National Aeronautics and Space Administration

X-tra

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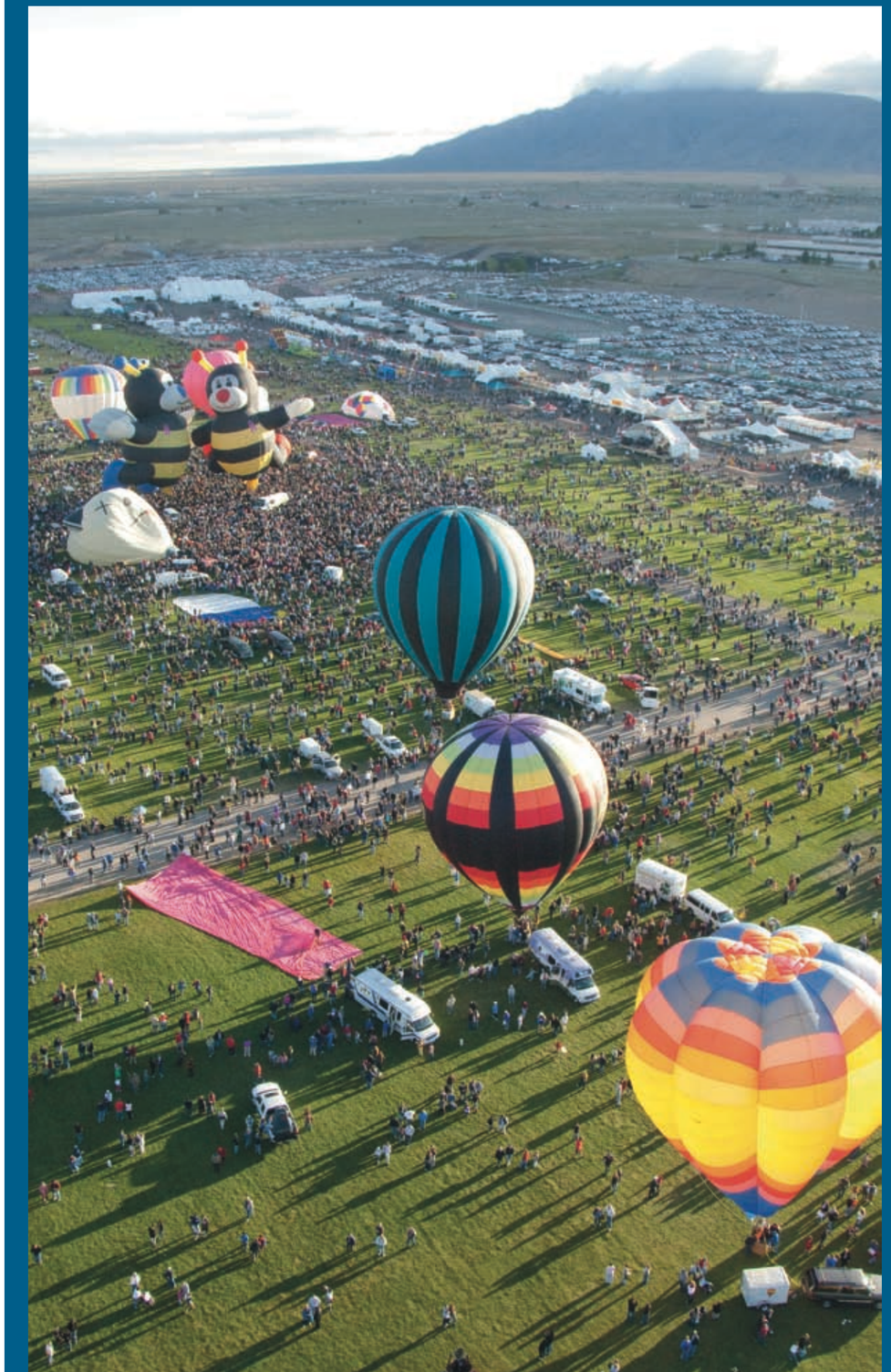
Ascension

Albuquerque International Balloon Fiesta brings ‘mass happiness’ to large crowds



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This page, *A wave of hot air balloons takes off during a mass ascension at the Albuquerque International Balloon Fiesta. (NASA Photo ED09 0286-83 by Tom Tschida)*

Cover, *A sea of spectators attended opening day at the 38th annual Albuquerque International Balloon Fiesta. (NASA Photo ED09 0286-047 by Tom Tschida)*

NASA Aeronautics

Agency's 'first A' featured at Fiesta

By Jay Levine
X-Press Editor

The average person is aware that NASA is legendary for its work in space, such as the Apollo 11 mission that featured the first steps on the lunar surface by astronaut Neil Armstrong on July 20, 1969. In 2009, NASA celebrated the 40th anniversary of that event that still inspires people around the world.

However, is not as widely known that before NASA sent men to the moon, the agency's aeronautics division flight-tested rocket-powered aircraft that touched the edge of space. Among the 550 hot air balloons and more than 850,000 people who attended the Albuquerque International Balloon Fiesta Oct. 3-11, many who visited the NASA exhibit learned more about the sleek black X-15 that 50 years ago redefined the limits of aviation and contributed to the Apollo mission.

"We're excited to have played a lead role in the aeronautics exhibit in the NASA tent at the Balloon Fiesta," said Mary Ann Harness, Dryden public outreach specialist and exhibit coordinator. "We had a number of people who came again and again because there was so much to see and experience."

Balloon Fiesta attendees had an opportunity to learn not only about the history of NASA aeronautics through a number of displays, but to experience some of it for themselves. For example, an F-15 cockpit simulator allowed people to picture themselves in the pilot's seat lifting off the runways at Edwards.

"A 70-year-old woman sat in the cockpit. It didn't matter if people were young, or young at heart, they enjoyed NASA's interactive exhibits," said Kevin Rohrer, Dryden public affairs director. "It's amazing to see people in the simulator and imagining themselves as pilots. We hope that inspires them to reach their own personal goals."

When exhibit attendees exited the cockpit, they had an opportunity to learn about the wind tunnels that are used for researching the different aircraft shapes or the aerodynamics of various parts of an aircraft.

Another exhibit detailed the Stratospheric Observatory for Infrared Astronomy, or SOFIA, a modified NASA 747SP with the world's largest airborne infrared telescope installed in its rear fuselage. The SOFIA will deploy to locations around the world where its high-tech German-built telescope will scan the heavens to obtain clearer views than those taken with Earth- or space-based telescopes. To help people see how infrared astronomy works, a camera is set up for visitors to see how they appear in the infrared spectrum.

"Many people are familiar with the Hubble Space Telescope and the visible light images it has taken. We hope to introduce people to the infrared spectrum by allowing them to see themselves on a monitor through the lens of an infrared camera. We also want them to know SOFIA's technology complements available space telescopes and gives another way of looking at the universe," said Darlene Mendoza, NASA SOFIA education and outreach representative.

See NASA exhibit, page 8

ED09 0286-56 **NASA Photo by Tom Tschida**
Tamera Eakes, 6, has her picture taken at a NASA photo kiosk with an assist from her dad Joseph and NASA exhibits staff member Kimberlee Buter.

ED09 0286-121 **NASA Photo by Tom Tschida**
Visitors to the NASA exhibit were able to sit in an F-15 cockpit simulator and picture themselves in the pilot's seat. Seated in the cockpit is Hunter Koontz. His mom, Jonelle Ellis, and Scott Andrus watch Hunter "fly."

ED09 0286-104 NASA Photo by Tom Tschida

ED09 0286-103 NASA Photo by Tom Tschida

__At left__, hot air balloons that lifted off from the Albuquerque International Balloon Fiesta fly over the Rio Grande. __Top__, hot air balloon pilot Randy Wright navigates his balloon called "Peacock." __Below__, NASA photographer Tom Tschida takes a self portrait on his first hot air balloon ride.

NASA Photo by Tom Tschida

First Flight

Photographer shares a few insights on hot air balloons

By Jay Levine
X-Press Editor

The balloonist community is friendly and welcoming and the view from up high gives a person a glimpse into the reasons why ballooning is a popular hobby, said Tom Tschida, a photographer at Dryden.

On a brisk morning during the Albuquerque International Balloon Fiesta Tschida experienced his first flight in a hot air balloon. Tschida had only briefly seen a hot air balloon up close prior to the event.

"I hung out with the crew as the balloon was readied. The pilot, Randy Wright, briefed the Peacock's crew about what would happen. Passengers were asked to come over and a set of stairs was brought over for us to climb into the balloon. We stood there while the crew did everything else," Tschida said.

He had previously done some skydiving, so Tschida imagined that the experience would be similar to the calm drift he enjoyed. Once aloft, the hot air balloon flight was peaceful and calm as the balloon drifted, but he noted that the burst of noise from the burner used to heat the air that kept the balloon aloft was loud.

The smooth, calm flight allowed Tschida to look out at other balloons and the winds were just right for travel over the Rio Grande. Once over the river, the pilot dipped the balloon's gondola and its occupants in twice as part of a tradition, soaking them in cold water.

The landing was exhilarating and a bit rough as the gondola hit the ground and slid to a stop about 20 feet from its touchdown spot.

The ride is only part of the experience for a first-time flier. First Tschida participated in a tradition and then a ceremony to commemorate the flight. The initiation for Tschida and another fellow passenger included the pair lying on the deflated envelope while the rest of the crew piled on top to assist in deflating the balloon.

Tschida was asked to kneel in front of the pilot, who then retold a brief history of ballooning and recited a ballooning prayer. The pilot used a sword to open a bottle of champagne, an event that he had repeated more than 200 times to initiate previous first-time fliers.

That wasn't the end of the ceremony. A toast was made, but Tschida had to pick up a cup of champagne with his mouth and drink it, while a bottle of champagne was poured over his head.

"The flight gave me broader depth of understanding into what ballooning is and how it works. I also learned how complex it is and how critical the direction of the wind is at different altitudes. The balloon is only controlled by changing its altitude," he said.

"There is inherent risk, but it is fun. It was like being under the parachute in skydiving; it is calm and quiet with a great view of everything."

The sense of community on the field and in the air was evident.

"I was really impressed by how friendly the balloonists are. The first group I shot asked me to a barbecue. It is a really relaxed and friendly crowd," Tschida said.

His creative juices also flowed in different ways in the air.

"Up in the balloon, I naturally shot more wide angle than I did on the ground to take advantage of the different perspectives," he said. "The day before, I was running around on the ground, but from the air you experience and see the whole thing and the view – which must be the biggest draw for balloonists."

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ED09 0286-123 NASA Photo by Tom Tschida

Tony Springer, right, NASA exhibits and education lead, demonstrates a flow-visualization wind tunnel.

Wind Tunnel

By Jay Levine
X-Press Editor

Aeronautics can seem like such heady stuff, but NASA staff members at the Albuquerque International Balloon Fiesta used a tool to bring some sky-high concepts down to Earth for visitors at the Fiesta.

One such tool was the flow-visualization wind tunnel that brings the aeronautical engineering technology of the wind tunnel down to a more manageable, desktop size.

"Before we fly anything it's tested in a wind tunnel, regardless of whether it is researched at NASA or with our partners in other government agencies, industry or academia," said Tony Springer, NASA lead for communication and education.

In the case of the flow-visualization wind tunnel, a smoke-like vapor is used to demonstrate the airflow around an object placed in the wind tunnel. Wind-tunnel components take incoming air through a honeycomb material that increases the air to provide what researchers call laminar flow, or smooth air.

The model wind tunnel permits people to observe airflow patterns over scale-model aircraft and cars to better visualize what researchers

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Enthusiasm

Sokolik's talks at Albuquerque schools and AIAA are warmly received

By Jay Levine
X-Press Editor

In presentations at four Albuquerque schools and another for the American Institute of Aeronautics and Astronautics in October detailing NASA's high-altitude flight suits, one theme was consistent – enthusiasm for aeronautics.

That enthusiasm grew when Dryden life-support technician Jim Sokolik asked students about the high-altitude pressure suit he brought with him. Students watched as Sokolik instantly inflated the pressure suit with a pump and explained how the lack of oxygen and pressure 11 miles up would cause pilots to pass out in six to eight seconds without the suits.

At Dryden, ER-2 pilots must wear such suits to survive in the harsh environment of high-altitude flight.

The ER-2 is the civil variant of the military U-2 reconnaissance aircraft. NASA's ER-2 aircraft are high-altitude research platforms that provide scientists and researchers the ability to gather information on Earth at altitudes that would be difficult or impossible for conventional aircraft or satellites to attain.

Kathleen Rutter, an anatomy and science teacher at Albuquerque High School, wanted her anatomy and physiology class to hear his presentation. As a teacher for about 30 years, she said this was the first time she was able to have a NASA representative in her classroom.

"I was very excited when I received an e-mail from science coordinator Trish Wagner saying that this opportunity was available to us. I jumped on it. It is a big thrill and the students were really excited about the visit," Rutter said.

ED09 0286-142 NASA Photo by Tom Tschida

Students at Jackson Middle School in Albuquerque take the opportunity to see a high-altitude pressure suit up close. Sokolik showed attendees of the Albuquerque International Balloon Fiesta, students at area schools and members of the Albuquerque chapter of the American Institute of Aeronautics and Astronautics the clothing that permits pilots to fly high-altitude missions.

ED09 0286-163 NASA Photo by Tom Tschida

Elizabeth Kallman, AIAA Albuquerque section chair, asks Dryden life-support technician Jim Sokolik about the high-altitude pressure suit.

That included a number of students at Albuquerque High School and all of the schools at which Sokolik spoke, where students asked how they could best prepare for a career at NASA.

Sokolik's advice: "Stay in school, work hard and do what you do well and excel at it."

Message received, said Albuquerque High School students Jourdan Beamont and Emily Williams. Beaumont said he intends to pursue his interests – which go back to his love of balsa airplanes – in either aeronautical or mechanical engineering. For Williams, she said her passion is to become an astronaut.

Sokolik showed video from an ER-2 flight and explained that it is difficult for pilots in the 35-pound pressure suits to move around. The added weight can add to pilot fatigue toward the end of missions that can be as long or longer than eight hours depending on the needs of the research mission.

"The pilot flying the aircraft in the pressure suit is like you wearing your winter clothes to ride your bicycle," he further explained.

Whatever the discomfort, the pressure suit can save the pilot's life in an extreme condition.

Sokolik showed people at his presentations a video of a glass of 70-degree tap water that was brought to conditions in a pressure chamber that simulated the environment at 70,000 feet and higher. When the water reached 83,000 feet, it boiled. In extreme conditions the pressure suit keeps the pilot's blood from boiling and the oxygen from pulled from his or her body, Sokolik explained.

Without a suit at high altitude, a pilot would lose consciousness, he said. However, the suit inflates in the blink of an eye and preserves adequate pressure for the pilot to get out of the hazardous situation.

People at the four schools and AIAA attendees were curious about a white ball hanging from the front of the pressure suit.

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By Jay Levine
X-Press Editor

Finding the NASA exhibit at the Albuquerque International Balloon Fiesta wasn't difficult. People just had to look for the big airplane.

At an event featuring hot air balloons, NASA appropriately had an F/A-18 half-scale blow-up model airplane that makes the way to the agency's exhibit more obvious.

"The main objective was for the F/A-18 to draw attention to the NASA tent that had a number of aeronautics displays. NASA is not just space, but also aeronautics," said Mary Ann Harness, Dryden public outreach specialist and exhibit coordinator.

"We try to bring the F/A-18 inflatable aircraft to events where we can't get one of our research aircraft," Harness added. "NASA Headquarters provided it to us several years ago and it has been a wonderful tool and exhibit piece."

NASA uses F/A-18s obtained from the U.S. Navy between 1984 and 1991. Two have a two-seat cockpit while the others are single-seat aircraft. The versatile aircraft are used for a number of research missions and for escorting research aircraft as an extra set of eyes, often referred to as chase aircraft.

F/A-18 aircraft are used for integration of experiments such as test fixtures, sensors and subsystems and for researching such equipment in flight conditions. Sometimes the aircraft's flight control systems or vehicle structure, or both, are extensively modified to validate new configurations, integrated designs and research objectives.

ED09 0286-53 NASA Photo by Tom Tschida

The F/A-18 half-scale inflatable aircraft made it easy for fiesta-goers to find the NASA display. Visitors to the exhibit took the opportunity to picture themselves as pilots, with an aircraft behind them.

F/A-18

The High Alpha Research Vehicle, Systems Research Aircraft and Active Aeroelastic Wing projects are examples of how NASA has used F/A-18 aircraft to redefine the cutting edge of flight research.

An F/A-18 was used for the High Alpha, or angle of attack, Research Vehicle in a three-phase program conducted from April 1987 until September 1996.

A total of 385 research flights were conducted with the test article, demonstrating that it was capable of flight at angles of attack between 65 and 70 degrees using thrust-vectoring paddles to direct engine thrust, a research flight control system and forebody strakes. Strakes are hinged structures on the forward side of the fuselage that provide control by interacting with vortices, generated at high angles of attack, to create side forces.

Dryden used another F/A-18 on loan from the U.S. Navy as the Systems Research Aircraft, to advance commercial and military technologies.

The SRA flight-test aircraft enabled government and industry to focus on integration, ground test and flight validation of such breakthrough technologies as vehicle management systems, advanced air data systems, photonic based systems, electric aircraft concepts and flight test techniques.

The Active Aeroelastic Wing project sought to verify a new structural design paradigm to enable future aircraft to use wing twist, rather than conventional methods of control, to improve overall performance.

This Air Force Research Laboratory-funded project demonstrated roll control by active control of a flexible wing on a modified F/A-18 at transonic and supersonic speeds – a modern outgrowth of the "wing warping" technique used by the Wright brothers to maneuver their first aircraft.

F/A-18 aircraft also are used to keep chase pilots in constant radio contact with research pilots and to monitor key parts of the flight, an important safety feature of research missions. Chase aircraft are used as camera platforms for research missions requiring photos and videos. Aeronautical engineers extensively use photo and video coverage to monitor and verify aspects of a research project.

No matter what their use, the F/A-18 plays a key role in NASA flight research.

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The sense of community from Albuquerque residents also impressed Tschida.

"As you go over neighborhoods little old ladies in robes and kids on bikes come out to see the balloons. When the balloon lands, kids, adults and other crews all come to help hold the basket down," he said.

Albuquerque's efforts to welcome the balloonists are seen everywhere.

"Parents thank the balloonists for coming. The whole community supports the fiesta. That is obvious, from all the signs welcoming them to the receipts from purchases at local stores that include a 'welcome, balloonists' message," he said.

While the view from the ground is spectacular, Tschida said the view from the sky is breathtaking.

That is especially true when a community is so enthusiastic about its hot air balloons and the people who fly them.

Wind tunnel ... from page 5

are looking for in their designs and also to see how the wind tunnel can help those researchers see a representation of how a concept, shape or component will perform in flight.

"We can show people how air moves over or around an aircraft and explain to them how similar methods are used in launch vehicles and even tall buildings to see how the air is going to flow, or what the aerodynamic characteristics are of the object," Springer said.

NASA uses wind tunnels at its centers, other government agencies or at industry-partner facilities. The tunnels range in size from a few inches to tunnels of 80 by 120 feet that can be used to test a full-sized aircraft.

"Wind tunnels allow you to determine what the aerodynamics of a vehicle are before you actually expend money on a full-scale aircraft. They're also used to reduce the unknowns, because you don't want to put a person or some hardware at risk," Springer said.

The concepts usually start small and get larger as the test article solidifies from data acquired through a number of increasingly complex tests in incrementally larger wind tunnels with bigger and bigger models, Springer said. Researchers essentially start off with a toy, where they can take the wings and flight control surfaces off and they can change out components to determine the optimum aerodynamic range through wind-tunnel tests.

"A majority of U.S. commercial and military aircraft or launch vehicle has been tested in NASA wind tunnels or uses NASA-developed technology. NASA has gone beyond the fundamental research that defines the concepts to actual application of them in the wind tunnel and following on with flight test," Springer said.

A number of key modern aircraft technologies were first proven in wind tunnels before undergoing the crucible of flight research.

A team led by Richard Whitcomb of Langley Research Center, Hampton, Va., who only recently died, originated a number of those technologies, including area rule, the supercritical wing and winglets.

Area rule is the concept that a narrowing in the fuselage over the wing reduces high-speed drag at transonic speeds.

The supercritical wing, an airfoil shape that reduces drag at speeds just below Mach 1, enables an aircraft to go slightly faster or see an increase in performance as a result of drag reduction. Research flights made at Dryden Flight Research Center with a modified F-8 validated wind-tunnel predictions that aircraft using the supercritical wing experienced increased cruising speed, saw improved fuel efficiency of about 15 percent, and saw better flight range than those featuring conventional wings. As a result, supercritical wings are now common on most modern subsonic military and commercial transports.

Winglets, which were tested on a KC-135 at Dryden, are end plates on the wing that "fool" the wing into behaving as though it had a longer span. In other words, with winglets, the wing is more efficient without the performance penalties of actually having a larger wing. The economic advantages of winglet use eventually led to their adoption on light aircraft, business jets, airliners and heavy military transports.

Another area of wind-tunnel use is icing research, which has made flight safer through use of NASA's world-class facilities, Springer said.

Aeronautics also is valuable to the design of semi trucks and race cars.

In fact, a research effort led by Ed Saltzman at Dryden on aerodynamic drag on semi trucks revolutionized the trucking industry in the 1970s. That research lead to major design changes resulting in an increase in efficiency and a 20 to 25 percent increase in fuel economy over vehicles that did not feature the aerodynamic improvements.

A professional racing association used the NASA Langley Full Scale Wind Tunnel for a detailed look at aerodynamics on race-car and drag reduction. Another area of interest was the impacts of aerodynamics with multiple racecars, Springer said.

People at the Fiesta had an opportunity to experience for themselves the value of wind tunnels and how they work, regardless of how they're used to test components, concept models or full-size aircraft or automobiles.

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"When the suit inflates, the helmet raises and the pilot can't see. The gloves inflate so he or she cannot feel their fingers either. Sight and touch are gone. Even if they can't see, they can find the helmet adjustment and pull the helmet back down. They might not be able to easily feel the golf ball, but they know it's there," Sokolik said.

In the 22 years Sokolik has been working with NASA's ER-2 aircraft he said there have been just two times an aircraft he launched had an instance where the suit was inflated and that both times it wasn't a life-threatening situation.

"[The suit] is there in case something happens," he said. "Safety is always first."

Elizabeth Kallman, AIAA section chair, was impressed by Sokolik's presentation.

"I loved it. I want him to come back," she said. It was the first time she had seen a pressure suit up close.

Regardless of the venue, Sokolik's presentations had impact in inspiring the next generation of explorers and scientists and showing people elements of NASA's missions.

NASA exhibit ... from page 3

In addition, visitors to the NASA exhibit also waited for their turn at a photo kiosk, where they could be photographed on either the moon or Mars at no cost.

At an event featuring hot air balloons, NASA appropriately had an F/A-18 half-scale blow-up model at the entrance of the NASA exhibit. Other, less expansive models of the SOFIA NASA 747 aircraft, the NASA 747 Shuttle Carrier Aircraft and the next-generation Orion spacecraft were available for attendees to view.

In addition, Dryden aerospace engineering technician Jim Sokolik demonstrated a high-altitude pressure suit that was used in the Mach 3 SR-71 program. He demonstrated the pressure suit daily at the Balloon Fiesta, at Albuquerque area schools and at an American Institute of Aeronautics and Astronautics event.

Balloon Fiesta attendees saw spectacular and breathtaking views at the events on the field and in the sky. They also had opportunities for similar experiences while learning about the latest technologies and test beds that NASA is developing to explore space, advance aeronautics and reveal more about planet Earth and its environment.

X-tra is published for civil servants, contractors and retirees of the Dryden Flight Research Center and the center's partners and civil customers.

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