

THE FLIGHT PLAN

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

MARCH 2021 SECTION MEETING: MAKING A DIFFERENCE AT MACH 2.

Presenter. Lt. Col. Tucker Hamilton

Organization USAF F-35 Developmental Test Director of Operations

INSIDE THIS ISSUE:

SECTION CALENDAR	2
NATIONAL AIAA EVENTS	2
SPACE NUCLEAR PROPULSION REPORT	3
ALBUQUERQUE DECEMBER MEETING	5
ALBUQUERQUE JANUARY MEETING	6
ALBUQUERQUE FEBRUARY MEETING	7
CALL FOR SCIENCE FAIR JUDGES	9
CALL FOR SCHOLARSHIP APPLICATIONS	10
NEW AIAA HIGH SCHOOL MEMBERSHIPS	10
AIAA HONORS AND AWARDS	11
WIND TUNNEL & ZIA INITIATIVE	12
JAN-MAR IN AIR & SPACE HISTORY	13
IMAGE OF THE QUARTER	19
SECTION INFORMATION	20



NEXT MEETING:

April:
15 April – Presenter – TBD

Abstract I humbly present my flying experiences through pictures and videos of what it takes and what it is like to be an Experimental Fighter Test Pilot. My personal stories include major life-threatening aircraft accidents, close saves, combat flying revelations, serendipitous opportunities testing first of its kind technology, flying over 30 aircraft from a zeppelin to a MiG-15 to an A-10, and managing the Joint Strike Fighter Developmental Test program for all three services. Through these experiences you will learn not just what a Test Pilot does, but also gain encouragement through my lessons learned on how to make a difference in your local communities...did I mention cool flight test videos!



Lt Col Tucker "Cinco" Hamilton started his Air Force career as an operational F-15C pilot. He supported multiple Red Flag Exercises and real world Operation Noble Eagle missions where he protected the President of the United States; at times escorting Air Force One. He then served as an Air Liaison Officer in Germany where he was the director of operations for a key command and control squadron. While serving in Germany he was hand-selected to be the initial cadre for the first MC-12 squadron in Afghanistan; heralding in the Air Force's first tactical Intelligence, Surveillance, and Reconnaissance aircraft. He served as the Chief Instructor for 200+ aircrew and accumulated over 400 combat hours directly supporting ground forces. After his time in the MC-12 he attended the USAF Test Pilot School (TPS) where he flew 30 different aircraft, wrote 38 technical reports, and took part in the first Automatic Air Collision Avoidance System testing. After TPS graduation he became an F-15C and F-15E Instructor Experimental Test Pilot and the Technical Director for the Operational Flight Program Combined Test Force at Eglin AFB, FL. He was the lead test

(Continued on page 2)

When: Mar 18 2021 (Thursday)

Where: On-line via Zoom

5:45 – 6:00 Virtual meet and greet

6:00 ~ 7:00 Presentation & Discussion

Join Zoom Meeting

<https://aiaa.zoom.us/j/95253687287>

Meeting ID: 952 5368 7287

[Click Here to RSVP](#)

https://docs.google.com/forms/d/1T8z2aAe_WIRsqoNVZI2iKleXjwtdPPE07VXuluNhhCM/viewform

CALENDAR

Local Section Events

Next General meeting 18 March 2021

Virtual Meeting Via Zoom

Start 6:00 pm

End 7:30 pm

National AIAA Events

[Congressional Visits Day 2021](#)

15 MARCH - 19 MARCH 2021

[ASCENDxSummit: Accelerating the Next-Generation Workforce](#)

16 MARCH 2021 1000 - 1400 (EASTERN DAYLIGHT TIME)

[U.S. Space Force Overview \(Member Exclusive Webinar\)](#)

16 MARCH 2021 1700 - 1800 (EASTERN DAYLIGHT TIME)

[2021 Region III/IV Student Conference](#)

26 MARCH - 27 MARCH 2021

[AIAA SOSTC Improving Space Operations Workshop 2021](#)

6 APRIL - 8 APRIL 2021

[2021 Integrated Communications Navigation and Surveillance Conference \(ICNS\)](#)

20 APRIL - 22 APRIL 2021

[3rd Cognitive Communications for Aerospace Applications \(CCAA\) Workshop](#)

21 JUNE - 23 JUNE 2021

[Upcoming U.S. Launches](#)

21 Mar Falcon 9 • Starlink V1.0-L22

TBD Electron • STP-27RM

22 Apr Falcon 9 • Crew 2

Apr Delta 4-Heavy • NROL-82

May Atlas 5 • SBIRS GEO Flight 5

May Atlas 5 • CST-100 Starliner OFT 2

Jun Falcon 9 • Transporter 2

Jun Falcon 9 • SpaceX CRS 22

Jun Falcon 9 • Turksat 5B

Jun Minotaur 1 • NROL-111

Jul Falcon 9 • GPS 3 SV05

Jul Falcon Heavy • USSF 44

Jul Antares • NG-16

MARCH 2021 SECTION MEETING: (CONTINUED)

pilot on 11 test programs; supporting the newest software, systems, and weapons for the 450+ F-15 fleet. He then served at the Pentagon as the Developmental Test & Evaluation (DT&E) Lead for the Joint Strike Fighter, F-35; overseeing the entire DT&E effort for the U.S. Air Force, Navy, and Marines. He managed an 18 test-aircraft fleet of specially equipped F-35s across multiple operating locations with a \$3B budget. After his F-35 work in D.C. he transitioned to Edwards AFB, CA where he currently flies the F-35 as the Developmental Test Director of Operations. Cinco has received numerous accolades and awards, the most recent being his recognition by the U.S. Junior Chamber as a Ten Outstanding Young American.

Lt Col Hamilton has a B.S. in Aerospace Engineering from the University of Colorado ('02), an M.S. in Aerospace Engineering from the University of Tennessee ('09), and an M.S. in Flight Test Engineering from the USAF Test Pilot School ('12).

NATIONAL ACADEMY OF SCIENCES REPORT

By Robert A. Malseed, Treasurer – AIAA Albuquerque

Section member Joe Sholtis was a member of the committee that issued this report last month. The commit-

(Continued on page 4)

Space Nuclear Propulsion for Human Mars Exploration

Bobby Braun and Roger Myers
Co-chairs
February 2021

The National
Academies of

SCIENCES
ENGINEERING
MEDICINE

Committee Members

ROBERT D. BRAUN, Jet Propulsion Laboratory, Co-Chair

ROGER M. MYERS, R Myers Consulting, LLC, Co-Chair

SHANNON M. BRAGG-SITTON, Idaho National Laboratory

JONATHAN W. CIRTAIN, BWX Technologies

TABITHA DODSON, Defense Advanced Research Projects Agency

ALEC D. GALLIMORE, University of Michigan

JAMES H. GILLAND, Ohio Aerospace Institute

BHAVYA LAL, IDA Science and Technology Policy Institute

PARVIZ MOIN, Stanford University

JOSEPH A. SHOLTIS, JR., Sholtis Engineering & Safety Consulting

STEVEN J. ZINKLE, University of Tennessee, Knoxville

NATIONAL ACADEMY OF SCIENCES REPORT

(Continued from page 3)

tee looked at using Nuclear Thermal Propulsion and Nuclear Electric propulsion for a human mission to Mars. Their task was summarized here:

- **Focus: Nuclear thermal propulsion (NTP) and nuclear electric propulsion (NEP) systems for the human exploration of Mars**
 - **NTP**
 - Specific impulse (Isp) of at least 900 s
 - Hydrogen propellant heated to at least 2500 K*
 - **NEP**
 - Power level of at least 1 MWe
 - Mass-to-power ratio (kg/kWe) substantially lower than the current state of the art
- **Identify:**
 - Primary technical and programmatic challenges, merits, and risks
 - Key milestones and a top-level development and demonstration roadmap
 - Missions that could be enabled by each technology

*Committee determined that 2700 K required for Isp of 900 s

Here is a very brief summary of their findings.

Major Development Challenges for NTP and NEP

Category	NTP	NEP
Reactor Core Fuel and Materials	<ul style="list-style-type: none"> High reactor fuel operating temperature (more than 2700 K) 	
System Operational Parameters	<ul style="list-style-type: none"> Rapid system startup to full operating temperature (preferably in 1 min or less) 	<ul style="list-style-type: none"> Long system operational reliability (4 years for power generation, 1 to 2 years for thrust)
Scale		<ul style="list-style-type: none"> Power conversion and thermal subsystem tests conducted to date have been at power levels orders of magnitude below that required for baseline mission Limited full scale, short duration electric propulsion subsystem testing at power levels an order of magnitude below that required for baseline mission
Ground-Based Testing	<ul style="list-style-type: none"> Need to capture and process engine exhaust (resulting in high cost) Facility preparation time (stresses baseline schedule) Little integrated system testing experience; none of it recent Last relevant-scale tests were nearly 50 years ago 	<ul style="list-style-type: none"> No fully integrated system testing experience
In-space Propulsion Technology Needs	<ul style="list-style-type: none"> Long-term storage of liquid hydrogen in space at 20 K with minimal loss 	<ul style="list-style-type: none"> Parallel development of a chemical propulsion systems
System Complexity		<ul style="list-style-type: none"> Highly complex: six NEP subsystems and a chemical propulsion system

NEP and NTP Commonalities

FINDING. NEP and NTP systems require, albeit to different levels, significant maturation in areas such as nuclear reactor fuels, materials, and additional reactor technologies; cryogenic fluid management; modeling and simulation; testing; safety; and regulatory approvals. Given these commonalities, some development work in these areas can proceed independently of the selection of a particular space nuclear propulsion system.

21

Findings and Recommendations:

Modeling and Simulation, Ground Testing, and Flight Testing

- The development of operational NTP and NEP systems should include extensive investments in modeling and simulation.
- Ground and flight qualification testing will also be required.
- For NTP systems, ground testing should include integrated system tests at full scale and thrust.
- For NEP systems, ground testing should include modular subsystem tests at full scale and power.
- Given the need to send multiple cargo missions to Mars prior to the flight of the first crewed mission, NASA should use these cargo missions as a means of flight qualification of the space nuclear propulsion system that will be incorporated into the first crewed mission.

22

ALBUQUERQUE SECTION MEETING 17 DECEMBER



Modeling and Simulation of COVID-19 Spreading as Aerosol Transport in a Closed Environment: Classroom as an Example.

Mohamed Abuhegazy, Ph. D. candidate, UNM Mechanical Engineering



Mr Abuhegazy spoke to the section members (in a Zoom meeting) about a study that was conducted recently to investigate aerosol transport in a classroom with relevance to COVID-19.

The objective of the study, was to numerically investigate the aerosol transport and surface deposition in a realistic classroom environment as an example of a closed area using Computational Fluid Dynamics (CFD) simulations. An instructor and nine students were placed in a 9 m by 9 m classroom, 2.4 m apart, following the social distance recommendations. A real situation of the room ventilation was applied by considering the classroom air conditioning according to ASHRAE 62.1 ventilation standards. Four different parameters including the particle size, aerosol source location,



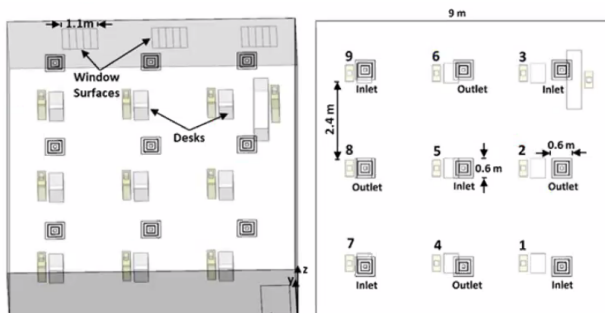
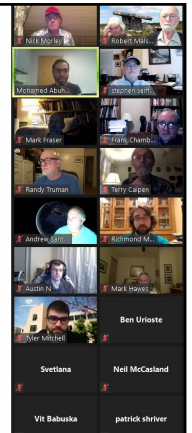
Modeling and Simulation of COVID-19 Spreading as Aerosol Transport in a Closed Environment: Classroom as an Example

Mohamed Abuhegazy

PhD Candidate at ME department
University of New Mexico

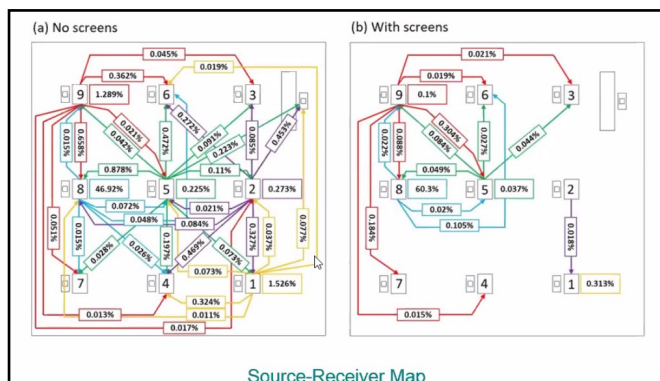
mabuhegazy@unm.edu

AIAA Meeting: 12/17/2020



Classroom Model

9X9 meter classroom model.

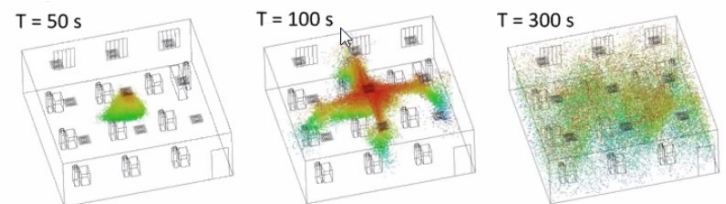


Source-Receiver Map

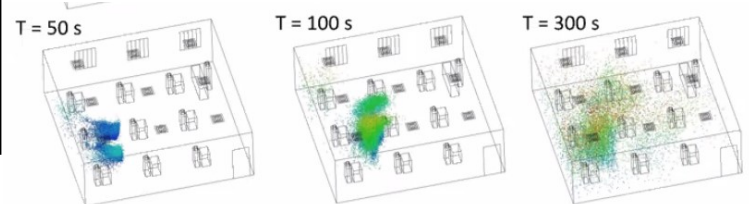
Placing screens between students greatly reduced the spread of the aerosol particles.

presence of sneeze guards in front of students, and the window state open vs. closed were studied.

It was found that a significant fraction (24 – 50%) of particles smaller than $15 \mu\text{m}$ exit the classroom through the return diffusers of the air conditioning system within 15 minutes. This highlights the importance of effective filtration and sterilization systems within air conditioners. Sneeze guards are found to reduce the aerosol transmission of the $1 \mu\text{m}$ particles from the source to others by $\sim 92\%$. By opening windows, the particle exit fraction can be increased by $\sim 38\%$ and aerosol deposition on people in the room is reduced.



Greater particle spread from the centrally located student.



Lesser particle spread from a student at the back wall.

ALBUQUERQUE SECTION MEETING 28 JANUARY



Prospects for a Liquid Hydrogen Economy

Ali Raissi, Ph.D., CTO, GenH2, Inc.



Dr. Raissi presented his views on an economy where many energy needs could be met using liquid hydrogen as a fuel. The meeting was conducted via Zoom. Here is a portion of his presentation. Liquid hydrogen has the potential for being a clean source of energy.

What Is Hydrogen Economy ?

The term "hydrogen economy" refers to the vision of using hydrogen as a low-carbon energy source – replacing, for example, gasoline as a transport fuel or natural gas as a heating fuel. ... In all cases it takes energy to convert these into pure hydrogen – *"The Guardian"*

What is the Advantage of Hydrogen Economy?

Hydrogen fuel cells are cleaner and more efficient than traditional ICEs and power plants. Hydrogen and fuel cells can be used in transportation sectors to power vehicles and mobile power packs. The benefits of fuel cells are: **Reduced Greenhouse Gas Emissions** – *"hfcc.org"*

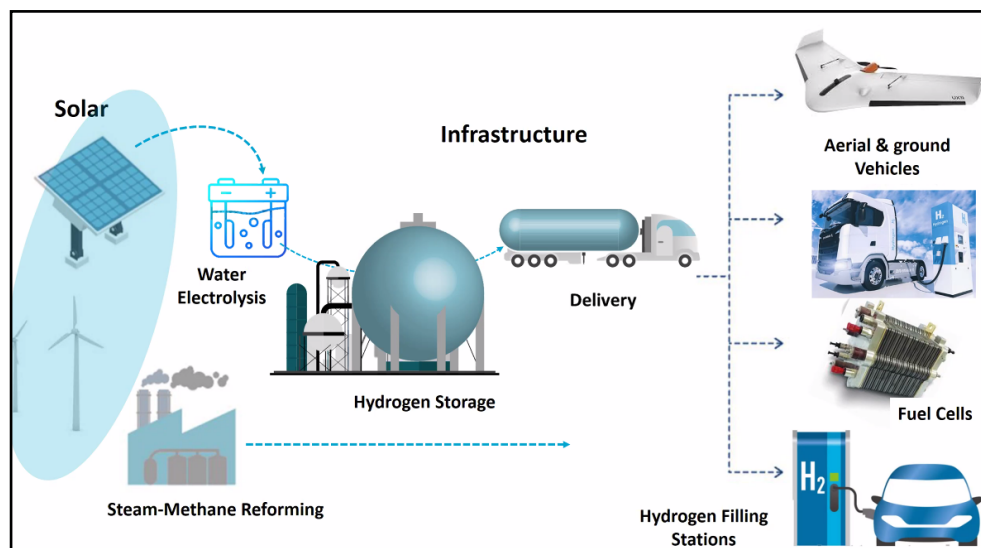
Electric Cars Vs Hydrogen FC Electric Vehicles

Hydrogen fuel cell vehicles tend to be more economical than the battery electric counterparts. The Hyundai Nexo comes with a real-world range of more than 400 miles and filling up takes just five minutes, whereas electric charging can be an hour-long affair – *"Autocar"*

Do Fuel Cell Electric Cars Run Clean Like BEVs?

The hydrogen fuel cell electric vehicle (FCEV), which runs on compressed hydrogen emits zero carbon emissions from its exhaust. – *"The Week"*

Hydrogen production, storage, delivery, and use in many diverse applications.



ALBUQUERQUE SECTION MEETING 25 FEBRUARY



The United States Space Force – What is it and where is it headed ?

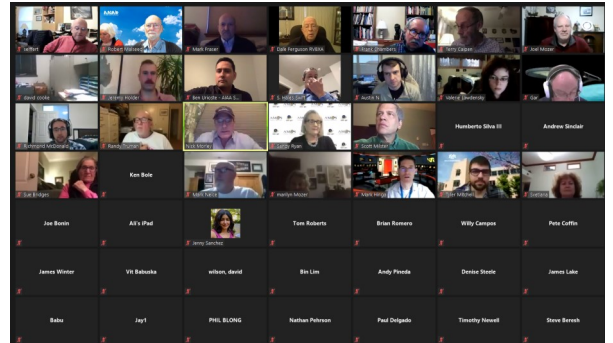
Dr. Joel Mozer, Chief Scientist, USSF.



Dr. Mozer is a former Albuquerque Section Chairman. He serves as the principal scientific advisor to the Chief of Space Operations and he is the service's senior authority for all science and technology matters. The meeting topic proved to be very popular and resulted in 69 attendees.

The US Space Force comprises approximately 16,000 space professionals worldwide and manages a global network of satellite command and control, communications, missile warning and launch facilities and is responsible for the Department of Defense's space system development and acquisitions. Dr. Mozer spoke about the newly-formed (1 year old) United States Space Force, why it was formed and what the new missions and technological challenges that it will face are. As the Chief Scientist, he described the long-term vision for the USSF and where we must invest in science and technology today in order to meet that vision.

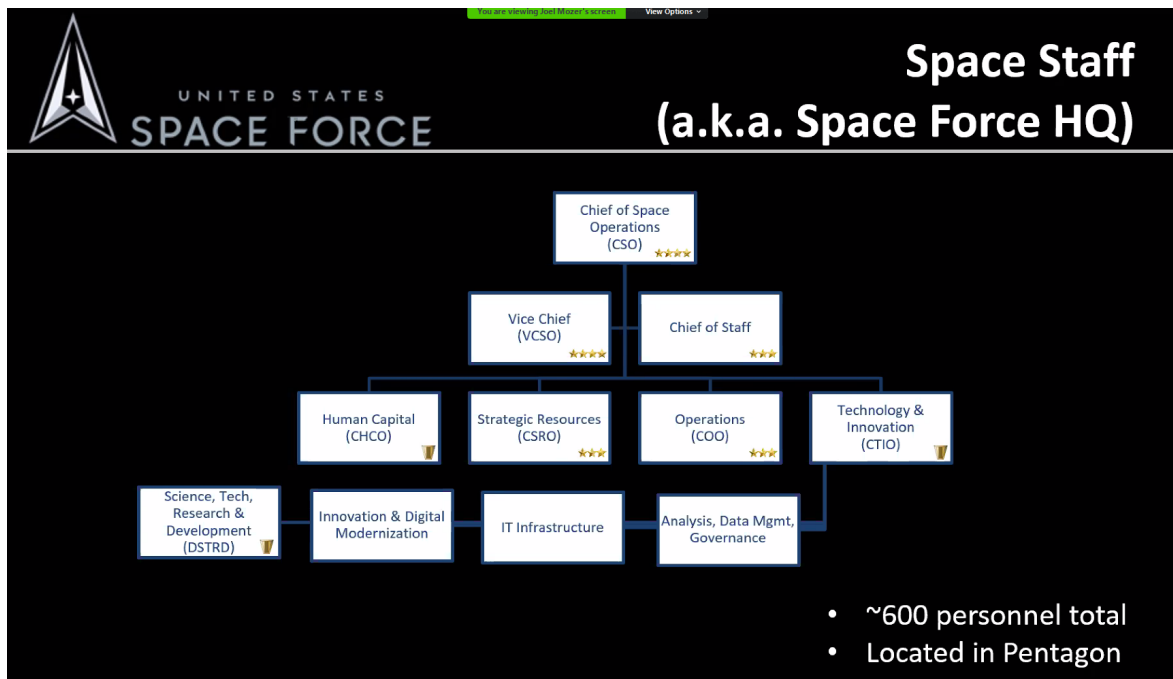
He showed two organization charts and one information chart, and spent the remainder of his time answering many questions from the meeting attendees.



49 of the 69 meeting attendees



Dr. Mozer on Zoom.



US Space Force top-level org chart.

Continued on next page

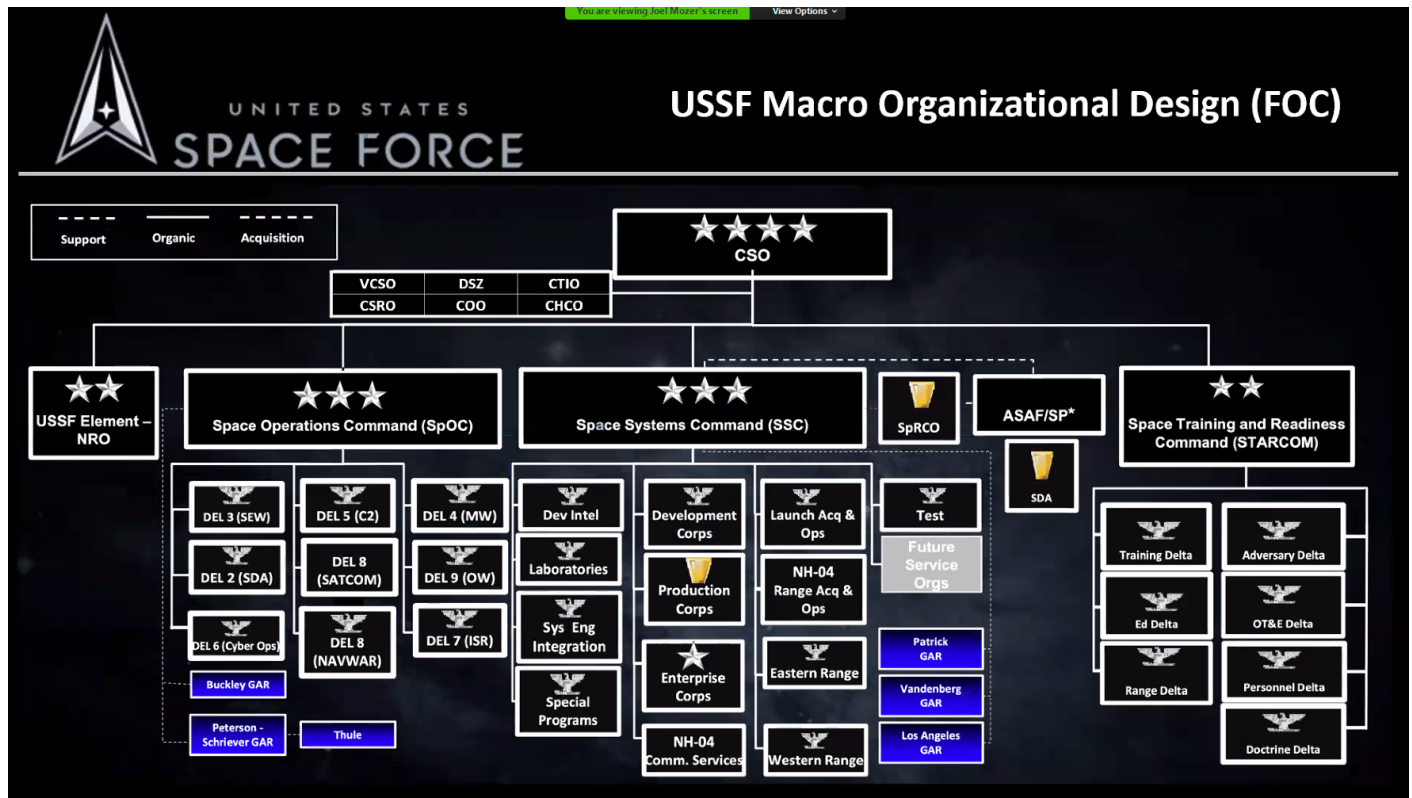
ALBUQUERQUE SECTION MEETING 25 FEBRUARY



The United States Space Force – What is it and where is it headed ?



continued



A little more detail.

USSF Term		US Space Force Guardian Ranks		
USAF Term		Grade	Rank	Abbreviation
Chief of Space Operations ("Space Chief")	Chief of Staff of the AF ("Air Chief")	E1	Specialist 1	Spc1
Space Staff (CHCO, COO, CSRO, CTIO)	Air Staff (A1, A2, ... A10)	E2	Specialist 2	Spc2
Field Commands (e.g., Space Operations Command)	Major Commands (e.g., Air Combat Command)	E3	Specialist 3	Spc3
Delta (O-6 level command)	Wing (O-6 level command)	E4	Specialist 4	Spc4
Space Garrison (e.g., Peterson Schriever Garrison)	Air Force Base (e.g., Kirtland AFB)	E5	Sergeant	Sgt
10-15,000 "Guardians" (TBD)	678,000 "Airmen"	E6	Technical Sergeant	TSgt
Semper Supra (Always Above)	Aim High...Fly—Fight—Win	E7	Master Sergeant	MSgt
		E8	Senior Master Sergeant	SMSgt
		E9	Chief Master Sergeant	CMSgt
		E9	Chief Master Sergeant of the Space Force	CMSSF
		O1	Second Lieutenant	2d Lt
		O2	First Lieutenant	1st Lt
		O3	Captain	Capt
		O4	Major	Maj
		O5	Lieutenant Colonel	Lt Col
		O6	Colonel	Col
		O7	Brigadier General	Brig Gen
		O8	Major General	Maj Gen
		O9	Lieutenant General	Lt Gen
		O10	General	Gen

Relating US Space Force to US Air Force

CALL FOR SCIENCE FAIR JUDGES

By Robert A. Malseed, Treasurer – AIAA Albuquerque

The week of 22–27 March our section will be judging Central New Mexico STEM Research Challenge (Science Fair) projects to choose four students to be the winners of our awards this year. We award \$100 to each of four students, usually two Junior Division (Mid School) and two Senior division (High School). Judging this year will be virtual, and we will have the week to view the information which will be posted about the projects that are entered in the Challenge. I should receive more specific information about the judging process this Friday. Anyone interested in helping to choose our winners should contact Robert Malseed at Robert@malseed.com.



March 22 - 27, 2021
VIRTUAL

SCHEDULE OF EVENTS

Visit the [RESEARCH CHALLENGE VIRTUAL LOBBY](#) (link coming soon) for instant access to Research Challenge events!

Link to the virtual lobby will be emailed to participants and posted on our [website](#) no later than 3/21/21. All events listed here can be accessed from the virtual lobby EXCEPT judging interviews.

March 22 – 27 ~ visit at your convenience!

PROJECT SHOWCASE – browse all student research projects competing in Research Challenge

STEM HALL – visit profiles and interactive exhibits from our sponsors and community partners

SPEAKERS & PANELS – view engaging discussions with STEM professionals including:

- Research Challenge Alumni
- Health Professions
- Energy & Engineering Careers

SCAVENGER HUNT – Participating students, complete a scavenger hunt as you explore Virtual Research Challenge for your chance to win prizes!

CALL FOR SCHOLARSHIP APPLICATIONS

By Stephen Seiffert—Honors and Awards Officer

A call for university students to apply for the Albuquerque AIAA Sections' established annual scholarship is announced; this year's value is \$1000, to be awarded in May of 2021. Undergraduates or graduate students enrolled in the University of NM, the NM Institute of Mining and Technology, NM Highlands University, and Northern NM College are eligible for application.

The **application deadline is April 10**. A winner announcement will be posted on or about May 1 and presentation of the award is at the annual AIAA Awards Banquet held in mid-May in Albuquerque.

Undergraduate applicants must have completed at least 60 hours in a degree-granting curriculum by the end of the semester of application. Graduate students must be admitted to a degree program.

Students from all applicable schools should check for the announcement, application instructions and deadlines, and forms and instructions posted on the **UNM School of Engineering website the last week of January**: www.soe.unm.edu/scholarship/.

Points of contact regarding the scholarship include:

UNM: Dr. Svetlana Poroseva poroseva@unm.edu

NMT: Dr. Mostafa Hassanalian mostafa.hassanalian@nmt.edu

Honors & Awards Committee, Chair: Dr. Stephen Seiffert seiffert@flash.net

NEW FREE AIAA HIGH SCHOOL MEMBERSHIP NEW

Our section currently has five members in the new High School Student grade.

A graphic with a dark blue background and yellow stars. It lists five benefits of AIAA High School Membership, each with an icon: 1. AIAA Mentor Match (icon of two people talking), 2. STEM-focused webinars and on-demand content (icon of a computer monitor with a play button), 3. Access to our exclusive Engage community platform (icon of a group of people), 4. Online subscription to *Aerospace America* (icon of a newspaper), and 5. Discounts to AIAA forums and events (icon of a group of people at a table).

MEMBERSHIP IS FREE AND INCLUDES:

- AIAA Mentor Match
- STEM-focused webinars and on-demand content
- Access to our exclusive Engage community platform
- Online subscription to *Aerospace America*
- Discounts to AIAA forums and events

Go to aiaa.org/hs to sign up . Questions? Contact custserv@aiaa.org

HONORS AND AWARDS NEWS OF SECTION MEMBERS

By Stephen Seiffert—Honors and Awards Officer

February 5, 2021 AIAA Announcement

Dr Humberto Silva III of Sandia National Laboratories has been selected to receive the **2021 AIAA Engineer of the Year Award**. The AIAA Engineer of the Year Award is presented to a member of AIAA who has recently made an individual, technical contribution in the application of scientific and mathematical principles leading to a significant technical accomplishment, representative of AIAA's national/ international recognition.

Dr. Silva is being honored *"For pioneering the modernization of re-entry vehicle probability loss of assured safety assessments including conduction, convection, chemical kinetics, radiation and associated thermo-physical material uncertainty."*

This premier award is awarded during the annual *AIAA Aerospace Spotlight Awards Gala*.

February 19, 2021 AIAA Announcement

Dr Walter H. Rutledge of CENTRA Technology, Inc., Albuquerque has been selected to present the **2021 AIAA Wright Brothers Lecture in Aeronautics**, lecture topic, *"Hypersonics for National Security: Conventional Prompt Strike."*

The Wright Brothers Lectureship commemorates the first powered flights made by Orville and Wilbur Wright at Kitty Hawk, North Carolina, in 1903 and emphasizes significant advances in aeronautics by recognizing recent accomplishment of a significant "First in Aeronautical Engineering". The lecture highlights the details and approaches to meeting both the technical and programmatic challenges involved thereof the lecture topic. The lecture is presented biennially (in odd-numbered years), and will be presented in conjunction with the AIAA Defense Forum in September 2021 in Laurel, Maryland. The award consists of a medal and certificate, and the lecture will be published in the AIAA Journal of Aircraft.

A listing of distinguished lecturers can be found on the AIAA website: [Award | AIAA](#).

February 25, 2021 AIAA Announcement

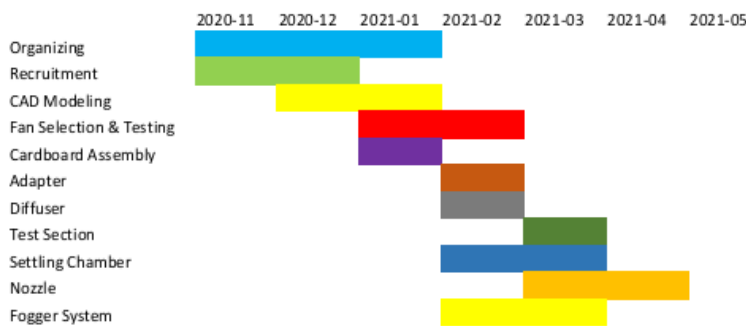
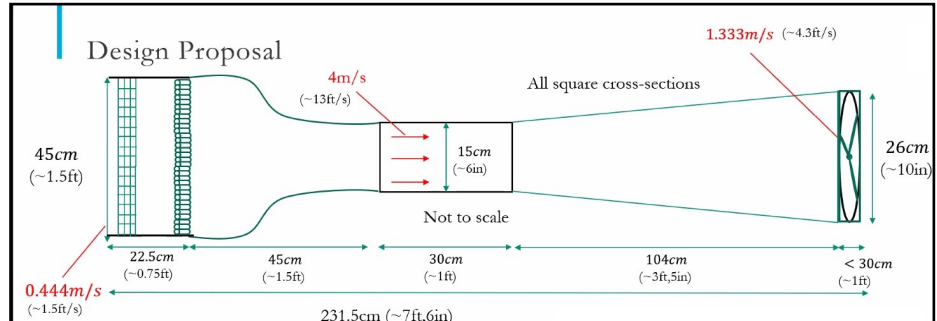
Dr Richard Scott Erwin of U.S. Air Force, Albuquerque, has been elected to the Class of 2021 Fellows. The induction ceremony for the new Fellows will take place later this year." AIAA President Basil Hassan said, "This distinguished set of individuals has earned the respect and gratitude of the aerospace community for their creativity and valued contributions to better understanding our universe and mentoring future generations of aerospace professionals." AIAA Executive Director Dan Dumbacher said, "These professionals have distinguished themselves by their significant and lasting contributions to the aerospace community. Their passion, accomplishment and dedication to the industry are worthy of this recognition. They are the inspiration to aspire to even greater heights for the generations that follow."

LOW SPEED WIND TUNNEL DESIGN AND THE ZIA INITIATIVE

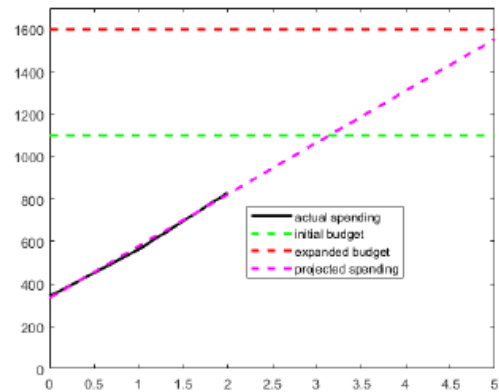
Dr. Paul Delgado, Sandia National Laboratories

Dr. Paul Delgado, Section Vice Chairman, is currently working with some of our student members to design and build a wind tunnel. Our December newsletter gave a preliminary look at the concept.

The current status is shown in this chart::



- **CAD Modeling Complete**
- **Fan Selection Complete**
- **Risk Reduction Tests in Progress**
- **Fan Adapter & Diffuser Assembled**
- **Delivery timeframe**
 - On schedule for delivery May 2021



Current Spending: \$829.82
On track to fully spend out
expanded budget by May 2021

Dr Delgado has also continued with his initiative to provide classroom training on aerospace subjects to young students.



Feb 2021 – Intro to Helicopters

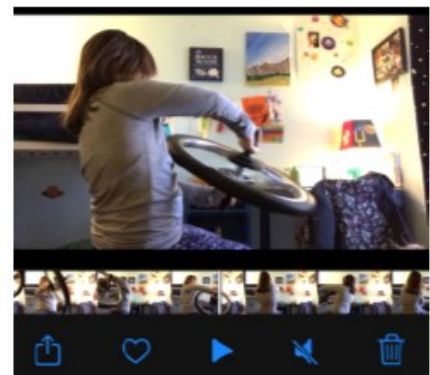
MOOC Class (80 participants)
Venue 1: Manzano Mesa Elementary

Hybrid Class (12 participants)
Venue 2: Singing Arrow Elementary



Upcoming Classes:

- Mar 2021: Intro to Helicopters (1st Grade)
- Mar 2021: Landing on Planets (Pre-K)



JAN, FEB, MAR IN AIR & SPACE HISTORY

JANUARY 2021

80 Years Ago -- 1941

January 23: Ground was broken in Cleveland, Ohio, to create the facility now known as The NASA Glenn Research Center at Lewis Field (GRC).

60 Years Ago -- 1961

January 31: Samos 2 orbited by Atlas-Agena, 3:23 p.m., EST, Vandenberg AFB, CA.

January 31: Mercury Redstone 2 (MR-2), launched 11:54 a.m., EST, Cape Canaveral, Fla. with chimpanzee Ham aboard.

55 Years Ago -- 1966

January 14: Sergei P. Korolev died, USSR.

January 20: Little Joe II launched, 8:17 a.m., MST, WSMR, NM. Apollo launch escape system development test.

January 31: Luna 9 Launch (USSR Moon Lander) by Modified SS-6 (Sapwood) or

Molniya. First successful soft landing on the Moon.

50 Years Ago -- 1971

January 20: Meteor 1-7 lifted off by Modified SS-6 (Sapwood) or Molniya, 1131 UTC, Baikonur, USSR.

January 31: Apollo 14 launched at 4:03 p.m., EST, Launch Complex 39, Pad A, KSC. Astronauts Alan B. Shepard Jr., Stuart A. Roosa, and Edgar D. Mitchell land in Frau Mauro region of the moon. This was the last lunar crew to be quarantined.

45 Years Ago -- 1976

January 15: Helios-B or Helios 2 orbited, 12:34 a.m., EST, Cape Canaveral, Fla. Launched aboard Titan 3E-Centaur. One of a pair of deep-space probes developed by the Federal Republic of Germany (FRG) in a cooperative program with NASA.

January 17: Hermes or CAS-C or CTS launched by a Delta at 6:27 p.m., EST, Cape Canaveral, Fla.

January 29: Intelsat IVA F-2 orbited 6:56 p.m., EST, Cape Canaveral, Fla.

35 Years Ago -- 1986

January 12: STS-61C (Space Shuttle *Columbia*) launched at 6:55 a.m., EST, KSC. Crew: Robert L. "Hoot" Gibson, Charles F. Bolden, Franklin R. Chang-Diaz, George D. "Pinky" Nelson, Steve A. Hawley, Robert J. Cenker, and Congressman William C. Nelson. Deployment of SATCOM Ku-1. Landed at Edwards AFB, CA, January 18, 8:58 a.m., EST. Mission Duration: 6 days, 2 hours, and 3 minutes.

Franklin Chang-Diaz became first U.S. Hispanic male in space. First member of U.S. House of representatives in space, Bill Nelson.

January 12: RCA Satcom KU-1 launched from STS 61C.

January 24: Voyager 2, Uranus Flyby.

January 28: *Challenger* Accident – STS-51L (Space Shuttle *Challenger*) launched at 11:38 a.m., EST, KSC. Astronauts: Francis R. "Dick" Scobee, Michael J. Smith, Ellison S. Onizuka, Judith A. Resnik, Ronald E. McNair, Sharon Christa McAuliffe, and Gregory Jarvis. The explosion 73 seconds after liftoff claimed crew and vehicle. The cause of explosion was determined to be an O-ring failure in the right solid rocket booster. Cold weather was determined to be a contributing factor.

(Continued on page 14)

JAN, FEB, MAR IN AIR & SPACE HISTORY

(Continued from page 13)

30 Years Ago – 1996

January 11: STS-72 (Space Shuttle *Endeavour*) launched at 4:41 a.m. EST, KSC. Crew: Brian Duffy; Brent W. Jett, Jr.; Leroy Chiao, Daniel T. Barry, Winston E. Scott, and Koichi Wakata (Japan). Mission objectives included the capture and return to Earth of a Japanese microgravity research spacecraft known as Space Flyer Unit (SFU) and also the deployment and retrieval of the Office of Aeronautics and Space Technology Flyer (OAST-Flyer) spacecraft. Landed at KSC, January 20 at 2:41 a.m. Mission Duration: 8 days, 22 hours, 1 minute.

20 Years Ago -- 2001

January 9: Shenzhou 2 (translated as "Divine Ship", or "Magic Vessel", or "God Vessel") is an unmanned Chinese (PRC) spacecraft that was launched by a Long March 2F rocket from Jiuquan launch center (in the north-western province of Gansu) at "01:00 a.m.".

January 16: The descent module (also carrying the name, Shenzhou 2) landed smoothly in Inner Mongolia on 16 January at 11:22 UTC after separating from the orbiter.

15 Years Ago – 2006

January 15: Stardust capsule landed in Utah desert returning samples of interstellar dust that could offer vital clues about the origins of our solar system. It's reentry speed - at 28,860 miles per hour- is the fastest ever of any human-made object, topping the record set in May 1969 by the returning Apollo 10 command module.

January 19: New Horizons probe launched by an Atlas 5 rocket from Cape Canaveral at 2 p.m. EST to reach Pluto (and its satellite Charon) by about 2015 and then other bodies in the Kuiper Belt.

10 Years Ago – 2011

January 22: The Japanese HTV 2 (H-II Transfer Vehicle), was launched from Tanegashima at 05:38 UT by an H-2B rocket. The HTV is vital to the resupply of the ISS after the retirement of the Space Shuttle. After the HTV has delivered cargo to the ISS, waste cargo from the ISS is loaded into the HTV and is destroyed upon reentry into the Earth's atmosphere.

5 Years Ago – 2016

January 17: Jason-3, the fourth mission in U.S.-European series of satellite missions that measure the height of the ocean surface was launched at 18:42:00 UTC by a Falcon 9 launch vehicle at Vandenberg AFB.

FEBRUARY 2021

115 Years Ago – 1906

February 7: Birthday of Clyde Tombaugh, discoverer of planet Pluto.

90 Years Ago -- 1931

February 2: First official rocket mail, cargo of 102 pieces, launched by Friedrich Schmiedl, Austria.

85 Years Ago -- 1936

February 23: U.S. rocket mail flight, New York to New Jersey, Greenwood Lake.

60 Years Ago -- 1961

February 1: First test launch of Minuteman ICBM.

February 10: Voice message sent from Washington to Woomera, Australia, by way of the Moon.

NASA Deputy Administrator Dryden spoke on telephone to Goldstone, Calif., which "bounced" it to the

(Continued on page 15)

JAN, FEB, MAR IN AIR & SPACE HISTORY

(Continued from page 14)

deep space instrumentation station at Woomera. The operation was held as part of the official opening ceremony of the deep space instrumentation facility site in Australia.

February 12: Venus 1 (aka Venera 1) launched by a Modified SS-6 (Sapwood) or Molniya, 0210 UTC, Baikonur, USSR. The first spacecraft to fly by Venus.

February 14: James E. Webb took office as second NASA Administrator.

February 16: Scout launch vehicle makes its first spacecraft launch, the Explorer 9, an Echo-type balloon satellite. Also, the first satellite launch from Wallop's Island, VA.

February 17: Discoverer 20 launched by Thor Agena, 3:23 p.m., EST, Vandenberg AFB.

February 18: Discoverer 21 launched by Thor Agena, 2:58 p.m., EST, Vandenberg AFB.

February 21: Transit III-B, LOFTI-1 launched by Thor, 10:45 p.m., EST, Cape Canaveral, Fla.

February 21: Mercury Atlas-2 (MA-2) launched by an Atlas, 0:12 a.m., EST, Cape Canaveral, Fla. A suborbital test of the Mercury spacecraft.

February 24: Explorer failure, orbit not achieved, Explorer S-45 launched aboard a Juno 2 rocket, 7:13 p.m., EST, Cape Canaveral, Fla.

February 24: Jodrell Bank transmits radio signals from the surface of the Moon that are received in Sydney, Australia.

55 Years Ago -- 1966

February 3: Luna 9 soft landed on moon and sent first radio television transmission to Earth. Launched January 31, 1146 UTC, Baikonur, USSR.

February 3: ESSA-1 launched by Thor Delta, 2:41 a.m., EST, Cape Canaveral, Fla.

February 26: Apollo Saturn 201 lifted off at 11:12 a.m., EST, Cape Canaveral, Fla. Suborbital flight of Apollo spacecraft block I and Saturn IB launch vehicle.

February 28: ESSA-2 launched by Thor Delta, 8:48 a.m., EST, Cape Canaveral, Fla.

February 28: Gemini astronauts, Elliot See and Charles Bassett died when their T-38 crashed into the St. Louis McDonnell Aircraft building where their *Gemini 9* spacecraft was being assembled.

50 Years Ago --1971

February 2: NATO 2, a military communications satellite, was launched by a Delta, 8:41 p.m., EST, Cape Canaveral, Fla.

February 16: Tansei 1, a technological test satellite, was launched by an M-4S, 0400 UTC, from the Kagoshima Space Center, Japan.

40 Years Ago --1981

February 21: Comstar D-4 launched, 6:23 p.m., EST, Cape Canaveral, Fla.

35 Years Ago --1986

February 19: MIR Space Station launched by Proton Booster Plus Upper Stage from Baikonur at 21:28:23 UTC.

30 Years Ago --1991

February 7: Salyut 7 space station re-entered Earth's atmosphere at 04:00 UTC.

(Continued on page 16)

JAN, FEB, MAR IN AIR & SPACE HISTORY

(Continued from page 15)

25 Years Ago – 1996

February 17: NEAR (Near Earth Asteroid Rendezvous) launched from Cape Canaveral by a Delta 2 rocket at 3:43 EST. to orbit around a major asteroid, Eros which it encountered on February 14, 2000. On Monday, 12 February 2001, the NEAR spacecraft touched down on asteroid Eros, after transmitting 69 close-up images of the surface during its final descent.

February 21: Soyuz TM-23 launched from Baikonur at 12:34 UTC, carrying two cosmonauts (Yuri Onufrienko, Yuri Usachev). It docked with the MIR station at 14:24 UTC on February 23.

February 22: STS-75 (Space Shuttle *Columbia*) launched at 3:18: pm EST, KSC. Crew: Andrew M. Allen, Scott J. Horowitz, Franklin R. Chang-Diaz, Maurizio Cheli (Italy), Jeffrey A. Hoffman, Claude Nicollier (Switzerland), and Umberto Guidoni (Italy). Carried the Tethered Satellite System Reflight (TSS-1R) into orbit and deployed it spaceward on a conducting tether. Also flew the United States Microgravity Payload (USMP-3) designed to investigate materials science and condensed matter physics. Landed March 9 at 8:58 a.m., EST, KSC. Mission Duration: 15 days, 17 hours, 41 minutes.

February 24: Polar spacecraft, part of the International Solar Terrestrial Physics Project (ISTP) launched by a Delta 2 rocket from Vandenberg AFB at 11:24 UTC to measure polar magnetospheric hot plasma and to map auroral displays.

20 Years Ago - 2001

February 7: STS-98 (Space Shuttle *Atlantis*) launched at 6:13 pm EST from KSC. Crew: Kenneth D. Cockrell, Mark L. Polansky, Robert L. Curbeam, Thomas D. Jones, and Marsha S. Ivins. Carried the Destiny module to the International Space Station (ISS). Landed February 20 at 3:34 p.m., EST at Edwards Air Force Base, California. Mission Duration: 12 days, 21 hours, 21 min.

February 12: NEAR spacecraft touched down on asteroid Eros.

10 Years Ago - 2011

February 16: Europe's ATV 2 (Automated Transfer Vehicle 2) or Kepler resupply vehicle launched from Kourou at 21:51 UT by an Ariane 5 rocket. The craft docked with the International Space Station's (ISS) *Zvezda* service module on February 24 at 15:59 UT.

February 24: STS 133 (Space Shuttle *Discovery*) launched at 4:53 pm from KSC. Crew: Steven W. Lindsey, Eric A. Boe, Michael R. Barratt, Stephen G. Bowen, Nicole P. Stott, and Alvin Drew. Shuttle *Discovery* docked with the International Space Station's (ISS) *Harmony* module on 26 February 2011 at 19:14 UT. The mission was the 39th and final flight of *Discovery* and the 133rd flight of the Space Shuttle program. The primary goals of the shuttle mission were to deliver critical spare parts and deliver Robonaut 2, the first humanoid robot in space. Landed March 9, 2011 at 11:57 a.m. EST at KSC. Mission Duration: 12 days, 19 hours, 4 minutes.

5 Years Ago – 2016

February 17: Astro-H (also known as Hitomi or "Eye"), an X-ray astronomy collaboration between the Japanese space agency (JAXA) and NASA, was launched at 08:45:00 UTC, by an H-2A launch vehicle from Tanegashima, Japan. Astro-H will explore the extreme universe that is abundant with high-energy phenomena around black holes and supernova explosions, and observe a cluster of galaxies filled with high-temperature plasma.

MARCH 2021

240 Years Ago - 1781

March 13: Uranus discovered by Sir William Herschel, British Royal Astronomer (1738-1822).

95 Years Ago - 1926

March 16: Dr. Robert H. Goddard launched the first liquid-propelled rocket at 2:30 p.m. on a farm in Auburn, MA outside Worces-

(Continued on page 17)

JAN, FEB, MAR IN AIR & SPACE HISTORY

(Continued from page 16)

ter, MA.

90 Years Ago - 1931

March 14: Johannes Winkler made first liquid-fueled rocket test in Europe. Bessau, Germany.

75 Years Ago - 1946

March 22: First American rocket to escape earth's atmosphere, the JPL-Ordnance Wac, reached 50-mile height after launch from WSPG.

65 Years Ago - 1956

March 14: ABMA launched first Jupiter rocket, Cape Canaveral, Fla.

60 Years Ago - 1961

March 9: Sputnik 9 or Korabl Sputnik 4 launched by Modified SS-6 (Sapwood) or Molniya at 06:28:00 UTC from Baikonur (Carried Dog Named Chernushka)

March 25: Explorer 10 launched by Thor Delta, 10:17 a.m. EST, Cape Canaveral, Fla.

March 16: Goddard Space Flight Center, dedicated, Greenbelt, MD.

March 18: Little Joe 5A, suborbital Mercury capsule test, premature escape rocket firing, Wallops Flight Facility (WFF), VA.

March 25: Sputnik 10 or Korabl Sputnik 5 launched by Modified SS-6 (Sapwood) or Molniya at 06:00:00 UTC rocket from Baikonur. (Carried dog Named Zvezdochka).

55 Years Ago: 1966

March 1: Venera 3, impacted on Venus making it the first spacecraft to impact on the surface of another planet.. Launched on Nov.16, 1965.

March 16: Gemini Titan 8. First manned docking of two spacecraft, (Gemini 8 with Agena target rocket). Astronauts Dave R. Scott and Neil A. Armstrong launched. 10:41 a.m., EST, Cape Canaveral, Fla. Made emergency landing in Pacific less than 11 hours later.

March 31: Luna 10 or Lunik 10 launched by Molniya or Modified SS-6 (Sapwood) with 2nd Generation Upper Stage + Escape Stage, 1048 UTC, Baikonur, USSR. First artificial moon satellite.

50 Years Ago - 1971

March 9: NASA research pilot Thomas McMurtry completed the first flight in a F-8A, modified with Langley researcher Richard Whitcomb's supercritical wing.

March 13: Explorer 43 (IMP-I) launched by Delta, 11:15 a.m., EST, Cape Canaveral, Fla.

March 31: ISIS 2 launched by Delta, 6:57 p.m., PST, Vandenberg AFB.

45 Years Ago - 1976

March 26: RCA-B or RCA-SATCOM-B launched by Delta at 5:42 p.m., EST, Cape Canaveral, Fla.

35 Years Ago - 1986

March 6: Vega 1, USSR Comet Halley Flyby.

March 9: Vega 2, USSR Comet Halley Flyby.

March 10: Sakigake, Japan, Comet Halley Flyby.

(Continued on page 18)

JAN, FEB, MAR IN AIR & SPACE HISTORY

(Continued from page 17)

March 13: Giotto, ESA Comet Halley Flyby.

March 28: ICE, Comet Halley Distant Flyby.

30 Years Ago - 1991

March 8: Titan IV launched. 4:03 a.m., PST carrying DoD payload. First launch of Titan IV from Vandenberg AFB.

March 31: ALMAZ-1 ("Diamond") launched by the U.S.S.R. on 15:12 UTC using a Proton-K rocket booster. The flight program provided for filming of the territory of the Soviet Union and other countries in the interest of geology, cartography, oceanography, ecology, and agriculture.

25 Years Ago - 1996

March 22: STS-76 (Space Shuttle *Atlantis*) launched from KSC at 3:13 a.m. EST for 3rd docking with the Russian Mir station. Left Shannon Lucid onboard. Crew: Kevin P. Chilton, Richard A. Searfoss, Linda M. Godwin, Michael R. Clifford, Ronald M. Sega, and Shannon W. Lucid. Landed at Edwards AFB March 31, 1996 at 8:28 a.m. EST. Mission Duration: 9 days, 5 hours, 16 minutes.

20 Years Ago - 2001

March 18: XM 2 (better known as XM Rock) is an American geosynchronous radio broadcast satellite that was launched by a Zenit 3SL rocket from the Sea Launch Odyssey platform on the equatorial Pacific Ocean at 5:33 pm EST. The satellite carries two transmitters (3 kW each) in the S-band to relay 100 channels of digital quality music uplinked in the X-band from one or more ground stations.

March 21: STS-102 (Space Shuttle *Discovery*) launched from KSC at 2:31 a.m. EST. Crew: James D. Wetherbee, James M. Kelly, Andy S. W. Thomas, and Paul W. Richards. International Space Station (ISS) Flight 5A.1 Delivered a multi-rack Italian container (Leonardo MultiPurpose Logistics Module, LMPLM) to the Destiny Module of the ISS and exchanged Expedition 2 crew for Expedition One crew: James S. Voss (up); Susan J. Helms (up); Yury V. Usachev (up); Sergei Krikalev (down); William M. Shepherd (down); Yuri P. Gidzenko (down). Landed March 21 at 2:31 a.m. EST, KSC. Mission Duration: 12 days, 19 hours, 51 minutes.

March 23: The Soviet/Russian orbital laboratory Mir, returned to Earth, scattering fragments in the South Pacific Ocean.

15 Years Ago - 2006

March 10: MRO Mars Orbit insertion.

March 22: ST5-A, ST5-B, and ST5-C were the first three microsatellites in the Space Technology 5 mission of NASA's New Millennium Program. They were launched at 9:04 am EST by a Pegasus XL rocket that was released from the belly of a Lockheed L-1011 plane flying out of Vandenberg AFB.

March 30: Soyuz-TMA 8 launched by a Soyuz FG rocket from Baikonur at 9:30 pm EST. It carried three astronauts (a Russian, Pavel Vinogradov, an American, Jeffrey Williams, and a Brazilian, Marcos Pontes) to the International Space Station (ISS). Pontes returned on Soyuz TMA 7.

10 Years Ago - 2011

March 17: NASA's MESSENGER spacecraft successfully achieved orbit around Mercury at approximately 9 p.m. EDT. This marks the first time a spacecraft has accomplished this engineering and scientific milestone at our solar system's innermost planet.

5 Years Ago - 2016

March 14: ExoMars 2016 mission, a European Space Agency program undertaken in conjunction with Roscosmos, launched at 09:31:00 UTC by a Proton-M launch vehicle from Tyuratam (Baikonur Cosmodrome), Kazakhstan. The Orbiter and Schiaparelli were launched together and flew to Mars in a composite configuration with the pair arriving at Mars in October. The main objectives of this mission are to search for evidence of methane and other trace atmospheric gases that could be signatures of active biological processes.

(Continued on page 19)

JAN, FEB, MAR IN AIR & SPACE HISTORY

cal or geological processes and to test key technologies in preparation for ESA's contribution to subsequent missions to Mars.

March 18: Soyuz TMA-20M launched at 21:26:00 UTC, by a Soyuz FG launch vehicle from Tyuratam (Baikonur Cosmodrome), Kazakhstan. Crew: Soyuz Commander Aleksey Ovchinin (Russian Federal Space Agency – RSA), Oleg Skripochka (RSA), and NASA astronaut Jeff Williams. (ISS Expedition 47). Installed Bigelow Expandable Activity Module (BEAM) prototype inflatable habitat. Jeff Williams set NASA record for cumulative time in space—534 days.

March 23: Orbital's Cygnus (OA-6), its fifth operational cargo resupply mission to the ISS was launched at 03:05:00 UTC by an Atlas V 401 launch vehicle from Cape Canaveral for NASA as part of the Commercial Orbital Transportation Services (COTS) program. COTS will involve full-scale development and flight demonstration of a commercial cargo delivery system. Cygnus is used to carry crew supplies, spare equipment and scientific experiments to the ISS. It is the first Cygnus to conduct scientific experiments onboard the spacecraft.

IMAGE OF THE QUARTER

Mars 2020—Perseverance reaches Mars.



View from the Mars 2020 Descent stage of the Perseverance rover ready to touch down on Mars.

PARTING THOUGHTS

“An expert is a person who has made all the mistakes that can be made in a very narrow field.”

— Niels Bohr

SECTION INFORMATION

AIAA ALBUQUERQUE

Chair	Mr. Ben Urioste
Vice-Chair	Dr. Paul M. Delgado
Secretary	Dr. Terry Caipen
Treasurer	Mr. Robert Malseed
Publications (Acting)	Mr. Robert Malseed
Young Professionals	Mr. Kyle P. Lynch
Membership	Ms. Erin Pettyjohn
Honors & Awards	Dr. Stephen Seiffert
Public Policy	Mr. Mark Fraser
Corporate Liaison	Dr. Neil McCasland
Education	Dr. Humberto Silva III
Programs	Dr. Nick Morley
Career Enhancement	Ms. Andrea Loper
STEM K-12	Dr. Elfego Pinon III
UNM Student Advisor	Dr. Svetlana Poroseva
NMT Student Advisor	Dr. Mostafa Hassanalian



AIAA Albuquerque Section
American Institute of Aeronautics & Astronautics
PO BOX 20818
Albuquerque, NM 87154-0818

Past newsletters are available online at:

<https://engage.aiaa.org/albuquerque/new-item3/ourlibrary>



[www.twitter.com/AIAA_ABQ](https://twitter.com/AIAA_ABQ)



www.facebook.com/AlbuquerqueAIAA

Become a member of AIAA!
Join or renew your membership
online at www.aiaa.org.

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.