

THE FLIGHT PLAN

The Newsletter of AIAA Albuquerque Section
The American Institute of Aeronautics and Astronautics

APRIL 2019 SECTION MEETING: STRUCTURAL HEALTH MONITORING (SHM) AND ASSESSMENT OF CRITICAL INFRASTRUCTURE USING UNMANNED AERIAL SYSTEMS

Dr. Fernando Moreu, PE
Faculty, School of Engineering, University of New Mexico

INSIDE THIS ISSUE:

SECTION CALENDAR	2
UNM STUDENT BRANCH NEWS	2
MAY MEETING DETAILS	3
HONORS & AWARDS NEWS BRIEFS	4
ADDITIONAL SCIENCE FAIR AWARDS	5
VIRGIN GALACTIC MOVES TO N.M.	6
KIRTLAND AIR AND SPACE FIESTA	7
AIAA ALBUQUERQUE ELECTION	8
MILITARY SPACE USA CONFERENCE	8
THIS MONTH IN AIR & SPACE HISTORY	9
PHOTO OF THE MONTH	11
SECTION INFORMATION	12



Bridges are critical to our nation's railroad infrastructure, and more than 50% are over 100 years old. Dr. Moreu summarized results on how to inspect railroad bridges using Unmanned Aerial Vehicles (UAVs) or Systems (UAS) with laser technology. The proposed system initially focuses on the monitoring of steel railroad bridges, which constitute 53% of the railroad bridge inventory in the US, other types of railroad bridges of interest, or other critical infrastructure. The innovation of this research is the ability to collect reference-free displacements using non-contact sensors enabled by the drone. The results are validated both indoors and outdoors and further research is being carried out in lowering the laser costs and improving the 1D algorithm to 3D. Dr. Moreu concluded his talk with showing how sensors were installed on a rocket to produce 3D trajectory information.



CALENDAR

Local Chapter Events

Thursday 16 May — Section Meeting Annual Awards Meeting

Copper Canyon Café: 5455 Gibson Blvd, Albuquerque
5:30pm Meet and greet
5:45pm Dinner (order when ready)
6:30pm Presentation and discussion

Upcoming U.S. Launches

May Falcon 9 • Starlink 1
Apr—Jun Pegasus XL • ICON
Jun 11 Falcon 9 • Radarsat Constellation mission
Jun 22 Falcon Heavy • STP-2
Jun 27 Atlas 5 • AEHF 5

National AIAA Events

17 - 21 Jun 2019

[2019 AIAA Aviation and Aeronautics Forum and Exposition \(AIAA AVIATION 2019\)](#)
Dallas, Texas



STUDENT BRANCH NEWS

By Svetlana Poroseva, Neil McCasland, & Robert Malseed

Students who'd presented at AIAA Regional Conference in Austin recently will be presenting some of their papers to the Professional Aerospace Contractors Association (PACA) locally at their monthly luncheon on 21 May. PACA had underwritten student travel to the AIAA conference, and the PACA members extended the invite to the student delegation. If any AIAA member is interested in attending PACA's luncheon, you may contact a PACA member in your company to go as a guest; or contact or section's Corporate Outreach Officer, Dr Neil McCasland (neil.mccasland@atacorp.com; cell (703) 595-7224)

Four members of the AIAA UNM Student chapter participated at the AIAA 2019 Region IV student conference, held this year in Austin, Texas on March 29-31. Three papers were presented, and two of them received awards for their papers. Josh Ludwigsen, a senior undergraduate student at the UNM Mechanical Engineering Department, won the second place among undergraduate students and a \$300 prize from the AIAA Foundation for his paper "Analysis of the Fractal Dimension of a Dense Particle Curtain for Multi-Phase Flow Analysis". Daniel Freelong, a master's student at the UNM Mechanical Engineering Department, took the third place among the graduate students and a \$250 prize for his paper "Reflections of a Shock Wave off a Sparse Curtain of Particles."



AIAA Lecture (May 16th)

**Agile Manufacturing Activities within AFRL, Space Vehicles Directorate,
and the R&D Path that Led There.**

Dr. Derek Doyle, Air Force Research Laboratory

Speaker Bio:

Dr. Derek Doyle is the Agile Structures Lead on the Integrated Structural System team at AFRL, Space Vehicle Directorate at Kirtland AFB, NM. Dr. Doyle's team works on developing technologies in the fields of Structural Health Monitoring, Rapid Prototyping, Multifunctional Structures and Electro-Magnetically Tailored Materials (Metamaterials) for integration into future space systems. He received his bachelors ('07) and masters ('08) from New Mexico Institute of Mining and Technology in Mechanical Engineering with a focus on Mechatronic Systems and his Ph.D ('15) at UNM in electrical engineering with a focus on applied electromagnetics.

We also give out the Regional Science Fair AIAA Awards and hear about their research.

When:	May 16, 2019 (Thursday)	COST: Pay for your own meal
Where:	Copper Canyon Café, (505-266-6318)	5:30 - 5:45 Meet and Greet
	Albuquerque NM 87108	5:45 - 6:30 Dinner (order when ready)
	(at Gibson and San-Pedro)	6:30 ~ 7:30 Presentation & Discussion

Students: Don't forget that we offer free dinners (up to \$15) for up to six students!

[Click Here to RSVP](#)

https://docs.google.com/forms/d/1T8z2aAe_WIRsqoNVZl2iKleXjwtdPPE07VXuluNhhCM/viewform

HONORS & AWARDS NEWS BRIEFS

By Dr. Stephen Seiffert — AIAA Albuquerque Section Honors & Awards Chair

The Albuquerque Section AIAA Selects 2019 Scholarship Winner

The Albuquerque AIAA Section has established an annual scholarship award. A single scholarship is awarded in May of each calendar year. This year's scholarship will be for the amount of \$1,000. The scholarship is presented to an undergraduate or graduate student enrolled in any of the four universities which are within the boundaries of the Albuquerque AIAA Section: The University of NM, the NM Institute of Mining and Technology, NM High-lands University, and Northern New Mexico College. The applicant(s) must have demonstrated all-around excellence in the pursuit of study in the art, science, and/or technologies of aeronautics and/or astronautics. This year's winner of the \$1,000 scholarship is Mr. Kavin Kullama, a Junior Computer Engineering student at the University of New Mexico. Mr. Kullama will receive the scholarship and associated certificate of recognition at the 16 May 2019, Albuquerque Section's Honors and Awards Banquet. Thank you to Dr. Neil McCasland, Corporate Liaison, and Mr. Brian Robbins, AIAA member for conducting the evaluations.

Albuquerque Section AIAA 2019 Science Fair Awards

The Albuquerque Section AIAA participated in the Central New Mexico Science & Engineering Research Challenge held at the Manuel Lujan Exhibit Complex at Expo NM, 22 March 2019 and selected four awards: one award in the 4th & 5th Grade Expo, one award for the Junior Division and two awards for the Senior Division.

Senior Division Winners

Reeves Winker

School of Dreams Academy, Los Lunas, NM

Exhibit Title: "Angle of Attack & Lift"

Koby Kwiecinski

Albuquerque Institute of Math & Science, Cedar Crest, NM

Exhibit Title: "Optimum Combination of Spoiler and Aero Kit: An Aerodynamic Study"

Junior Division Winner

Elias Braun

Holy Ghost Catholic School

Exhibit Title: "Wind Tunnel Parachute Testing"

Fourth & Fifth Grade Expo Winner

Simon Marshall

San Antonito Elementary School, Sandia Park, NM

Exhibit Title: "Need a Lift"

The four winners will receive a certificate and a monetary award of \$100, as well as, a one-year student membership in AIAA. These students have been invited to attend the 16 May 2019 Section Awards Banquet meeting as our Honors & Awards guests.

ADDITIONAL SCIENCE FAIR AWARDS

By Robert Malseed—Treasurer

Three of our section's Science Fair winners also won other awards. Here is a list of their other honors.

5th Grade Expo

Simon Marshall Project title: *Need A Lift*
Honorable Mention medal in Elementary Physical Science

Junior Division

Elias Braun Project title: *Wind Tunnel Parachute Testing*
Broadcom Masters certificate of Recognition and invitation to submit project.
Explora Museum - \$25
Regional Research Challenge Junior Encouragement Award - \$25
United States Air Force certificate and award
US Navy and Marine Corps Certificate and Medallion
Advancement to state level Science Fair

Senior Division

Reeves Winker Project title: *Angle of Attack & Lift*
Albuquerque Soaring Club - Certificate for a free sailplane ride
Civil Air Patrol New Mexico Wing - \$25 and set of Astronautics History books

One of our own section members, Rusty Ludwigsen, won several awards in the category of Senior Medicine & Health Sciences. His project is *Increasing Metabolic Substrates to Improve Spreading Depolarization Recovery in a Brain Slice Model of Stroke: An Innovative Therapy for Reducing Brain Injury After Stroke*.



First Place in his category - \$100 and medal
Donald L. Lifke Memorial Award for Excellence in Data Visualization - \$100
Dr. Donald Partridge Memorial Neuroscience Award - \$100
Karen & Tommy Hudson Award - \$500
Sedberry Associates Award - \$250
UNM Health Sciences Center Award - \$150
Advancement to State level and subsequently to the International Science Fair to be in Phoenix 12-17 May.

Congratulations to all these students!

VIRGIN GALACTIC TO MOVE REMAINING SPACESHIP TWO TEST FLIGHTS TO NEW MEXICO AHEAD OF COMMERCIAL OPERATIONS.

By Robert Malseed—Treasurer

[SPACE](#) (5/10) reported that Virgin Galactic “is moving its development and testing activities from Mojave, California, to its commercial-operations headquarters, Spaceport America, in New Mexico.” In a May 10 statement, Virgin Galactic representatives said, “This announcement signals the final countdown to a regular commercial spaceflight service for paying passengers and science research from Spaceport America.”

[Spaceflight Now](#) (5/10) reported that “Virgin Galactic’s SpaceShipTwo vehicle, its carrier aircraft, pilots and support staff will relocate to Spaceport America in southern New Mexico this summer, officials said.” Virgin Galactic CEO George Whitesides “said the company will add about 100 jobs in New Mexico, including pilots, mechanics, engineers and hospitality hosts.”

[Space News](#) (5/10, Subscription Publication) reported that Virgin Galactic “is completing work on the interior of its dedicated facility at Spaceport America, known as Gateway to Space.” The company is also updating the spaceport hangar “for vehicle and operations support.” According to Whitesides, the move will occur following completion of the cabin interior for the VSS Unity SpaceShipTwo vehicle by Virgin Galactic’s wholly-owned The Spaceship Company.



Virgin Galactic’s WhiteKnightTwo carrier jet, which hoists the company’s rocket plane aloft, pictured at Spaceport America in New Mexico. Credit: Virgin Galactic



SpaceShipTwo fires its rocket motor during its Feb. 22 test flight. Credit: Virgin Galactic / MarsScientific.com / Trumbull Studios

KIRTLAND AIR & SPACE FIESTA

SATURDAY MAY 18, 2019



JOIN US AT THE FIESTA

By Robert Malseed—Treasurer

Our section is planning to participate in the Fiesta by providing information and exhibits which will be housed in a hangar where we expect to meet with thousands of visitors. This will be similar to what we have done at various STEM events where we have taken our DreamFlyer flight simulator, our desktop flight simulator, pieces of aerospace hardware for hands-on talks, and also video presentations and printed handouts. Our exhibit will be in hangar 333, the Aero Club/Kirtland Flight Center hangar and should look like this:



If you are going to the Fiesta please stop by and help us to reach out to the public at this event.

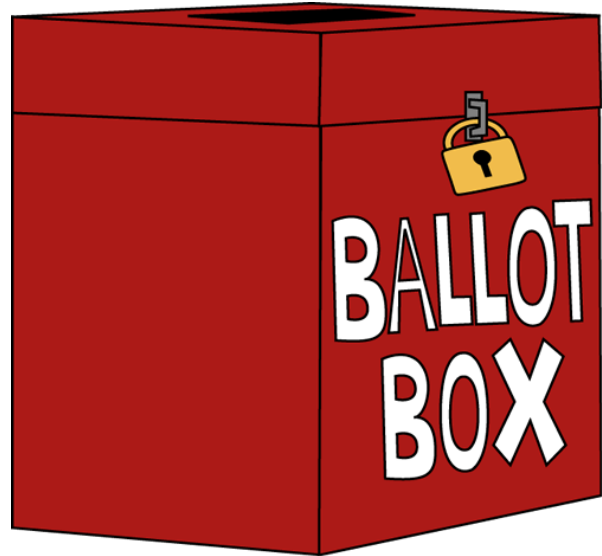
Contact Robert@malseed.com or Elfego.Pinon@emergentspace.com for information.

AIAA ALBUQUERQUE ELECTION

By Robert Malseed—Treasurer

The annual election results are in, and here are our officers for 2019/2020:

Chair	Ben Urioste
Vice-Chair	
Secretary	Terry Caipen
Treasurer	Robert A. Malseed
Publications	
Young Professionals	Brian Robbins
Membership	Erin Pettyjohn
Honors & Awards	Dr. Stephen Seiffert
Public Policy	Mark Fraser
Corporate Liaison	Neil McCasland
Education	
Programs	Nick Morley
Career Enhancement	Andrea Loper
STEM K-12	Dr. Elfego Pinon III
UNM Student Advisor	Dr. Svetlana Poroseva



THE MILITARY SPACE USA CONFERENCE AT SMC ON JUNE 11TH AND 12TH

By Andrea Loper—Career Enhancement

Featuring high level briefings from senior leadership across industry, government and allied partner states, Military Space USA will explore how organisational efforts such as **SMC 2.0** are facilitating the space supremacy that is demanded by the warfighter. Additionally, the conference will provide a forum for senior military and industry authorities to collaborate in the development, acquisition, deployment and sustainability of space-enabled communications that support allied objectives. Exploring both provision of SATCOM and PNT, EO, COMSATCOM, Remote Sensing and Small Satellite Expansion – along with an assessment of the SSA and SST implications of these systems – Military Space USA will provide a holistic overview of developments in the 4th domain.

The website is:

<https://www.smi-online.co.uk/defence/northamerica/conference/milspace-usa>

THIS MONTH IN AIR & SPACE HISTORY

70 Years Ago - 1949

May 3: U.S. Navy launched Martin Viking Rocket No. 1 to altitude of 51.4 miles and a speed of 2,250 miles per hour, from the White Sands Missile Range, NM.

May 11: President Harry Truman signed into law the act authorizing the Atlantic Missile Range, FL.

60 Years Ago -- 1959

May 1: The former Beltsville Center renamed Goddard Space Flight Center in honor of Dr. Robert Hutchings Goddard, rocket pioneer who achieved first launch of a liquid-propellant rocket.

May 14: The Moon was used as a relay station for intercontinental transmission. Jodrell Bank, England to Bedford, MA.

May 28: Two monkeys, "Able" and "Baker", were successfully launched atop a Jupiter rocket to an altitude of 360 miles and 1700 miles down-range. They survived in good condition. Launched from the Eastern Space Missile Center, FL (Cape Canaveral, Fla).

55 Years Ago - 1964

May 15: The Atlantic Missile Range was renamed the Eastern Test Range, FL.

May 28: SA-6 launched by Saturn 1 rocket, 11:07 p.m., EDT, Cape Canaveral, Fla. The first flight of an unmanned Apollo spacecraft boilerplate.

50 Years Ago -- 1969

May 9: HL-10 first supersonic flight, piloted by John A. Manke, Dryden Flight Research Facility (DFRF).

May 18: Apollo 10 launched by Saturn V, SA-505. 12:49 a.m., EDT, KSC on "the mission before THE mission." Astronauts Thomas P. Stafford; John W. Young, Jr.; and Eugene A. Cernan tested all aspects of the lunar landing mission, except the actual lunar landing. First crew to shave in space. First transmitted color photographs of the full Earth from a crew in space with a Westinghouse color TV camera. First demonstration rendezvous in lunar orbit. First burning of LM descent stage engine in lunar landing configuration. First LM steerable antenna at lunar distances. First LM within 15,240 meters [8 nautical miles] of lunar surface. First in-flight test of the abort guidance system. First in-flight use of VHF ranging. First landing radar test in near-lunar environment. First crew assisted navigational, visual, and photographic evaluations. First and only Apollo launch from Launch Complex 39B. First use of the pad's water deluge system to cool flame deflector.

May 21: Intelsat III F-4 launched by Thor Delta, 10:00 p.m., EDT, Cape Canaveral, Fla.

45 Years Ago -- 1974

May 17: SMS-1 (Synchronous Meteorological Satellite-1) launched by Delta, 5:31 a.m., EDT, Cape Canaveral, Fla. First prototype geosynchronous orbit weather satellite.

May 19: Luna 22 (lunar orbiter) launched on Proton K rocket from Baikonur at 08:57 UTC.

May 30: ATS-6 (Applications Technology Satellite-6) launched by Titan III C at 9:00 a.m., EDT, Cape Canaveral, Fla.

40 Years Ago -- 1979

May 1: First time the complete Space Shuttle (Enterprise) configuration was assembled in the VAB & transported to Launch Complex 39A.

May 4: FLTSATCOM-2 launched by Atlas Centaur, 2:56 p.m., EDT, Cape Canaveral, Fla

30 Years Ago -- 1989

May 4: STS-30 (Space Shuttle Atlantis) launched from KSC at 2:46 p.m., EDT. Crew: David M. Walker, Ronald J. Grabe, Norman E. Thagard, Mary L. Cleave, and Mark C. Lee. First U.S. planetary mission in 11 years and the first deep space probe on a Space Shuttle mission [Magellan]. It was deployed to Venus. First time a general purpose computer was switched on orbit. Returned to Edwards AFB, CA, May 8th. Mission duration: 4 days, 57 minutes.

May 4: Magellan spacecraft launched from Shuttle Atlantis (STS-30). Rendezvoused with Venus on Aug. 10, 1990 to begin planetary mapping mission.

May 14: Richard H. Truly takes office as eighth NASA Administrator.

25 Years Ago -- 1994

May 9: MSTI 2 (Miniature Sensor Technology Integration 2), a U.S.A. defense spacecraft, was launched at 02:47 UTC from Vandenberg AFB by the last of the now discontinued Scout series

20 Years Ago -- 1999

February 7: Stardust probe launched atop a Delta II rocket from Florida's Cape Canaveral Air Station at 4:04 p.m. EST to become the first U.S. mission destined for a comet, and the first-ever spacecraft sent to bring a comet sample back to Earth from Comet Wild 2.

February 20: Soyuz TM-29 launched on a Soyuz-U rocket from Baikonur at 04:18:01 UTC. Docked with Mir space station February 22. Crew: Viktor M. Afanasyev; Jean-Pierre Haigneré (France); Ivan Bella (Slovakia).

15 Years Ago -- 2004

February 26: International Space Station (ISS) Expedition 8 crew: first spacewalk outside a space station without a human crewmember inside by C. Michael Foale and Alexander Y. Kaleri.

THIS MONTH IN AIR & SPACE HISTORY

20 Years Ago -- 1999

May 18: TERRIERS (Tomographic Experiment using Radiative Recombinative Ionospheric EUV and Radio Sources) launched at 05:09:36 UTC by a Pegasus XL rocket carried by a L-1011 cargo plane flying out of Vandenberg AFB intended to monitor the solar (not ionospheric) extreme ultraviolet (EUV) spectrum.

May 27: STS-96 (Space Shuttle Discovery) launched from KSC at 6:49 a.m., EDT as a logistics and resupply mission (2A.1) for the International Space Station. Crew: Kent V. Rominger, Rick D. Husband, Ellen Ochoa, Tamara E. Jernigan, Daniel T. Barry, Julie Payette (Canada), and Russian cosmonaut Valery I. Tokarev. Julie Payette was the first Canadian to participate in an ISS assembly mission – and the first Canadian to board the International Space Station. Landed at KSC on June 6 at 2:02 a.m., EDT. Mission duration: 9 days, 19 hours, 13 minutes.

10 Years Ago -- 2009

May 11: STS-125 (Space Shuttle Atlantis) launched from KSC at 2:01 p.m. Crew: Michael J. Massimino, Michael T. Good, Gregory C. Johnson, Scott D. Altman, K. Megan McArthur, John M. Grunsfeld and Andrew J. Feustel. This is the fifth Hubble Space Telescope Servicing Mission. Atlantis' astronauts repaired and upgraded the Hubble Space Telescope, conducting five spacewalks during their mission to extend the life of the orbiting observatory. Landed at Edwards Air Force Base, Calif. on May 24, at 11:39 a.m., EDT. Mission duration: 12 days, 21 hours, 37 minutes.

May 13: Planck, and Herschel, two ESA astronomy satellites, were launched by an Ariane 5 rocket from Kourou at 13:12 UTC. Planck's mission is to measure minute variations in the cosmic microwave background radiation. Herschel operates from an orbital position around the second Lagrangian point and makes infrared observations of stars, galaxies and star-forming regions using a 3.5 m-diameter mirror, the largest yet carried into space.

May 27: Soyuz-TMA 15 launched from Baikonur cosmodrome by a Soyuz-FG rocket at 10:34 UTC. It carried a Russian cosmonaut (Roman Romanenko), an ESA astronaut (Frank De Winne) and a Canadian Space Agency astronaut (Robert Thirsk) to the International Space Station (ISS). This mission will increase the number of crew members of the ISS to six.

May 31: The Space Shuttle program transferred Launch Pad 39B, originally used to launch Apollo lunar missions, to the Constellation Program.

5 Years Ago -- 2014

May 28: Soyuz TMA-13M (Expedition 40). Launched at 19:57:00 UTC from Tyuratam (Baikonur Cosmodrome), Kazakhstan to the ISS. Delivered the ISS-Rapid Scatterometer (ISSRapidScat) to monitor ocean winds, which reused leftover hardware from the QuikScat scatterometer and demonstrated a unique way to replace an instrument aboard an aging satellite. The Vegetable Production System (Veggie) produced the first salad greens, which may be used to further human habitability in space. Crew members: Reid Wiseman (NASA), Maxim Suraev (Russian Federal Space Agency), Alexander Gerst (European Space Agency).

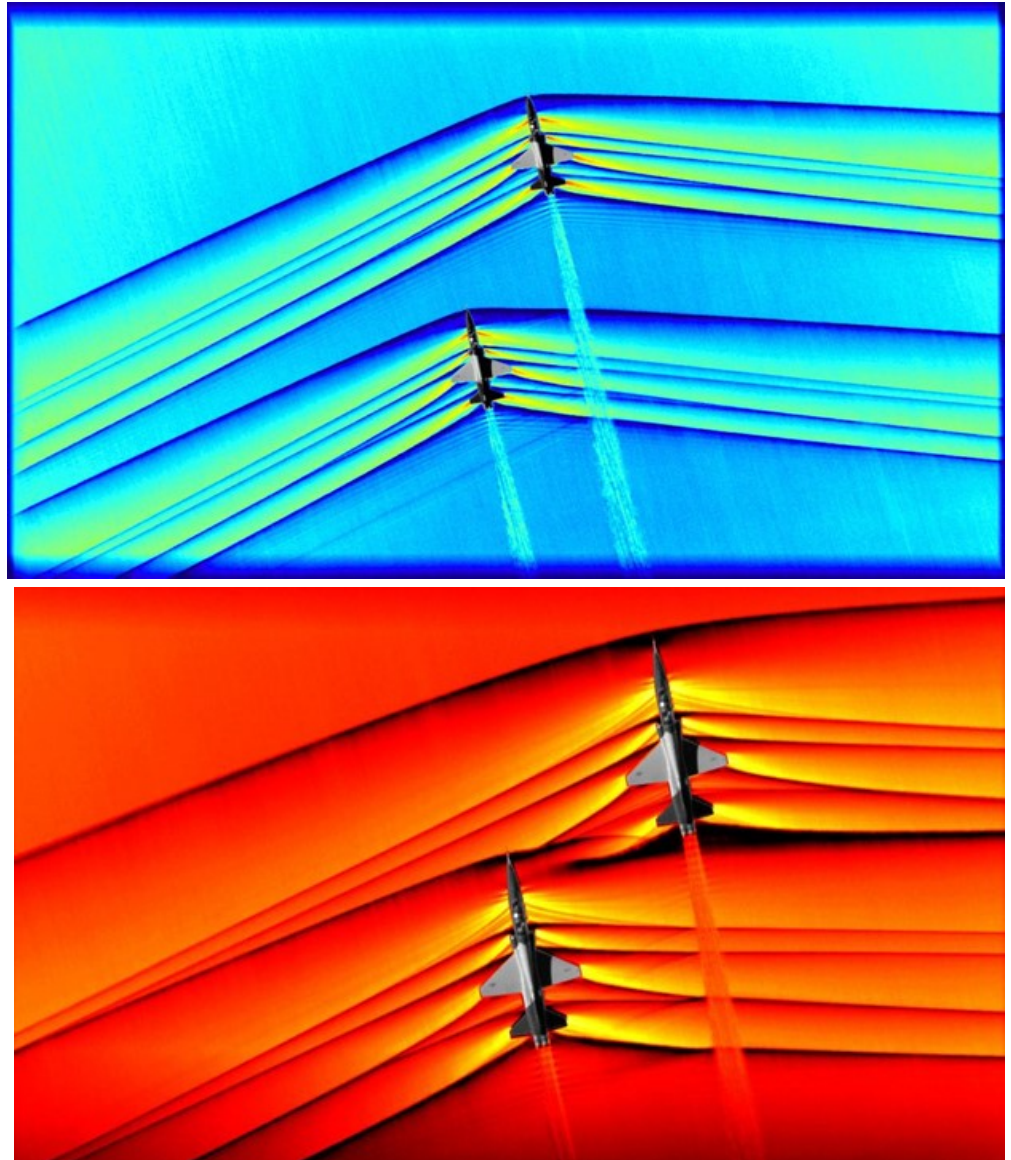
IMAGE(S) OF THE MONTH

T-38 Shock Waves

The images look unreal. They show two US Air Force T-38 training jets with lines radiating off to their sides and plumes extending out behind. This gives us a gorgeous visualization of the shockwaves that are heard on the ground as loud sonic booms.

NASA says these are "the first-ever images of the interaction of shockwaves from two supersonic aircraft in flight." The achievement came about during the latest phase of the agency's Air-to-Air Background Oriented Schlieren (AirBOS) flights at the Armstrong Flight Research Center in Edwards, California.

NASA's advanced air-to-air imaging system required some fancy flying to make it all work. The T-38s traveled in formation about 30 feet (9 meters) apart. A NASA B-200 King Air plane carried the camera system as the T-38s flew below it at supersonic speeds. The timing had to be perfect, and it was.



Photos: NASA

PARTING THOUGHTS

"All truths are easy to understand once they are discovered;
the point is to discover them."

— Galileo Galilei

SECTION INFORMATION

AIAA ALBUQUERQUE

Chair	Dr. Nick Morley
Vice-Chair	Mr. Ben Urioste
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Treasurer	Mr. Robert Malseed
Publications (Acting)	Mr. Robert Malseed
Young Professionals	Dr. Brian Robbins
Membership	Ms. Erin Pettyjohn
Honors & Awards	Dr. Stephen Seiffert
Public Policy	Mr. Mark Fraser
Corporate Liaison	Dr. Neil McCasland
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AIAA MISSION AND VISION STATEMENT

AIAA's mission is to inspire and advance the future of aerospace for the benefit of humanity. AIAA's vision is to be the voice of the aerospace profession through innovation, technical excellence, and global leadership.