rozier was also the first man to die in a balloon. In 1785, his hot air/hydrogen balloon exploded during an attempt to fly across the English Channel. Both de Rozier and his fellow passenger, Pierre Romain were killed.
- The term balloon "pilot" may have been coined because of the first man to fly in a balloon – Jean-Francois Pilatre de Rozier.
    - Word "Pilot" origin: 1510s, "one who steers a ship," from Middle French *pillote* (16c.), from Italian *piloto*, supposed to be an alteration of Old Italian *pedoto*, which usually is said to be from Medieval Greek **pedotes* "rudder, helmsman," from Greek *pedon* "steering oar,
- A letter from Ben Franklin was taken along on the first successful balloon flight across the English Channel, making it the first "air mail" delivery.
    - Franklin was observing balloon flights primarily because he was interested in how they might be used in war
    - The letter he wrote was written and delivered to his grandson who was living in France.
- The traditional Champagne toast at the end of each balloon ride originated with King Louis XVI of France instructing balloonists to hang a bottle of champagne beneath their balloon. It was thought that the peasants would understand that seeing something very French, they were less likely to be afraid.
-

Piccard Family Tree

- Don Piccard (the father of modern **sport** ballooning) is a relative of both Auguste Piccard and his twin brother Jean Felix Piccard (Don's father). Auguste and Jean were both Swiss inventors, scientists and balloonists. Gene Roddenberry, the creator of the TV and motion picture series *Star Trek*, is said to have named the Captain of the Starship Enterprise, Jean-Luc Picard, after the Piccard brothers, specifically Jean-Felix.
    - Bertrand Picard, grandson of Auguste, son of Auguste's son Jacques, and nephew to Don Piccard (son of Jean), was 1st to fly round the world balloon flight in a hot air balloon in Mar 1977 with Brian Jones.
    - Piccard family tree

	Auguste	Jean Felix & Jeannette (wife)
	Jacques	Don
	Bertrand	

- Comic Flip Wilson was part of the first ground crew in Japan (DEIV?) making the attempt to cross the Pacific.
    - Wilson was a licensed balloon pilot.
- Larry Newman flew on the 1st balloon to successfully cross the Atlantic in 1978 – the *Double Eagle II*.
    - He had practiced hang gliding for this attempt by attaching a hang glider beneath the Sandia Peak Tram car which was co-founded and built by Ben Abruzzo and Robert Nordhaus.
    - Newman had planned to hang glide to land once they made landfall but they had to ditch his hang glider (which was under the gondola) because they were getting very low crossing the English Channel.
- Cartier invented the men's wristwatch based upon his relationship with Brazilian aviator (lighter than air (balloons) and heavier than air (airplanes)) Santos Dumont.
    - Whether it was in a balloon or in an airplane, Dumont was busy with both hands when flying and needed to be able to check time without pulling out a pocket watch. Cartier was a friend and used leather for the first time to make a men's wristwatch.
    - This was NOT the first wristwatch, however. A wristwatch worn primarily by women was invented earlier in the 1800's and did not involve leather.
    - Dumont is thought by Brazilians to have preceded the Wright Bros (1903) in flying the first airplane.

Balloon Museum Reference Document

The Renaissance vs. the Age of Enlightenment

The Renaissance

- Centered in Italy from the 14th to the 17th century
- Obsession with the classical (Greco-Roman) math, art and architecture
- Leading figures: Da Vinci and Michaelangelo

Age of Enlightenment

- Centered in France in the 17th and 18th centuries
- Based on science and philosophy, not on Greco-Roman history and the "possible"
- Helped motivate the French and American revolutions
- Leading figures: Isaac Newton, Voltaire, Ben Franklin

Main Gallery as You Enter

- **Main Idea: THE WORLD CHANGED FOREVER**
    - The Age of Enlightenment begins
    - People are fascinated by what is now possible

Balloon Museum Reference Document

The History of Early Ballooning

Historic Experiments with Balloon Flight

- Chinese made and flew balloons for 1000's of years
- Greeks flew balloons as early as 500 BC
- Leonardo da Vinci created balloon designs in the late 1400's
- 1705 – Brazilian Laurenco de Guzmas demonstrated a small balloon to the court of Portugal

1st Manned and Unmanned Balloon Flights

1760's

Montgolfier Family History

- Mongolfier family in Annonay France. Long time paper business. 16 children
- The two brothers
    - **Joseph**-Michael was the 12th Montgolfier child – ***the free thinker***, maverick and first one to come up with the idea of a hot air balloon.
        - Joseph is said to have seen smoke from his fireplace rise and then wonder how that affect could be translated into raising objects into the air
        - Spanish & French Siege of Gibralter (held by the British) at the time was a motivator for Joseph. Joseph wondered if soldiers could be transported over the wall and dropped inside.
    - Jacques-**Etienne** was the 15th Montgolfier child. Serious, studied architechure. Helped advance the family's paper business. ***Took over the family paper business*** after his brother Raymond died in 1772.
- Joseph's early experiments
    - Joseph used paper bags and warmed the air inside the bag with black smoke. Joseph thought that smoke produced different gases depending upon the amount of heat generated. But really, it was just heated oxygen. Joseph called it "*a cloud in a paper bag*".
    - He tried lots of different materials to generate the smoke, many of which were very disagreeable smelling – noxious really. He once did a demonstration for King Louis and Queen Marie Antoinette and they left because the smell was so bad.
    - Joseph's first balloon was made of silk and was a polyhedron – not round. Burning paper heated the air and made it rise to the ceiling of his home.

- He told Etienne about this success and, having labor problems with his paper business at the time, Etienne jumped at the chance to join Joseph and hopefully improve the image of his business at the same time.

1783

June 4: 1st hot air balloon flight - no passengers (Montgolfier Brothers)

- **June 4, 1783**: Joseph and Etienne prepared a public demonstration from the town square in their home town of Annonay France. The balloon they displayed was now round, and made of paper instead of silk.
- They attached some burning coals underneath the envelope to produce more heated air and let the balloon fly further.
- It rose up to 6000' and travelled about 10 minutes and a mile and a half before landing on a stone fence. The envelope caught fire from the coals and destroyed the balloon. However, the crowds of people were very impressed.

Aug 27: 1st gas balloon flight – no passengers (Charles & Lavoisier)

- News of the first flight reached the Academy of Science in Paris almost a month later. A group of men was appointed to study the flight, but they decided to wait until Etienne came to Paris. One man, Antoine-Laurent Lavoisier, was part of the group and also a leader of the chemical revolution of the time. He did not want to wait for Etienne.
- Lavoisier raised money which he gave to scientist Jacques Charles who was commissioned to design this gas filled (hydrogen) balloon. Charles worked with two Robert brothers who constructed the balloon. They also produced a hydrogen generator to make the gas needed for the balloon. Charles realized that hydrogen was lighter than air and used it, rather than heated air, to fly his balloon.
- **August 27, 1783**: The gas balloon was inflated and sealed at the bottom to prevent the gas from escaping. Ben Franklin, the U.S. Ambassador to France, was among those in the half million attendance at Place de Victoires in Paris. Supposedly Franklin watched at a distance from his carriage with a telescope.
- There was net placed around the balloon and the gondola underneath was attached to the net – not to the envelope. This was not just to reduce stress on the envelope but also to help prevent gas from escaping as quickly.

  Note: The external net was the characteristic that most identified a gas balloon from a hot air balloon in the beginning.

- As the balloon rose, the gas expanded and burst the envelope after about 45 minutes.

- It flew about 10 miles and fell near a local village whose villagers thought it was demonic and who attacked and destroyed the balloon with scythes and pitchforks.
- King of France decided to have balloons hang a bottle of champagne under the balloon to ease fears of peasants by seeing something "very French". This thought to be start of tradition of champagne at end of balloon flights.
- The gas balloon was referred to as a "**Charliere**" in honor of it's designer, Jacques Charles.

Sept 19: 1st hot air balloon flight w/ live beings (Duck, Sheep, Rooster)

- Etienne Montgolfier was reportedly nearby but was not allowed to witness the ascension of the gas balloon by the Charles group.
- **Sept 19, 1783**: To refocus public attention on his hot air balloon, Etienne arranged financing by the French Ministry of Finance to build a new "**Montgolfier**" hot air balloon. A public demonstration was planned for Paris.
- Demonstration for King Louis the 16th of France and Queen Marie Antoinette and lifted off from the Palace of Versailles.
    - King was worried that man could not breathe up high in the air. He wanted to send prisoners from the Bastille for the test.
    - Montgolfiers convinced him to send animals instead - a duck, sheep and a rooster. The sheep, in particular, was chosen because its physiology was thought to be similar to that of a human.
    - Black smoke was used to heat the air which raised the balloon
    - All animals survived the short flight. The sheep became a bit of a national hero.

Nov 21: 1st hot air balloon flight w/ 2 live humans (de Rozier & Laurent)

- **Jean Francois Pilotre de Rozier**, a friend of Etienne, witnessed the flight of the animals and requested to be the first person to fly next. His friend, **Francois Laurent, the Marquis d'Arlandes,** convinced Etienne to send him and Francois up.
- King of France was worried about the survival of the humans so he suggested sending prisoners from the Bastille. But he was convinced by d'Arlandes that sending a prisoner would not be a good idea because the King would not want to risk having a prisoner become a national hero like the sheep did.
- There were a number of "tethered" tests in Oct 1783, the first of which was ridden in by Etienne. De Rozier became the first human to fly in a "tethered" balloon on Oct 19, 1783.

Note: The Montgolfier brothers never flew untethered in any of their balloons, although Etienne did leave the ground on a few occasions while the balloon was still tethered. Their father would not allow untethered flight, thinking it too dangerous for them.

- **Nov 21, 1783**: 1st manned hot air balloon flight, with **De Rozier** and **Laurent,** flew. It took off from Paris and flew from Paris centre to the suburbs.
- Balloon was named "**Le Revillon**" after the balloon's French manufacturer.
- It was witnessed by both Ben Franklin (the U.S. ambassador to Paris at the time), and a very young (16) John Quincy Adams.
- The pilots stood on opposite sides of the round "gallery" with a burner at the bottom of the balloon. There was an opening at the bottom of the envelope and they fed straw into the burner to generate heat to keep the balloon aloft. Both men had to extinguish fires on the balloon started by the fires. They used sponges on the ends of long poles to do that.
- The flight of **about 5 miles** ended in an open area near a few windmills. D'Arlandes jumped out first and De Rozier landed and had to crawl out from beneath the collapsed envelope.

Dec 1: 1st gas balloon flight w/ 2 live humans (Charles & Robert)

- **Dec 1, 1783**: Less than 2 weeks after the first, manned hot air flight, **Jacques Charles** and **Nicolas (Noel) Robert** took the first manned flight in a gas balloon, also near Paris. Nicolas and his brother Louis were partners with Jacques Charles.
- The design of the original gas balloon is very similar to that we still have today.
- Hot air balloon.
    - To rise, they had to stoke a fire to heat the air.
    - They simply came down when the air was no longer heated.
- Gas balloon.
    - To initially rise, the sealed balloon envelope was filled with gas.
    - To descend, a wooden valve in the top of the envelope was connected to a line dangling down to the bottom. When the line was pulled, gas was let out of the envelope and the balloon descended.
    - To rise again, ballast was dropped from the balloon.
- The first flight flew 27 miles and took about 2 hours. They landed near a French village. Charles wanted to go back up alone, thus becoming the first solo balloon pilot. When Nicolas Robert got out, the balloon quickly ascended to about 1000' and flew for another 35 minutes.

- Jacques Charles never flew in a balloon again, although both of the Robert brothers did continue to fly.
- 400,000 people witnessed the launch, including both Ben Franklin and also Joseph Montgolfier who was honored by Charles to be able to launch a small pilot balloon which is still traditionally let fly prior to a balloon launch in order to measure wind speed and direction.

1785

Jan 7: 1st Flight Across English Channel (Blanchard & Jeffries)

- **Jan 7, 1785**. Frenchman **Jean-Pierre Blanchard** and American **Dr. John Jeffries** (financier for the flight) made the first successful flight across the English Channel. Flight was just a few days after De Rozier's flight crashed.
- This was done as part of a competition to see who could be the first to successfully fly across the English Channel.
- Gondola used was in the shape of a boat and even had oars in the thought they might be able to control direction (steer) or even "row" to make the balloon go faster. Blanchard experimented with steering capability.
- Balloon nearly crashed into the English Channel along the way. They threw everything out that they could to try and lighten the load – even stripped down to their underpants.
    - "I see London, I see France, I see (someone's) underpants." I have been unable to link that childhood rhyme to this balloon flight, but there certainly "could" be a connection.
- Balloon successfully landed in Calais France with both men clad only in their underwear.
- A letter from Ben Franklin was taken along on this flight making it the first "air mail" delivery. It was a letter to his son who was living in Paris.
- It was also the first intercontinental flight – England to France.

1793

Jan 10: 1st Balloon flight in America (Blanchard)

- Jean-Pierre Blanchard flies a hydrogen filled balloon from Philadelphia to New Jersey.

Early Ballooning Achievements Summary

1783

- 1st hot air balloon flight, with no passengers (Montgolfier design)
  - **June 4, 1783**. *Joseph and Etienne Montgolfier* launched an unmanned hot air balloon from the town square in their home town of Annonay France.
- 1st gas balloon flight, with no passengers. (Charles design)
  - **Aug 27, 1783**. From the Place de Victoires in Paris, Antoine LaVoisier commissioned Jacques Charles to build and fly an unmanned gas (hydrogen) balloon. Witnessed by Ben Franklin.
- 1st hot air balloon flight – with live passengers – duck, sheep, rooster
  - **Sep 19, 1783**. Mongolfier brothers sent up Aauck, a sheep and a rooster flew. Lifted off from the Palace of Versailles in Paris.
- 1st hot air balloon flight – with 2 live passengers – de Rozier & Laurent
  - **Nov 21, 1783**. Jean Francois Pilotre de Rozier and Francois Laurent, the Marquis d'Arlandes, flew. Lifted off from Paris.
- 1st gas balloon flight - with 2 live passengers – Charles & Robert
  - **Dec 1st 1783**. Jacques Charles and Nicolas-Louis Robert brothers took the first manned flight in a gas balloon near Paris.

1784

- Elizabeth Thibble becomes 1st woman to fly in an untethered balloon.

1785

- 1st successful flight across English Channel. Blanchard & Jeffries.
  - **Jan 7, 1985.** Jean-Pierre Blanchard & Dr John Jeffries.
    - "I see London, I see France"
    - 1st airmail – Franklin's letter to his son in Paris.
- Blanchard went on to make many country's first balloon flights, incl. the U.S.

1793

- 1st Balloon Flight in America. Blanchard
  - **Jan 10, 1993.** Jean-Pierre Blanchard flies a hydrogen filled balloon from Philadelphia to New Jersey.

1797

- **Andres-Jacque Garnerin** 1st to jump from a balloon in a parachute

Balloon Museum Reference Document

Modern Balloon Achievements Summary

(See also following section: Grand Hall Exhibits)

1978: 1st transAtlantic flight in a gas (helium) balloon (Charliere)

- **Aug, 1978**. *Double Eagle II* flown by Ben Abruzzo, Max Anderson and Larry Newman.

1981: 1st transPacific flight in a gas (helium) balloon (Charliere)

- **Nov, 1981**. *Double Eagle V* flown by Abruzzo, Newman, Ron Clark and Rocky Aoki.

1987: 1st transAtlantic flight in a hot air only balloon (Montgolfier)

- **July, 1987**. *Virgin Atlantic Flyer* flown by Sir Richard Branson and Per Lindstrom

1991: 1st transPacific flight in a hot air only balloon (Montgolfier)

- **Jan, 1991**: Sir Richard Branson, Per Lindstrom and Steve Fossett

1999: 1st transGlobal flight in a hot air/helium balloon (Roziere)

- **Mar, 1999.** *Breitling Orbiter 3* flown by Bertrand Picard and Brian Jones

2002: 1st transGlobal ***solo*** flight in a hot air/helium balloon (Roziere)

- **July, 2002.** *Spirit of Freedom* flown by Steve Fossett
- Set record for fastest time around globe – 355h50m (just under 15 days)

2015: Record transpacific flight in a gas only balloon (Charliere)

- **Jan, 2015**. *Two Eagles* flown by Troy Bradley and Leonid Tiukhtyaev
- Broke records for distance travelled and duration aloft in a gas only balloon.
    - Record for duration aloft had been set by DEII in 1978.
    - Record for distance travelled had been set by DEV in 1981.

Complete List of Notable Balloon Firsts

1783

- 1st hot air balloon flight, with no passengers (Montgolfier design)
  - **June 4, 1783**. *Joseph and Etienne Montgolfier* launched an unmanned hot air balloon from the town square in their home town of Annonay France.
- 1st gas balloon flight, with no passengers. (Charles design)
  - **Aug 27, 1783**. From the Place de Victoires in Paris, Antoine LaVoisier commissioned Scientist Jacques Charles to build and fly an unmanned gas (hydrogen) balloon. Witnessed by Ben Franklin.
- 1st hot air balloon flight – with live passengers – duck, sheep, rooster
  - **Sep 19, 1783**. Mongolfier brothers sent up Aauck, a sheep and a rooster flew. Lifted off from the Palace of Versailles in Paris.
- 1st hot air balloon flight – with 2 live passengers – de Rozier & Laurent
  - **Nov 21, 1783**. Jean Francois Pilotre de Rozier and Francois Laurent, the Marquis d'Arlandes, flew. Lifted off from Paris.
- 1st gas balloon flight - with 2 live passengers – Charles & Robert
  - **Dec 1st 1783**. Jacques Charles and Nicolas-Louis Robert brothers took the first manned flight in a gas balloon near Paris.

1784

- Jun, 1784. 1st woman**, Elizabeth Thibble**, flies in an untethered balloon over Lyon, France.
- Aug, 1784. 1st manned balloon flight in the British Isles by **James Taylor** – Scotland.
- Sept 1784. 1st manned balloon flight in England, from London by **Vincent Lunardi**.

1785

- Jan 7, 1785. **Jean-Pierre Blanchard** and **Dr. John Jeffries** made the first successful flight across the English Channel.
  - "*I see London, I see France, I see (someone's) underpants*." Child rhyme.
  - 1st airmail – Franklin's letter to his son in Paris.
- June, 1785. 1st British woman, **Leticia Ann Sage**, flew in a balloon designed by Vincent Lunardi.
- June 15, 1785. 1st balloon crash resulting in a recorded fatality. Happened in France. **De Rozier** and **Pierre Romain** were both killed in the first, hybrid *Roziere* balloon as they attempted to cross the English Channel.

Balloon Museum Reference Document

1793

- Jan 10, 1793. **Jean-Pierre Blanchard** made the first manned balloon flight in America.
    - Took off from Philadelphia and landed in New Jersey. Witnessed by George Washington, Thomas Jefferson and John Adams

1797

- First successful jump from a balloon with a parachute: **Andre-Jacques Garnerin** in Paris.

1799

- First woman to jump from a balloon with a parachute: **Jeanne-Geneviève Labrosse** (later to marry Andres Garnerin) jumped from an altitude of 900 metres (3,000 ft) on October 12, 1799.

1805

- **Sophie Blanchard**, wife of **Jean-Pierre Blanchard**, becomes first woman to pilot her own balloon solo in Toulouise France.

1819

- **Sophie Blanchard** was the first woman killed in a balloon accident.

1836

- **Charles Green** took two men on a then world record distance balloon trip from England to the Continent, landing in Germany after flying almost 500 miles.

1844

- Apr 1844: Hoax created for supposed 1st flight across Atlantic made by Monck Mason. This was a hoax perpetrated by Edgar Allan Poe when he wrote "The Atlantic Balloon". It was published in New York newspapers and was taken as fact when he described a trip that had many of the same elements as Charles Green's balloon trip from England to Germany. Green had always dreamed of crossing the Atlantic by balloon.

1852

- 1st steerable balloon (dirigible/airship) flown by **Henri Giffard**. Powered by a steam engine.
- This balloon was very slow and it was only after the invention of the internal combustion engine that dirigible flight became more realistic.

1858

- **Nadar** takes 1st aerial photo from a balloon

1882

- 1st balloon flight (helium) in ABQ, flown by **Prof. Park Van Tassel**

1896 & 1897

- **S.A. Andree's** attempts to fly a gas balloon over the North Pole

1898

- 1st flight in an untethered, airship powered by an internal combustion engine by **Alberto Dumont**.

1900

- First flight of a rigid airship: **Theodor Kober** and **Ferdinand von Zeppelin's** LZ 1 first flew from the Bodensee on July 2, 1900

1902

- First woman to pilot a powered aircraft: **Rose Isabel Spencer**, in Stanley Spencer's Airship Number 1, at Crystal Palace, London on 14 July 1902.

1903

- **Wright Brothers** make first heavier than air flight in Kitty Hawk, NC
  - Santos Dumont is believed to have flown earlier by people of Brazil

1907

- **Ray Stamm** flies a hydrogen balloon at the ABQ Territorial Fair

1927

- May 21st: **Charles Lindbergh** 1st to solo across Atlantic, landing in Paris.

1930

- Remains of Andree's North Pole expedition found on White Island.

1931

- 1st Gas Balloon Flight into the Stratosphere.
- Swiss Physicist **Auguste Piccard** and **Paul Kipfer** fly to a height of 51,000' over Augsburg Germany.

1932

- May 20th: **Amelia Ehrhardt** 1st female to solo across the Altlantic

1937

- July 2nd: **Ehrhardt** disappears over Pacific while trying to solo around world

1960

- **Ed Yost** invents the propane burner which modernizes hot air only balloons
- **Col. Joe Kittinger** sets the record for the highest parachute jump from a balloon – 102,000' during **Project Excelsior**.
    - Kittinger broke the sound barrier with his body while making the descent

1972

- **Sid Cutter** organizes a balloon rally in ABQ that later (1975) becomes the famous Albuquerque International Balloon Fiesta.
- In 1972, 13 balloons took off in front of 10,000 people from an ABQ shopping mall.
- The Balloon Fiesta now regularly draws more than 500 balloons from 15 or more countries, and nearly 1 million spectators over the nine days in October.
- Cutter died of cancer in 2011 at the age of 77.

1973

- **Oct, 1973**. 1st World Hot Air Balloon Championships are held in Albuquerque.

1975

- **Oct, 1975**. First year that the ABQ balloon festival is called "Balloon Fiesta"

1978 – ***1st Trans-Atlantic balloon flight***

- **Aug 1978**. 1st successful transAtlantic flight in a gas (helium) balloon.
- This is believed to be the 14th attempt to cross the Atlantic in a balloon in over 100 years of trying
    - 5 people were known to have died in previous attempts
    - 1st attempts were made by **John Wise** and **Cameron Lowe** just before the Civil War. No attempts made again until the 1950's.
    - The *Zanussi* flown by **Don Cameron** & **Christopher Davey** came closest in 1978, just before DEII, when it ditched just 110 miles off the French coast
- *Double Eagle II* flown by **Ben Abruzzo**, **Max Anderson** and **Larry Newman**. Their first attempt in 1977 failed when winds took them off course and they landed near Iceland.
- Flew from Presque Isle, Maine to Miserey, France in 137 hours
- Landed on Aug 17, 1978 just northwest of Paris in a field. Le Bourget airfield had been closed for them to land there, where Lindbergh had landed, but they were running out of ballast and didn't want to risk flying over Paris.

- Upon landing, they were out of oxygen and down to 250#lbs of ballast.
- Original gondola was first housed in the Smithsonian and is now at Dulles Airport. Cabin was unpressurized but occupants had oxygen masks.
- This was the 16th known attempt to cross the Atlantic in over 100 years.
  - 5 balloonists died in the attempt.
  - A&A were the first to attempt the crossing twice.
- Flight took 6 days. Newman had planned to hang glide to land once they made landfall but they had to ditch his hang glider (which was under the gondola) because they were getting very low crossing the English Channel.
- Newman had practiced hang gliding for this attempt by attaching a hang glider beneath the Sandia Peak Tram car which was co-founded and built by Ben Abruzzo and Robert Nordhaus.
- President Jimmy Carter sent them a congratulatory telegram.

Interesting fact:

Abruzzo and Newman were friends but Newman did not get along with Anderson. Newman later said this flight was like having two captains.

Abruzzo and Anderson split after this flight.
Abruzzo's immediate goal was a trans-Pacific flight.
Anderson wanted to fly trans-global.

1981 - ***1st Trans-Pacific balloon flight***

- **Nov, 1981**. 1st transPacific flight in a gas (helium) balloon.
- *Double Eagle V*. Flown by **Abruzzo**, **Newman**, **Ron Clark** and **Rocky Aoki**.
- Envelope designed by Ed Yost who was also Launch Director for the flight
- Original gondola is in our museum.
- They landed in trees in a forest north of San Francisco.
- Publicity was not as great for this flight, in part because the Space Shuttle made its first flight earlier in 1981.

1984 - ***1st Solo Trans-Atlantic balloon flight***

- 1st solo crossing of the Atlantic in a gas balloon (the **Rosie O'Grady**) by **Col. Joe Kittinger**

1987 - ***1st Trans-Atlantic hot air balloon flight***

- **July, 1987**. 1st transAtlantic flight in a hot air balloon (not gas).
- ***Virgin Atlantic Flyer*** flown by **Sir Richard Branson** and **Per Lindstrom** in largest balloon ever to that point (2.3 million cu ft).
- They flew 2900 miles in a record 33 hours
- Their balloon touched down briefly in Northern Ireland but then ascended again on their way to Scotland. Before getting to Scotland, the balloon went down in the water of the Irish Sea. It was dragged through the sea at up to 100mph and both men had to jump into the sea. Branson feared that Lindstrom had not made it but both men were rescued by the Royal Navy. Lindstrom may have spent up to 2 hours in the water.
- There was some controversy over whether the attempt would be certified as successful because the Intl Aeronautical Federation (IAF) required the landing to take place over land or fresh water with the balloon intact. But the record was eventually certified because they had touched down in Ireland.

1991 - ***1st Trans-Pacific hot air balloon flight***

- **June, 1991**. 1st transPacific flight in a hot air (not gas) balloon flown by **Sir Richard Branson** and **Per Lindstrom**.
- I have tried to find the name of the balloon for this flight but have been unable to do so.
- They flew from Japan to Arctic Canada – 6700 miles – in an even larger balloon (2.6 million cu ft)

1995 - ***1st Solo Trans-Pacific balloon flight***

- First trans-Pacific solo flight in a balloon.
- **Steve Fossett** flew in a helium balloon from Seoul, South Korea, to Leader, Saskatchewan, Canada, on February 21, 1995.[26]

1999 - ***1st Trans-Global balloon flight***

- **Mar, 1999**. 1st non-stop round the world balloon flight in a combo hot air/helium balloon.
- ***Breitling Orbiter 3*** flown by **Bertrand Picard** and **Brian Jones** fly in a combo hot air/helium (Roziere). The gondola is in our museum.
- Piccard is the grandson of Auguste Piccard.
- They flew 2900 miles in just under 20 days.

2002 - ***1st Solo Trans-Global balloon flight***

- **July, 2002**. ***Spirit of Freedom*** flown by **Steve Fossett** makes 1st transGlobal solo, non-stop balloon flight. It was Fosset's 6th attempt to make this flight.
- Steve Fosset becomes the first person to fly around the world, nonstop in any type of aircraft.
- Fosset's 6th attempt was successful. The flight began in Western Australia on June 19, 2002 and ended in Queensland Australia on July 2, 2002.
- The *Spirit of Freedom* was a Roziere type – combination helium and hot air.
- Fossett flew in an unpressurized capsule. He trained for that by using the hyperbaric chamber that is in our museum..
- Fossett disappeared in 2007 during a flight over Nevada.

2005 – ***Highest balloon flight***

- **Nov, 2005**. Highest ever hot air balloon flight – 69,000 ft (13 miles).
- Flown by an Indian businessman, **Vijaypat Singhania**, in a pressurized cabin (Duh!)

2009 - ***1st balloon flight over Mt. Everest***

- 1st balloon crossing over Mt Everest by **Leo Dickinson**.

2015 – ***Fastest Trans-Pacific balloon flight***

- **Jan, 2015**. **Troy Bradley** (from ABQ) and **Leonid Tiukhtzaev** flew the ***Two Eagles*** gas only balloon across the Pacific
- Broke records for distance travelled and duration aloft in a gas only balloon.
  - Record for duration aloft had been set by DEII in 1978.
  - Record for distance travelled had been set by DEV in 1981.
- Actual gondola from that flight is near the north window in the main hall.
  - Since it was gas only, the gondola was very small – 5'X5'
- Flight began in Japan and ended in Baja, Mexico
- Troy Bradley is also planning flights to break additional ballooning records.
- Troy's wife and daughter are planning 1st female trans-Atlantic flight for later 2019/2020.

Note: The ***Two Eagles*** exhibit near the north windows in the main hall will be redone in the near future. A 5 year anniversary of their 2015 flight is being organized.

Balloon Museum Reference Document

Women in Ballooning

1784 – Elizabeth Thibble

- 1st woman to fly in an untethered balloon with a Mr. Fleurant, in the "La Gustav"

1785 - Leticia Ann Sage

- 1st British woman to fly in a balloon.
- She flew with **George Biggan,** who helped finance the balloon which was built by a man named Lunardi.
    - Lunardi was the first man to fly in a balloon in England in 1874.

1799 – Jeanne-Genevieve Garnerin

- She made the first parachute drop from a balloon by a woman in 1799. Wife of showman **Andres-Jacque Garnerin**.

1819 – Sophie Blanchard

- She was the 1st woman killed in an aviation accident in 1819. She was 41.
- Wife of **Jean-Pierre Blanchard** who died in 1809.
    - She met Blanchard when he was married, and she was only a child, but he supposedly saw her and vowed to return and marry her when she came of age.
    - Jean-Pierre was 1st to fly across English Channel in 1785 with Dr. John Jeffries.
- Like **Jacques Guarnerin**, Sophie specialized in night ascents and fireworks .
- Her trademark was the small, bucket-like gondola on which she stood below her balloon.
- Sophie made 59 flights before she too died in 1819.
    - Her hydrogen balloon caught fire and fell onto a roof. Wind picked up and dragged the balloon off the roof and then Sophie fell to her death.
    - The fire was started when she set off fireworks from her balloon.

1902 – Rose Isabel Spencer

- First woman to pilot a powered aircraft: in Stanley Spencer's Airship Number 1, at Crystal Palace, London on 14 July 1902

Dolly Shepard

- Probably the most famous of the "parachute girls of England in the late 1800's and early 1900's.
- She was famous for going up without a gondola – hanging from a trapeze attached to her balloon. She would perform gymnastic feats and then detach herself and parachute to safety.
- Her most famous feat was in 1908 when she took another woman, **Louie May**, up with her and they both parachuted. But the other woman's chute malfunctioned. Dolly managed to grab the other woman and open her parachute, and they floated to safety although Louie May suffered injuries and was temporarily paralyzed.

Jeannette Piccard

- Wife of **Jean Piccard** (Auguste's twin brother); mother of **Don Piccard**
- Held many records and firsts
  - 1st female licensed balloon pilot
  - 1st woman to fly into the Stratosphere; 1934, 57,000' over Michigan and Lake Erie
  - Worked for NASA until 1970
  - 1st woman to be ordained as an Episcopal priest in 1971

Balloon Museum Reference Document

Entrepreneurial - Entertainment Ballooning

- Entrepreneurs went up in balloons and either jumped or did tricks while hanging from balloons
    - Women and men hanging from balloons

Early History

Reference: Summaries are from the novel "Falling Upwards" by Richard Holmes.

Andres-Jacques Garnerin

- Performed the first parachute drop from a balloon in 1797.
- Garnerin pioneered the idea of multiple types of entertainment from a balloon – not just the ascension – acrobatics, nighttime fireworks and parachuting. His wife, Jeanne-Genevieve, made the first parachute drop by a woman in 1799.

Sophie Blanchard

- Like Jacques Guarnerin, Sophie specialized in night ascents and fireworks .
- Her trademark was the small, bucket-like gondola on which she stood below her balloon.
- She died in a fiery accident in 1819 at the age of 41. Her death marked the end of entertainment ballooning in France.

Lt Thomas Harris and Miss Stocks

- He died but she survived in a ballooning accident in England. He was experimenting with a new double valve intended to ease rough landings. When the balloon crashed into trees, he died but a myth developed that he had jumped from the balloon in order to slow the balloon's descent and thereby save Miss Stocks.

The Advent of the Recreational Balloon

- With the invention of the railroad in the 1820's, balloons where no longer thought to be a reliable alternative for travel or transport.
- The new use was for commercial recreation – customers paid to take trips in the sky. They also substituted coal gas for the more expensive hydrogen.

Charles Green

- Famous, English Balloon exhibitionist and entrepreneur in the mid 1800's
- Initially, he was noted for fireworks, night ascents, aerial music, trapezes, parachuting from balloons. He often launched from Vauxhall Gardens on the River Thames in central London.
    - **He once famously ascended while sitting on a horse**.

- He was different because he was a businessman. His use of coal gas made flying much more cost effective. He worked with a London gas company to lay a series of gas mains which could be used for re-inflating balloons. Those were the same mains that powered gas lights and buildings.
- He invented the use of the **trail rope**, which was later planned to be used by Solomon Andree in 1897. The rope was designed to keep a balloon at a low altitude. Andree took it a step further to try and use it to steer his balloon.
- In 1836, Green took two others on a flight from England to the continent. They travelled for 18 hours and almost 500 miles, landing in Germany. It set a record for a long distance balloon flight. This cemented Green's international reputation.
- Green is credited for re-establishing balloons in the minds of the public and for inspiring many authors.
- Green dreamed of trying to cross the Atlantic in a balloon, having supposedly discovered air currents which would carry him from west to east. But he never found a sponsor and that dream died. However, it lived in fiction as Edgar Allan Poe wrote "The Atlantic Balloon". It was published in New York newspapers and was taken as fact when he described a trip that had many of the same elements as Green's trip from England to Germany.
- Green also pioneered the goal of performing high altitude ballooning as a scientific endeavor to learn about the atmosphere, rather than as just commercial.
    - He took two flights in 1837 and again in 1841 that went up to 19,000 and then 27,000'
- Green died of heart failure on March 26, 1870, at age of 85. He had made over 500 balloon flights during his life.

Balloon Museum Reference Document

Ballooning in America

John Wise

- Inspired by Jean-Pierre Blanchard and Charles Green's long distance ballooning in Europe. Wise's contemporary balloon "professors" were **Thaddeus Lowe** and **John LaMountain**
- Born in Pennsylvania and worked in Philadelphia as a cabinet and piano maker.
- Inspired by the notoriety of Ben Franklin and the 1st U.S. balloon trip by Blanchard in 1794, Wise began experimenting with his own balloons in his late 20's and 30's.
- He invented the rip panel to allow for more controlled, less violent landings.
    - The rip panel was the first serious balloon invention since Green's trail rope.
- Wise dreamed of a trans-continental mail system by balloons
- Wise envisioned the strong west to east winds across America which not only encouraged long distance flights over the U.S. but over the Altlantic to Europe as well.
- In 1859, Wise and two others, including John LaMountain, began a balloon trip on *The Atlantic* from St Louis with a goal of the east coast. Winds took them north over Lake Ontario and they barely made it over the lake before landing in New York on the northeastern shore. Their trip covered over 800 miles and set a long distance record which would stand until 1910.
- Wise made many balloon flights. On one occasion, he may have taken **Solomon Andree** up with him when Andree had ventured over to the states. This helped fuel Andree's dream to fly a balloon over the North Pole.
- Competed with Thaddeus Lowe to become official aeronaut of the Union Army in 1861. Wise was ***originally*** appointed Chief Aeronaut of the Union Army but he was relieved and replaced by Thaddeus Lowe after Wise's observation balloon was accidentally destroyed during the *Battle of Bull Run*.
- Wise made his last balloon trip at the age of 71. He and another passenger were lost over Lake Michigan.

Thaddeaus Lowe

- Lowe, like Wise, dreamed of flying west to east across America and then across the Atlantic
- Whereas Wise was more romantic regarding ballooning, Lowe was more the scientist.

- Lowe unsuccessfully tried to build and fly a huge balloon (5X size of Wise's *Atlantic*) named initially *City of New York* but later changed to *The Western*.
- Afterwards, he began flying smaller balloons trying to take advantage of those west to east winds and to lay the groundwork for a trans-Altlantic flight.
- Competed with John Wise to become official aeronaut of the Union Army in 1861.
- Lowe's idea was to have a tethered balloon, equipped with a telegraph, to fly up and monitor a battlefield and then send reports back to the Union commander. He successfully demonstrated this to President Lincoln and was commissioned to begin the Military Aeronautics Corps. Union General George McClellan became one of Lowe's biggest supporters.
- Lowe built a fleet of 8 balloons to be used to support the Union army. His Corps made over 3000 flights in support of the Union Army was the U.S.' first Air Force.
- Lowe's last telegraph from a balloon was sent in 1863. During his time with balloons, he observed the horrors of the war from the air.
- Lowe at one point operated a tethered balloon from a coal barge, *The Rotary*. This is often referred to as the first "aircraft carrier".

  Note: We have a model of *The Rotary* in the Balloon Museum FAVIA gallery.

  Note: Gen. George Armstrong Custer, then a Capt and age 22, went up in one of Lowe's balloons. He was in McClellan's Union Army regiment. Custer was one of the few Union officers to go up with Lowe. Even though he was brave and brash, he was unnerved by the experience.

John LaMountain briefly challenged Lowe to also provide balloon reconnaissance to the Union. LaMountain was much more brash and risk taking and flew more untethered flights directly over Confederate positions. But he was not as well backed as Lowe. General McClellan finally dismissed LaMountain from further service to the Union.

The Confederate Silk-Dress Balloon

- Once thought to be legend, this Confederate balloon, *The Gazelle*, did exist although balloons were not typical of the poor Confederate army.
- It was made of silk, half the size of Lowe's balloons, and deliberately covered with colorful and decorative patterns.
- It actually came face to face with Lowe in one his balloons during the battle for Richmond. That battle eventually broke in favor of the Confederates and McClellan's Union army had to withdraw. That marked the end of not only McClellan's command but of the Lowe's Balloon Corps.

- The balloon's contribution to Lee's defeat of McClellan in Richmond is questionable. *The Gazelle* was shortly thereafter captured by the Union army. But its myth lived on and is said to have inspired the rag-tag Confederate army.

- Lowe fell ill after the end of his Balloon Corps and returned to the private sector. He continued to experiment with hydrogen gas manufacturing.

- Lowe invented the **"Water Gas" process** for making hydrogen from steam and charcoal.
- Lowe moved to California and eventually died at age 80.

Commercial Ballooning

Nadar

- Balloons were increasingly used in the mid 1800's to create maps of the great cities of Europe,
- Nadar (nickname for Frenchman Tournachon) took pictures of them, and some are in our museum.
- Nadar started making money by taking pics of people in his studio, making believe they were up in a balloon. The 4 photos in the frame on the wall are actual pics by Nadar.
- Nadar made enough money with his studio photos that he built a couple huge balloons of his own. He then became the first person to take aerial photographs.
- Famed for his balloon *Le Geant*
- 1st aerial photo taken from a balloon in 1858
- Example of wooden box hung from balloon to take pictures in in the museum
    - This allowed the creation of maps for cities since that view had never before been seen
- "Nadar" – means "bitter sting" because of his stinging caricatures
- Tournachon legally changed his name to Nadar

Reference: From "Falling Upwards" by Richard Holmes …

- Born Gaspar-Felix Tournachon in Paris in 1820 to a wealthy printing family.
- Got into radical politics and satirical journalism in his 20's and 30's
- Established himself as a successful and well-known cartoonist, caricaturist and commercial artist. He drew cartoons of all the leading celebrities in Paris.

- His drawings were mostly positive and he counted authors Victor Hugo and Jules Verne among his friends.
- He changed from writing to photography in the 1850's when advancements in photography allowed pictures to be developed much more quickly than they had been able to before.
- He began experimenting with aerial photography. It was difficult because he had to develop pictures while still in the air and the escaping gas from the hydrogen balloons affected that process. He eventually invented a method of closing the balloon's escape valve so as to allow picture development.
- Nadar was always looking for commercial uses of his trade. He opened a studio and took pictures of himself, and also paid customers in a balloon with a backdrop making it look they were up in a balloon.

Le Geant

- Nadar came up with the idea of creating a truly huge balloon in an effort to not only make money but also to explore the capabilities of balloons.
- He commissioned the building of Le Geant – 212,000 cu ft of hydrogen and 196' tall.
- The gondola was huge and luxurious, designed to take paying passengers in comfort. It was like a small cottage with an observation deck on top. Below were multiple compartments that contained captain's quarters, a photo studio, a kitchen and a wine store.
- Le Geant inspired Jules Verne to write *Five Weeks in a Balloon*.
- Le Geant flew 5 times, not very successfully.
    - The first flight did not go nearly as far as Nadar had hoped.
    - The second flight crash landed very badly in Germany when they descended too fast and were pulled along the ground until finally crashing into trees, narrowly missing an oncoming express train. All six passengers were injured but no one miraculously had died. Nadar's wife was one passenger as was a member of the Montgolfier family.
    - The last flight of *Le Geant* took off from Les Invalides in Paris in 1867. It barely made it to the French suburbs.
- Nadar turned the disaster of the 2nd flight into publicity when he wrote and published a memoir about the flights.
- Nadar next turned his attention to heavier-than-air powered flight. He enlisted the help and financial backing of his friend, and French exile, Victor Hugo. In perverse logic, they hailed Nadar's accomplishment in proving that lighter-than-air flight was not capable of fulfilling the future of flight. That

needed to be done by a craft capable of steering. They used the crash of *Le Geant* as proof of this.

- Hugo helped Nadar gain publicity for his heavier-than-air ideas with his highly publicized "Letter on Flight".

Jules Verne

- Through his friendship and experiences with Nadar, Verne eventually wrote his first science fiction novel, the highly successful "Five Weeks in a Balloon". This shot him to international fame and he followed up with many others *From the Earth to the Moon*, *Twenty Thousand Leagues under the S*ea, *Around the World in 80 Days* and *Mysterious Island*.

  Note: One of the ideas from Jules Verne's *Mysterious Island* was the idea of using a Bunsen Burner to raise the temperature of the hydrogen in the balloon. This was perhaps a precursor to Ed Yost's invention in the 1960's of the propane burner for heating the air in a hot air balloon.

- According to Jules Verne …
  - Nadar proved that "***it is not enough to merely float through the air. The true hero would actively fly through it."***

Von Zeppelin

- He was a young Prussian officer during the beginning of the Civil War. He was a military observer of the Union army and saw some of Lowe's balloons in action. He also ascended in a civilian balloon before returning to Germany.
- Von Zeppelin could see the benefit of high altitude surveillance on military actions. But he could also see that the balloon's inability to steer was a major problem. That led him to start developing his "derigible" (capable of being steered).

The Siege of Paris – 1870-1871

- Bismarck & Kaiser Wilhelm's Prussian army surrounded and cut off Paris after the failure of Napoleon's invasion of Prussia.
- Parisians used a gas galloon airlift to make a desperate, last ditch attempt at establishing communications with the outside world, and to try and mobilize the rest of France against the Prussians.
- It was organized by **Nadar**.
- Balloons took off from the *Place St-Pierre*, which is a square located just below the *Sacre Coeur de Montmartre* – a high spot in Paris.

- The goal was first to use tethered balloons for observation and then to free-fly balloons over the Prussian perimeter and to take mail to the provisional French government located in Tours – near Rouen. They also took carrier pigeons which were to be used for return messages.
- After initially sending only a few balloons with mail and one person, more balloons followed, including one which carried the French Minister of War, Leon Gambetta. Gambetta helped mobilize the French population against the Prussians.
- It became a huge public relations success – French air power had defeated Prussian firepower.
- Messages were also delivered to the English and published in the London Times which got worldwide attention.
    - Nadar led the PR effort to convince the English. They had supported the Prussians when they were invaded by Napoleon.
    - Nadar successfully contrasted the new, provisional French govt with that of Napoleon.
- Messages were sent back to Paris from outside France via Carrier Pigeon.
- Both the balloons and the pigeons became symbols of French resistance.
- Paris was finally captured by the Prussians in January 1871, but not after over 71 free-flight balloons had been launched – 67 successfully carrying over 100 passengers, 400 carrier pigeons and potentially millions of letters.
- It became the first successful airlift in European history.

Balloon Museum Reference Document

Ballooning to the Stratosphere

Summary – Major Milestones

- 1837/38 **Englishman Charles Green** flies his hydrogen balloon, the *Nassau*, up to 19,335 ft.
- 1841 **Englishman Charles Green** flies his hydrogen balloon up to 27,146 ft.

  Note: Green also flew on a horse, set distance record on flight from England to Germany and also dreamed of a trans-Atlantic flight.
- 1862, Sep: **Englishmen James Glaisher** and **Henry Coxwell** flew to over 32,000' feet before becoming overcome by lack of oxygen.
- 1931, Aug: **Swiss Auguste Piccard** flies up to 51,000'
- 1934, Jan: **Soviet Osoaviakhim-1** reached height of 72,000' before plunging and killing all 3 Soviet aeronauts.
- 1934, Jul: **U.S. Explorer I**. Reached height of 60,000' before it tore & caught fire. 3 men survived.
- 1935, Nov: **U.S. Explorer II**. Successful flight which set world record for height – 72,395. Lasted for over 20 yrs until **Manhigh I**.
- 1950's: Development and testing of **polyethelene film** to create a lighter and more sturdy gas balloon envelope which allowed balloons to go higher.
- 1957, Jun: **U.S. Manhigh I**. Kittinger reached height of 96,784'.
- 1957, Aug: **U.S. Manhigh II**. David Simons reached record height of 101,516' and stayed there for over 30 hours.
- 1957, Oct: **Soviet Sputnik I**. Satellite first to orbit the Earth in space. Started space race and motivated creation of NASA and also continued funding for Manhigh III.
- 1958, Oct: **U.S. Manhigh III**. Clifton McClure reached height of 98,097' before having to descend when body temp got up to 108°
- 1959, Nov: **U.S. Excelsior I**. Kittinger jumped from 76,400' but passed out
- 1959, Dec: **U.S. Excelsior II**. Kittinger jumped from 74,700' but was completely successful.
- 1960, Aug: **U.S. Excelsior III**. Kittinger jumped from record 102,400'.
- 1961, May: **U.S. Stratolab V**. Reached height of 113,739'
- 2012, Oct: **U.S. Red Bull Stratos**. Felix Baumgartner jumped from height of 127,852'. Col. Kittinger was part of the ground crew.
- 2014, Oct: **U.S. Alan Eustace**. Jumped from height of 135,889' from Roswell NM

Charles Green

- **Englishman Charles Green** flies his hydrogen balloon, the *Nassau*, up to 19,335 ft.
    - Green pioneered the goal of performing high altitude ballooning as a scientific endeavor to learn about the atmosphere, rather than as just commercial.
- **Green** flies his hydrogen balloon up to 27,146 ft.

James Gleisher and Henry Coxell

- **Englishmen James Gleisher** and **Henry Coxwell** flew to over 32,000' feet before becoming overcome by lack of oxygen. They surmised later that anything over 26,000' was too dangerous.
- They conducted experiments on altitude's effect on the human body that paved the way for future high altitude experimentation.

Auguste Piccard

- 1931 & 1932: 1st Gas Balloon Flights into the Stratosphere.
- Swiss Physicist Auguste Piccard flies to a height of 51,000' (May 1931) and 54,000' (Aug 1931)
- Piccard later used his spherical, pressurized gondola to explore the ocean's depths. He and son Jacques dove to record breaking depth of 10,335' in 1953.

Osoaviakhim-1

- Jan, 1934. Russia sent 3 men up and did experiments and also beat Auguste Piccard's altitude record by reaching a height of 72,000'.
- During descent, the balloon lost its buoyancy and descended in an uncontrolled fall, disintegrating in the lower atmosphere.
- All three men were probably unconscious and unable to deploy parachutes and were killed when they hit the ground at high speed.

Explorer Project

- *Explorer* (aka Explorer I) – July, 1934
  - Hydrogen balloon. Funded by the Natl. Geographic Society
  - Launched from Black Hills of South Dakota w/3-man crew.
  - Reached a height of 60,000' before fabric tore, starting a rapid descent and then a spark ignited the hydrogen destroying the balloon.
  - Capsule fell and all men parachuted safely, but the last one got out only 500' from the ground.
- *Explorer II* – Nov, 1935
  - Helium balloon. Used instead of hydrogen to reduce risk of fire, but meant that balloon had to be bigger.
  - New, lighter capsule was built and crew was reduced to 2.
  - 1st attempt to launch in July 1935. Balloon ruptured during liftoff.
  - In Nov, 2nd successful attempt launched from South Dakota with a 2-man crew – Army **Capt's Albert Stevens** and **Orvil Anderson**.
  - Reached a height of 71,260' (Wikipedia says 72,395')
  - Balloon landed gently in an open field.
  - 1st humans to witness the curvature of the Earth, although some claim that Auguste Piccard was actually the first in 1931.

Project Manhigh

- Also a pre-cursor to space travel, performing aero-medical experiments on humans sent into stratosphere; studied effects of cosmic rays on humans
- Conducted by US Air Force from 1955-1958

Manhigh I

- June 1957. **Capt Joe Kittinger** launched from St Paul MN and achieved record altitude of 96,784' becoming the "first man in space". Kittinger was chosen for this test flight, because of his experience as a test pilot, that went up to altitude to see if it was possible, before staying up for 24 hours which was the goal of the flight. There were problems both with his oxygen supply and with air to ground communications that proved the wisdom of having a test pilot perform this flight.

Manhigh II

- Aug 1957. **Dr** (**Major) David Simons** achieved altitude of 101,516'. Simons was the project leader and had objected to Kittinger being allowed to be the first one to go up in the gondola, but he was not a test pilot. In this second flight, he set records and had a generally uneventful flight. Simons had Kittinger removed from the Manhigh project shortly after the completion of Manhigh I.

Interesting Fact: Kittinger is in the USAF Hall of Fame – Simons is not.

Manhigh III

- Oct 1958. **Lt Clifton McClure** achieved altitude of 98,097'. Because of the omission of dry ice attached to the outside of the gondola, Lt McClure experienced severe heat complications during this trip and had to abandon it shortly before breaking the altitude record. His body temp got up to over 105° but he survived.

Interesting Facts: McClure survived in part because he had the makings of what was eventually looked for in men who would be chosen to become NASA's first seven, Mercury astronauts.

McClure applied for Project Mercury but was not chosen because he was too tall.

Kittinger may have made it into Mercury if Col. Stapp had not asked him to remain with him.

Balloon Museum Reference Document

Project Stratolab

- High altitude, manned ballooning program sponsored by US Navy in 50's & 60's
  - An extension of Navy's unmanned balloon program "Skyhook"
  - Performed research necessary for later manned rocket flights
  - Studied high altitude effect on human physiology, also astronomy
- Five flights to reach the stratosphere (60,000'+) from 1956-1961
  - Stratolab IV reached a height of 81,000'
  - Stratolab V reached 113,739' in May 1961 piloted by Navy Cmdr Malcolm Ross and observer Lt Cmdr Victor Prather
    - Prather drowned upon landing at sea in the Gulf of Mexico
- Four crew members
  - Cmdr Malcolm Ross, **Lt Cmdr M.L. Lewis**, **Lt Cmdr Victor Prather** and physicist **Charles Moore**.
- One of the original gondolas is on display in our museum
  - It is silver now but was once painted white on top to reflect solar radiation
  - Other gondola on display looks more like the original did back in 1961
  - Size: Gondolas were 7' in diameter and weighed 1200 lbs
- Gondola was carried into sky by a single balloon developed in part by Jean Piccard
  - Size: 90' in diameter and containing 1 million cu ft of gas

Balloon Museum Reference Document

High Altitude Ballooning and Parachuting

Colonel Joe Kittinger

- Air Force pilot and pioneer in high altitude flying and ballooning
  - Look to the left as you enter the balloon museum
- *Project Manhigh I* – 1957: high altitude ballooning into stratosphere to study effect of cosmic rays on humans. Pre-cursor to the space program.
  - Then Capt Kittinger launched from St Paul MN and achieved record altitude of 96,784'
- *Project Excelsior* – 1959-60: high altitude parachuting in multi-stage parachutes
  - Kittinger volunteered to test whether pilots could eject and parachute safely from those heights
  - He made 3 test jumps – Excelsior I, II and III
  - **Excelsior I**: Nov 1959. Jumped from 76,400'
    - 1st parachute deployed too quickly, did not inflate, and wrapped around Kittinger's neck causing him to spin violently.
    - Kittinger lost consciousness but was saved when the main parachute deployed automatically.
  - **Excelsior II**. Dec 1959. Only 3 wks after near disaster of Excelsior I
    - Went up to 74,700' and performed successful free fall.
  - **Excelsior III**: Aug 1960. Capt Kittinger sets the record for the highest parachute jump from a helium balloon with an open gondola – **102,000'** from Roswell NM
    - Kittinger lost use of his right hand due to exposure on way up but didn't tell anyone until he was ready to jump for fear of them aborting the mission.
    - He needed 3 parachutes to make the landing
    - Kittinger broke the sound barrier with his body while making that descent
    - He also held records for longest descent (20 miles) and top speed of fall, for 52 years until those records were broken by Felix Baumgartner in 2012 as part of the **Red Bull Stratus** project.
- Just 17 days away from the end of his 3rd tour in Vietnam, Joe was shot down over Hanoi in May 1972. He was a POW at the Hanoi Hilton until the Peace Treaty was signed in March of 1973.
- 1984, Sept
  - Joe Kittinger becomes first to fly solo across the Atlantic in a hot air balloon
- He still visits Balloon Fiesta on occasion

- Wrote autobiography, *Come Up and Get Me*, a few years after his release from a North Vietnamese prison camp in 1973.
- ***Interesting fact***:
  - Kittinger's record, based upon Air Force records, was always "unofficial" because the Air Force didn't want to pay for the additional things needed to officially record the flight to qualify as a record. Kittinger also did not want the U.S. taxpayer's to pay for him to set a world record.
  - Kittinger's willingness to become an integral part of Felix Baumgarter's jump, 52 years later, which broke his unofficial record, is a testament to his dedication to the accomplishment.

Notes from Kittinger's Autobiography: *Come Up and Get Me*

"*I do not accept death. I accept risk.*" (Col. Joe Kittinger)

"*The only thing more fun than flying a plane, is jumping out of one.*"
(Col. Joe Kittinger)

Early Life

- Born in Tampa Florida in 1928. Grew up near Orlando. Taught life on the river by his father. Hunted alligators and ducks. This started him on his life of adventure.
- He and brother went to Bolles Military High School in Jacksonville. Brother stayed in Florida and continued with his father's business. But Joe's thoughts were elsewhere.
- He was fascinated with flying as a boy, often went to Orlando airport to watch the planes. After high school, he wanted to become a fighter pilot and took 2 years of college to prepare him for that.
- WWII vet, Phil Orr, came to work for his father and Phil would take young Joe up in a small plane and often give Joe the controls. That experience convinced Joe that he had to become a pilot.
- In college, Joe raced speedboats and hydroplanes. Racing career ended when his speedboat flipped.

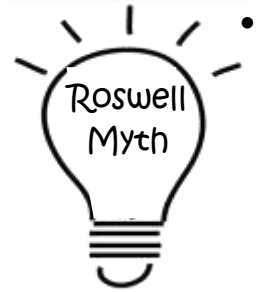
Air Force Career

- Applied for the US Air Force's new Aviation cadet program in June of 1948. He was finally accepted into the program in Jan of 1949. Trained in San Angelo, TX and later in Las Vegas. Fell in love with the P-51. He flew 93 different airplanes in his career but the P-51 was his favorite.
- He was stationed in Germany as the Korean War started. He wanted to go to Korea and fly P-51's. On a training mission over Germany in 1950, one of his 2nd Lt fellow pilots was killed. His flight leader, Capt Goman, was blamed for the death.
- He started aerial gunnery training while in Italy and Libya. He trained as a combat fighter on the F-84 and met and spoke with Gen. Eisenhower in person during an inspection. He would next meet Eisenhower again in the Oval Office.
- His move into becoming a test pilot, in addition to a fighter pilot, came when he volunteered for a duty in Denmark. He had to trouble-shoot fuel problems with F-84's he was assigned to test and he liked that process.
- Joe was never able to fly in the Korean War having spent all of his time in Cold War Europe.
- He requested transfer to experimental aircraft test duty and was transferred to Hollomon AFB in Alamogordo NM, near White Sands Proving Ground, in June 1953.
- 1955. He volunteered to become part of a "Zero Gravity" test program at the Aerospace Medical Laboratory not knowing what the program was but knowing that volunteering had usually been responsible for most of the good things that had happened to him in his Air Force career. His commander was a Dr. (Col.) John Paul Stapp whom Joe came to admire as the bravest man in the Air Force.
    - The **Zero Gravity** program was the start of what came to be known as the "Vomit Comet" – an Air Force Plane that flew up and down in a parabola that created anywhere up to a minute of actual zero-G where weightless testing and training could be done.

Project Manhigh

- In **1956**, while still at Alamagordo, Col. Stapp asked Joe to become involved in what would become Project Manhigh. The current project, headed by Dr (Major) David Simons, involved sending animals and dummy's up into the atmosphere under a balloon. However, Col Stapp convinced Major Simons that he wanted to send a man up first into the Stratosphere for 24 hours to test how man could survive in those conditions. The capsule would be taken up attached to a helium balloon. This was Joe's first experience with ballooning.

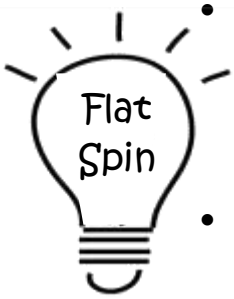
- One requirement for being part of Manhigh was becoming qualified as a parachutist. Joe went to El Centro CA to receive parachute training.
- In training for the flight, Joe was required to get a balloon pilot's certificate and, while doing so, really fell in love with ballooning, and how very different it was from being in an airplane.
- Joe recounts one test flight done with animals who had pressurized helmets. It came down unexpectedly in the city of Saginaw Michigan. Locals quickly surrounded the capsule and quickly determined that it must be extra-terrestrial in nature. The myth only grew when Joe and other military showed up to retrieve the capsule.



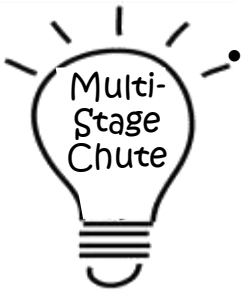
- Joe recounts that on a test balloon flight with two, new alternate pilot volunteers, their balloon came down hard near Roswell NM in 1947. One of the pilots was injured and his head swelled badly. Joe got a military helicopter to take them to the nearest AFB before they had to explain things to an Accident Investigation Team. That incident became one of Roswell's most infamous – on in which a large headed alien was whisked away by a red-headed man. Joe was that red-headed man and his injured trainee was the large headed alien.
- Col Stapp overrode the decision of a Maj Simons who directed Project Manhigh, and sent Joe up in the first gondola to test if this was feasible with a man, after they had made many tests sending up animals. Simons wanted to send a scientist but Stapp knew that the risks of the unknown required a test pilot with Joe's experience. Building and testing of the balloon and gondola was done in Minneapolis MN.
- On **June 2, 1957**, Joe went up in his balloon and small gondola. He found out very quickly that he using up his oxygen supply much more quickly than had been planned but decided to continue the flight and just conserve oxygen. He also had to use Morse Code to communicate with the ground when his radio failed. He and the balloon survived ascent through the jet stream at about 40,000' and continued on up to a height of 96,000'.
    - As he passed 73,000', he saluted the men from Explorer II who held the previous altitude record.
- He was ordered to descend, a process which he had already begun. But as a bit of a dig to Major Simons, he typed out in Morse Code: COMEUPANDGETME. It not only drove Major Simons crazy, it became the name of his autobiography.
- Maj Simons had Joe removed from Project Manhigh shortly after completion of Manhigh I. Simons went up on Manhigh II and set the altitude record and stayed there for 24 hours. Lt. Clifton McClure went up in Manhigh III but had to abort the mission before he broke Simons' record because of excessive body head (105°) caused by an overheated gondola.

Note: One of the accomplishments of the Manhigh project was to test the use of an oxygen and helium mix to lower the risks of fire in a pressurized environment. They were successful in that testing but NASA stayed with the full 100% oxygen environment until their three astronauts were killed in the Apollo I fire on the launch pad. Gus Grisson, Ed White and Roger Chaffee died in that fire. Gus Grisson was a friend of Joe's and Joe had helped Ed White enter the astronaut program.

Project Excelsior



- After leaving Project Manhigh, Joe barely escaped alive when he had to eject from a burning jet at very low altitude. He was called a month later by Col Stapp and asked to join him in a project to test emergency escape systems, which Joe believed had just saved his life. That project, **High Dive**, eventually became Project Excelsior.
- One of the main problems they were trying to solve was the tendency of high altitude parachuting to cause the jumper to go into an uncontrolled flat spin, and thus be unable to deploy the parachute properly. The spinning would also render the jumper unconscious.
- Being a trained pilot, and also a parachutist, Kittinger wanted to test to ensure that not only could a trained parachutist survive a high altitude jump, but that even an untrained pilot, and someone who also might be unconscious, could survive the jump as well. Col Stapp put Joe in charge of the new project – Excelsior (Latin for "ever higher).



- They needed to test at extreme altitudes which were not accessible by a powered aircraft, so they decided to use a gas balloon. They also developed a multi-stage parachute system (Beaupre) which allowed smaller pilot chutes to be opened at high altitudes, but the main chute being delayed to automatically open only at a much lower altitude. This would help avoid the flat spin that was so dangerous.
- Unlike Project Manhigh which had used a pressurized gondola, Project Excelsior was on a tighter budget so their gondola was small and open.
- On Nov 15, 1959, Joe went up in Excelsior I. On the way up, his goggle fogged up and he ascended virtually blind for some time. The goggle eventually cleared up but this experience would later benefit Felix Baumgartner when he broke Joe's records over 50 years later.
- Joe jumped from 76,000' after freeing himself from being stuck in the seat of the gondola. Right away he sensed that something was wrong. The initial chute in

the multistage chute had not deployed and he was free falling right away. He then started to spin violently eventually rendering him unconscious.

- Joe regained consciousness at 3000' beneath his deployed reserve parachute. After reviewing the data recorders and instruments, they determined that the following had happened.
    - While trying to free himself from being stuck in the seat, Joe had activated the timer for the first jump parachute. As a result, it activated just after he jumped and before Joe had gained enough speed to fill the parachute canopy. The unfilled canopy quickly wrapped itself around Joe's neck, and then the flat spin rendered him unconscious.
    - The main chute was automatically set to deploy at 17000' but the chute wrapped around Joe's head prevented the main chute from deploying properly. Joe continued free-fall while spinning. The reserve parachute deployed at 10000' after yet another problem, but this also validated their preparations for a situation in which an unconscious pilot would be able to survive the fall because of fail safes in the multistage chute system.

- The failures in Excelsior I still validated the need for the multi-stage parachute system and also proved that an unconscious man could survive the fall. After correcting the problems encountered, Joe went back up in Excelsior II less than a month later.
- Excelsior II launched and everything went perfectly and Joe jumped from 74,400'. The chutes all deployed as designed and the jump went perfectly. They were ready for the ultimate jump at over 100,000'.
- On Aug 16, 1960, Excelsior III launched from north of Alamagordo NM with the intent of coming down over White Sands Proving Grounds. They launched but the weather had changed which meant low hanging clouds prevented cameras from filming much of the initial ascent.

- At 40,000', Joe's pressurized suit had fully inflated except for his right hand glove. Believing that if he told the ground crew of the problem, the flight would be cancelled and that they would likely not get approved to make another try, Joe kept the glove issue to himself and operated essentially one-handed, just hoping that the unpressurized hand would not suffer some kind of catastrophic injury due to swelling on the way up, or down, from 100,000'.
- The balloon achieved peak altitude of 102,400' and Joe floated for 11 minutes while getting to the exact point at which he needed to begin his jump. During that time, Joe looked out at the Earth from a height that only a very few had ever seen. His crew asked for his thoughts before he jumped, and he said this …

  - "*Looking out at a very beautiful, beautiful world … a hostile sky. As you sit here, you realize that man will never conquer space. He will learn to live with it, but never conquer it.*"

- Just before he jumped, Joe radioed the ground that his right hand was not pressurized (it had swollen to about twice normal size). Joe wanted them to at least know so they could monitor it in case something went wrong. As he jumped from the gondola, he said to himself: "*Lord, take care of me now.*"
- At 90,000' Joe felt a tightness in his throat and was unable to catch his breath. As mysteriously as it had started at 90000', it stopped at 70000' and the free-fall continued. That tightness was later determined to be his helmet pulling up on his neck. The free fall was over 4 minutes and the entire jump over 14 minutes.
- After landing, Joe was rushed to LAX airport and did an on the ramp interview with Walter Cronkite in New York for the 6 o-clock news. Excelsior III set the record for the highest manned flight and the first spacewalk of any kind at that altitude. It paved the way for manned missions to outer space and for space walks.
- Joe's flight was never considered the official FAI record for highest jump. Joe didn't believe that U.S. taxpayers should pay for them to set a world record. He refused FAI the ability to install their recording equipment which would have been necessary to get the record.
  - Two Russians jumped from 83,000' a year later and did have FAI equipment so they were credited with the world record. One of them died during the jump when his faceplate failed. But Joe's concern had never been about getting records. It was about saving the lives of pilots who had to parachute from high altitudes.
- Joe's record was finally accepted by the *Guiness Book of World Records* and his record remained for 50 years until broken by **Felix Baumgartner** as part of the **Red Bull Stratos** Project. Joe agreed to be part of the ground crew for Felix's mission.
- Joe admits that he got most of the glory for the success of Excelsior, but that he gives ultimate credit to Col. Stapp who had faith in Joe and bet his career on the success of the project.
- Joe appeared on TV shows like "I've Got a Secret", "What's My Line" and the "Ed Sullivan Show." He also got a chance to meet General, now President, Eisenhower once again, this time in the White House when Joe received the Harmon Trophy.

- Joe knew many members of the original Mercury Project which sent the first man into space and Earth Orbit. Alan Shepard was once asked if he would have ever jumped from over 100,000' feet like Joe did. Shepherd's answer was …

"***Hell No***!"

- Although there were plans for an Excelsior IV, with another man making the jump, they never received funding and the project was cancelled. NASA was busy with plans for Project Mercury and the idea of more balloon flights was no longer considered important.

The real story behind the actual gondola used on Excelsior III.

- The Smithsonian asked for the gondola and it was on its way to DC when the plane crashed killing all aboard. The gondola was recovered and fixed and was readying once again for the trip to DC when the building in which it was housed burned down.
- The Air Force quietly built an exact replica many years later which now hangs in the Air Force Museum at Wright-Patterson AFB in Dayton Ohio. But it is a replica even though the USAF tried to keep that quiet.

- Joe had an opportunity to join Project Mercury but Col. Stapp asked him to stay on with Excelsior to continue their research. To this day, Joe owes his successes much to the dedication and belief of Col. Stapp and, because of that, he decided to stay with him and not audition to become part of the Mercury program.

Project Stargazer – Taking pictures of the stars from the Stratosphere

- The goal was to send a 2-man gondola up into the Stratosphere and take pictures of the stars from beyond the atmosphere. Joe would fly the balloon and operate the gondola and an astronomer named Bill White would handle the telescope and pictures.
- Stargazer was ready to fly by the end of 1962, by which time Project Mercury was almost complete and John Glenn and Wally Schirra had already orbited the Earth.
- Stargazer I became the last of its kind balloon flight into the Stratosphere. Two subsequent attempts to fly ended when the balloons detached from the gondola before liftoff and the project was cancelled. Also, Col. Stapp had been transferred and Joe was on his own without Col. Stapp's support. It was also the end of the Air Force's parent participation in space exploration. That would continue to be completely on the shoulders of NASA.

Vietnam and POW Captivity

- Early in 1962, Joe applied to become a member of a combat training called the Air Commandos, who trained in Florida. He had never flown combat and felt that he owed it to the U.S. He volunteered for Vietnam and received gunnery range training.
- In Sept 1963, he left for South Vietnam and ended up commanding a squadron of B-26's that flew various types of missions. During his first tour in Vietnam, he spent a week with a ground patrol trying to get a feeling of what the ground war was like and ended up greatly appreciating that he was in the Air Force.
- He witnessed the coup and assasination of President Diem of South Vietnam from the air and this soured him greatly on the role of the U.S. since the coup was sponsored by the CIA.
- He went back to the states in 1964 after all B-26's were grounded because of potential equipment failure. Along with nine other pilots, he was summoned to testify about the war effort before a Senate sub-committee chaired by Senator John Stennis. An Air Force General tried to intimidate them before their testimony but Stennis threw him out of the hearing. They testified that we were not winning the war and the only way to do so was either to declare war on North Vietnam or to get out. At that point, the U.S. had only lost 250 servicemen in Vietnam. They would eventually lose 60,000.
- Despite their recommendations, the U.S. increased their military presence but did not declare war. Joe blames Johnson and McNamara for the remaining eleven years and 60,000 U.S. lives it took before the war ended in 1975.

- Joe became involved in testing and training on the A-26 – a modified and improved version of the B-26 which corrected its design flaws. In June 1965, Joe led a squadron of A-26's on their way to fight over in Vietnam. His second tour in Vietnam ended in Jan 1967.
- He was assigned to Germany to a parachute squadron and in 1970, then as a 42 year old Lt Col, he volunteered for a 3rd tour in Vietnam. He was given command of the 555th Tactical Fighter Squadron (also known as the Triple Nickels, like that all-black parachute squadron from the end of WWII.

- In March 1972, the North Vietnamese launched their full offensive and the U.S. began bombing Hanoi and Haiphong. In May 1972, 17 days before his 3rd tour in Vietnam was scheduled to end, Joe's plane was hit and he ejected 30 miles NW of Hanoi. He was captured and spent almost a year at the Hanoi Hilton.
- As he spent time in solitary confinement, this was the first time that he really considered the possibility of making an around the world balloon trip. He developed a plan and the balloon design in his mind during this time.
- Joe was taken out of solitary and put with other newer prisoners (FNG's – Fucking New Guys). He became their Senior Ranking Officer (SRO) because of his age and rank.
- After continually getting under his captor's skin, Joe was moved in with some of the FOG's – Fucking Old Guy POW's., including the overall senior officer - Col. Jack Flynn. Some had been in prison for over 7 years. Joe tried to tell them as much as he could about what had happened since they had been imprisoned.
- Joe received his promotion to full Colonel while in prison. All of the POW's had been advanced in rank.
- The Peace Treaty was signed and Joe was released on March 29, 1973.
- Joe stayed in the Air Force hoping to be given the job of commanding a Tactical Fighter Wing but his last real opportunity for that fizzled when his commanding general was transferred. Joe retired from the USAF in 1978.

Ballooning Achievements

- Joe worked for Martin-Marietta in Florida after retiring from the USAF.

<u>Working with Ed Yost on the *Silver Fox to attempt global circumnavigation*</u>

- While still in the USAF, Joe contacted Ed Yost regarding Joe's desire to fly around the world in a balloon, but to start by crossing the Atlantic, which to that point had never been done. They were unable to find a sponsor for Joe's trip but Ed Yost made his attempt in 1976 in the *Silver Fox*. Ed asked Joe to be his Chief of Operations on the European side which Joe gladly accepted. Joe was stationed

in England at the time and he took leave to operate out of Heathrow for Ed's attempt.

- Weather and wind conditions changed when Ed was about 700 miles off the coast of Europe. He did set a world record for distance and time in the air. He landed the *Silver Fox* safely in the ocean, and thanks largely to Joe was picked up by a German freighter and towed to Gibralter.

Attempting to be the First to Cross the Atlantic

- Although Joe wanted to fly solo, he agreed to a sponsor joining him on an attempt to be the first to cross the Atlantic in 1978. At the same time, Anderson & Abruzzo were preparing for their attempt in *Double Eagle II*, also like Joe, in an Ed Yost designed balloon. There was also one other attempt being readied – Don Cameron and Christopher Davey in the *Zanussi*.
- Joe's sponsor tried to delay A&A by issuing a challenge to a race and offering a reward. They refused but they did the same thing with Cameron and Davey, who also refused.
- The *Zanussi* came down just 100 miles short of the European coast and A&A went on to become the first to cross the Atlantic in a balloon.

The Gordon Bennett Balloon Races & the Rosie O'Grady

- Joe became involved once again with Bob Snow, whom he had worked with on Ed Yost's *Silver Fox* attempt to cross the Atlantic. Snow owned a restaurant, *Rosie O'Grady's*, in Orlando and also a bunch of airplanes and balloons.
- Joe finally resigned from Martin-Marietta and took a job for Bob Snow flying passengers in balloons in the morning and then flying a plane trailing advertising banners in the afternoon. He wasn't making much money but he was very happy which is what he had vowed to himself when he was released from prison as a POW.

- Bob taught Joe how to sky write and Joe went on to sky write in planes for the next 18 years all over the United States.
- The Gordon Bennett Balloon Race was restarted in 1978. It was a race where balloons all took off from the same place near Los Angeles California and the one who went the farthest won. Joe finished 2nd three times with various partners. Finally, he won the race in 1982 but his balloon crashed in a snow storm just outside of Cody Wyoming, having flown almost 900 miles. Joe broke his arm and had a dislocated shoulder … but he was incredibly happy to have won the race.
- Joe ended up winning the Gordon Bennett for four consecutive years, the 3rd with Sherry Reed riding with him.

- Joe had met Sherry Reed in the fall of 1982.
- Joe flew solo in the Rosie O'Grady and won the Tropicana Aero Cup Race in Nov of 1982. The goal of this race was to land as close as possible to a pre-determined target. There was also an additional prize for anyone who could land in New Jersey, which was 2000 miles away. That would set a gas balloon distance record. Joe won the race, and set a distance record, but he had to land in New York, not New Jersey, so he lost out on the $100,000 bonus.

The Solo Flight Across the Atlantic in the Rosie O'Grady

- In 1984, Ed Yost was contacted by a sponsor who offered $250,000 to set a ballooning record. Yost recommended Joe to make the solo flight across the Altlantic. They made modifications to the original Yost gondola and envelope that had been intended to use in 1978 before their sponsor backed out.
- He took off in the evening from Caribou Maine and began the trip he had been envisioning in his mind ever since those days as a POW in Hanoi.
- The trip was eventful. He had to throw out his cooking stove when it caught fire and made most of the trip trying to thaw frozen food and water enough in order to eat and drink. He also experienced numerous sonic booms from aircraft from aircraft flying overhead.
- He succeeded on his goal when he crossed over Spain but he wanted to break A&A's distance record that they set on Double Eagle II. He thought he might be able to land in Red Square in Moscow!
- After 4 days in the air, he crossed the Mediterranean into Italy. He landed in trees and fell to the ground and broke his foot. They went back to France to do interviews simultaneously with the major networks. Tom Brokaw and Peter Jennings led the coverage for all of the major networks.

Joe never did achieve his goal of completing a solo balloon trip around the world. Steve Fossett beat him to it in 2002, but Joe was gracious in his congratulations to Steve's achievement.

Red Bull Stratos Project

After having been approached by many individuals and groups over the years to get his assistance in breaking Joes parachuting records, Joe agreed to become part of the Red Bull Stratos Project.

Joe had held records for longest descent (20 miles) and top speed of fall for 52 years until those records were broken by Felix Baumgartner in 2012 as part of the **Red Bull Stratus** project. Joe was an integral part of the ground communications crew.

Current Aspirations

Reference Documents

- "*Come Up and Get Me*". 2012 by Joe Kittinger & Craig Ryan
- "*Space Men*". 2016. 54 min. DVD from PBS recounting Projects Manhigh & Excelsior.

Kittinger Exhibit Presentation Tips for Docents

- Start by asking where visitors are from
- (Optional) If you haven't already done so, greet your visitors in their native language
    - See *Balloon Museum Reference* document, Appendix II
- I like to start my presentation of this exhibit by pointing out that the **Ballooning to the Stratosphere** exhibit is a natural extension of the initial exhibit when you walk in – **Lighter than Air Ballooning History.** In that exhibit, it talks about the initial quest to be **the first** to go up in the air, and how hot air and gas filled balloons were used to do so in the late 1700's.
- As you walk around the wall from the 1st exhibit, we review more "**firsts**"
    - The first to fly across the English Channel
    - The first to fly in each country
    - The first to perform in the air – acrobatics, fireworks, flying horses, etc.
- From there, I take my groups into **Ballooning to the Stratosphere** where you explore more **firsts** - man's efforts to go as high up into the air as possible.
- I then go to where Col. Kittinger is shown suspended in his flight suit as he parachutes to Earth.
- I present my talk about Col. Kittinger at that point.
- This exhibit memorializes Col. Kittinger's momentous leap out of a capsule from over 102,000 feet. That was in Excelsior III. The capsule was suspended beneath a hot air balloon. The record that Joe set stood for over 50 years, and which Col. Kittinger himself helped a man break. More on that later.
- The Colonel is a hero in the ballooning community for this feat and also for his exploits in hot air balloons after he retired from the Air Force. He has made personal appearances on occasion at our annual Balloon Fiesta in October.
- But his career is so much more than just this one feat. Here are just a few of his accomplishments.
    - Flew over 93 different types of aircraft during his 35 year Air Force career – 1943 to 1978.
    - Piloted many different experimental aircraft, including the ones known today as the "vomit comets" which are so important in preparation for the weightlessness of space.

- Participated in the **Manhigh** and **Excelsior** projects in which the goal was to first see how man reacted to being in the Stratosphere (over 60,000 feet - **Project Manhigh**) and then to test experimental parachutes by jumping out and free falling from the Stratosphere … or higher. That was **Project Excelsior**.
- Tell the story of how Joe's autobiography, *Come Up and Get Me*, got its name
    - Joe flew the 1st flight of Project Manhigh, but not the 3rd record setting one.
    - Another Air Force doctor, Major David Simons, was ostensibly the project manager for Project Manhigh. Col. Strapp, however, overrode Maj. Simons in having Joe be the first one to go up in the balloon, which Simons wanted to be able to do himself. Simons eventually flew on the 3rd and final record setting balloon flight in Manhigh.
    - When Joe got up to maximum elevation during that first flight, he was supposed to begin his descent immediately upon reaching the maximum height. However, he waited a bit, during which time Simons ordered him to begin coming down. Before doing so, Joe typed out a message for Simons in Morse code and sent it to him. The message was classic Kittinger, and it said …

COME UP AND GET ME

- He then volunteered for three tours of duty in Vietnam including the last one, as a Lt. Colonel, at the age of 42. Just 17 days short of completing that 3rd tour, his plane was shot down over North Vietnam and he spent the last year at the *Hanoi Hilton*, before the war ended in 1973.
- After retiring from the Air Force, Kittinger continued his passion for hot air ballooning by pursuing a goal to be the first person to fly solo around the world in a balloon. He did not achieve that. However, he set ballooning records, including being rhe first to fly solo across the Atlantic Ocean during which he set the record for travelling the furthest in a balloon.

- In 2012, at the age of 82, he participated in the ground crew operations for Felix Baumgartner, who broke Joe's 52 year old record for ascending the highest in a balloon. Baumgartner's **Red Bull Stratos Project** is shown to the left of this exhibit.
    - Note the extreme difference between the spacesuit worn by Baumgartner in 2012 compared to the flightsuit worn Col. Kittinger in 1960.

Balloon Museum Reference Document

Felix Baumgartner

Biography

- Born in Austria in 1969. Dare devil and parachutist.
- Claimed record for **highest parachute jump from a building** (Petronus Tower in Kuala Lumpur, Indonesia) in 1999
- **1st person to sky dive across the English Channel**
- Also **jumped from the hand of the *Christ the Redeemer* statue in Rio de Janeiro** Brazil
- In 2007, he became **1st person to jump from the 91st floor of, at that time, the world's tallest building** (Taipei 101 in Taipei, Taiwan)

The Red Bull Stratos Project

- Started in 2010, this project enabled Baumgarterner to make 3 jumps in 2012 in an effort to set world records for high altitude parachuting.
- He broke Kittinger's world altitude record after making two, previous test jumps at 71,000' (March) and 96,000' (July).
    - Kittinger was an integral part of the ground crew for the Red Bull project.
    - The second test jump is shown in the TV video which is playing in the High Altitude Gallery of the balloon museum.
    - During the main jump (October), he set 4 world records
        - 127,852' – Highest altitude jump in a helium filled balloon.
        - 119,431' – Longest free fall
        - 843 mph (Mach I) – Fastest free fall speed
        - Became 1st person to break the sound barrier (767 mph) outside of a vehicle.
- **Interesting fact**: (Story heard from docent Mary)

    - Kittinger was part of the support ground control crew. During the record jump, at one point Baumgartner's mask began fogging up. Other ground crew tried to calm Felix down by telling him it was not a big deal.
    - But having been the only one in the ground crew to have ever done what Baumgartner was doing, and in fact having had his own mask fog up, Kittinger told them that it most definitely WAS a big deal if you are the one up there all by yourself.

Alan Eustace

- 2014, Oct 24: Broke Baumgartner's world record for highest freefall by jumping from 135,889'.
- He is a computer scientist and an executive at Google.
- He ascended via a helium balloon from an abandoned runway near Roswell NM
- He did not go up in a gondola. He wore his pressurized suit and was suspended beneath the balloon. When ready to "jump", he separated from the balloon by means of an explosive.
- He broke records set by Baumgartner for highest altitude jump, longest and fastest descent. But since he used a drogue parachute, similar to the one used by Joe Kittinger, Baumgartner's records are in a separate category.

Balloon Museum Reference Document

The History of Sport Ballooning

Piccard & Yost

Beginning in 1949, Swiss-born American Don Picard and American Paul Edward Yost worked to develop hot air ballooning as a sport.

- By the end of the 1950's, there were only about 10, flyable balloons in civilian hands.
- Ballooning was just too expensive - $1000 for hydrogen alone for one flight

Don Picard is generally regarded as the "**father of the sport of hot air ballooning**". Picard and Yost founded the organization which eventually became the *Balloon Federation of America* which is the current national Federation.

Fun Fact : Don Piccard is a relative of both Auguste Piccard and and his twin brother Jean Felix Piccard (Don's father). Auguste and Jean were both inventors, scientists and balloonists. Gene Roddenberry, the creator of the TV and motion picture series Star Trek, is said to have named the Captain of the Starship Enterprise, Jean-Luc Picard, after the Piccard brothers.

- Auguste Piccard set a record in 1932 for the highest altitude achieved in a balloon – 52,498'.
- Bertrand Piccard, Don's nephew, was first to fly around the world in a hot air balloon in Mar 1999. He flew with Brian Jones.

Picard began experimenting with lower cost methods to heat the air in balloons and thereby make ballooning more affordable. It would also allow longer flights with hot air balloons, vs. the more expensive gas balloons.

Paul Edward (Ed) Yost – the "**Father of hot air ballooning**"

- Also wanted to develop the sport of ballooning.
- One of the key developments he helped create was to enable hot air balloons to carry their own fuel – high powered propane tanks. This allowed much longer flights which is why hot air balloons had basically been abandoned in favor of gas (hydrogen and helium) balloons.

1st ever sanctioned balloon race was in 1962 at the St. Paul (MN) Winter Carnival. That marked the beginning of hot air ballooning as a competitive sport.

Positive Publicity

- 1963 – April: Yost and Piccard flew a hot air balloon over the English Channel in order to try and attract some attention for the sport. They were the first to ever do that in a hot air – not a gas – balloon.
- They set a speed record for the time it took to cross the Channel by balloon.

Negative Publicity

- 1964 - California race from Catalina Island back to the coast of California
- Only 1 of the 8 balloons entered in the race made it to the coast – Yost's
- All others had to ditch in the water and be rescued, including one balloon flown by actor Cliff Robertson
- One woman drowned – Sarah Keith, a grandmother from Connecticut. She became the 1st victim of new balloon technology.

Major Turning Point

- The Cutter family is the first to own a balloon in New Mexico and they fly it in Albuquerque in 1971.
- 1st balloon race in Albuquerque in 1972
    - Sid Cutter and Dick McKee, station manager of local KOB-TV started the competition which attracted 20,000 people and 13 balloons. It was in honor of KOB's 50th anniversary.
    - They had hoped to break the current record of 19 balloons, but the weather was not great and only 13 balloons took off.
    - It was held in the parking lot of the Coronado Mall.
    - They held a balloon race which is still held each year. Don Piccard won the initial balloon race back in 1972.
    - This is generally known as the first year of Balloon Fiesta. However, the first event actually called Balloon Fiesta was in 1975.
- The following year in 1973, ABQ hosted the **World Hot Air Ballooning Championships** and Balloon Fiesta had begun. 132 balloons participated this year.
- Balloon Fiesta continues to this day each October and attracts balloonists from all over the world.
- Fiesta reached a peak of 1,019 registered balloons in 2000. That maximum number was reduced to 750 in 2001 and further reduced to 600 in 2009. However, that number does not generally include all of the special shape balloons. There were 665 registered balloons in 2018.
- Balloon Fiesta moved to its current, permanent home at Balloon Fiesta Park in 1996.
- See **Appendix > Balloon Fiesta > Balloon Fiesta** 2019 for more info

Balloon Museum Reference Document

The History of Trans-Oceanic Ballooning

Long Distance Ballooning Beginnings

- Dec, 1958 – "Small World" tried to fly from the Canary Islands to the America's Coast
    - Forced into ocean after just 3 days and rescued 21 days later and towed to the Bahamas.
- 1969 – Three people died (were never found) when they tried to fly a balloon from Long Island NY to Europe

Combination Hot Air and Gas Balloons

- Jean Pilotre de Rozier was the first known to try and fly a combination hot air and gas (hydrogen) balloon. He and another man died when their balloon exploded in 1785 while trying to cross the English Channel.
    - To this day, combo hot air and gas balloons are still called "Rozieres" in honor of Pilotre de Rozier.
- 1975 – Bob Sparks flew the first combo hot air and gas (helium) balloon
    - Outer envelope was filled with helium
    - Inner envelope was filled with hot air and was heated by propane burners
    - This first attempt only made it less than 2 days.
- 1977 – Sparks tried again and was unsuccessful
- Combo balloons are typically now only used for very long distance ballooning, such as circumnavigating the world.

Crossing the Atlantic Ocean by Balloon

- Crossing the Atlantic in a balloon had been an open ballooning challenge for over 100 years
- 1976 – Ed Yost made an almost successful attempt to cross the Atlantic.
    - He flew over 4 days and 2500 miles before having to ditch in the ocean just 750 miles off of the European coast.
    - He set world records for time and distance in a balloon
- 1977 – Anderson and Abruzzo (A&A) from Albuquerque took the challenge
    - They had pioneered ballooning in Albuquerque and had won may ballooning events.
- 1977, Sept - The **Double Eagle**
    - Flight was originally planned to commemorate the 50th anniversary of Charles Lindburgh's solo trans-Atlantic airplane flight in 1927.
    - Flight Launched from Massachusetts with just A&A aboard
    - Encountered storms which blew it off course. They landed in the sea just off Iceland just 3 days out

- 1978 – **Double Eagle II (DEII)**
  - A&A plus Larry Newman attempted to again cross the Atlantic
    - Larry Newman was an airline and hang glider pilot and had introduced Anderson to the sport of ballooning
  - Ed Yost & Joe Kittinger were trying to beat A&A across the Atlantic but were behind A&A in developing their balloon
    - They challenged A&A to a race if only A&A would wait a bit for them to be ready
    - A&A refused but they did the same thing by asking another balloon *The Zanussi*, piloted by Don Cameron, to wait for them to be ready. Cameron refused as well.
    - Cameron's attempt ended in failure, but only 110 miles off of the French coast.
      - Ice formed on top of the balloon then melted and drained down around the envelope and flooded the gondola
  - The **DE II** took off from Maine on Aug 11, 1978
    - It was helium filled and had red chiles hanging beneath the gondola
    - 5 days after take off, it crossed over the Irish Coast and officially set the record for being the first to cross the Atlantic
    - However, they flew another day and landed just east of Paris
    - They set records for time and distance in a balloon
    - Newman had originally planned to hang glide to a landing after they crossed the European coast but when the balloon started descending, they had to jettison the hang glider which was hanging beneath the balloon.
    - Original gondola is in Smithsonian. A copy is in our museum.
    - The team was awarded the Congressional Gold Medal for this effort.
- 1984, Sept
  - Joe Kittinger becomes first to fly solo across the Atlantic in a balloon
- 1981
  - Julian Nott crosses the English Channel using a hybrid balloon, which utilized solar energy.
- Written history
  - "Double Eagle" and "Pacific Eagle" by Charles McCarry
  - "Flight of the Pacific Eagle" by Ray Nelson

Crossing the Pacific Ocean by Balloon

- 1981, Nov – 1st successful trans-Pacific balloon flight
  - The **DE V** flies from Japan to California – 5768 miles
  - Passengers were Abruzzo, Newman, Ron Clark (from ABQ) and Rocky Aoki (owner of Benihana)
    - Anderson & Abruzzo had split before this attempt and they never flew together again.
  - ***Trivia***: Comic Flip Wilson was part of the first ground crew in Japan making the attempt to cross the Pacific. (DEIV?)
  - Actual gondola is in our museum. However, Wilson's name is not on it because he was not part of crew for the successful flight (**V**) that made it across the Atlantic.
  - Publicity was not as great for this flight, in part because the Space Shuttle made its first flight earlier in 1981.

Legacy of Anderson & Abruzzo

- Anderson died in 1983 while ballooning over Germany with co-pilot Don Ida
  - They didn't want to land in East Germany or Czecholslovakia so he tried to release the gondola from the balloon when it touched down. However, the explosive bolts failed to fire, the balloon rose again and when the explosive bolts did fire, he and Ida fell to their deaths.
- Ben Abruzzo died on Feb 11, 1985 with his wife and 4 others in a crash of their Cessna airplane near Albuquerque
- Abruzzo's son Richard also died in a ballooning accident.

Balloon Museum Reference Document

Galleries in the Balloon Museum

Early Ballooning – Initial Gallery As Guests Enter

1st Section

- **Main Idea:** **THE WORLD CHANGED FOREVER**
  - The Age of Enlightenment begins – 17th & 18th centuries
  - People are fascinated by what is now possible

2nd Section – right behind the initial gallery

- **Main Idea:** **WHAT HAPPENED NEXT**
  - Men tried to fly over water (hence the gondola like a boat)
  - Men tried to be the first to do … (you name it)
    - First to fly in different countries (see balloons on wall to left)

Main Hall – The Double Eagle Flights

- **Main Idea:** **TAKING RISKS/BEING THE FIRST**
  - DEII replica (original is in the Smithsonian)
    - They had failed just before in the DEI
    - The fields shown in the grass and on the wall mural show the area where they landed outside of Paris
  - Early DE's did not have all the technology of later flights, such as having their own meteorologist aboard.
- Larry Newman – one of the three on the DEII
  - Hang glider below had to be dropped to reduce weight
  - Newman originally planned to drop off the balloon in the hang glider once they went over land
    - Had he done so, they "might" not have qualified as the 1st successful trans-Atlantic flight
    - Had to have all people initially on board land to qualify
    - That has NOT been able to be verified.
  - Newman tested his concept of having the hang glider below the gondola and then releasing it by testing on the Sandia Peak tram car.

Balloon Museum Reference Document

Balloons in War

First Military Use of Balloons

- The French Corps d'Aerostiers in 1794 outside of Paris. They used manned, tethered observation balloons against the Austrian army to provide information for where to make cavalry charges.

Airships – Zeppelins

- Von Zeppelin was a young Prussian officer during the beginning of the Civil War. He was a military observer of the Union army and saw some of Lowe's balloons in action. He also ascended in a civilian balloon before returning to Germany.
- Von Zeppelin could see the benefit of high altitude surveillance on military actions. But he could also see that the balloon's inability to steer was a major problem. That led him to start developing his "derigible" (capable of being steered).
- Count Von Zeppelin came to America again to observe how Americans used balloons during WWI
- 1920-1930
    - Aircraft carrier balloons hung planes beneath them and released them into the air
    - The Airship was difficult to control in bad weather and most crashed
- Non-rigid airships
    - British developed these
        - They had numerous models – A, B, C and D
        - The airships were initially called "Limps". Since model "B" was the most successful, the word "Blimp" was coined.

Initial Question for Visitors

- Why do you think that airships were first developed?
- What was the main thing you could not do in a hot air or gas balloon?
    - Answer: Navigate/steer

Early Design

Late 1700's

- **J.B.M. Meusnier** - French engineer and mathematician.
- 1784 - Meusnier is considered by many to have designed the first airship not long after the Montgolfiers flew the first hot air balloon in the 1780's.
    - He envisioned an elliptical, egg-shaped airship that looked strikingly familiar to the eventual modern airship

- He envisioned a rudder for steering, an gas envelope with a *ballonet* (bladder inside the envelope which could be filled or emptied to equalize air pressure on the envelope and help the balloon keep its shape) and also a method of propulsion
  - Propulsion was 3 propellers driven by three men
- It also had a boat as a gondola in case of water landings

1800's

- 1852 – **Henri Giffard** designed and successfully flew the first powered airship. It was inspired by Meusnier's designs from 60 years earlier.
- Another source indicates that Frenchmen Gaston and Albert Tissandier designed and flew the first propeller-driven dirigible in 1883.
- Lots of variations on these airships were experimented with.
  - One had 3 hot dog shaped envelopes tied together
  - Early versions could only go 5-10mph and had great difficulty in anything but calm winds

French Developments

- 1st military use of an airship during the Franco-Prussian War of 1870. French govt supported the development of airships
- French airship "La France" 1st flown in 1884
  - Had an electric motor that could make it fly up to 15mph
  - An internal combustion engine (ICE) was added in 1897 but the 1st one burned and exploded killing the occupants

Metal Airships

- Metal first used by Austrian David Schartz in 1897
- His airship looked like a "wrinkled tin can"
- Schwarz envisioned a "rigid airship" with an internal frame that maintained the envelope shape instead of using a ballonet.
- Schwarz died in late 1897 and his design failed its first and only flight attempt

Count Von Zeppelin

Note: Von Zeppelin survived not 1 but 2 potentially career ending disasters with his invention that would likely have stopped anyone else.

- Ferdinand Graf von Zeppelin. Born in Germany in 1838.
- Prussian officer who served in the Austro-Prussian and Franco-Prussian wars of the mid to late 1800's
- He was a young Prussian officer during the beginning of the Civil War. He was a military observer of the Union army and saw some of Lowe's balloons in action. He also ascended in a civilian balloon before returning to Germany.
- Von Zeppelin could see the benefit of high altitude surveillance on military actions. But he could also see that the balloon's inability to steer was a major problem. That led him to start developing his "derigible" (capable of being steered).
- After leaving the military, he wanted to develop and airship that could counter the French airships which he saw used during the Franco-Prussian war
- He wanted a really BIG airship – one that could fly long distances, stay in the air for 24 hours and carry lots of men
- Von Zeppelin worked with Austrian engineer Theodor Kober to design and build the first of his airships in 1899 – the LZ1.
    - It utilized an aluminum frame.
- Aluminum substitute
    - "Duralumin" developed in 1909 which was then used instead of aluminum for airships. It was 5X stronger than the same weight of aluminum.
- Von Zeppelin's first factory was on an island in Lake Constance near where he was born in southern Germany
    - Island was called "Bodenese"
- Airships built by Zeppelin were numbered beginning with the letters "LZ" standing for Luftshiff (airship) Zeppelin
- Link to a Wikipedia history of all LZ series Zeppelins
  https://en.wikipedia.org/wiki/List_of_Zeppelins
- LZ1 in 1899 and first of 3 flights in 1900
    - 420' long and 38' in diameter
    - 400,000 cubic feet of hydrogen
    - Powered by 2, 16hp Daimler gas engines (Daimler Chrysler of today)
    - Rudders provided the directional control
    - Had a rigid frame of aluminum alloy which allowed it to fly without a ballonet

    - Movable weights were moved forward and back to make the airship either go up or go down.
    - LZ1 made three flights but was not successful enough to warrant any additional funding from German govt and von Zeppelin was broke, so he stopped work on airships.
    - LZ1 is considered the first "successful" airship but was not practical
- French Airship Development
    - French gained status as leading airship manufacturer after failure of LZ1.
    - "Le Jaune" built by firm Astra, and flew to Paris in 1903 at speeds of up to 25 mph which allowed it to maneuver better in winds. Because of this, Le Jaune is considered the first really practical airship.
    - Airships were built for the French navy
- LZ2 - 1905
    - Germans could not let the French outdo them.
    - Von Zeppelin got new funding from the German King who instituted a public lottery for funds, and also raised money by mortgaging his wife's estates. He began building LZ2 in 1905
    - LZ2 had a stronger frame and 2, 80hp Daimler engines which allowed to go up to 20mph
    - Made its only flight in 1906 which ended in trees and then was further damaged by high winds. Had to be dismantled.
- LZ3 – 1906
    - Construction began in May 1906.
    - Engines upped to 85hp which allowed it to achieve speeds over 30mph
    - Better rudder controls and larger gas capacity
    - Made two successful flights in 1907 including one of 220 miles
- LZ4 – 1908
    - German govt was pleased by success of LZ3 but only agreed to finance the LZ4 if it could stay in the air for 24 hours
    - Von Zeppelin knew that the LZ3 had to be bigger yet in order do that so she started building the LZ4.
    - First flew successfully in June 1908.
    - LZ4 was destroyed in July 1908 by fire at Echterdingen. It had been attempting to stay in the air for 24 hours but had to be landed for repairs near Echterdingen.
    - While moored for repairs, winds lifted if off its moorings and the envelope ripped when it went into trees. The hydrogen ignited due to static electricity caused by the rubber membrane enclosing the hydrogen cells.
    - After LZ4 fire, hydrogen cells lined with the skin of animal intestines were used which generated less static electricity than rubberized materials
- German nationalism
    - The fire of the LZ4 was witnessed by 40-50,000 spectators.

    - Despite the LZ4 fire, Von Zeppelin gained fame as a German national hero and received funding to continue his work.
- LZ5 - 1909
    - The German Army funded the LZ5
    - LZ5 was conscripted by the German army at the beginning of WWI
        - It broke apart in a hanger before ever making a flight
- LZ10, LZ13, LZ17 -1909 to 1913
    - After Von Zeppelin falling out of favor with the military due to his criticism after the failure of LZ5, new company DELAG formed continued commercial use and enhanced the Zeppelins attract passengers.
    - Von Zeppelin observed how the U.S. utilized balloons during WWI.
    - LZ6-LZ9 had difficulties with fire or weather.
    - LZ10 made over 200 commercial flights but then caught fire in June 1912
    - LZ13 made almost 400 flights and carried passengers outside of Germany for the first time
- LZ11, LZ12, LZ14-LZ25 up to July 1914
    - Military use Zeppelins up until the beginning of WWII

Zeppelins during World War I – 1914-1918

- LZ26-LZ114 - Airships built and used by the Germans in WWI
- They could fly higher than airplanes (up to 26000').
- They could cover long distances (up to 7500 miles)
- Airplanes were still not equipped with guns early in the war and anti-aircraft was still non-existent
- 2 main companies built Zeppelins
    - Count Von Zeppelin (Fredrichshafen) and another by Johann Schutte (Mannheim)
- Size – 700' long by 78' wide
- 51 bombing raids on England between 1915 and 1918
- Used a "sub-cloud car"
    - A small, bomb looking car, that carried one man and which was lowered below the Zeppelin and then which provided information on where and when to release bombs.
- Improved anti-aircraft guns and advanced pursuit aircraft resulted in 40% casualties of all men involved in the Zeppelin raid, and well over 50% of all Zeppelins used in the war. Last raids were in 1918.

Zeppelins After the War – 1918-1938

- LZ120 to LZ130 (LZ131 begun but not finished)
- Count Von Zeppelin died in March 1917 at age of 79 before the end of WWI
- Victorious allies ordered Germany to turn over all be turned over to them as war reparation and they ordered the destruction of the factory in Fredrichchafen. However, the U.S. wanted the technology and they negotiated with the Zeppelin company to build new Zeppelins
- 1923 – Goodyear-Zeppelin Corporation created to build rigid airships
- Airships had hook-on airplanes beneath so that they could transport planes without notice and then launch them over enemy territory.
- U.S. helium airships crashed but they did not burn because of their helium
- The infamous **Hindenburg** (LZ129) was intended to be filled by less flammable helium but that was thwarted by the U.S. who had a monopoly on helium production.
    - Hiddenburg travelled to North & South America before burning and crashing on May 6, 1937 in Lakehurst NJ
    - One other Hindenburg class airship was built – the Graf Zeppelin II - but it was ordered dismantled by Hermann Goring in 1940
    - Hindenburg crashed & burned in Lakehurst NJ in 1937.

British Airship Development

- Brits initially developed
- Non-rigid airships
    - British developed these
        - They had numerous models – A, B, C and D
        - The airships were initially called "Limps". Since model "B" was the most successful, the word "Blimp" was coined.
- French, Italians and Americans also built blimps
- Successfully accompanied and protected shipping convoys from German U-boats

American Airship Development

- Goodyear began manufacture in 1911 and built the *Akron*.
- Goodrich and Goodyear both built blimps.
- Mainly used for patrols during WWI, similar to the Brits
- Gas changed from hydrogen to helium, primarily because of the the *Wingfoot Express*, built by Goodyear. It crashed and burned near Chicago in July of 1919.
- Helium was discovered in 1868.
    - Helium was more expensive than hydrogen and did not provide nearly the lift of hydrogen but the gas was inert and much less susceptible to explosion and fire.
    - The U.S. was the only nation with access to helium during the years of WWI and after.

- Goodyear made the first airship to fly with helium, the Pilgrim, in 1925. That was the predecessor to Goodyear blimps that still fly all over the U.S. today.

The Japanese Fugo Project

Initial Question for Older & Younger Guests

YOUNGER:

Would you like to know something that very likely your parents may NOT know, so you can teach *them*?

Do you know if the mainland United States (not Pearl Harbor) was bombed by the Japanese in World War II?

OLDER

Does anyone know if the mainland U.S. (not Hawaii) was ever bombed by the Japanese during WWII?

Why is this project called "Fugo"?

- Roughly translated, Fugo is Japanese for "wind ship weapon" or "fire balloon"

Motivated in part by their desire for revenge against the Jimmy Doolittle air attacks on Tokyo after Pearl Harbor, starting in 1944 Japan built and launched up to 9300 FUGO bombs – incendiary devices attached to hydrogen filled balloons. Balloons were launched into the jet stream at 30-35,000' intended to fly and drop their bombs over the Pacific Northwest.

> ***Note***: Most statistics cited in this report, such as the first launch date and the number of Fugo bombs released, came from records uncovered in Japan after the war.

Materials

- 33' diameter balloon made of approx. 600 sheets of rice paper and/or paper made from mulberry bushes. The sheets were then held together with vegetable glue and coated with polyvinyl and alcohol. They could carry up to 1000 pounds of payload.
- Aluminum ring attached beneath balloon, which supported incendiary devices (that would explode and start a fire), an anti-personnel bomb and a wooden box, which housed a battery connected to an altimeter. The altimeter was used to determine altitude which controlled the release of ballast to maintain altitude, or to vent hydrogen if the balloon got too high.
- 32 sandbags were attached for ballast
- Balloons were filled with hydrogen and contained 5 incendiary bombs and 1 anti-personnel bomb.

Intention/Goal

- Most balloon envelopes were made by Japanese school girls.
- The Japanese planned to use the 30,000' Jet Stream that they had discovered to send the balloons over the Pacific to the U.S. in as little as 3 days.
    - The Jet Stream has been discovered by a Japanese Meteorologist (weather man) in 1920.
- The concept for the balloon was to release it up into the Jetstream and have the winds carry the balloons from Japan to the U.S. Coast. They calculated that it would take about 3 days for the flight to be made. During the flight, the altimeter detected when the balloon dropped below 30,000 feet (the approx. altitude of the jet stream) and it would drop ballast to maintain altitude. It could also vent hydrogen when the balloon got too high. After 3 days, it was assumed that the balloon would have reached the mainland U.S. and a process would begin to release hydrogen from the balloon and eventually light a fuse which would destroy the balloon at such time as it was thought to be near the ground. The incendiary device and the anti-personnel bomb would then explode.
- They were intended to start fires in the Pacific Northwest which would hopefully cause panic and divert U.S. resources from the war effort in the Pacific

Results

- The first one was launched from the island of Honshu Japan on Nov 3rd, 1944.
    - 4800 miles (Honshu to Portland)
- Perhaps only an estimated 6-10% (up to 900) of the devices ever detonated over the U.S, but a few even went as far as Michigan (6400 miles Honshu to Detroit). It is thought that less than 300 or so of the bombs ever started any forest fires.
- Most were launched between Nov 1944 and March 1945 which is during the period of maximum velocity of the jet stream. However, it is also the time for much precipitation (rain and snow) in the Pacific Northwest so that mitigated the damage of the few fires that were started because the ground was often so wet.
- Only reported casualties: Rev Archie Mitchell, his pregnant wife and 5 Sunday school students were on a fishing and picnic trip near Bly (south central) Oregon on **May 5, 1945**. Mrs. Mitchell and the five students found an unexploded device which detonated while they were inspecting it. The minister, who was parking his car after everyone got out, was the only one to survive as the bomb exploded as he was about to join them.
    - This took place one month after the Japanese had ended the Fugo bombing campaign.

    - A sister of one of the victims later married the minister who survived. They went to Vietnam as missionaries. He was taken by the Viet Cong in 1962 and never seen again.
- One bomb exploded in central Washington state and temporarily disrupted power lines that provided electricity to a plant making elements of the atomic bombs.
- The U.S. Military created ***Project Firefly***, which stationed firefighters and parachutists throughout critical points in the Pacific Northwest to be ready to fight fires. There was one fatality and 22 injuries reported in fighting those fires.
    - See info on the **Triple Nickels** – black parachute squadron
- Originally, it was thought that the bombs were being released off of the U.S. Pacific coast by Japanese submarines. But an examination of the sand ballast from some of the unexploded FUGO's determined that the sand could not have come from sand on the U.S. coast. The origin of the sand was eventually narrowed down to two different areas on the island of Honshu in Japan.
- Secrecy
    - The U.S prohibited/censored newspapers from reporting successful FUGO bomb explosions to prevent the Japanese from being able to gauge the success of the program.
    - They also did not want to alarm the U.S. public.
    - It was only after the death of the 6 people that the government decided to alert the public to watch for those balloons and to alert authorities.
        - Unfortunately, it was too late to save those six.
    - To this day, it is however still a very little known fact about the war effort.
- There was a plan in late 1944 to load anthrax onto the Fugo bombs in order to launch biological warfare against the U.S. However, that plan was rejected by Emperor Hirohito.
- The Japanese stopped the project in April 1945 thinking that it was a very costly failure. Three of their hydrogen plants had also been bombed by U.S. B-29's which limited their capability for producing more hydrogen.

Lasting Effects

- The FUGO program, while unsuccessful, is considered by some to be the precursor to intercontinental ballistic missiles and also to drones.
- Unexploded FUGO bombs have been discovered as recently as 2015 in the Pacific Northwest.
- *Japanese Apology*
    - John Takeshita, later a professor at the Univ of Michigan, was held at a northern California Japanese internment camp near where the explosion

and deaths occurred. 40 years later, he made a trip to Japan and heard a teacher describe how her students had made the balloons. Takeshita wrote her the names of the 6 victims and the teacher sent him 1000 paper cranes (Japanese symbol of atonement) to take back to Bly, Oregon and to give to descendants of the victims.

- After learning about the deaths of the 6 people caused by one of the FUGO bombs they had been forced to make, on May 5, 1989, a group of Japanese women sent a letter of apology and some dolls to relatives of the victims. Their descendants continue this annual tradition.
- May 5th was the 44th anniversary of the deaths and also Children's Day in Japan.

Internet References

If you would like to read further, here is a link to an excellent article by the Atomic Heritage Foundation.

https://www.atomicheritage.org/history/japanese-balloon-bombs-fu-go

Balloon Museum Reference Document

Related Stories

Robert Oppenheimer – the "Father of the A-Bomb.

- He was the Director of the Los Alamos lab in New Mexico
- He knew about the FUGO bombs because of his involvement in covert government programs.
- He once thought he saw a Fugo balloon coming to Albuquerque and called the Commander at Kirtland AFB.
- They investigated and reported back to Oppenheimer that what he had seen was the planet Venus in the night sky.

A Guest attending one of a docent's Presentations

- One of our guests was really quiet during a presentation about the FUGO program.
    - Our docent asked him about this after the end of the presentation.
    - The man said he was a fighter pilot stationed in the U.S. near the end of WWII. One of his jobs was to fly up and down the Pacific northwest coast. He was told that if he saw any of these balloons, he was ordered to shoot them down. He always thought that it was just some sort of target practice.
    - He didn't know until the day he visited our museum that what he was shooting down were those FUGO bombs.
    - He was probably one of the 500 or so aircraft which were dispatched by the U.S. government as part of **Project Firefly** to intercept the Fugo bombs before they made landfall.

Britain's Project Outward

- Britain developed their own version of the later FUGO project starting in 1939.
    - They sent balloons carrying incendiary bombs, and also some trailing wire cables, to fly over Germany.
    - The ones with wire cables were designed to brush power cables causing short circuits and electrical disruption.
    - One caused enough damage to a German power station in Leipzig Germany in 1942, to more than cover the cost of the entire *Project Outward* program. So **Project Outward** was nominally even more successful than the FUGO program itself.

The Triple Nickles

- The 555th Parachute Infantry Battalion of World War II (also known as the "Smoke Jumpers") played an important role in the U.S. defense against the Japanese Fugo project in 1944-1945.
- The 555th was an elite, all black (enlisted and officers) group of 17 men who were specially trained as paratroopers at Fort Benning, Georgia. They were ready for combat and prepared to enter World War II in 1944.
- However, two factors led to them never participating directly in the war effort.
    - First, racism was still so prevalent in the military, even in war, that commanders feared the presence of an elite, all black group would provoke more overt racist reactions.
    - **Project Firefly**. Second, the paratroopers were given an assignment to help combat the effects of the Japanese Fugo project on the forests of the Pacific Northwest. The request was made by the U.S. Forest Service.
- The 555th ended up responding to some 36 fire calls, and made over 1200 jumps, which were either in response to a Fugo balloon dropping its incendiaries and starting a fire, or in response to a Fugo balloon being shot down by fighter jets that were assigned to do just that, and then also starting a fire.
- While they suffered injuries during these jumps, only one fatality occurred.
- After the end of the Fugo project in 1945, the 555th went on to serve in more airborne projects, both in times of war and peace, than any other parachute group in history.
- The last surviving member of the original group of 17, Sergeant Clarence H. Beavers, died on Dec 4, 2017.

Internet references

http://triplenickle.com/history.htm

http://triplenickle.com/clarencebeavers.htm

Fugo Exhibit Presentation Tips for Docents

- Start by asking where visitors are from
- (Optional) Greet your visitors in their native language
  - See *Balloon Museum Reference* document, Appendix II
- Ask question: "Does anyone think that the Japanese were able to bomb the U.S. mainland during WWII?"
  - If there are younger people present, ask one of them the question designed for younger visitors so they can "teach" their parents.
- Tell visitors what the term "Fugo" stands for
  - "wind ship weapon" or "fire balloon"
- Explain why Japanese were able to send up balloon bombs and have some of them actually drop onto U.S. soil.
  - The Jet Stream
  - Altimeter that maintained balloon altitude on the estimated 3-day flight across the Pacific, after which the gas would be released from the balloon and the bombs would be ignited upon reaching the ground.
- Be sure to point out the exhibit on the rear wall of this exhibit which identifies the only people who were known to have been killed by a Fugo bomb.
- Tell visitors how far east in the U.S. Fugo bombs were known to be found. Answer: Michigan (6400 miles from Honshu, Japan)
- Tell the story of the museum visitor whose job it was to shoot down Fugo bombs during WWII but he never understood what he was shooting down until he visited our museum.
- Tell the story of the **Triple Nickels**.

Grand Hall Exhibits – Trans … Ballooning Attempts

TransAtlantic Crossing Attempts

1976, Silver Fox: Solo attempt by Ed Yost

- 2475 miles, 700 miles short of Europe
- This was the 7th of 9 attempts to cross the Atlantic by balloon before Double Eagle II finally accomplished the feat in 1978.
- Ed's balloon was the first balloon to fly over 2000 miles (2400); though unsuccessful, Yost's attempt was a major milestone for long distance ballooning
- Yost is considered the "Father of Modern Day Hot Air Ballooning"
- 150 years after the Montgolfier brothers came upon lighter-than-air flight, Ed Yost created the on-board **propane burner** systems that allows for flights of longer duration

  Note: One of the ideas from **Jules Verne's** *Mysterious Island* was the idea of using a Bunsen Burner to raise the temperature of the hydrogen in the balloon. This was perhaps a precursor to Ed Yost's invention in the of the propane burner for heating the air in a hot air balloon.
- Other inventions include non-porous synthetic fabrics, maneuvering vents, and deflation systems for landing
- Only about 700 miles from the European coast, the weather and winds changed, turning Ed around and starting to blow him away from Europe. Col Joe Kittinger, who was still in the USAF at the time, was Ed's Chief of Operations on the European side. He directed the rescue effort which ultimately resulted in Ed being picked up and towed to Gibralter by a German freighter – the *Elisabeth Bolton*.
- Although not successful in crossing the Atlantic, Ed did set world records for both distance covered and time in the air.

Fun Facts: In 1978, there were three competing teams trying to win the race to pilot the first balloon over the Atlantic

Bob Snow and Joe Kittinger worked with Ed Yost on the *Silver Fox* flight. Ed asked Joe to be his Chief of Operations on the European side.

Snow & Kittinger would later work together when Kittinger flew for Snow's company. Snow taught Joe how to sky-write.

Don Cameron and Christopher Davey in the *Zanussi*

Anderson, Abruzzo and Newman in the *Double Eagle II*

Kittinger's sponsor challenged A&A to a race if only A&A would wait a bit for them to be ready.

Knowing they had a lead on readiness, A&A refused but they then did the same thing by asking another balloon *The Zanussi*, piloted by Don Cameron, to wait for them to be ready. Cameron refused as well and made the attempt just before DEII made their attempt, but came down just 100 miles from France.

1977, Double Eagle: Attempt by 2 - Ben Abruzzo and Maxie Anderson

- 15 attempts to cross Atlantic. 5 never returned or were found.
- Lindbergh 1st to fly Atlantic in May 1927. He was called the Lone Eagle. Ben and Maxie admired Lindbergh and called their balloon the Double Eagle. They also wanted to land in Paris near where Lindbergh landed.
- They were meticulous in their preparation for this flight. Planned everything they would need to make the trip. But just before taking off, one of their wives asked how long they were planning to fly and what were they planning to sit on.
    - They had no chairs so they added lawn chairs.
- Balloon flew 5 days and flew in circles due to air currents. It came down in the water near Iceland.

1978, Zanussi: Attempt by Donald Cameron and Christopher Davey

- Roziere balloon (helium cell, surrounded by hot air heated by burner during night time).
- Used the same gondola as used in DEI for Double Eagle II attempt but new balloon.
- There was a tear in the envelope, causing the balloon to lose altitude just 100 miles west of France
- 2,074 miles in 97.4 hours (4 days, 1 hour, and 24 minutes)

Fun Fact: In 1978, there were three competing teams trying to win the race to pilot the first balloon over the Atlantic

- Joe Kittinger, working with Ed Yost.
- Don Cameron and Christopher Davey in the *Zanussi*
- Anderson, Abruzzo and Newman in the *Double Eagle II*
- Kittinger's sponsor challenged A&A to a race if only A&A would wait a bit for them to be ready.
- Knowing they had a lead on readiness, A&A refused but they then did the same thing by asking another balloon *The Zanussi*, piloted by Don Cameron, to wait for them to be ready. Cameron refused as well and made the attempt just before DEII made their attempt, but came down just 100 miles from France.

1978, Double Eagle II: Ben Abruzzo, Maxie Anderson, Larry Newman

- First successful manned flight across Atlantic Ocean from Presque Isle, Maine to Miserey, France.
- Ben and Maxie added 20 something Larry Newman – professional hang glider.
    - Newman had planned to hang glide down before the balloon landed in Europe.
- 3100 miles in 137 hours (5 days and 17 hours) in a straight gas balloon on August 11-17, 1978
    - Fall in altitude near Iceland caused them to drop from 19,500 feet to 4,000 feet
- Ice formed on top of the balloon, melted and drained down around the envelope and flooded the gondola.
- Balloon lost altitude as they neared the European coast and they had to release more ballast.
    - Ballasted food, water, radios, and other equipment including Newman's hang glider that was hanging below the gondola.

Fun fact : Good thing they had to jettison Newman's hang glider. Had he left the balloon before they landed, the FAI would not have recognized the flight's accomplishment. One requirement was that anyone lifting off in the balloon had to be on board when it landed.

Fun fact : In general, if in an open gondola, there is a need for oxygen tanks above 12,000 feet elevation.

TransPacific Flights (Japan to California)

1981, Double Eagle V: Ben Abruzzo, Rocky Aoki, Ron Clark, and Larry Newman

- 1st attempts in 1980 (DE3 and DE4). In both cases, the balloon did not get high enough, quick enough and the envelope shredded. Aoki had another envelope ready but that one shredded as well. They then had to wait until 1981 to try again.
    - Flip Wilson was on crew for DE3 and DE4. One of his duties may have been to wake everyone up each morning in his Geraldine persona.
- Straight helium balloon with a closed gondola
- Double Eagle II used tenacity neoprene impregnated nylon that was painted silver and black to control for the expanding and contracting of helium due to temperature change
    - Specifically, the silver color was supposed to reflect the sunlight and heat of the midday sun, causing excessive heating and expanding
    - However, the silver worked so well that it prevented the absorption of any heat, and thereby any expansion or ascension
- Having learned from experience, Ed Yost created Double Eagle V's envelope with 3 layers of 0.45 mil clear polyethylene, which would have little effect on the helium
- First successful transpacific flight from southern Japan to California
- 5768 miles in 84 hours and 31 minutes (3 days and 12 hours) from November 10-12, 1981
    - At the time, this was a new distance and duration record by about 2,000 miles
- Double Eagle V reached altitudes between 6,000 and 22,000 feet but never attained maximum jet stream speeds
    - Maximum speed of 110 miles per hour, average of 65-70 miles per hour
- Publicity was not as great for this flight, in part because the Space Shuttle made its first flight earlier in 1981.

Fun fact : 6000 pounds (3 tons!) of ice buildup on their envelope served as unintended ballast and kept them from achieving their intended altitude.

Airplane flying by them while they were in flight (Quantas) noted the ice on top of the balloon and radioed the balloon crew.

2015, Two Eagles: Troy Bradley and Leonid Tiukhtyaev

- Successfully challenged Double Eagle V for transpacific flight record
- 6656 miles in 160 hours and 37 minutes (6 days, 16 hours, and 37 minutes) from Saga Prefecture, Japan to Baja coast of Mexico
- Broke records for distance travelled and duration aloft in a gas only balloon.
    - Record for duration aloft had been set by DEII in 1978.
    - Record for distance travelled had been set by DEV in 1981.
- Straight gas balloon with a 7 feet long, 5 feet wide, 5 feet tall (with dome for standing) gondola, weighing only 220 lbs.
    - The goal was safety and efficiency, while sacrificing comfort in their attempt to set a new record
- Set new Pacific distance record (going further) and duration record (staying in the air longer)
- The essential weight was 1475 lbs and they set the gross lift weight to be 14,500 lbs on the first after reaching 15,000 feet
    - They carried 11,500 lbs of ballast, with each bag at 40 lbs. Each
    - Max duration based on ballast was 10 days
    - Transcontinental (cross country) flight

Fun fact : Troy Bradley is currently the lead pilot for ***Rainbow Riders*** in ABQ.

1980, Kitty Hawk: Maxie and Kris(tian) Anderson

- Intended to travel from California to North Carolina but ended up in Canada's Gaspe Peninsula
- 3,100 miles in 99 hours and 54 minutes (~4 days and 4 hours) on May 8-12, 1980
- Traveled across 9 states and 2 Canadian provinces

Around-the-world flights

1981-1982, *Jules Verne*: Attempts by Maxie Anderson and Don Ida

- First to attempt around-the-world flight. Used a hot air/gas (Roziere) balloon.
- 3 attempts between 1981 to 1982 departing from Egypt (2,673 miles), India (20 miles), and South Dakota (1162 miles) but unsuccessful
- Anderson died along with Don Ida in 1983 while ballooning over Germany
    - They didn't want to land in East Germany or Czecholslovakia so he tried to release the gondola from the balloon when it touched down. However, the explosive bolts failed to fire, the balloon rose again and when the explosive bolts did fire, he and Ida fell to their deaths.
- The Jules Verne gondola was built around the core of the transcontinental *Kitty Hawk* gondola to save money
- Roziere balloon: Small tent helium cell at the top and a central helium cell, all encompassed in a hot air cone
- The heat from the burners warms the air surrounding the helium cell at night, avoiding the problem of helium contraction and loss of lift.
- This method is more efficient than ballasting and removes the limitation on time around how many bags of ballast is brought on-board.

1992, Attempt by *Earthwinds* Hilton

- Around-the-world attempt with a very novel design: two balloons, the top one filled with helium and the bottom one pressurized with air
- First attempt was 31 minutes; subsequent attempts encountered equipment failures and weather problems
- Though unsuccessful, provided a lot of insight to future balloon designs

1999, *Breitling Orbiter 3* : Bertrand Piccard and Brian Jones

- First successful around-the-world (transGlobal) flight from Chateaux d'Oex, Switzerland to Mut, England on March 1-20, 1999 in a hot air/helium (Roziere) balloon. Certified by the Federation Aeronautique Internationale (FAI)
- Piccard is the grandson of Auguste Piccard.
- Used a Cameron built Roziere hybrid balloon and a pressurized gondola. The pressurized cabin concept was invented by Piccard.
    - Envelope: Nylon fabric wielded to a helium-tight membrane, with an outside protective skin with aluminum on both sides for improved thermal control
    - Envelope held 650,000 cubic feet and was 150 feet tall
- Named after Roziere who experimented with gas and hot air balloons back in the 1790's. His were dangerous, however, because of how he had to heat the air.
    - Roziere was the first death by ballooning when he died in a crash.
- Max speed of 120 miles per hour; maximum altitude of 38,500 feet

2002, *Spirit of Freedom*: Steve Fossett

- Five previous attempts, successful on the 6th attempt
- 20,626 miles in 355 hours and 50 minutes (14 days, 19 hours, and 50 minutes) from Northam, West Australia to Lake Yamma Yamma, Australia on June 19-July 4, 2002
- Envelope: 108 feet in diameter; 572,000 cubic feet of helium, 100,000 cubic feet of hot air
- Did not qualify as a round-the-world flight because he only flew around Antarctica in the southern hemisphere

Balloon Museum Reference Document

Balloon Museum Reference Document

Arctic Air – Commemorating the flight of S.A. Andree

The Balloon Museum Exhibit

1st Section of the exhibit

- Looks like an 19th Century study where they planned for the flight to the North Pole
- Andree wanted to use a balloon to try and fly over the land/water obstacles that had been making the trip so perilous.
- Prior to the 1st trans-Atlantic flight, the goal of adventurers had been to either fly high or to fly to the most remote locations on Earth.
- The North Pole was one such location and the goal was "polar exploration".
- Gallery shows pictures of the three men – Andree, Strinberg and Frankel, and the women in their lives
    - Andree's mother; his mistress Gurli Linder – a feminist and governess
        - Linder was married and considered divorce but her married status probably appealed to Andree who likely considered marriage to be an obstacle for his ambitions.
    - Strindberg's fiancée – Anna Charlier.
    -

(See map of Sweden and the North Pole on page 113)

2nd Section of the exhibit

- The Balloon House - The thing they used to build the balloon used for the flight.
    - Built on *Dane's Island* (1000 mi N of northern tip of Sweden), so they could start as far north as possible.

3rd Section of the exhibit

- The trip itself
    - Total flight would have been less than 800 miles to the north Pole. Plan was to fly over the north pole and then land near the Bering Strait on the other side – maybe a distance of at 1500 miles in the air and up to 30 days.
    - They were forced to land after flying less than 3 days and about 300 miles.
    - They planned to walk east to Cape Flora but ice on which walking flowed in opposite direction of their walk so they actually ended up west of where they started. Ended up on White Island which was about as far south from the North Pole as they had started.

- All three died not long after getting to White Island. Their remains, and the remains of their campsite, were found 33 years after the attempted flight.
- Strinberg was likely killed by a Polar Bear and then buried by the other two.
- The other two died but the cause is not specifically known.

4th Section of the exhibit

- This area is dedicated to the discovery of the expedition's remains 33 years after the flight took place.
- This final area begins with a large picture showing the mass turnout in Stockholm Sweden when the remains of three explorers were returned in 1930.
- The remainder of this area contains news and magazine articles, as well as books and a movie that were made about Andree's expedition.
- At the end of the hall on the right wall is a poster from the 1982 theatrical movie that was made about this flight – *Flight of the Eagle*.
    - The movie starred Max Von Sydow. Besides recounting the trip, it also dramatized the relationship between Knut Fraenkel and the loyal fiancée he left back in Sweden.
    - While the movie may have over-dramatized Fraenkel's romantic relationship, his fiancée Anna Charlier actually did wait more than 13 years before marrying an Englishman. When she died, her heart was buried with Fraenkel back in Sweden as she had specified in her will.

Expedition Participants

Andree, Solomon August (S.A.)

- Mechanical Engineer, physicist and arctic explorer
- Born 1854 in *Gränna* Sweden. Died in 1897 at age 43.
- Graduated from Swedish Institute of Technology.
- Idea for ballooning across Atlantic came to him on cruise across Atlantic to America at age 22 while reading a book on balloon currents.
- Studied with and inspired by American balloonist **John Wise** who made over 400 balloon trips. Andree later claimed that he had flown with Wise in one of his balloons. That account is disputed. Andree met Wise at the American Centennial celebration in 1876.

    - Wise also dreamed of crossing the Atlantic in a balloon and even thought about ballooning to the North Pole. Although he did not publish an article on this until later, the subject may well have been discussed when he met with Andree.
- Returned to *Gränna* from America. Consumed by dream to fly in a balloon.
- Mother supported him and was devoted by Andree. Father supported him but died when Andree was 17.
- He got enough money for his own balloon , eventually making 9 flights
- His first flight in 1893 made him famous when he flew from Sweden across he Baltic Sea to Finland
    - He was lost for a day and that became national news
    - It was Andree's 1st taste of publicity and some say it led to his downfall
- He took last flight in his balloon in 1895 then 2 years later flew in the Ornen on the ill-fated trip to the North Pole.

Andree's 1895 Speech That Convinced His Financial Backers

Factors in favor of their flight to the North Pole included in Andree's speech to the Swedish Academy of Science in 1895.

Andree took a copy of this speech with him on his flight in 1897. The speech accomplished Andree's goal of obtaining financial support, including winning over Alfred Nobel, who had earlier disagreed with Andree about the flight's likelihood of success.

- Because of **perpetual light in the north** at that time of year, they did not plan to have to come down each night when it got dark.
- Also, there would **not be much temperature variation** so there would not be significant cooling and warming of the gas each day.
- **No vegetation** so the drag lines will not be in danger of snagging
- **Little electrical activity in** the North – no thunder or lightning to endanger the balloon
- **Little or no snowfall** in the North so no worry about heavy snow accumulating on the top of the balloon envelope.
- **Gale wind force is very rare** in the North in July.

Nils Strindberg

(Beginning page 73 of the PDF – *Record of a Tragic Adventure*)

Nils Strindberg – a university trained theoretical scientist, was primarily the photographer and meteorologist for the trip who trained as a balloonist for the mission after being selected. He was also the first to die, perhaps having been killed by a polar bear. He was also scheduled to fly with Andree on the 1896 attempt.

- Strinberg was the second man chosen to accompany Andree, after an older scientist, and Andree mentor, Dr Nils Ekholm. Strinberg was Dr Ekholm's assistant. Ekholm and Strinberg accompanied Andree on the first failed attempt in 1896 but Ekholm was replaced by Fraenkel for the second attempt in 1897.
- Strinberg helped test the drag lines that Andree wanted to use for steering.
- He designed the camera and tripod specifically for this mission.
- Strinberg was also a violinist and had a violin with him.
- His pictures were developed after their remains were found in 1930. Along with the journals, it formed our knowledge of their trip.
    - The perpetual light of the North was great for photography.
    - A darkroom was in the lower portion of the balloon gondola.
- Strindberg's relationship with his love and fiancée, Anna Chartier, was dramatized in the 1982 movie **"Flight of the Eagle"** starring Max Von Sydow.
    - Movie itself used dramatic license and focused on Strinberg and Chartier. But the balloon itself was built to be very true to history. In fact, a visitor to our balloon museum said that he helped build the netting for the balloon used in the movie.
- Anna Charlier waited for 26 years for Strinberg to return before marrying a school teacher and settling in Concord, Massachusetts. When she died, she had arranged for her heart to be removed and buried along with Nils back in Sweden.
- Strinberg, like Fraenkel, went to Paris in 1896 and made 6 balloon flights. I don't believe that he ever flew with Fraenkel, however

Knut Fraenkel

Knut Fraenkel was the "muscle" of the mission and main rifleman.

- Fraenkel replaced Dr Nils Ekholm who had accompanied Andree for his attempted flight in 1896 but decided not to try again thinking that the plan to fly entirely across the North Pole was not realistic given how long they could expect to have enough gas to remain in the air.
- Fraenkel applied to Andree in person and was accepted on the spot over many other applicants. ***Note***: Andree would only allow Swedes to accompany him.
- Fraenkel was not a physicist or meteorologist, but he was strong and enthusiastic and an experienced outdoorsman.
- Fraenkel, like Strinberg, made 7 balloon trips near Paris in the year before the 1897 flight. I don't believe that he ever flew with Strinberg, however.
- However, Fraenkel, like both Andree and Strinberg, did not have any experience in arctic hunting or sub-zero existence.

Two Attempts – 1896 and 1897

The Goal of the Expedition

- In 1896, Andree led the first serious balloon expedition to try and reach the North Pole
    - Funded by King Oscar II and Alfred Nobel.
- He planned to use a gas balloon to fly over obstacles which were preventing access via the ground (ice, polar bears, etc.)
- The plan was not actually to land on the North Pole, other than very briefly to land and plant a Swedish flag, but to fly across and to land on the other side near the Bering Straits. The plan was for a flight of 15 days or less. However, they took provisions to allow for a trip of up to 4 months and planned for balloon to be capable of flying up to 30 days.
- The ability to steer the balloon (to be "derigible") was a requirement for the flight, hence the drag lines and sails.
    - The concept was for the lines to slow the balloon down, slower than the wind, which would then allow the sails to steer the balloon.
    - The idea of trailing ropes had originated with Charles Green earlier in the 1800's and Andree had accidentally seen the effects of dragging ropes during his first flight to Finland in 1893. When his balloon headed out to sea, he dropped guide ropes into the water and noted that it slowed the balloon down. He then hypothesized that with the addition of sails, he might be able to steer the balloon, as long as the drag ropes were able to touch the surface.
    - The gondola was round, not square, in order to facilitate steering

Note: Charles Green had invented the use of the trail rope earlier in the 1800's. The rope was designed to keep a balloon at a low altitude. Andree took it a step further to try and use it to steer his balloon.

Note: Year's later the theory and practicality of using drag lines to steer a balloon was tested and deemed not feasible. So even had the drag lines not broken upon liftoff, they likely would not have worked.

Flight would cost $38,000 USD which was very cheap compared to say Peary's quest for the North Pole which is said to have cost over a million dollars.

The Balloon – the *Ornen* (Eagle)

- Balloon was built and housed in Spitzbergen, on Danes Island north of Sweden, including building of equipment and hoses to produce hydrogen.
    - This was all built and tested first in Paris prior to the 1896 attempt.
- Suphuric acid and iron filings for making hydrogen were transported to Danes Island prior to preparations for the flight on Danes Island.
    - ***Note*: This became the first, furthest north "gas filling station"**
- Balloon was named the Ornen (Swedish for "Eagle")
    - A model of the Ornen is in the museum
        - 3 levels 1: Lowest, enclosed to protect from the elements
          2: Observation deck above level 1
          3: Area above which held tools and other supplies
    - It had sails supposedly to help it steer
    - It had 3, 1000-1200' drag lines to assist with low level flying by dragging on the ground as a type of rudder.
        - 2/3^{rds} of the drag ropes were lost when it took off after the premature detonation of explosive charges that were designed to be used only in an emergency. The rest of the ropes were abandoned as ballast.

Supplies. The Ornen contained a large amount of supplies.

- Food for over up to 4 months
- 1 fur sleeping bag intended for lower compartment – 1 man sleep at time
- "**Concentrated nourishment**" said Andree about the bullets they had for guns. They considered polar bears "**wandering butcher shops**"
- Photographic supplies, guns, maps, books, navigational instruments
- 36 carrier pigeons intended to be able to take messages back to Sweden.
    - Only one carrier pigeon post was ever received.
- 12 polar buoys – almost like a message in a bottle that were sent afloat
- Lemon lozenges to prevent scurvy
- 55 lbs of chocolate cake and a "considerable" amount of wine!
- 2 sleds and a canvas boat
- Floats to be used if balloon forced down in water. They would be able to release the balloon and float in the water like a boat.

- All items on board were marked with either "Andree's Polar Expedition 1896" or AEE's PEX 1896""
- Andree's name was also stamped under the wing of each carrier pigeon.
- A unique cooking stove suspended beneath the gondola and connected by tubes. This allowed a fire to be made but not to endanger the hydrogen in the balloon envelope.

June-Aug 1896 – 1st attempt

- Andree, Strinberg and Dr. Nils Ekholm were prepared to take the flight in 1896 but the weather never allowed them to get off the ground. The time window for making the flight was small due to the extremely short summer season (June July) in the north.
- 50 men set out from Sweden on the vessel "Virgo" on June 12, 1896.
- Delays began when their trip from Sweden to Danes Island was delayed because of ice flows and they had to maneuver south to get around it. They did not get to Danes Island until June 21st.
- By the time all construction of ***The North Pole*** was completed and they were ready to fly, it was July 27th, and the winds had become unfavorable. Also, winds from the south were very weak. The balloon was inflated but by early August, the winds had not allowed them to take off. Even if they had, gas had escaped which would have reduced their ability to fly by over half, down to just 15 days.
- Flight was cancelled on Aug 15th when Andree sent 8 carrier pigeons telling of the decision to cancel.
- The Virgo returned to Gothenborg Sweden on Aug 29th.

June 11, 1897 – second and final attempt

The Flight of the Ornen - summary

- Even though their first effort had to be postponed, and the second balloon was found to be leaking helium, they took off on July 11, 1897. More recently, Andree is not as well respected because of his decision to fly knowing of the problems and with his inexperience in flying balloons in those conditions.
  - A man who cut the line to let them rise is reported have said "Oh Hell" when he cut his finger doing so.
  - Andree supposedly leaned over the side and said "Hell? That is where we are going."
- Shortly after takeoff, they lost 2/3rds of each of their trailing ropes which had been intended to be used for steering. Andree had fashioned explosive devices in each rope which could be detonated to release a rope if it became entangled

or caught on the ground/ice during the flight. All three explosives detonated after take-off.

    - Another theory is that each rope contained a connection like a screw and that as they took off, each rope spun and disconnected the screw.

- The Ornen vanished shortly after takeoff
- 1930. A Norweigan ship, the **Bratvaag**, found the remains of the crew and their final camp on White Island in the Arctic Ocean - less than 300 miles east of where they began.
    - They found journals which described the trip and also some picture negatives. Many of those pictures are in the museum. Lindstrom was a photographer and the lower level of their gondola was secure enough to be a darkroom.
    - The path of the Ornen was determined from the recovered journals.
- The had made it 1/3 of the way to the North Pole in less than 3 days when they were forced down on ice about 200 miles from land.
- They tried walking back to land but it was very slow because of the gear they tried to bring along, and because the ice flows on which they walked were flowing in the opposite direction.
- Strinberg died, possibly from a polar bear attack or from a heart attack, shortly after they finally made landfall on White Island after travelling over two months on the ice. His unmarked grave was found by a second search of White Island, a few weeks after the first one made its discovery.
- The cause of death of the other two, also shortly after landfall, is only speculation because their remains were cremated upon return to Sweden so no autopsy could be done.
    - However, there is some evidence that indicates they may have succumbed to intestinal disease perhaps caused by ingested polar bear meat. A polar bear was discovered at the site where the remains were found and parasites were found in the polar bear.
    - They also did not take all of their food provisions with them after landing indicating that they may have been suffering from extreme diarrhea.
    - Another thought is that Andree and Fraenkel may have died from carbon monoxide poisoning from their stove.
- The adventurers remains were treated as heroes when they arrived back in Sweden in 1930.

The Flight of the Ornen – summary from Putnam's book

- Homecoming after the failure of the 1st attempt was very difficult for Andree, but his financial backers almost all agreed to finance a second attempt.
- The size of the balloon was increased and enough gas was planned to keep the balloon aloft for 6 weeks.
- Swedish govt offered the use of the Swedish Naval vessel *Svenskund* to take them back. They met with the original vessel – The *Virgo* – just before getting to Danes Island and the Virgo took them all the way in.
    - ***Note***: The **Svenskund** was the same vessel that returned their remains to Sweden 34 years later.
- Dr Ekholm disagreed with Andree about the margin of safety needed for the balloon to stay in the air so he did not go on the 2nd trip, and was replaced by Knut Fraenkel.
- Andree's mother died in April 1897, just before the 2nd attempt. While he still wanted to make the 2nd attempt, his enthusiasm had been almost completely diminished by the failure of the 1st attempt and then by the death of his mother.
- 2nd expedition left for Danes Island in May 1897. Very little fanfare for their departure, unlike the send off given them for their first effort the year before.
- They found the building they had made the year before, along with the gas making apparatus to be salvageable.
- The 2nd expedition left on July 11, 1897.
- Pigeon Post. A Norweigan fishing boat found a carrier pigeon 4 days after they left, but they killed it and threw it in the water. They later determined that it likely came from Andree and went back and miraculously found it in the water. It contained the following message from Andree …
    - "*July 13. Good speed eastward. All well on board. This is the 3rd pigeon post.*"
    - This was the only pigeon post from Andree that was ever recovered.
    - Their experiment with pigeons on the 1st attempt in 1896 had basically failed so Andree had little expectation with the 2nd attempt.
- Polar buoys. Andree released at least 6 of the buoys during the first few days of the flight. They were found over the course of the next years, one as late as 1912.
- Rumors began to circulate almost right away of sightings of Andree's crew and the mystery of what became of them grew into a worldwide fascination. Bogus balloon sightings and even supposed letters from Andree himself were touted.

- Any sighted carrier pigeons were in danger of being shot in hopes that they carried a message from Andree.
- A grave was found in Labrador in 1908 purported to be Andree's. It turned out to be the grave of another man named Andre.
- They were also purported to have been killed by Eskimos frightened when they saw the "great white house" in the sky.

Discovery of remains in 1930

- Two harpooners were seeking food on White Island and came across a rusty tin can at a place where there should have been no sign of any type of civilization. They searched further and found the remains of a boat with words painted on it: "Andree's Polar Expedition 1897".
- 1930 was very mild, and the ice flows were manageable so there was a great deal of search for Andree's crew.
- Andree's last camp was found on August 6, 1930 by men of the Norweigan sailing ship **Bratvaag**
- On Aug 23rd, the discovery hit the world's newspapers.
- The artifacts, remains of the crew and other odds and ends were finally transferred to the Swedish ship **Svenskund** and the vessel arrived back in Gothenborg harbor on Sept 27, 1930.
- The *Svenskund* continued on to Stockholm to a heroes welcome. Crowds lined the shores as the ship sailed and flags were at half mast.
- King Gustaf of Sweden was the first to board the Svenskund. He said:

> "*I hail the dust of these polar explorers … Peace be with their memory.*"

The Record of the Tragic Expedition is Revealed

(pages 222-239 of Putnam's book)

- Initially, the diaries found were illegible due to age and decay. However, later 4 diaries of Andree were found packed in straw and wrapped in oilcloth, and strapped to Andree's back. This was his last act to try and preserve a record of their expedition.
- Strinberg's and Fraenkel's diaries did not have much information from the trip, just meteorological data and also some records of the 1896 attempt by Strinberg, along with love letters from Strinberg to Anna Charlier.

The following story of the flight is very indefinite, pieced together from what could be read in the diaries of Andree and also of the artifacts that they found.

- Almost immediately upon taking flight, they lost 2/3rds of each of their drag lines and Andree knew the significance. But he decided to continue flying anyway. The pressure to continue was enormous.
- All went well on day one after initially touching down on the water, but they released ballast and gained altitude.
- On day 2, the wind shifted and they no longer were flying north. They managed to avoid disaster when a fire started from their cooking device below the gondola.
- The weight of ice forming on the envelope and the loss of gas brings the Ornen lower to the ice and it continues bouncing and dragging on the ice.
- On July 14th, barely 60 hours into the flight, they decide they cannot remain in the balloon any longer. They calculate that they are 200 miles or so from home and they plan to make that trek back. However, they tried to make their way eastward rather than straight back to Danes Island. To do that, may have meant to admit ultimate defeat for a second time.
- As they walked east, the ice flow drifted to the west, however. After 13 days, they abandon their march east and decide to try and head back to Danes Island. Based upon their latitude and longitude measurements, when they stopped going "east", they were actually about 60 miles "west" of where they had abandoned their balloon.
- On Sept 17th, they sighted **White Island**. They celebrated with a meal of seal steak, liver and wine as their ice drifted toward the island.
- Before reaching White Island, their initial shelter (their "Home" as they call it) is destroyed when the ice beneath them breaks up. They lost much of their provisions and were cold and wet from having to dive into the water to retrieve what they could.
- October 6th: "**Resignation**" is the last entry in Strinberg's diary.
- Strinberg apparently died first because his body was found partially buried.
- It appeared from the camp remains that they had died not long after they reached White Island and set up camp.
- After Strinberg's death, Andree and Fraenkel tried to begin the walk back towards Danes Island. But the effort was too much and they returned to their camp and to the grave of their friend. The camp had been partially destroyed by a storm and they apparently resigned at that point to die.
    - Fraenkel wrapped himself in his sleeping bag.
    - Andree propped himself up against some rocks.

Balloon Museum Reference Document

Additional Information

Andree is often misunderstood

Note : Andree was not the totally reckless, unprepared adventurer that some articles portray him to be. Wikipedia is NOT kind to Andree.

Solomon Andree was a scientist and trained balloonist. Before lifting off on the eventual trip, he had thought long and hard by himself whether to go or not, but was under enormous pressure to do so – by the Swedish govt., by the public and even by Strinberg.

They had provisions and supplies with them which demonstrated great preparation for the possible things they might experience.

Andree's concept of using the ropes below the gondola to control altitude and even allow some steering, in combination with the fixed sails, had been successfully tested by Andree and Strinberg. However, they lost 2 of the three trailing ropes on liftoff which immediately made them over 1000lbs lighter and forced them to go up much higher than planned right away.

Andree had fashioned explosive devices in each rope which could be detonated to release a rope if it became entangled or caught on the ground/ice during the flight. All three explosives detonated after take-off.

- Another theory is that each rope contained a connection like a screw and that as they took off, each rope spun and disconnected the screw.

The Gränna (Sweden) Museum

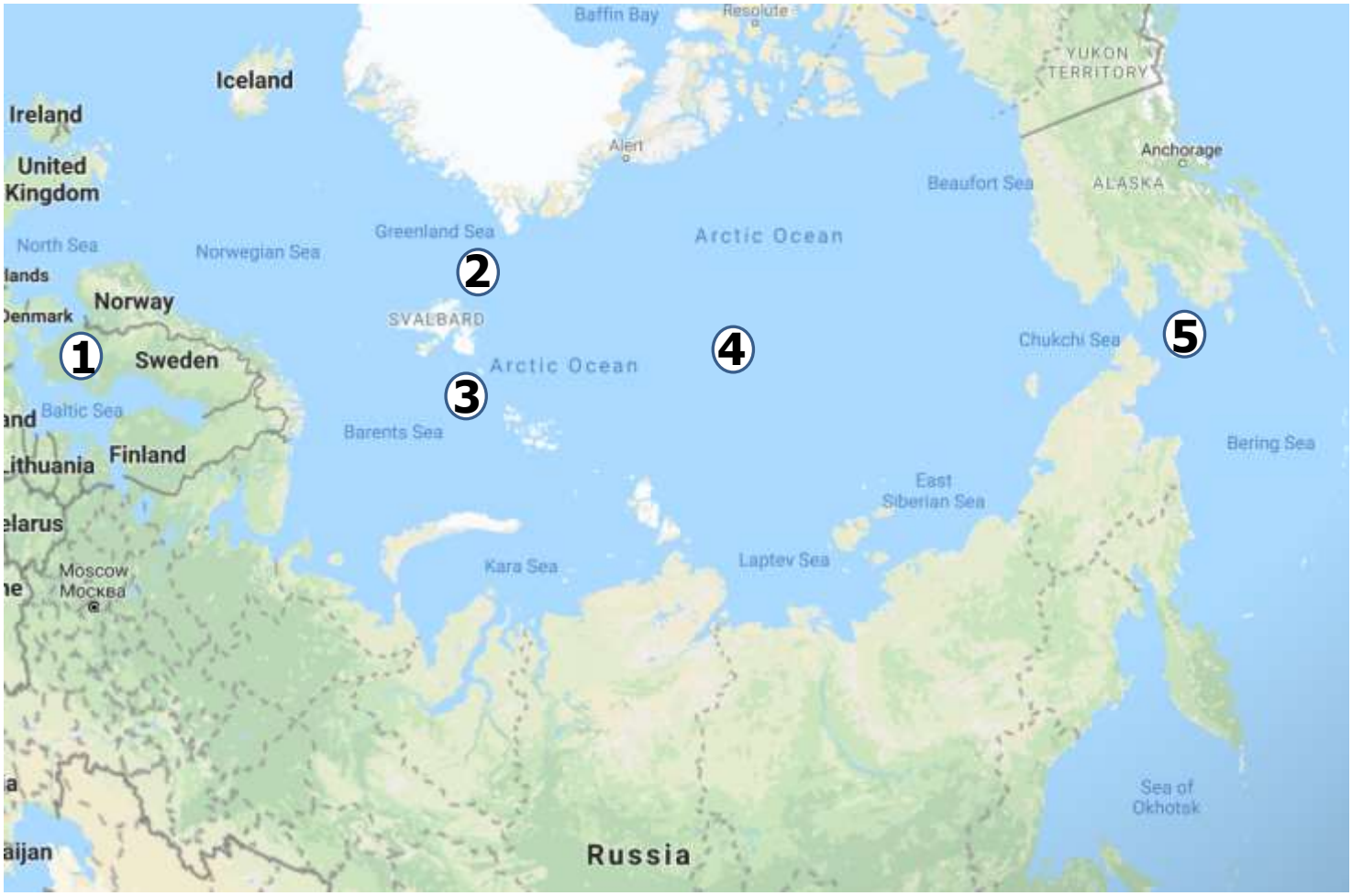
- A museum in *Gränna Sweden* is dedicated to the men and their trip. Our museum has worked closely with the Gränna Museum.
  - Original, actual artifacts from the expedition are in Gränna.
  - Our artifacts are examples of what the actual ones may have looked like.

Literary Record

- *The Record of a Tragic Adventure* by George Palmer Putnam in 1930
- PDF: https://babel.hathitrust.org/cgi/pt?id=uc1.$b276802;view=1up;seq=1

Andree's Expedition Path

- 1 – Granna, Sweden – Andree's birth place
- 2 – Dane's Island (Danskoya) – Where the expedition began
- 3 – White Island (Kvitoya) – Where the expedition ended
- 4 – The North Pole
- 5 – The Bering Straits



Balloon Museum Reference Document

Who was the 1st to reach the North Pole

Robert Peary was first to reach the North Pole in 1909

Artic Air Exhibit Presentation Tips for Docents

- Start by asking where visitors are from
- (Optional) Greet your visitors in their native language
    - See *Balloon Museum Reference* document, Appendix II
- Gather visitors at entrance to Exhibit and provide a brief overview of what they are going to be seeing – the four parts of the exhibit. This is also a convenient area for people to sit.
    - Area #1: The Library
        - This room is an approximation of a 19th century library. It contains biographies of the participants, artifacts from that period of time and an interactive map.
    - Area #2: Construction of the Balloon
        - Pictures on the wall show the balloon house which was built on Dane's Island.
        - A pretty accurate replica of the actual balloon is displayed.
        - There is also an example of a portion of the drag ropes that Andree thought would be crucial to being able to control the direction in which the balloon floated.
    - Area #3: The Journey
        - This area begins with a timeline of the timeline of the trip displayed on the wall to left as you enter.
        - You then enter a room which has actual pictures taken by one of the three explorers.
        - There are also some examples of the types of tent and tools that they may have used on this trip.
    - Area #4: The Discovery
        - The final area begins with a large picture showing the large turnout in Stockholm Sweden when the remains of three explorers were returned in 1930.
        - The remainder of this area contains news and magazine articles, as well as books and a movie that were made about Andree's expedition.

- Area #1: The Library
    - Note the pictures and biographies of the three explorers as well as the women they left behind.
    - Demonstrate how to use the interactive exhibit so the visitors can return and use it later if they wish
    - Before exiting the library, note the pictures on the wall to the right of the exit. These show the primary financial backers of the expedition, including the King of Sweden and Alfred Nobel (of the Nobel Prize).
- Area #2: Construction of the Balloon
    - Point out the pictures of the balloon house and the information about how the hydrogen for the balloon was created.
        - Note that the balloon house was left behind and mostly intact from the aborted attempt the year before.
    - Point out the balloon display.
        - Note the three separate levels – middle for use during flying and observations.
        - Top for storage of expedition supplies
        - Bottom for sleeping
    - Note first the display showing an actual example of what the drag ropes looked like.
        - Then explain why Andree thought the ropes would enable him to control the direction of flight.
        - Look at the picture on the wall that shows the balloon taking off with all three drag ropes still attached.
        - 2/3rds of each drag rope were lost immediately after lifting off because of the premature detonation of charges which were designed for use in an emergency.
- Area #3: The Journey
    - Note the long wall mural that shows the actual flight of the Ornen (balloon).
    - Most notable is how the balloon went up quickly right at the start because it lost 2 of three drag ropes.

    - Then point out how it actually spent most of the short, 3 day flight flying low to the ice and bobbing up and down off of the ice.
    - You then enter the room where you see pictures on the wall taken by Nils
- Area #4: The Discovery
    - Use the large picture at the beginning of the hall to tell a the story about the discovery of the remains over 33 years after the expedition took off and their return to Sweden
    - Point out the movie poster for *Flight of the Eagle*. It starred Max Von Sydow in the title role. Critics said that it overly dramatized the relationship between Fraenkel and the loyal fiancée he left back in Sweden.
    - While the movie may have over-dramatized Fraenkel's romantic relationship, his fiancée Anna Charlier actually did wait more than 13 years before marrying an Englishman. When she died, her heart was buried with Fraenkel back in Sweden as she had specified in her will.

Balloon Museum Reference Document

Solar Ballooning

- From Ghost Ranch NM to Oklahoma
- This area is not normally highlighted when giving tours to students

FAVIA – First Air Voyages In America

- Commemorates Blanchard's voyages in the U.S.
- Also includes information about other balloon innovations and air voyages
  - That's why they also have airplanes in this area
- Model of a Civil War "Aircraft Carrier"

Amanda's Presentation on 2/21

- FAVIA display area started in 2016 – 225 anniversary of 1st hot air balloon flight in the U.S.

1st areas on left as you enter

- 1784, June - 1st U.S. hot air balloon flight (tethered) – 13-year old Edward Warren flew in Blandesburg, MD
  - Ended in a crash but Warren survived
  - Traumatic for people who witnessed and it stopped hot air ballooning
- 1793 - 1st successful U.S. hot air balloon flight (untethered) - Jean-Pierre Blanchard
  - Blanchard had been first to fly over English Channel and had many country 1st flights to his credit
  - Lifted off from a prison yard in Philadelphia for security
  - He charged $100 for spectators but many watched from outside the prison walls
  - He flew across the Delaware River
  - Attended by George Washington, Thomas Jefferson and John Adams
  - Spectator handed him a dog as he took off

Next areas

- **John Wise** and **Thaddeus Lowe**
  - Made improvements to balloon design as they also made money as entrepeneurs flying balloons in shows
    - Invented the rip panel. Allowed the balloon envelope to be quickly deflated upon landing preventing it from being dragged along the ground.
    - Wise said to be one of the 1st to recognize the effects of the jet stream, running west to east high in the atmosphere

- Union Army Balloon Corps
    - **Thad Lowe** won a competition to be the 1st general of the Army Balloon Corp for President Lincoln
        - **John Wise** was actually the first "Chief Aeronaut" of the Union Army but he was replaced by Lowe after Wise's observation balloon was accidentally destroyed during the *Battle of Bull Run*.
        - Lowe invented the "water gas" process for creating large amounts of hydrogen gas from steam and charcoal
    - Competition was with 4 others, including John LaMountain
    - Reference book: *Lincoln's Flying Spies*
- Display of the 1st aircraft carrier – used in Civil War to launch a balloon
    - Developed by Thad Lowe's Union Army Balloon Corps
- **John LaMountain** was another ballooning pioneer at the same time of Lowe and John Wise.

Note: See also the section **Ballooning in America** in this document for more information regarding balloons used in the Civil War.

Next areas

- The development of airplanes – heavier than air flights
- Early wood airplanes by the Wright Brothers in 1903
    - Santos Dumont is thought to be 1st by people of Brazil
- Then the transition is made to metal
- TWA became the first to transport people across the U.S.
- Dick Rutan – 1st round the world flight w/o refueling

Next areas

- Transition back to balloons
- High Altitude ballooning – who could go the highest
    - August Picard set early records in the "Century of Progress"
    - Display of a high altitude balloon
        - Initially it looks kind of funny since there appears to be only a smaller balloon at the top and a long envelope below
        - This was because the balloon would expand as it got higher and eventually fill out the entire envelope
- Hot air balloon rebirth due to Ed Yost's invention of the portable propane burner
    - Hot air was better for quicker, less expensive launches so it helped usher in the era of sport ballooning

Balloon Museum Reference Document

Balloon School

- Balloon gondola picture area
- Excursions over Europe
  - They took balloon flights over European sights and served gourmet lunches
- The GRAPE – Karen Brown's balloon
  - Show and talk about the elements of present-day recreational balloons
- Balloon flight simulator
  - 3 screens show what you do as you try to control the flight of a balloon and land on a target
  - Have one person in the balloon operating the controls as another helps by watching the screen
  - You can control running the burner to heat air and increase altitude
  - You can control the release of air to lower the balloon
  - You can control direction by watching where the air flow direction is and raising or lowering the balloon to the correct height
  - You are given individual scores and a total score based on how well you do

  Tips :
  1. Ascend to 340' in for winds to take you left toward the target.
  2. Try not to use the rope on the left to descend. If you don't go up too high (over 375'), you should be able to descend slowly and drift towards the target.

- Balloon numbering
  - AA = gas balloons
  - AX = hot air balloons with varying size volumes
    - Ex: AX1 might be 80-90,000 cu ft
      AX2 90-100,000 cu ft
      Etc.

4D Theater

Instructions for manually running just the 3D movie

- To turn off the system
  - Hit **Please Exit** and click **Work Lights On**
  - Make sure that the **Countdown Numbers** to the next showing is off.
- Seat the people
- Wait for the people to get seated
- Click **Work Lights Off**
- Hit **Put On Glasses**
  - This starts up the program
- When light come back on, hit **Please Exit** and restart cycle
- Repeat for the next group

Balloon Museum Reference Document

Hall of Fame

Start at the end closest to the Main Hall

1st Section – History as told by the HOF inductees

HOF History

- HOF was created in 1995 conjunction with the FAI – the Federation Aeronautique Internationale.
- 2 people per year are inducted – one living, one deceased.
    - Multiple inductees were selected in 1995 to get this started.
    - Montgolfier Brothers – the first inductees
    - Per Lindstrom – the most recent inductee. First to flyacross Atlantic and Pacific with Richard Branson in a hot air only balloon.
- The HOF takes you through the history of lighter-than-air flight by relating the accomplishments of HOF inductees
- Quad A (AAAA) – Albuquerque Balloon Club
    - *Top Gun* award – given based on a year-round NM competition
- Federation Aeronautique Internationale (FAI) – HQ in Lusanne Switzerland

Elements of Section I

Prior to the Montgolfiers

- Chinese made and flew balloons 1000's of years before
- 1705 – Brazilian Laurenco de Guzmas demonstrated a small balloon to the court of Portugal
- De Guzmas had plans to build a larger balloon and gondala but he was forced to destroy his research in fear of the Portuguese Inquisition

First Balloon Flights

- Pictures and text talk about the first hot air flights (the Montgolfiers), the first gas(hydrogen) flight – de Pilotre and the Count d'Arlandes, and the first English Channel crossing (Blanchard and Jeffries)
- De Rozier and Blanchard had a rivalry. This prompted de Rozier to come up with the concept of a combo hot air/hydrogen balloon (the Roziere)
    - De Rozier tried to fly the combo balloon across the English Channel but he failed and died in the attempt. However, the balloon did not crash because it caught fire.

Artifacts in Section I

- Burner display includes earliest version of burner by Yost in 1961.
  - Ed Yost is the "**father of the modern hot air balloon**" because of his invention of the propane burner to use to heat the balloon air.
  - Don Piccard is the "**father of sport ballooning**".
- Also includes another model developed by Tracy Barnes (the triangular one) who was a competitor of Yost.

Controlled / Powered Flight

- **Henri Giffard** – built and flew 1st airship in 1852. Flew it in a complete, but small, circle proving that **steering was possible,** due to powered air flight.
- Von Zeppellin developed airships for military use.
  - Duralumin invented which was lighter and used for the interior structure of the airships.
- **Jeanette Piccard** – picture of her because she was the first woman to fly into the Stratosphere
- Text describes the 4 women who are in the HOF

2nd Section – Celebrating Ballooning

- Talks about how ballooning has been talked about and celebrated throughout the world
  - A picture of the balloon field during Balloon Fiesta is on the wall
  - Glass case containing 3, black objects d'art
    - These are things that balloonists have collected and which have passed on down to the balloon museum
- Artifact display cases
  - Most show a comparison between an example of the old version and the new version side-by-side

3rd Section – Voyages of Discovery

- How balloons were used to explore and to learn new things
- One balloon flight, and accomplishment/innovation, builds toward the next
- Yost and Piccard's flight across English Channel in hot air only balloon.
  - Copy of the actual gondola is in a display case
  - Very small wood platform on which Yost and Piccard sat
- Interactive screen allows you to find out more about each of the 52 HOF inductees
  - This is available online as well from the FAI website. A website for the balloon museum is in the design phase.

Balloon Museum Reference Document

Weather Lab

Question: Why does a balloon museum have a section on weather?

Answer: 1 – Weather conditions are absolutely necessary to be known by balloon pilots

2 – Weather balloons are crucial to weather forecasting around the world

What makes weather? **Air**, **Sun**, **Water** … and **Terrain**

- This area describes the relationship between lighter-than-air ballooning and weather.
- The Sun is the most important factor in weather.

"Weather is the result of the variable reaction of the Earth to radiation received from the Sun."

During the ***day*** …

- Solar **Radiation**
  - Not affected by the atmosphere, Absorbed by and heats the Earth
- Earth **Convection**
  - Earth conducts warm air back into the atmosphere via convection

During the ***night*** …

- No radiation from the sun. Convection cools the Earth.
- Temps are cooler at night in dry/arid/desert areas, like NM, because there is generally less moisture in the air, like clouds, which absorb convection heat from the Earth. Since more heat is allowed to be released without that moisture, the ground cools more in dry areas.

Air composition

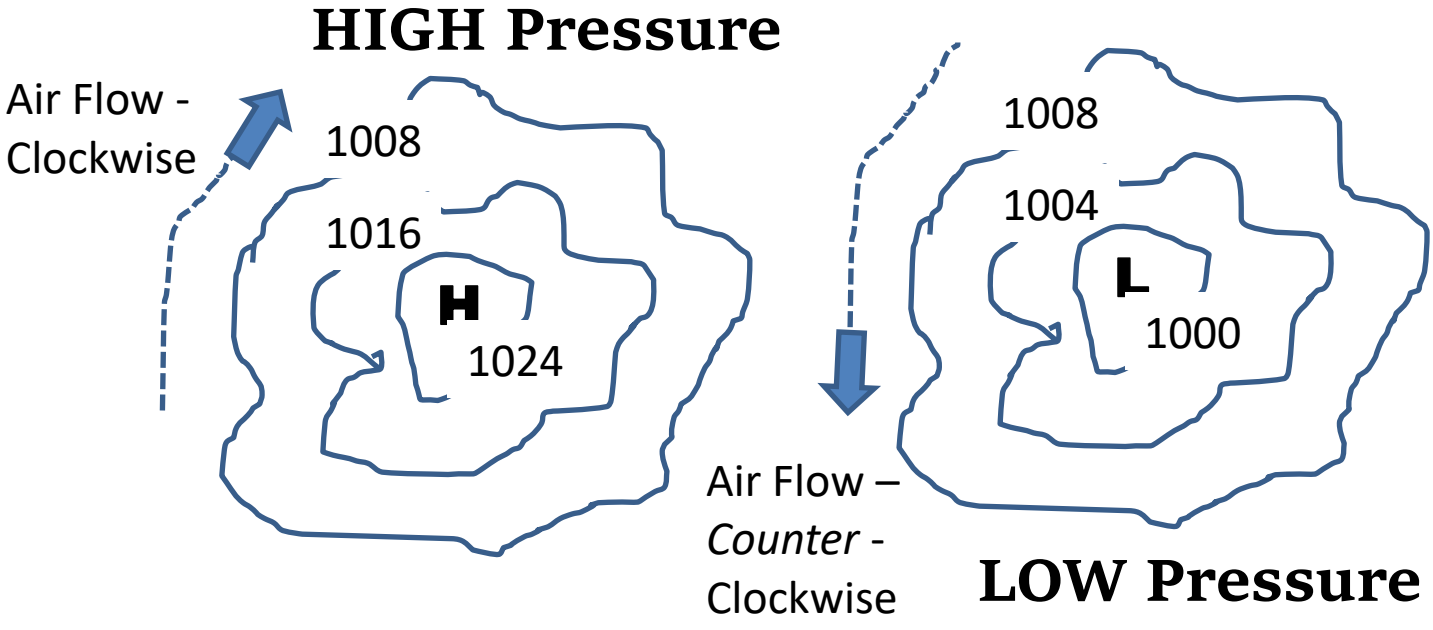
- 78% - Nitrogen; 20% Oxygen
- Carbon Dioxide, ozone and methane are the **Greenhouse Gases** found in air

Major Sections of the Weather Lab

The **SUN** is the <u>most important factor in weather</u>
and is centrally located in the Weather Lab.

I – Air Pressure

- Go to the large, wood mural
- This demonstrates the lows and highs of air pressure and the circulation
- Solar radiation is absorbed differently by different surfaces – water, sand, forest
- Winds are due to differences in air pressure
- Air has weight. Air pressure is caused by the density of air molecules.
    - Density is greatest near Earth's surface so air pressure is greater as well.
- Air Pressure: Typically 1000mb at the Earth's surface.
    - MB readings vary by how above nearest land the readings are taken, such as when above mountains, or in areas of higher elevation.
    - That is why all air pressure measurements are corrected to the "**mean sea level**" air pressure so the comparisons are consistent.
- ***Hand Boiler***. A demo device which shows that when you close your hand around the bottom of a beaker with liquid, the liquid expands and flows up and then begins boiling. Demonstrates concept of "**convection**"
- **Winds**. Air wants to move straight from higher pressure to lower pressure but rotation of the earth causes it to move in clockwise or counter-clockwise motion



Balloon Museum Reference Document

Low Pressure – COUNTER Clockwise winds

- Associated with more violent weather, storms, precipitation
- Air is rising from lower pressure to higher pressure
- Winds go COUNTER CLOCKWISE in the northern hemisphere

High Pressure – CLOCKWISE winds

- Associated with less clouds, less precipitation
- Air is rising from lower pressure to higher pressurep0l.pl
- Winds go CLOCKWISE in the northern hemisphere

I – Weather Balloons

- Example of balloon and older model instrument device is in square glass case.
- Balloons are now filled with Hydrogen. Helium is too expensive and increasingly rare.
- 100 balloons go up in the U.S. 2X/day (5AM and 5PM local)
    - Increases to 4X/day during hurricane season
- 1000 balloons go up all around the world incl. from ocean islands
- More go up during violent weather such as tornados, hurricanes, etc.
- Balloons are launched, rise and detect conditions with instruments, then the envelope bursts and it falls back to Earth with a parachute.
- Instrument device contains …
    - A thermometer (temperature)
    - A thermister (water content)
    - A barometer (air pressure)
    - A radio and battery to send info back to Earth

III – Clouds

- Clouds are formed with water molecules or ice crystals either **COLLIDE** or **COALESCE**
- Different types of clouds named for their shape and their relative elevation or rain content.
    - Cirro (streaks), Cumulo (heaps), Strato (sheets), Nimbo (rain)
        - Alto – very high as in Alto Cirrus
    - Ex: *Cumulo-nimbus*. Cumulo refers to cumulus clouds; Nimbus refers to containing rain.

How much do clouds weigh? Avg weight of a cumulous cloud is **1 million lbs**.

- Like 20-40 elephants.
- Think about how much a gallon of water weighs. (8.4 pounds)

IV – Precipitation

- Water needs a surface to condense upon – ***aerosols*** likes dust, clay, sea salt, etc.
- Big drops fall and when they crash into smaller drops, they cling together and form bigger drops.
- Snow is the only form of precipitation that stays frozen all the way from the cloud to the ground.

Dew Point

- The point at which air is 100% saturated with water vapor – 100% relative humidity.
- The higher the dew point, the more moisture that there is in the air, regardless of what the Relative Humidity may be.

Relative Humidity

- The amount of moisture in the air compared with the total amount of moisture the air can hold at a certain temperature.
- Since warmer air can hold more moisture, the relative humidity at higher temps is more uncomfortable.
- Ex: 100% RH at 30 degrees is much more comfortable than 100% at 80 degrees because there is much more moisture in the air.

V – Storms

- Lightning.
  - **Safest place to be is inside a car**. If struck, body of car will disperse the electricity
  - Most lightning flashes we see go up from ground to the clouds.
    - Electrical charge goes down from clouds but is not visible.
    - It bounces back and that portion is usually most visible to the eye
  - TV screen in this area slow motion displays visible lightning going up from ground

VI – The Albuquerque Box

- This area allows you to design your own balloon, place it on the big screen, and then see how it reacts in the Box.
- The Box is most apparent in the fall, but even then, it only is present maybe 1/3rd of the time.
- DRAINAGE WINDS. Typically, the flow starts from the north (higher elevation in Santa Fe) flowing south near the ground.
- Box most typically forms when a High pressure area is just to the east meaning that upper air is flowing more typically to the north

VII – Weather Satellite

- Sometimes area is missed – behind wall and hanging from the ceiling
- TIROS – Television and Infra-Red Observation Satellite
    - Realistic copy of the TIROS weather satellite hangs from the ceiling.
    - This 1st weather satellite was launched from New Mexico in 1960.
    - Only weather satellite to have cameras.
    - Only stayed in the air for 3 months.
- Modern satellites don't have cameras and stay in the sky for long time due mostly to their solar powered wings.

VIII – Fires

- Fires occur most often on dry, windy days

Balloon Museum Reference Document

Initial Series of Mandatory Volunteer Trainings

** - Indicates areas of specific volunteer interest to me

Field Trip Volunteer Orientation – 1/9/2019

Field Trip Programs

Regular Field Trips

- Tues & Thurs; beginning at 9 or 10AM runs to Noon
  - ** Gallery guides do their thing from 10:00-10:40 and again from 10:45-11:30
- 20-60 students
- Includes a Learning Activity and Tour

First Friday Fun Day

- 1st Fri of each month
- 50-100 students
- Activity Stations and Self-Guided Tours

Science in the Sky

- Monthly, 3rd or 4th Friday
- 100-150 students
- Exhibit stations within the museum – 8-15 minutes per station

Stories/Music in the Sky

- Weekly, each Weds
- Pre-K and Kindergarten

Montgolfier Days

- *Balloon Explorium* (group separate from Balloon Museum) works with schools to create tissue paper balloons
- Museum hosts three events per year at the museum

Website for more information about field trips

Hpps://www.cabq.gov/culturalservices/balloonmuseum/field-trips-group-tours-volunteering/school-year-field-trips

Balloon Museum Reference Document

Program Topics/Learning Activities

Offered for the regular Tues/Thurs field trips

** - Indicates areas of specific volunteer interest to me

RC Balloon Field Trips

- All About Balloons (1st & 2nd grade)
- What is "Lighter than Air" (3RD - 5TH grade)

Other Learning Activity Field Trips

Flexible on Thursdays throughout the month

- Weather Watchers (1st & 2nd grade)
- Water and Weather (1st & 2nd grade)
- Weather Experts (3rd-5th grade)
- The Water Cycle (3rd-5th grade)
- Ballooning in Albuquerque (6th-8th grade)
- Extreme Weather (6th-12th grade)
- Epic Flights (9th-12th grade)
- Exploring the Arctic (9th-12th grade)

Volunteer Opportunities

Gallery Trainings

- ** **Gallery Interpreter** – lead groups through specific galleries during scheduled tours and share knowledge of specific Learning Activities
    - Shadowing recommended
- **Gallery Guide** – more of a general guide, answering questions, engaging and directing students
- **Theater Usher**
    - Normal usher – film runs automatically
        - User in and limit group to 38
        - Move glasses from exit to entrance
    - Addl. training for *Science in the Sky*
        - Stop and start film based on schedule of tours
        - Does not run every 15 minutes on schedule

Volunteer Requirements per Year

- Req'd to complete 2 field trips per semester
- Shifts longer than 3 hours will count toward year-round active volunteer status

Balloon Museum Reference Document

The Logistics of a Field Trip

Regular Field Trip

- Greeting, welcome and manners in the Sky Lounge
- Split into 2 groups and program begins
    - Group A
        - Learning Activity Assistant
    - Group B
        - ** **Trained Gallery Guides** – Early ballooning
        - ** **Trained Gallery Guides** – Designated gallery
- All learning activities are 45-60 minutes
- Guided tours
    - Touch on a specific item related to an activity
    - Self-guided exploration

Age Appropriate Training for Various Age Groups

- Pre-K – Kindergarten
    - Hands on exploration of size, shape and feel
    - Identify simple objects
- Kindergarten – 1st grade
    - Ask simply "what" and "why" questions
    - Basic arts and crafts
- 1st-2nd grade
    - Work together to tell short stories
    - Basic arts and crafts
- 2nd-3rd grade
    - Ask them to compare and contrast
    - Simple, multi-step activities
- 3rd-4th grade
    - Able to read and use text to augment learning
    - Ask them their personal opinion
- 4th-5th grade
    - Introduce more complex concepts
    - Students are able to think more on their own
    - Great age to work more in pairs or small groups
- 5th-6th grade
    - Hands-on exploration and engage students in deeper learning of content, debate and discussion
- 6th-7th grade
    - Ask students to show their thinking in different ways (illustrate it, write about it, create something to demonstrate it using media)

Balloon Museum Reference Document

Appendix I

Balloon Fiesta

Balloon Fiesta 2019 Facts

- Started in 1972 when 13 balloons went up in the Coronado Mall parking lot as part of KOB-TV's 50th anniversary.
    - That is generally considered the first Balloon Fiesta but the first one actually called that was in 1975.
- Fiesta moved to the Balloon Fiesta Park in 1996.
- Fiesta 2000 had 1,019 registered balloons. The maximum is now 600.
- The Anderson-Abruzzo Intl. **Balloon Museum opened in 2005**.
- 590 balloons registers including 100 special shapes
- Non-US participants
    - From 17 countries
    - 17 special shapes
- Typically800-900K visitors over the 9 days. Big day is 80-100K.
- 50th anniversary
    - 50th EVENT will be in 2021
    - 50th ANNIVERSARY will be in 2022
- 15000 parking spaces
- Fiesta Park: 360 acres
- Launch Field: 80 acres
- Balloon Glo: Sat, Sun and Sat evenings
- Mass Ascensions: Weekends and Weds
- Special Shape Glodio: Thurs and Friday evening
- Fireworks: Nightly
- Gordon Bennett Americas Challenge
    - 23rd event
    - 9 teams – 6 U.S., 2 France, 1 Austria
    - All balloons use hydrogen gas
    - Good video on Balloon Fiesta website
    - Amount of ballast on board controls how far they can fly
- Glamping: Glamorous camping
- Music Fiesta: 2nd Saturday, 1-9PM
- Car Show: 1st Sunday
- Balloon Fiesta Live Stream
    - Go to Balloon Fiesta.com / This Year / … Live
    - Live stream of all 14 events
    - You Tube
    - Channel 28 on low power TV. Only available near Balloon Fiesta Park

Balloon Museum Reference Document

Anderson-Abruzzo Balloon Museum Facts

- Opened on October 1st, 2005
- 59,000 sq ft
- 4D theater
    - Planning began in 2006
    - Finally opened in 2016

Appendix II – Multi-Lingual Greetings for Visitors

Particularly when we have special events, such as during **Balloon Fiesta**, but also at most any other time of the year, you will not find it uncommon to have visitors at the museum not only from all parts of the United States, but also from many different foreign countries as well.

For those who may be interested, I have included here a list of perhaps the most common greetings and salutations in 16 different languages. In most cases, I have also provided, as close as I have been able to determine, the phonetic pronunciation of each.

I like to begin my tours by finding out where my visitors are from. If I am able to at least try to say "WELCOME" in their native language, I find that to be a nice icebreaker.

Welcome		
Arabic		AH HA LEN RI ca
Chinese	Huanying	WAN ying
Danish	Velcommen	Vel KOM men
French	Bienvenue	Be AHN veh NEW
German	Willkommen	VILL come
Greek	Kalos Irthate	kah los IR ta tay
Hawaiian	E komo mai	e komo MY
Irish/Gaelic	Failte	FALL cha
Italian	Benvenuto	BEN VEN uto
Japanese	Yokoso	YO ko so
Korean		HAN yeong (not AHN yeong)
Norwegian	Velcommen	vel KO men
Russian		da bro pa ZHAA lo vit
Spanish	Bienvenidos	Be en veh KNEE DOS
Swedish	Valkommen	VAL ko men
Vietnamese	Chao Mung	chow MUNG

Hello	
Spanish	Hola / Buenos dias
French	Bonjour
German	HAH lo
Irish/Gaelic	JEE ah witch
Japanese	ko NEE che wah
Swedish	HA lo
Norwegian	HA lo
Danish	HIGH
Chinese	KNEE how
Korean	yow BOW SAY ow
Italian	CIAO
Greek	CHAIR ay tay
Arabic	As-Salaam-Alaikum
Russian	PREE VEE yet

Have a nice day / Good day	
Spanish	Que tengas un bien dia
French	Bonn journee
German	EYE nen SHO nen TAGH noch
Irish/Gaelic	GEE ah witch
Japanese	YOI EE chi NEE chi oh
Swedish	HAW EN bra dog
Norwegian	ha en fin dag
Danish	HAY EN GO day
Chinese	CHEW NEE sing sienne you KWAI
Korean	SUN ha low dey see ahn
Italian	buona giornata
Greek	na PAH STA ka lo
Arabic	ah ta MEN ah lek .. en HARANA sayd
Russian	HA ROH SCHNID nyah

Balloon Museum Reference Document

Your Welcome/My Pleasure	
Spanish	De nada; Es un PLA ser
French	Je vous enprie; C'est mon plasir
German	Bitte schön
Irish/Gaelic	TAW - FALL cha - root
Japanese	DOY ta she MAS teh
Swedish	VAR SHAH good
Norwegian	VAR SA good
Danish	DU AIR val KOM men
Chinese	bay KLET zhee
Korean	TSUN MAHN AY ow
Italian	Prego
Greek	PAH RAH KAH lo
Arabic	AH LA rek bee
Russian	PAA SCHAL stah
Vietnamese	CONG ko GAY