

Event Report

SpaceGen Summit



Virtual Event
5 – 8 November, 2020



SPACE GENERATION
ADVISORY COUNCIL



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IN SUPPORT OF THE UNITED NATIONS PROGRAMME ON SPACE APPLICATIONS

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EVENT MANAGERS FOREWORD

On behalf of the SpaceGen Summit Organising Team, it is our great pleasure to present the official Report of the SpaceGen Summit. The SpaceGen Summit is the virtual iteration of the 2020 Space Generation Fusion Forum. SGFF 2020 was supposed to take place in March 2020 but was cancelled due to the Covid-19 pandemic. So much time, creativity, and love for all things space went into crafting this programme behind the scenes. We were delighted to receive so much positive feedback from our delegates and industry guests. This report serves as a summary of the meaningful dialogue that took place at this year's event.

SpaceGen Summit has been designed to provide a comprehensive and diverse programme that brings to the forefront pertinent topics across the current global space industry. SpaceGen Summit proved to be dynamic, stimulating, and fun. We encouraged thoughtful conversations, lively debates, creative exchange of ideas, and, most importantly, connection with young space professionals from around the world.

We would like to take this opportunity to personally thank the Organising Team for their hard work and dedication in putting together an incredible programme. We couldn't have done it without many late nights, early mornings, and creative problem-solving sessions with our fabulous team.

We would also like to extend a special thank you to all of our sponsors who have stepped up to show their support for the next generation and make the SpaceGen Summit possible.

We hope that you enjoy reading through this report and remembering or learning anew from our incredible delegates and space industry leaders.

Tara Halt
SGFF 2020 Manager | SpaceGen Summit
Manager

Kristin Shahady
SGFF 2020 Deputy Manager | SpaceGen Summit
Deputy Manager



SPACEGEN SUMMIT OVERVIEW

The SpaceGen Summit (SGS) was the 2020 online edition of the Space Generation Fusion Forum. We gathered more than 75 participants, experts from the industry worldwide and SGAC Alumni over the course of four days. SGS included breakout sessions, lightning talks, keynotes, and other online gatherings.



PROGRAMME

THURSDAY, NOVEMBER 5TH		FRIDAY, NOVEMBER 6TH	
TIME (EDT)	PROGRAMME	TIME (EDT)	PROGRAMME
16:00	WELCOME	15:25	Q&A WITH GWYNNE SHOTWELL, PRESIDENT AND CHIEF OPERATING OFFICER OF SPACEX
16:05	KEYNOTE: KIRK SHIREMAN, VICE PRESIDENT, LUNAR EXPLORATION CAMPAIGN, COMMERCIAL CIVIL SPACE, LOCKHEED MARTIN SPACE	16:00	PUBLIC-PRIVATE PARTNERSHIPS PANEL
		17:00	KEYNOTE: SPACE TECHNOLOGIES FOR GLOBAL GOOD TONY FRAZIER, EXECUTIVE VICE PRESIDENT OF GLOBAL FIELD OPERATIONS, MAXAR
17:00	KEYNOTE: BADRI YOUNES, NASA SCAN	17:35	LIGHTNING TALK NETWORKING SESSION DR. ANDY ALDRIN, FIT DR. JON ARENBERG, NORTHROP GRUMMAN BERNADETTE MAISEL, SPACE FOUNDATION KATHERINE MONSON, KSAT MARK MUKTOYUK, ASTROSCALE CORY SPRINGER, BALL AEROSPACE
17:35	OPPORTUNITIES IN SGAC	18:35	FIRESIDE CHAT WITH CLAY MOWRY OF BLUE ORIGIN AND PHIL McALISTER OF NASA
17:45	NETWORKING/ICE BREAKER	19:10	END OF DAY 2
18:45	END OF DAY 1		

SATURDAY, NOVEMBER 7TH		SUNDAY, NOVEMBER 8TH	
TIME (EDT)	PROGRAMME	TIME (EDT)	PROGRAMME
13:00	KEYNOTE: JAN WÖRNER, ESA DIRECTOR GENERAL	13:10	OPENING REMARKS
		13:15	KEYNOTE: SCOTT PACE
13:35	NETWORKING SESSION	14:00	BREAKOUT SESSIONS
14:35	KEYNOTE: JAMES MORHARD, NASA DEPUTY ADMINISTRATOR	15:15	BREAKOUT SESSION OUTBRIEF
15:10	BREAKOUT SESSIONS	16:00	THE FUTURE ROLE OF MILITARY IN SPACE PANEL
17:10	END OF DAY 3	17:15	WRAP-UP & END OF DAY 4



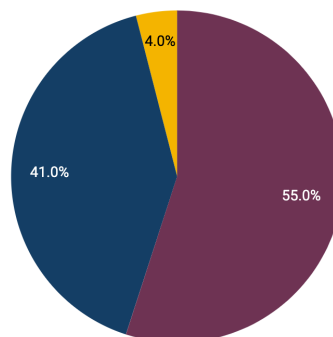
EVENT STATISTICS

Number of Delegates



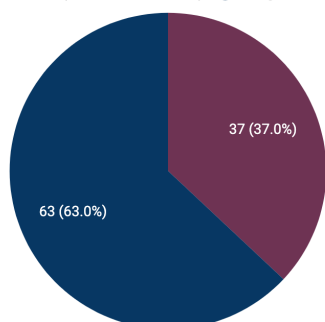
Male/Female Ratio (%)

● Male
● Female
● Prefer not to disclose



Academic Background of Participants (%)

● Students (Phd, Masters, Bachelors) ● Young Professional



Number of Nationalities represented



Number of Breakout Sessions





PRE-EVENT

24 October 2020 | 9 - 10:30AM PST

Entrepreneurship in Space Panel

Entrepreneurship takes vision, courage, and persistence - and every such endeavor has an inspiring story! Leaders from the industry share the motivations that have sparked the conception of their companies, fuelled their innovations, and driven positive change in the world through space-based endeavors. They also share insights from their journeys to success - for example, what it takes to establish and maintain a competitive edge in the space industry, staying abreast of avenues and expectations associated with funding opportunities, embracing flexibility, striking a balance between marketing, strategy and technical development, and nurturing company growth. The panelists include: Bonnie Rosen, Program Manager - Techstars Starburst, Janice Starzyk, Vice President - Bryce Space and Technology, Jeff Guido, Director Special Projects - Planet, Kyle Acierno, CEO of ispace technologies US, Stephan Reckie, Executive Director - GEN Space (Moderator), and Vanessa Clark, Co-founder and CEO - Atomos Space.



DAY 01 HIGHLIGHTS

KEYNOTE



Kirk Shireman | Vice President, Lunar Exploration Campaign, Commercial Civil Space, Lockheed Martin Space

Kirk Shireman discussed the **future of space exploration, including the policies and technologies needed to make lunar exploration possible**. Shireman also told the delegates a little bit about his background, including his experience working on engineering challenges for the International Space Station. He provided updates on the National Team partnership with Blue Origin, Northrop Grumman, and draper to develop the artemis human landing system.

Badri Younes gave a fascinating keynote on the **capabilities and challenges of NASA's Space Communication and Navigation Program**. He discussed the technology developments that will make it possible for NASA to communicate with spacecraft as they explore the moon and beyond. He also spoke about the challenges and risks that he faced throughout his career. Younes stated that "If we didn't take risks, we would never get anywhere."

KEYNOTE



Badri Younes | NASA SCaN



Davide Petrillo | Executive Director, SGAC

OPPORTUNITIES IN SGAC

Davide provided the delegates with a full overview of all of SGAC activities including project groups, regional events, webinars, mentoring, and more!

AUDIENCE QUESTION: When Badri Younes was asked about taking risks, he said "I love risks. I finished my bachelor's degree in 2 years. Do not shy away from taking risks. Early on in your life, take on the biggest challenges"



DAY 02 HIGHLIGHTS

Q&A



Gwynne Shotwell | CEO and President of SpaceX

Gwynne Shotwell took the time to connect and reply to questions from our delegates at the SpaceGen Summit.

PUBLIC-PRIVATE PARTNERSHIPS

Brett Alexander | Vice President, Government Sales at Blue Origin

Debra Facktor | Head of U.S. Space Systems at Airbus U.S. Space



Joe Landon | Vice President, Advanced Programs Development, Commercial Civil Space at Lockheed Martin

Janet Kavandi | Senior Vice President, Space Systems Group Sierra Nevada Corporation

The evolution of private-public partnerships has evolved significantly during the panelist's careers in the industry. Beginning as solely contractors during the Apollo era, the public sector has begun establishing full-blown partnerships with private enterprises. One panelist defined a partnership as a relationship where both parties are determined to help the other succeed. The first successful instance of this was the Commercial Orbital Transportation Service (COTS), where the US government was invested in the success of the private launch companies.

In response to the question, "What other opportunities are there for Public Private Partnerships," the panelists suggested inflatable/modular space stations to support tourists, manufacturing, and research. Additionally, because the US administration has declared a return to the moon in a sustainable way, there are also opportunities in addition to the Artemis Human Landing System, including in-situ resource utilization and lunar habitats for astronauts.

From an international standpoint, there are opportunities for nations to take part in Public Private Partnerships through the use of vehicles such as the Dream Chaser vehicle, that can fly payloads for countries that do not normally have access to space.



KEYNOTE: SPACE TECHNOLOGIES FOR GLOBAL GOOD



Tony Frazier | Executive Vice President of Global Field Operations, Maxar

Tony Frazier gave an overview of Maxar's mission and current activities. Frazier's keynote discussed "Space Technologies for Global Good" with a particular focus on satellite imagery and how that can be used to help create a better world. Maxar is constantly looking for ways to engage more with the global community.

LIGHTNING TALK NETWORKING SESSION

Dr. Andy Aldrin | FIT

Dr. Jon Arenberg | Northrop Grumman

Mark Muktoyuk | Astroscale

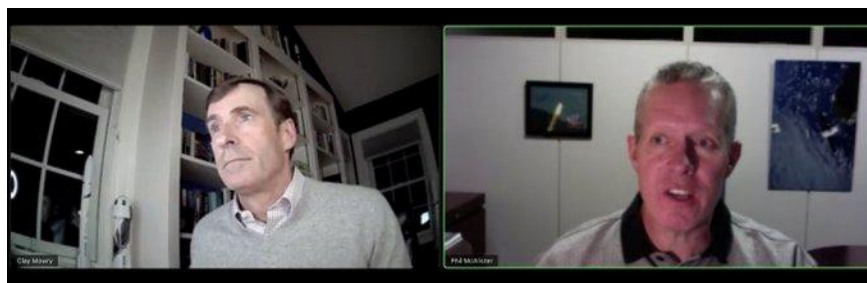
Bernadette Maisel | Space Foundation

Katherine Monson | KSAT

Cory Springer | Ball Aerospace

During the lightning talk networking session, the delegates listened to short 2-3 presentations from 6 different speakers. Then the delegates had the opportunity to network with each speaker for 10-15 minutes.

FIRESIDE CHAT



Clay Mowry | Blue Origin

Phil McAlister | NASA

Clay Mowry and Phil McAlister had a wonderful fireside chat to share their views on the evolving dynamics of the space economy. In particular, they discussed the LEO economy as a continuum: from suborbital platforms to commercial human spaceflight programs.

AUDIENCE QUESTION: When asked about new opportunities and taking on new challenges, Gwynne Shotwell said "You will always feel uncomfortable taking on a new role... but if you listen hard to those around you and work hard, you will succeed. Don't hold yourself back...be fearless".



DAY 03 HIGHLIGHTS

KEYNOTE



Jan Wörner | ESA Director General

Jan Wörner spoke to the SpaceGen Summit delegates about the future of space exploration and how ESA activities fit into the overall space economy. He discussed how the promise of space spans global challenges and serves to bridge them for the benefit of humankind. He also emphasized the importance of diversity: “We need to all come together to make the world better. Cultural diversity is an asset for everyone”.

When asked about the future of NASA in the next administration, James Morhard said “Humans as a species are explorers, and that’s going to continue no matter who’s in charge”.

KEYNOTE



James Morhard | NASA Deputy Administrator



DAY 04 HIGHLIGHTS

KEYNOTE: Scott Pace | Executive Secretary of the National Space Council

During his keynote, Scott Pace outlined the National Space Council's government approach, its main priorities for space exploration, including Artemis, post-ISS LEO presence, and international cooperation. Pace also discussed some of Council's upcoming work on nuclear power, planetary protection, and updates to existing policies. Pace stated that "We will not have a sustainable space program if we don't have the support of the American people. We need to provide programs that serve the broad American interest (incl. economy, diplomacy, and security), and not that of the space community alone".

THE FUTURE ROLE OF MILITARY IN SPACE

While the military has always played a critical role in the space sector, an increasing dependence on space assets and the emergence of new sophisticated actors in space has led many nations to renew their focus on military space capabilities. The Space Generation Summit sought to explore this new focus by inviting a panel of four early career space military personnel from Australia, Canada, the United Kingdom and the United States to share their perspectives on the future role of military in space.

MODERATOR



Major Steven Jordan
Tomaszewski
The Aerospace Corporation /
USAF



Captain Kevin Bernard
Canadian Armed Forces



Lt Ben Piggott
Staff Officer for Space Policy
Royal Navy



Flight Lieutenant
Mark Platt
Royal Air Force



Captain Tasia Reed
Mission Management Operator
U.S. Air Force

Two important discussions within the panel revolved around collaboration. It was made clear that the military has a growing interest in collaborating with the civil and commercial space sectors, recognizing these forums as a hotbed for new innovation and technologies. Furthermore, when prompted about the future for potential conflict in space, our panellists shared that they did not believe kinetic conflict in space was inevitable and that fostering international collaboration, with existing and new partners, was our best pathway towards ensuring continued peace in space and on Earth.

A majority of the delegates participating in the Space Generation Summit originated from the civilian space sector, and this panel provided them with the opportunity to candidly engage with members of the military. The goal of this panel was to break down barriers and develop an improved understanding of how the civil and military space sectors could collaborate more effectively towards maintaining a peaceful space environment.



BREAKOUT SESSIONS

OUTCOMES



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THE RELEVANCE OF SPACE TRAFFIC MANAGEMENT (STM) IN THE DEVELOPMENT OF THE SPACE SECTOR

Sponsored by The Coalition for Deep Space Exploration



Participants

Subject Matter Expert

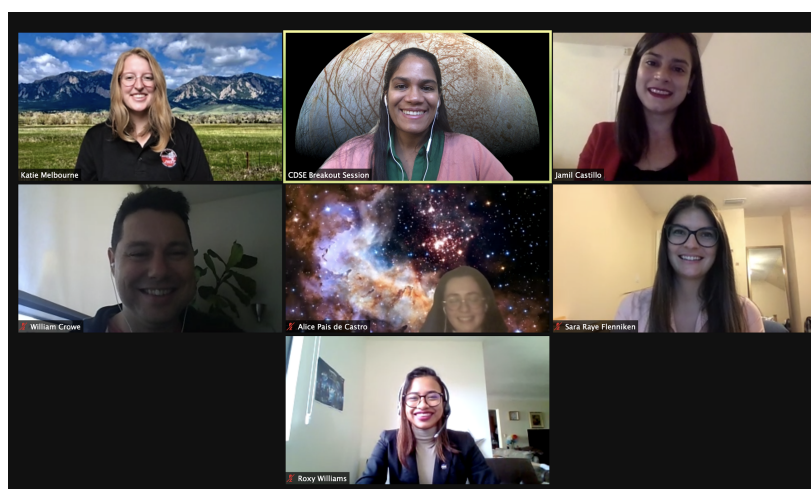
Jamil Castillo | Coalition for Deep Space Exploration

Moderator

Ashwati Das | Systems Engineer at NASA Jet Propulsion Laboratory

Rapporteurs

Sara Flenniken | **Katie Melbourne** | **William Crowe** | **Karina Perez Molina**



Description

Let's face it - Earth can no longer survive without space, and to ensure continuity of the orbital operations that benefit us on a daily basis, it is essential to address the organization of the



space environment. However, this is an increasingly hard task: the number of space objects is growing and new activities such as space tourism and human deep space exploration could take off in the near future. So, to ensure the sustainability of space activities, it is important to consider future coordination efforts required, some common rules of the road, and serious dialogues that would facilitate space situational awareness and ultimately, the creation of a space traffic management system.

The team addressed the above goals by working through 3 specific questions on the following topics: 1) the cooperation at national and international levels to address space traffic management challenges, 2) avenues to ensure the reliability of space situational awareness data, and 3) options to prevent cluttering and chaos around the Moon given future cislunar space endeavor plans. The team split into two sub-groups to discuss questions 1) & 2) followed by reporting their findings to the larger team. The entire team worked together to draw on insights from discussions related to questions 1) and 2) to answer question 3).

Main Objectives

- 1) As the number of space objects increases, it becomes imperative that the space community works toward rules of the road that assure the sustainability of the space environment. One of the objectives of the Coalition for Deep Space Exploration's breakout session on space traffic management was to present delegates with a policy perspective regarding the importance of international coordination for the safe development of outer space activities.
- 2) With the number of space actors and space activities increasing, it will also be necessary to have robust space situational awareness that can properly inform space traffic management efforts. In that regard, another objective of the breakout session was to raise questions about the steps that we need to take to overcome specific obstacles related to the data collection necessary for effective space situational awareness. Some of the topics included national security concerns and the potential need for more transparency from satellite operators and their planned activities in space.
- 3) The Coalition for Deep Space Exploration sees space as an ecosystem that benefits humankind with activities in different orbits. One of the objectives of the breakout session on space traffic management was to present delegates and ultimately the space community at large with the potential questions that we will need to answer regarding the sustainability of lunar space as plans to work on and around the Moon develop.

Questions

- 1) Because various nations operate in space and benefit many countries on Earth, space traffic management will require international dialogue and coordination. What actions do nations need to encourage, at both the national and international levels, to work towards global cooperation in space traffic management?
- 2) One of the first steps in building a space traffic management system is to ensure robust space situational awareness. What are ways in which space operators and governments can ensure that we head in the right direction when it comes to securing that space situational awareness data is reliable?
- 3) How can we leverage some of the behaviors described in answers to questions 1 and 2, and other ideas, to prevent future cluttering and chaos around the Moon as we start to work and live on and around it?

Conclusions

- 1) Guided by the Coalition for Deep Space Exploration's Subject Matter Expert and a moderator from SGAC, the delegates reached various conclusions on each of the questions presented. On the topic of international coordination and space traffic management the delegates determined it would be helpful to incorporate best practices from satellite operators into standards and regulation at the national level, with the goal of bringing those standards to international forums where they would be made homogenous with other nations' ideas. Other answers included creating mechanisms to involve young professionals in the sustainability topic, encourage more developed space faring nations to help less capable ones, and ensure more involvement from young professionals.
- 2) The delegates' responses on space situational awareness included the need to bring different sectors to the conversation to develop innovative technologies to better characterize the space environment. For example, academia can be of help. The delegates also considered the need for having standards to integrate data from different actors, and countries and the importance of being transparent about space events such as collisions, which can inform future tracking. The responses also highlighted the potential need for protocols to protect data that can compromise national security.
- 3) The delegates also reached conclusions on what we should do to ensure we do not create a chaotic environment around the Moon as we develop space activities on and around it. The delegates consider it important to raise awareness by including the topic in relevant conferences and by creating competitions to deliver ideas on how to conduct



space traffic management, space situational awareness, and debris mitigation and removal in cislunar space. Other responses included academia, international agencies, and industry in the study of the cislunar environment to ultimately learn how objects will behave in space beyond Earth orbit.

Recommendations to the United Nations Committee on the Peaceful Uses of Outer Space

Question 1:

Recommendation #1: Create an environment at a national level where the industry can create best practices from their own experience in operating satellites and incorporate those practices into national regulations, with the goal of ultimately bringing those same standards to an international forum to discuss with other nations in making them homogenous, thus ensuring a bottom-up approach. Moreover, create ways to hold space actors accountable, if possible, for the violation of such regulations. Incentives—such as economic incentives—might be a good idea for making sure operators comply.

Recommendation #2: When explaining the urgency of the issue of orbital debris, liken it to other, more “Earthly” problems such as climate change so that the public can compare the issue to one of which they already have an understanding or are familiar with.

Recommendation #3: With regards to capacity building, create opportunities for more developed countries to assist less developed countries and ensure there are mechanisms to create continued interest in the space industry and platforms to pass along knowledge accumulated so as to avoid lost knowledge through “retirement waves.”

Question 2:

Recommendation #1: Expand sensor capabilities to better characterize the space environment, including debris. Involve a variety of participants in problem solving for SSA, including academia, military, commerce, and government. Ensure that development occurs in a transparent environment.

Recommendation #2: Integrate the systems for SSA data compilation that exist today with a specific set of standards with the purpose of building trust. These standards would include a cross-check of information from multiple contributing organizations as well as an incentive system to reduce possibility of collisions and conflict. This entity would also serve to analyze conjunction events if they are to occur. Where there is a



national security risk, encrypt the data such that other nations are still aware of the object's location, but do not know to which nation the object belongs.

Recommendation #3: Encourage a shift in culture within the space industry by focusing on educating the general public about the importance of space and encouraging an innovative environment for space companies. We want people to be open to talking about failures to prevent future issues and learn from accidents to prevent people from being hesitant about launching more satellites in the future.

Question 3:

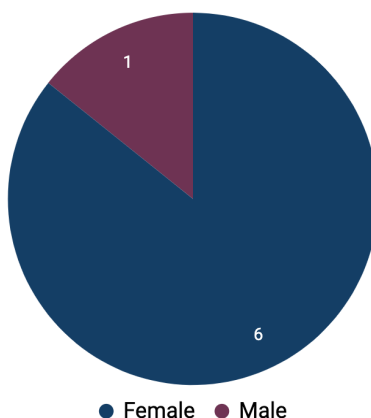
Recommendation #1: Raise awareness by opening up the topic of space situational awareness to the public through competitions and including the topic in conference agendas at the UN level, with a specific emphasis on a future market and the need for early infrastructure to avoid the issues we're facing with LEO.

Recommendation #2: Discuss economic and legal limitations associated with active debris removals such as the need for consent to remove another nation's property and to try to create solutions for the lack of an economic incentive and the liability in removing another nation's property.

Recommendation #3: Use academia, international agencies, and industry to study the effect of the moon and Earth's gravitational pull on orbital objects and to create concepts of operation to learn how objects behave in cislunar space.

Statistics

Male/Female





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COMMERCIALIZATION OF SPACE AND THE TECHNOLOGY TRANSFER TO EARTH-BASED OPERATIONS

Sponsored by Lockheed Martin



Participants

Subject Matter Experts

Kat Coderre | Senior Staff Systems Engineer at

Lisa May | Chief Technologist, Commercial and Civil Space Advanced Programs at Lockheed Martin

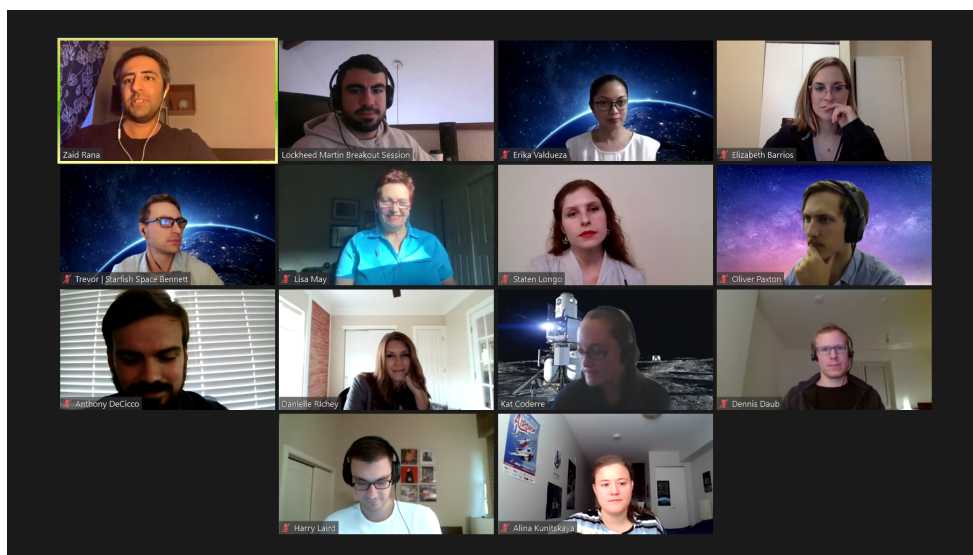
Danielle Richey | Project Manager, Systems Engineer, and Architect at Lockheed Martin

Moderator

Simon Shuman | Propulsion Engineer at Blue Origin

Rapporteur

Elizabeth Barrios | Graduate Research Assistant at U.Central Florida/NASA



Description

The aerospace industry fosters the creation of so many next-generation technologies that often have the ability to impact beyond the boundaries of the aerospace industry. Such technologies offer the possibility of creating more business on Earth. In order to realize these opportunities, a deep understanding of the commercialization potential and the challenges surrounding this potential is needed. In this workshop, we addressed the current status of technologies that cross the boundaries of both Earth and space, how these technologies are being successfully commercialized in multiple markets, and what the current barriers are that prevent the commercialization of such technologies in space or on Earth. After addressing our thoughts on this matter, we propose a few recommendations of action items that can be taken by SGAC, the United Nations, and the industry at large to target the current hurdles associated with the commercialization of space while starting a new generation in the economy of space exploration.

Main Objectives

- 1) What technological advancements may take place during human exploration of the moon and Mars?
- 2) How can these new technologies and any tangential activities (i.e. geopolitics, medical applications, operations) be used by industries on Earth?
- 3) How can these advancements be commercialized on Earth?

Questions

- 1) What technologies are industries currently using that can be developed for space and Earth? Specifically, where is radiation protection, habitat design, life support and monitoring systems, telecommunications, power and transportation, and sustainable agriculture used on Earth and is the terrestrial-based technology more advanced or less advanced than the space-based version?
- 2) What methods of commercialization have proven successful and unsuccessful for these types of technologies, regardless of where (space or Earth) the technology was developed?
- 3) What major barriers (technical or non-technical) exist when commercializing a technology developed for in-space use to use on the Earth?



Conclusions

- 1) There are a few technologies that stand out when discussing the impact on both space exploration and Earth-based living. Continued development of In-Situ Resource Utilization (ISRU) technologies in space have the ability to impact the infrastructure and fueling industry on Earth, such as the development of new energy technologies and fuel cells for Earth-based operations. The intense radiation protection needed for space exploration has the ability to provide significant advances in both the medical and nuclear industries. Additionally, the advanced robotics needed for deep space exploration can impact Earth's ability for extended and remote operations for all industries, including oil, gas, and mining.
- 2) Success in the commercialization of these types of specialized technologies has been the result of many different methods, such as public-private partnerships (PPP), academics and incubator programs, and government-supported programs. Additionally, it was noted that future success in commercialization might be achieved through the diversification of the supply chain through policy changes. However, even though there are many successful avenues to achieving commercialization of such technologies, one of the largest hurdles to overcome is the research and development graveyard, where many hopeful technologies fail due to program or funding changes.
- 3) One of the largest barriers to commercializing technologies developed for space exploration for use on Earth is that of single-point applications. For example, technologies such as the space pen, the spacesuit, and the unique human waste disposal technologies needed for space flight have no valuable application on Earth. Another huge factor to consider is the monetary mindset when designing the technology – whereas space is more concerned with the launch costs (i.e. lightweight, next-generation technologies), Earth usage is more focused on manufacturing and end-user costs. Finally, there are many regulatory barriers that surround both space and Earth that are a significant hurdle to overcome when considering the commercialization of technology.

Recommendations

Recommendations to the Space Generation Advisory Council

- 1) The Space Generation Advisory Council should support the continued discussion on the commercialization of space-based technologies for the advancement of life on Earth.



- 2) SGAC should continue to educate its members on the current commercialization efforts and environment surrounding the space industry (i.e. webinars, seminars, workshops).
- 3) SGAC should provide resources from its member countries that support such commercialization efforts, such as incubators, small business grants, technology start-up grants.

Recommendations to the United Nations Office for Outer Space Affairs

- 1) SGAC encourages the Office to address the current status of the commercialization of space technologies for use on Earth. Specifically, on this platform, methods for overcoming barriers that result from multinational teams and space policy.
- 2) SGAC also encourages the inclusion of Young Professionals in the above discussions.
- 3) SGAC suggests that the Office provide resources to all its members to learn and understand the current state of the commercialization environment of space-based applications, specifically focusing on the multinational and space policy aspect. This platform would serve as a continued place of learning in the hopes of encouraging more commercialization of space technologies for Earth-based applications.

Recommendation to the Sponsor(s)/Partner(s) and/or the Industry at large

- 1) SGAC suggests that the aerospace industry find new ways to support not only the development of new technologies but also, new ways to commercialize those technologies and bring them to life.
- 2) SGAC suggests that the industry ask the questions of "What space-based technologies can create more business on Earth?" and "Is there a potential to create an economy in space?" in order to advance the industry in this area and to push down the barriers that exist currently.
- 3) SGAC suggests that these discussions take place in a very diverse manner, including multiple generations, backgrounds, and geographies in order to see the next generation of the commercialization of space.



Statistics

Number of Delegates

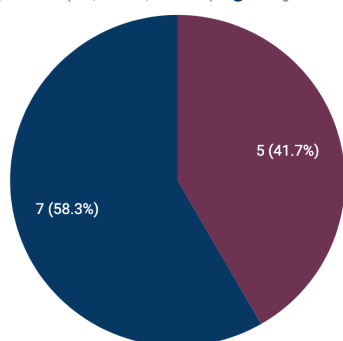


Number of Nationalities represented



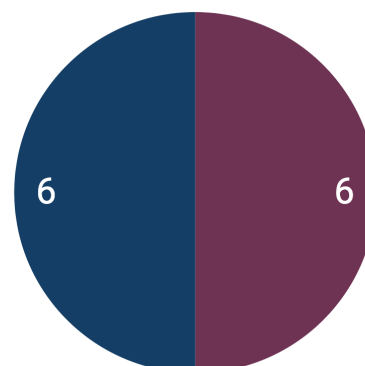
Academic Background of Participants (%)

● Students (Phd, Masters, Bachelors) ● Young Professional



Male/Female Ratio

● Male
● Female





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SPACE TECHNOLOGIES FOR GLOBAL GOOD

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MAXAR

Participants

Subject Matter Experts

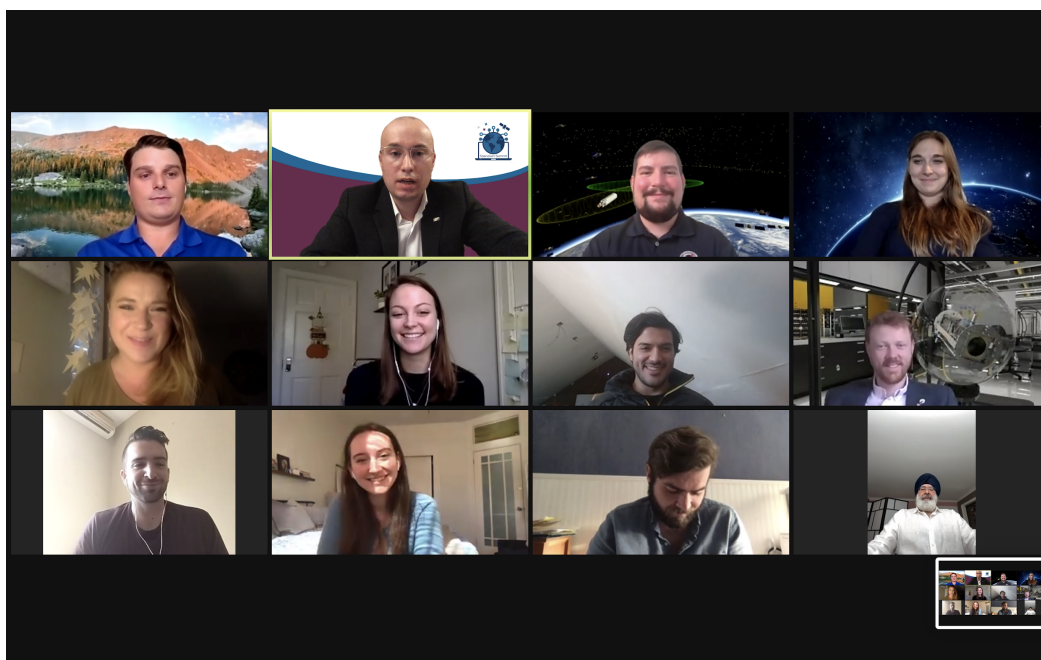
Rabindra (Rob) Singh | Vice President, Strategic Initiatives, and Chief Architect at Maxar Technologies

Matthew Hallas | Technical Lead at Maxar

Jared Gill | Mission Architect at Maxar

Moderator | Rapporteur

Claudiu Mihai Tăiatu | Remote researcher, a contributor to the Studies in Space Policy projects under ESPI supervision.





Description

The space industry is in the business of collecting and disseminating data at a truly monumental scale, but real solutions only happen when the proper datasets are combined and analyzed in a meaningful way that is focused on solving a problem with specific end-users in mind. From monitoring humanitarian and environmental crises to bridging the digital divide with broadband internet, space technologies have become essential to our everyday lives. As these technologies continue to evolve, new use cases are emerging. In this breakout, we will discuss existing and future space technologies that are having a positive impact across the globe.

Main Objectives

- 1) The activities in the Maxar Breakout Session focused on disseminating the usefulness of satellite data, in particular how space activities and space data could support the activities on Earth for the global good.
- 2) The Maxar Breakout Session provided the delegates with the opportunity to learn and provide solutions with regard to the space infrastructure in LEO, GEO, and high-altitude platforms/drones.
- 3) The delegates had to provide examples of available downstream services and analyze future satellite applications to achieve the UN 17 Sustainable Development Goals, and formulate recommendations to the SGAC, the United Nations and the Space Industry.

Questions

- 1) There is a tremendous amount of interest and money being spent on the internet from space. What do you think is the best architectural approach? LEO constellations? GEO satellites? High altitude platform/drone?
- 2) What sort of investments in space infrastructure and/or data can result in prolonged benefits for a wide number of people?
- 3) How do you see the free and open datasets (like Landsat/Sentinel) working with the commercial datasets?
- 4) What kind of problems can we currently not solve due to data latency?

Conclusions

- 1) The delegates concluded that the more constellations we have in LEO the more space debris we are creating. For LEO, there are also astronomical implications that will change the night sky dramatically. The delegates underlined that probably the GEO satellites would not provide internet for rural users, the main reason being the expensive cost of technology. Internet would be too expensive for low-income communities; the GEO satellite operators could not provide quality internet at a competitive price. The delegates have provided examples of available downstream services and future satellite applications, including the fight against climate change.
- 2) The delegates highlighted the need to educate customers on the use of data sets. Further investment in space-based data would be necessary to provide analytics and tools to understand how to process and use the data. It was concluded that most likely, the outreach targets for satellite imagery do not know all the applications related to satellite data, the reason for which examples should be provided on an open platform. In this context, the delegates analyzed how ESA and NASA are reaching the communities through competitions. The knowledge of who has what bands and who is interested in what bands should be largely made available.
- 3) The Maxar open data was analyzed as an example from an educational standpoint. The delegates concluded that the free data should be made available to academic and research institutions. About the paid data sets, the delegates emphasized their usefulness mainly to governmental and private customers. Governments should include the costs for the acquisition of space-based data in their annual budget. Also, commercial entities that build algorithms and services based on public data will eventually need to shift to commercial and paid data to differentiate themselves in the market.
- 4) Currently, human movement is difficult to track due to the lack of short revisit times. The delegates mentioned that a dense LEO network with rapid refresh will increase the number of uses cases served. One key challenge for the LEO constellations satellite imagery technology would be the costs for data storage and how long the LEO satellite operators would have to store the data sets. Also, the LEO constellations would have to either create a better communication system to bring data down or improve the onboard processing. Regarding remote sensing, it was analyzed if satellites are equally or more competitive than drones.

Recommendations

Recommendations to the Space Generation Advisory Council

- 1) Advocate for more workshops, specifically on Earth Observation technology, in order to continue to disseminate information about the usefulness of space-based data to the UN 17 Sustainable Development Goals.
- 2) Have more visibility into non-science workshops. A broader industry outreach could identify solutions for companies that might not be familiar or aware of satellites-based data and satellite imagery solutions.
- 3) Organize events where Government and Industry come together, in order to identify legal and technical gaps and how to solve them.

Recommendations to the United Nations Office for Outer Space Affairs

- 1) The United Nations (UN) should play a role in bridging the gap between satellite operators and the global communities that have the need for open data. The UN could learn these communities about the free data programs and what these programs are specifically doing and also provide guidance for accessing these programs.
- 2) The United Nations (UN) should contact directly the local communities in order to identify their needs that might be solved using satellite imagery and then provide this request on an open platform accessible to industry partners.

Recommendation to the Sponsor(s)/Partner(s) and/or the Industry at large

- 1) The space industry should build partnerships to make data available for schools/sectors/communities, taking into consideration the following steps:
 - o step 1: internet for all;
 - o step 2: getting the resources to use;
 - o step 3: educating the community to use;
 - o step 4: making satellite data available.
- 2) Continue advocating for relaxing the ITAR Regulations especially those that have to do with high-resolution imagery available to the world.



Statistics

Number of Delegates

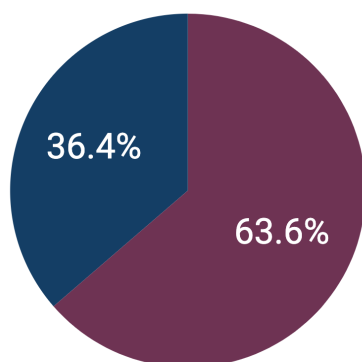


Number of Nationalities represented
(Australia; Canada; India; Mexico; U.S.A.)



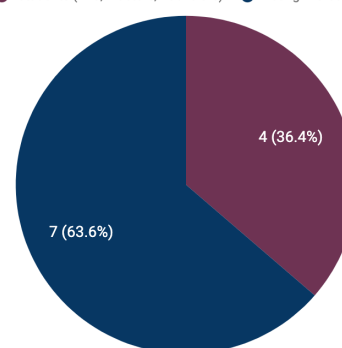
Male/Female Ratio (%)

● Male
● Female



Academic Background of Participants (%)

● Students (Phd, Masters, Bachelors) ● Young Professional





SPACE GENERATION
ADVISORY COUNCIL



SGS 2020 VIRGIN GALACTIC BREAKOUT SESSION

Sponsored by Virgin Galactic



Participants

Subject Matter Experts

Cody Knipfer | Government Affairs Specialist at Virgin Galactic

Sirisha Bandla | Vice President of Government Affairs at Virgin Galactic

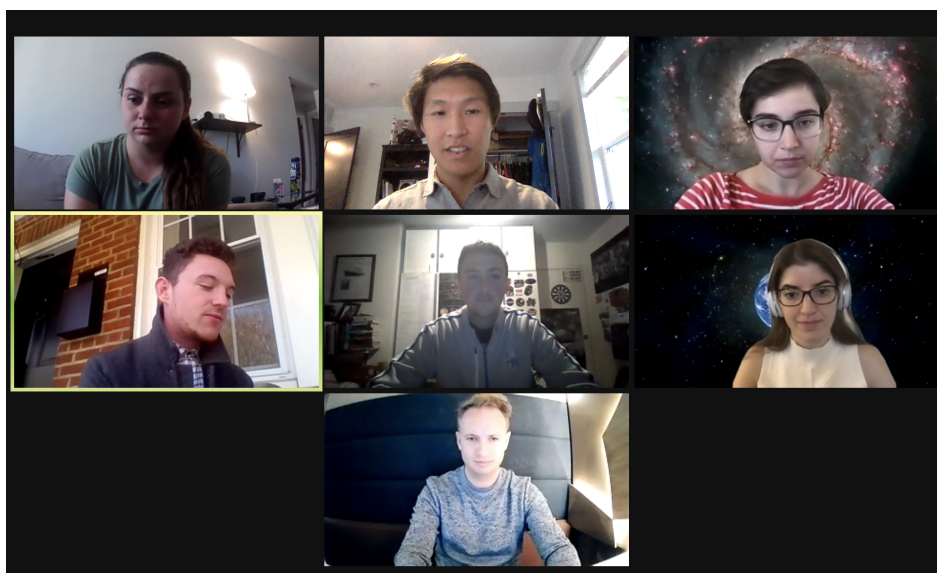
George Whitesides | Chief Space Officer at Virgin Galactic

Moderator

Cody Knipfer | Government Affairs Specialist at Virgin Galactic

Rapporteur

Manwei Chan | SGS Programs Team at SGAC





Description

During our breakout session, we talked about the exciting present and future of suborbital spaceflight – which is promising to democratize and widely expand access to space and microgravity, and redefining “who” an astronaut is and “what” an astronaut can do. At Virgin Galactic, we believe in the power of suborbital spaceflight to open access to space for good – for “everyday” individuals; academics, scientists, and researchers; and for people, institutions, and countries across the world. As we’re entering this era of routine suborbital spaceflight, we’re considering the range of possibilities that suborbital spaceflight could play a transformative role in the way we interact with space...

Main Objectives

Talk about the vision for the future of suborbital spaceflight and the democratization of space.

Questions

- 1) Can you envision ways that low-cost access to suborbital space could transform how we use/perceive space?
- 2) What are your thoughts on future suborbital opportunities, such as suborbital human-tended research/private astronaut training/environmental and inspirational missions/missions for diplomacy?
- 3) What future roles do you see suborbital astronauts and spaceflight participants playing in our exploration of, and discussion about, outer space?
- 4) How do you see suborbital spaceflight fitting into the future of our broad space exploration goals and initiatives?

Conclusions

- 1) Low-cost access to space will allow new demographics to experience spaceflight. For example, programs that involve the disabled such as paraplegics and the blind were discussed to broaden outreach efforts. However, it was also noted that low-cost access can diminish the reputation of the word “astronaut”. For instance, there may be potentially divisive individuals, such as Justin Bieber, receiving astronaut wings.
- 2) Giving researchers more opportunities to the suborbital, microgravity environment opens



up many opportunities for both researchers and institutions. Lowering the barrier to suborbital missions allows more universities and similar research institutions to have access to this experimental venue. One can foresee a scenario where an institution has developed a mature relationship with Virgin Galactic and first-year graduate students and even first-year undergraduate students can look forward to developing a project during their tenure that they can accompany on a suborbital flight. This will also work as a recruiting angle for the institution as it is an attractive opportunity for potential students.

- 3) By lowering the cost of access to suborbital space, we give people opportunities to fly that wouldn't have had access to space before. For example, by giving artists access to space, this new group of astronauts can then convey experiences like the Overview effect to the general public through art.
- 4) Suborbital flight can become a government sponsored activity. A precedent for this kind of policy is the National Science Foundation Artists and Writers program that funds artists and writers to travel and complete a project in Antarctica. Similarly, there might be a program that funds artists to travel on a suborbital flight to convey the feelings of peace, serenity, and unity that many astronauts feel.

Recommendation to the Sponsor(s)/Partner(s) and/or the Industry at large

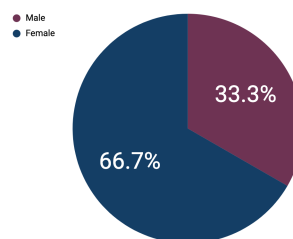
Potential programs to fund artists would be to create a patronage program where high networth individuals can pay 10% more than the ticket price. 10 of these patrons can then fund an artist to fly, who then creates a work of art where the patrons will be recognized. Another option would be for a matching program where money raised by a potential flyer can be matched by another source such as Virgin Galactic or another donor.

Statistics

Number of Delegates



Male/Female Ratio (%)



SGAC SPACE MEDICINE AND LIFE SCIENCES (SMLS) PROJECT GROUP



Participants

Subject Matter Experts

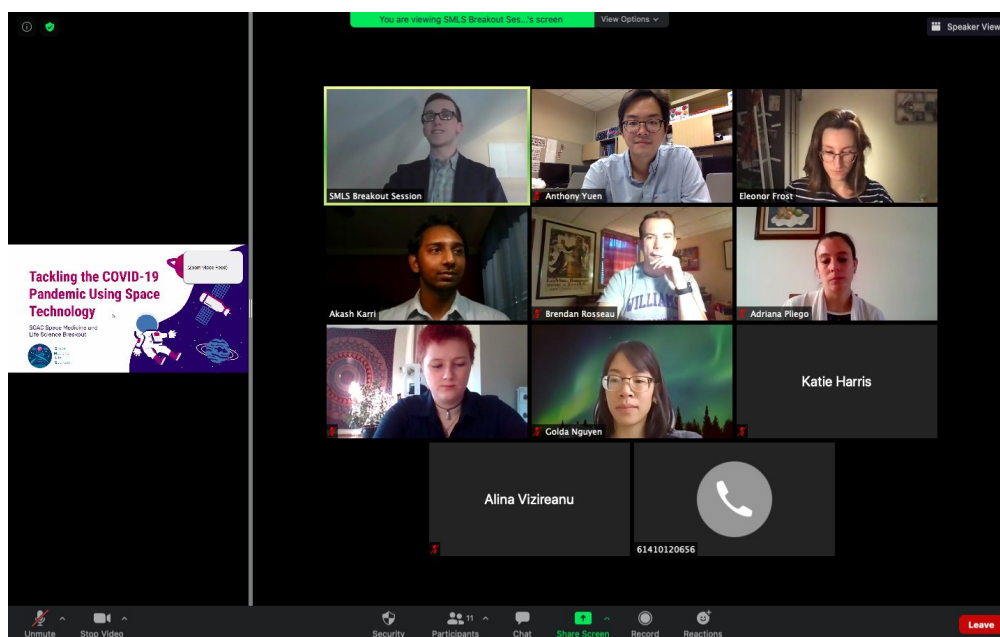
Anthony Yuen | Emergency Medicine, Physician, Weill Cornell Medicine, Co-Lead Space Medicine & Life Sciences Project Group

Eleonor Frost | BSc Physics and Medical Physics MBChB Candidate Vice Lead Space Medicine & Life Sciences Project Group

Rochelle Velho | Intensivist Physician, NHS, Co-Lead Space Medicine & Life Sciences Project Group

Moderator

Joseph Levine | SGAC Programs Team, SGC and SGFF Aerospace, Analyst at Bryce Space and Technology





Introduction

Our passion for space has always led us to look towards the stars. Time and time again, however, we are reminded of our fragility onboard "Spaceship Earth". As the COVID-19 pandemic continues to create tremendous disruption and challenges to every health, social, economic, and environmental aspects of the life of everyone on Earth, space technology has a vital role to play in addressing this global crisis. Our breakout group will draw inspiration from the Semi-Finalist essays of the recent SGAC SMLS and UKSpaceLabs essay competition on "How would you address the COVID-19 pandemic using a space application/technology?", and explore with real examples, the immense impact space technology can have on Earth today during this pandemic.

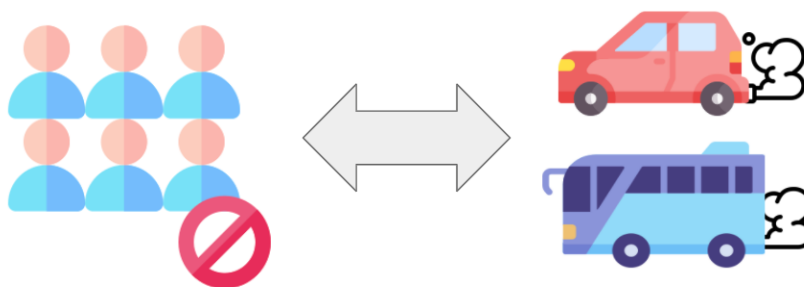
Questions

- 1) What are the challenges and barriers to the widespread application of space technology in tackling the COVID-19 pandemic?
- 2) How can we overcome them?

The Novidien Project

The Idea

People meeting and not social distancing = more air pollution generated by the gases emitted from transportation



Satellite vs ground station:

We chose satellites because: (1) space tech (2) consistent reporting (3) more access to nearly all of earth

Satellites are not perfect: still can be occluded by other weather phenomena occurring but with the technologies present, it's less of an issue

Also note that while we're collecting data, there may be regional events that may increase air pollution such as the 4th of July for the USA or a celebration like Diwali in India



Prior Satellite use in Epidemiology

Hantavirus:

- Cao et al. (2011): satellites to observe vegetation indexes to estimate deer mouse (a vector of hantavirus) abundance and thus predict the disease risk to humans.

Cholera:

- Ford et al. (2009): NASA data including sea surface temperature, sea surface height, and chlorophyll A levels were able to predict peaks in the disease that closely correlated with actual cholera incidence
- Jutla et al. (2013): models using Satellite Water Marker may be able to predict outbreaks at least two months in advance in coastal regions

Our Work

1. Collected Data

- Air pollution data across 32 European capital cities
 - Collected via satellite AND through ground stations
 - Black Carbon, PM_{2.5}, Ozone, etc
- Google Mobility Data

2. Analyzed Data

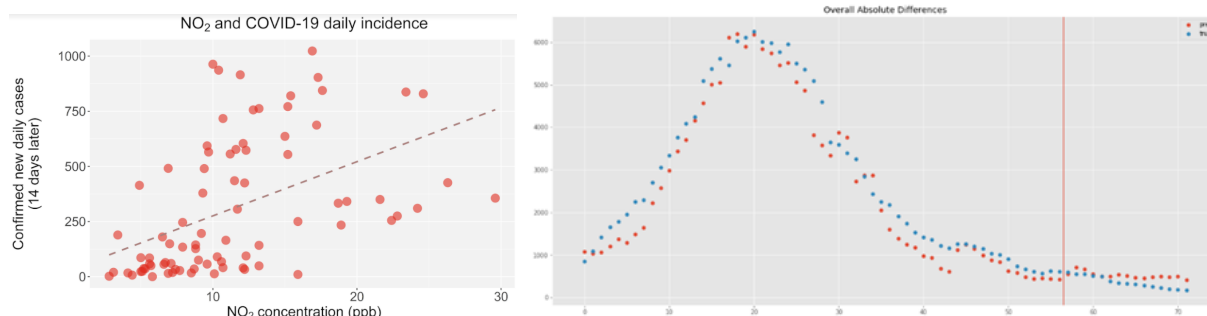
- Ground station data vs Satellite data
- Satellite data vs mobility

3. Predictive Model?

- Put all the information together in an ML Model
- Predicting increases in COVID-19 cases in European cities after an incubation time.



Results



Future Expansion

Mobility data and air pollution data are just a couple of pieces of the puzzle

Other data can include:

- Lamos et al. (unpublished): Using the prevalence of online searches
- Al-garadi et al. (2016): Using social media analysis
- Imaging: How empty/full are common zones like parking lots or airports?

The Space Medicine and Life Sciences Essay Competition

Theme: How would you address the COVID-19 pandemic using a space application/technology?



Isolated, Confined, Supported:

Leveraging lessons from Space Medicine to address COVID-19-related decrease in physical fitness

SGAC Space Medicine and Life Sciences Essay Competition, Stage 2

Katie M. Harris

Katie Harris | Second-year medical student at the Memorial University of Newfoundland, Canada; Holds degrees Astrophysics (Undergraduate) from the University of Toronto and Space Studies (Masters) from the International Space University

Flight surgeons have been maintaining confined astronauts' health for decades using exercise programs and telemedicine. The challenges faced by ordinary citizens during the pandemic, such as isolation, confinement, physical deterioration, depression, psychosis and anxiety are similar to those experienced by astronauts during spaceflight, and therefore could benefit from similar solutions (Cinelli and Russomano, 2020). A medical team of flight surgeons and sports medicine experts/physiotherapists work together to monitor astronauts' health, and to develop individualized exercise programs that maintain fitness and can be implemented autonomously (Petersen *et al.*, 2016). I propose that we similarly address the current widespread decrease of physical activity using systems and tools that are effective in space medicine.

The first step is to assess population physical activity levels using remote physiological monitoring. Space medicine has developed technologies such as NINscan-SE (Strangman, Ivkovic and Zhang, 2017), the Canadian Space Agency Bio-Monitor (Canadian Space Agency, 2019), and the European Space Agency Everywear (European Space Agency, 2017) to track astronauts' physical health. While these technologies are not applicable at a population scale, basic physiological data could be collected from health monitoring devices such as the Fitbit, Apple Watch, and Garmin watches among others, as well as basic movement data (ie. daily steps) from mobile phones. I propose developing an app that will collect data from these inputs and put it into a common format for the purposes of data analysis.

In the second step, the app will integrate environmental data from Earth observation satellites and urban design data from Google Maps to identify barriers to physical fitness, such as confinement in high-rises, a lack of green space, or inaccessible outdoor walking areas.

Addressing Secondary Population Health Effects from COVID-19: Lessons from Space Medicine will be cross referenced with available local information regarding level of lockdown regulations and case-infection rates. The app will then link individuals to resources that will address the barriers they are facing, just like the individualized plans created for astronauts by their health teams. For example, if the app detects someone is not active enough to maintain their health, and then identifies that they are in a high rise building with no available green space in a city restrictive lockdown regulations, it will link them to at-home work-out programs, such as the ones being published by the World Health Organization (World Health Organization, 2020). Alternatively, if someone is not being physically active enough and the app identifies that they are in an area with low

case infection rates and an abundance of green space, the app will suggest local walking trails or parks that are open to the public. The app can be integrated with reminders to move, as well as resources from physicians and other healthcare professionals in order to recreate the successful team therapeutic approach used in space medicine to maintain the health of confined astronauts.

Additional Considerations: While the opportunity to use clinical techniques from space medicine is the focus of this proposal, special consideration must be given to the barriers to implementation of widespread telemedicine interventions. People need to have access to internet infrastructure to receive virtual care. Once again, space-based communications systems could be used to build the connectivity needed. For example, SES has the ability to deploy emergency ground-based systems that provide connectivity in areas struck by natural disaster. Using their existing medium Earth orbit (MEO) and Geostationary satellites (GEO), resilient communication networks can be built that could support the aforementioned health monitoring devices as well as access to the proposed application (SES, 2018).

Looking forwards the future, as the application collects more data, hotspot areas of reduced physical activity can be identified and provided to local governments in order to address systemic structural barriers to fitness, such as lack of green space or unsustainably restrictive lockdown measures.



[Nina Chuey](#) | Recent Medicine graduate from Mexico

My proposal to address the COVID-19 pandemic is the creation of a Mobile Application (APP), which purpose is to make an assessment of risk factor for travelers, generating a privacy-preserving and scientifically utile mobile data resource, for wider use by the medical research community.

Functional design. First, a global authorized source document must be developed. The magnitude and velocity in which new scientific data on COVID-19 is generated have been



unprecedented, but it is problematic too, as IATA (2020e) describes, it causes a rapid accumulation of uncoordinated measures, that are challenging to manage. Hence, it is needed a global template questionnaire, with coordinated and standardized criteria, certified and with complete recognition of all nations, for it to be valid and harmonized. Using as model the information collected by IATA (2020e) in Annex A, is shown in Table 1 an example of the criteria that could be used for the risk assessment for travelers. The questionnaire is divided into seven parts containing different categories of information. Based on the information collected in this template, an assessment of risk factors for the traveler's scale (ARFT scale) can be achieved. The data highlighted in red (Table 1), could be utilized for the ARFT scale, granting to each of them a numerical value, that when added up, would give a total score. Thus, it can be classified in categories, depending on the level of risk: High risk, Medium Risk, Low Risk, exemplified in Table 2. Based on the result obtained, the best follow-up is given, authorizing, or not to travel.

Implementation. For the pandemic, the questionnaire should be made obligatory for any person who will travel by airplane, either for domestic flights or for international flights. The questionnaire can be completed from any device that has access to the internet (mobile phones, tablets, and computers). When purchasing the plane tickets via the internet, to complete the transaction, the user must perform the assessment of risk factors for travelers, or the plane tickets would not be sold. When purchasing the plane tickets in the airport, the user must have completed the questionnaire before making the purchase and provide the access code (explained below). Once the questionnaire is completed, the data is immediately stored and the ARFT scale score is generated, if the user qualifies into the category of medium risk or low risk, it is given an access code, to continue the purchase; if the user qualifies into the high risk category, will not be granted the plane tickets and, should be given the relevant instructions on how to proceed next.

Second, acquire a wearable technology (common example: smartwatch), that is going to allow the 14-day follow-up before and after the travel. This biometric recognition sensor device specifically created to assist in public health crisis, should be free cost or very low cost. The device should be compatible with the smartphone of the user, thus the vital signs measurements can be monitored and stored daily in real-time. These new biometric signs will also be given a numerical value and, will be added to the past criteria for the ARFT scale, automatically recalculating a new ARFT scale score, every day in the system. This way it is possible a close user monitoring, but remotely.



[Linda Dao](#) | Project Officer in Operational Space Medicine at the Canadian Space Agency

Another space technology called the Bio-Analyzer uses both LOC technology and bio-molecular analysis to assess an individual's state of health. This technology is relevant for space as it reduces the need for astronauts to take large

samples of blood and impairing the sample quality by freezing them until they reach Earth (Canadian Space Agency, 2017a). It further allows for the sample analysis to take place within minutes, without the need for specialized lab equipment, supplies or a high level of scientific expertise. Applying this concept to address the COVID-19 pandemic would positively impact the point-of-care testing procedures.

Combining the sample preparation and analysis capabilities from the Canadian space technologies exemplified above, with state of the art light spectroscopy, I propose a simple diagnostic test that any individual can use within the comfort of their home. A high-level concept of operations for this test would be as follows:

Customized chips with LOC technology and a simple paper hand centrifuge (Bhamla et al., 2017) can be mass-produced and mailed to an individual who would like to know whether they are infected with SARS-CoV-2. Without leaving their home and risk infecting others or risk being infected by the virus, the individual can place a sample of their saliva into the chip. They will then use the simple paper hand centrifuge to prepare the sample before using a developed mobile phone application that can use the mobile camera light to analyze the sample, and assess it for COVID.

The application of the proposed technology has the promising potential to reduce strain on health providers and healthcare institutions, saving economical resources spent on personnel and supplies used for current swab tests. It will additionally reduce anxiety and stress on the individual by allowing the test to be done anywhere, with results within minutes. Incorporating the space concepts of being a minimally invasive procedure, robust, user-friendly, and portable, the testing aspects of the pandemic can be addressed. Empowering individuals to take care of their own health allows them to be informed on the best practices to reduce risk and improve health outcomes as a global society.



Conclusions

Through the presentation from the Novidien Project Team and diverse ideas from the finalists of the Space Medicine and Life Sciences Essay Competition, our breakout group was able to appreciate the broad range of ideas and possibilities where space technology can make an impact on our COVID-19 pandemic. There is a tremendous amount of knowledge and technology in the space field that can be translated into impactful solutions on Earth.

From our discussion, we identified three main challenges that may hinder successful translation of such space technology to Earth:

1. Awareness and understanding of knowledge and technology in the space industry that may address a problem on Earth
2. Expertise and people who can lead the translation of knowledge and technology from a space application to a solution on Earth
3. Infrastructure to support this translation process

Recommendations

To tackle the challenges our breakout group identified, we recommend the following:

1. To increase awareness of the opportunities in translating space technology and applications to solutions on Earth by supporting projects and opportunities that focus on this process
2. To partner with industry, accelerators and incubators to support an infrastructure that assist in the successful translation of space technology to an application on Earth

SECURE WORLD FOUNDATION & SPACE GENERATION ADVISORY COUNCIL

Sponsored by Secure World Foundation and Space Generation Advisory Council



Participants

Subject Matter Experts

Timiebi Aganaba-Jeanty | Assistant Professor, School for the Future of Innovation in Society at Arizona State University

Danny Bednar | Assistant Professor at Department of Geography and the Environment, Western University

Krystal Azelton | Director of Space Applications Programs at Secure World Foundation

Moderator

Tasman Powis | PhD Candidate at Princeton University

Rapporteur

Chimira Andres | Young Graduate Trainee at European Space Agency

Mina Takla | Co-founder/CEO/Director at CosmoX, Inc.

Kelsey Doerksen | Space Systems Engineer at Planet

Description

As space technology continues its forward progress into a state of ubiquity in our daily lives, it has become critical to reflect on the intersection of this technology and issues of ethics. Given that the SGAC operates in support of the United Nations Programme on Space Applications, the organization seeks to be ahead of the curve on issues of space technology and its application in relation to, or support of, basic human rights in alignment with the UN Sustainable Development Goals (SDGs). Finally, as a representation of young professionals around the world, the SGAC offers a unique environment to discuss, and envision, a diverse and inclusive future for the



space sector. This discussion track explores these issues through a discussion on: emerging ethical issues for space technology, and improving the diversity of participants in the space sector, as well as the potential for space activities to support the UN's human rights agenda, and a visioning exercise for the future of the space sector.

Main Objectives

- 1) Identify the main challenges that emerging, or existing, space technologies present, and expand on how they intersect with ethics and human rights issues.
- 2) Discuss potential solutions to the aforementioned challenges, envision how a diverse space sector would look like, and list action items to implement these visions.
- 3) Make recommendations to the SGAC, UNOOSA and industry partners.

Questions

- 1) How will emerging, or existing, space technologies intersect with issues of human rights and ethics in the future?
- 2) By 2030, what will a diverse space sector look like, and how do we get there?
- 3) What areas should we be focusing on within the SGAC?

Conclusions

- 1) Opportunities for augmenting human rights with space technology:
 - Increased access to information, data products and services enabled by telecommunications, internet, Earth observation, GPS and navigation satellite constellations.
 - Improved access to basic human needs and resources (e.g. food, water, shelter, health and safety) enabled by satellite data-driven decision making.
 - Detection of human rights violations via Very High Resolution (VHR) satellite imagery.

Ethical concerns highlighted within the session included:



-
- Implicit or intentional bias in “black-box” AI models and machine learning algorithms. Particular focus on those driven by Earth observation data.
 - Compromise between the rise of mega-constellations, their various benefits, potential threats and broader implications (e.g. “polluting” our view of the night sky and privacy concerns).
 - Challenges to space security with respect to anti-satellite weapons against essential national assets, which could result in debris-generating events and disrupt lives and businesses reliant on critical satellite services.
 - Challenges to space sustainability with respect to law, policy, treaties, or best practices which promote space safety and collaboration.
 - Challenges to space safety with respect to the exponential increase in the number of satellites and space debris threats.
 - Challenges concerning the potential overexploitation of space resources, the exploitation of resources on other planetary bodies for non-peaceful purposes, and the potential for conflict over space resources.
- 2) Improvements in diversity within the space sector have primarily been focused on gender, ethnicity and cultural identity. A diverse space sector should embrace such diversity, as well as a broader definition which also transcends socioeconomic barriers, age, and international borders. Those with wealth, or the freedom of movement are often at an advantage in a sector which rewards experience (often unpaid) and connections (at international conferences). People from underrepresented backgrounds with limited international mobility or communication skills are inherently disadvantaged when launching a career or business in the space sector. A diverse space industry should strive to provide equal access to professional (paid) opportunities for the community irrespective of gender, identity, nationality, age, first spoken language or wealth.
- 3) The SGAC Ethics & Human Rights working group is the ideal vehicle for continued investigation of the issues listed in Answer 1 above. We hope that these details will provide further ideas for discussion within the working group, the SGAC and the industry at large.

Recommendation 1

The SGAC should consider ratifying a non-binding code of ethics, which can act as a guide to members and alumni for how to pursue a career which is both sustainable and encourages a diverse future for the space sector. Rather than a binding set of rules, this code should aim to educate members on important



ethical issues within the space sector, and encourage them to make conscientious decisions in their future role as leaders of the industry.

We suggest two ways in which the SGAC could encourage improvements to diversity within the space sector. Here we provide further details to motivate these recommendations (which are listen to in the following section).

Recommendation 2

The SGAC should leverage its large sponsor network to facilitate improved opportunities to members of our community from non-traditional space faring nations via *digital internships*. Digital internships can transcend the challenges of immigration and simplify those of quarantining interns from sensitive or restricted data. With the transition to a more digital working environment during the times of the COVID-19 pandemic, now is the perfect time to persuade sponsors to pursue new and novel ideas to attract diverse and international talent. The SGAC should highlight the importance of paid internships as a vital tool in advancing diversity, as unpaid internships act as an experience barrier to low-income individuals unable to live off of parental or familial wealth while taking advantage of unpaid opportunities.

Recommendation 3

University programs in space studies (engineering, science, policy, law, business etc.) often poorly equip students with the necessary soft skills or nuanced knowledge (for example on export restrictions) to succeed in a space career. The SGAC is in a unique position to collate relevant knowledge and experience from its members and alumni to smooth this transition for the next generation of space leaders. This could come in the form of soliciting short biographies from members/alumni or requesting responses to specific questions related to the challenges of breaking into the space sector. Such a database would help to break down barriers in language and culture which often lead to an implicit bias against international job applicants.

Recommendations

Recommendations to the Space Generation Advisory Council

- 1) It is recommended that the SGAC ratify a non-binding code of ethics, encouraging members to make choices which promote a diverse and sustainable future in the space

sector.

- 2) It is recommended that the SGAC work with industry partners to offer paid *digital internships* to SGAC members from under-privileged/underrepresented backgrounds or from non-traditional spacefaring nations.
- 3) It is recommended that the SGAC compile a database of career experience and lessons learnt from members and alumni as a resource or guide for future leaders of the sector.
- 4) It is recommended that the SGAC work with industry partners to support students, early career professionals and space entrepreneurs from under-privileged/underrepresented backgrounds or from non-traditional spacefaring nations through coaching, mentorship and fellowships.

Recommendations to the United Nations Office for Outer Space Affairs

- 1) We recommend that the UN-COPUOS work with international partners to promote and ramp up capacity building efforts in developing countries to enhance equality, diversity, and inclusion, to train a skilled workforce to lead their countries' respective space programs, and to support the creation of local space entrepreneurial and academic ecosystems.
- 2) We recommend that the UN-COPUOS work with industry and academic institutions to offer special scholarships, apprenticeships and fellowships, which open pathways to career development and growth, to qualified students and young professionals in space-related fields/disciplines.
- 3) We recommend that the UN-COPUOS consider or promote bi-lateral agreements between nations which promote space safety, security and sustainability (as defined above). These agreements may act as seeds for future multilateral treaties.
- 4) We recommend that the UN-COPUOS work with UN member states, especially developing nations, to promote satellite data-driven decision making, which provides access to basic human needs and resources (e.g. food, water, shelter, energy, health and safety), as essential to promoting and protecting human rights.

Recommendation to the Sponsor(s)/Partner(s) and/or the Industry at large

- 1) We recommend that the Secure World Foundation continue to broaden its focus to encompass some or all of the ethical and human rights issues referred to in this report.
- 2) We recommend that the Secure World Foundation continue to provide opportunities for



student or young professional internships, and where possible, extend these offers into new formats such as digital internships, improving access to under-privileged/underrepresented persons or residents of non-traditional space-faring nations.

- 3) We recommend that the industry address inherent bias in AI models and machine learning algorithms that process their data to promote diversity, inclusion, sustainable development, and detect human rights violations.
- 4) We recommend that the industry integrate sustainable technologies, business models and product design into their mission lifecycle to promote space sustainability.

Statistics

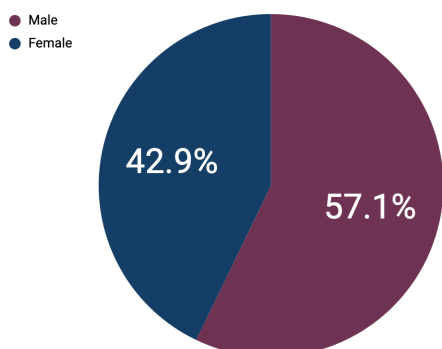
Number of Delegates



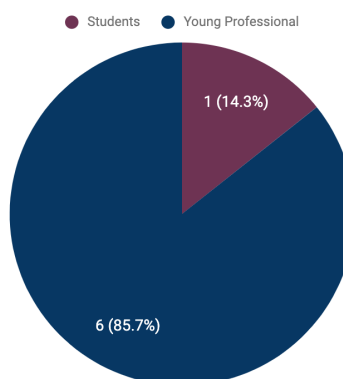
Number of Nationalities represented



Male/Female Ratio (%)



Academic Background of Participants (%)





SCIENCE COMMUNICATION

Sponsored by Space Foundation



Subject Matter Experts

Bernadette Maisal | Senior Director, Program Initiatives for the Space Foundation

Ron Sparkman | Digital Content Strategist for the Space Foundation

Description

The last thing science should be is boring. Proper science communication connects the everyday person to the wonders of the universe. It is our duty as scientists, engineers, and science communicators to share the discoveries that are shaping our future. An effective and credible science communicator is more important than ever in this age of misinformation. This weekend we will discuss the do's and especially the don'ts to successful #SciComm.

Main Objectives

- 1) What are businesses, the media, and museums doing to communicate current science and how can these approaches and methods be used more widely in the aerospace community?
- 2) How do you address misinformation in science and what do we still need to learn?
- 3) How does controversy or uncertainty affect how people understand information from science?
- 4) How do we connect new Information and data to what people already know?

Conclusions

- 1) (i) One popular scicomm topic is SpaceX launching the Tesla Roadster; pros of engaging & building buzz, cons of cost & purpose questioned; (ii) sci-fi movies, books, comics have always provided a great way to engage general public & we've seen great examples in recent years from the Martian to Star Wars; (iii) diversity in SciComm helps propel diversity in the space industry; (iv) a challenge in scicomm is navigating politicized topics and staying relevant to the general public with other pressing Earth/societal concerns.



- 2) (i) Important to check multiple sources as well as have a list of people you trust; (ii) Ensure you verify the correct information; (iii) Develop the art of quoting people correctly and capturing the essence of their message; (iv) This can be complicated by the idea that social media may get information even faster than internal communications even in organizations such as NASA.
- 3) (i) Controversy within the science community can cause confusion within the broader community; (ii) Looked at some examples: Is Pluto a Planet? / Government led (SLS) vs commercial pursuit of the Moon (e.g. SpaceX) / Moon vs Mars; (iii) As communicators, you can help point people to the “correct” sources (i.e. to Planetary scientists rather than astronomers for the question on whether or not Pluto is a Planet); “Don’t be lazy consumers of information” / Important to ask the question: What value are you providing to the consumers?; (iv) The internet has really changed the way that controversy (and information in general) is shared; social media, in particular, has distorted information because people are looking for a short sound byte that will get clicks and loses the context of the narrative of what was being discussed; (v) As communicators, it’s important to focus; (vi) Be cognizant that controversy can be found in two different ways: Fact / Policy.
- 4) (i) It’s important to maintain credibility/reliability and neutrality; (ii) A lot of times, our job as science communicators is just to connect and communicate very basic information to help correct misperceptions; (iii) It’s a matter of trust; so one important aspect of SciComm is building trust within the community within which you’re communicating: Encourage external research and remain humble because you’ll never know everything / Point to the people/sources that you find trustworthy; (iv) It can be important at first to first talk through ideas with a closer network of people you trust to double-check your knowledge; having a network to lean on to get the “real” answer can be very helpful to use those connections to provide good quality information; (v) It can be useful to re-share information that you personally found beneficial; (vi) Consider the diversity of platforms; articles, social media, panels, podcasts; think about how the data is distributed and how to leverage the benefits of the particular platform.

Main Take-Aways

- We can all support & propel science communication!
- Talk with your friends & family, get involved with local community, or share content online;
- Use your expertise & networks to verify info and build trust about space/science knowledge;
- Successful science communication is a key to advance science, recruit more scientists/engineers, promote diversity in space, and secure support/funding for further exploration;
- STEM is about change, innovation, going above & beyond; scicomm helps promote this work;
- We can all spark inspiration & motivation!

APPENDIX

A) SPEAKERS AND PANELISTS



Dr. Andrew Aldrin | Director of the Aldrin Space Institute at Florida Institute of Technology

Dr. Andrew Aldrin is Director of the Aldrin Space Institute at Florida Institute of Technology. ASI is a multidisciplinary institute created to advance commercial space development. Prior to FIT, Dr. Aldrin was President of Moon Express, responsible for day to day operations for the company. Dr. Aldrin also held executive positions in more traditional aerospace industry, serving as Director of Business Development and Advanced Programs at United Launch Alliance where he oversaw development of corporate strategies, business capture, senior customer relations and advanced program development for civil space markets. Before ULA, Dr. Aldrin headed Business Development and Advanced Programs for Boeing's NASA Systems, and Launch

Services business units. He has also served on the professional research staff of the RAND Corporation and the Institute for Defense Analyses.

Brett Alexander | Vice President, Government Sales at Blue Origin

Bretton (Brett) Alexander is Vice President, Government Sales for Blue Origin, a developer of rocket engines and space transportation capabilities, which he joined in 2011. Mr. Alexander is a recipient of the NASA Exceptional Public Service Medal and, from October 2009 to October 2011, was a member of the NASA Advisory Council (NAC). Mr. Alexander served as a member of the FAA's Commercial Space Transportation Advisory Committee (COMSTAC) from 2008 to 2019.

Mr. Alexander previously served as a senior policy analyst for space issues in the White House Office of Science and Technology Policy where he played a central role in development of the Vision for Space Exploration announced by President Bush in 2004.

From December 2006 to May 2011, Mr. Alexander served as president of the Commercial Spaceflight Federation, the industry association of businesses and organizations working to make commercial human spaceflight a reality.

From 2008 to 2011, Mr. Alexander was also a consultant in the space industry. From 2007 to 2008, he served as the executive director for space at the X PRIZE Foundation.

Mr. Alexander was senior advisor to Transformational Space Corporation (t/Space) from 2005 to 2007. Prior to the White House, he held positions in the Federal Aviation Administration's Office of Commercial Space Transportation, The Aerospace Corporation, and ANSER Corporation.

Mr. Alexander holds Master and Bachelor of Science degrees in aerospace engineering from the University of Virginia in Charlottesville, Virginia.





Dr. Jonathan Arenberg ([@JonArenberg](#)) | Chief Engineer for Space Science Missions at Northrop Grumman

Jonathan Arenberg has been with Northrop Grumman Aerospace Systems since 1989 having started with Hughes Aircraft Company. His work experience includes optical, space and laser systems. Dr. Arenberg has worked on such astronomical programs as the Chandra X-ray Observatory, James Webb Space Telescope and helped develop the New Worlds Observer concept for the imaging of extra-solar planets. He has also worked on major high-energy and tactical laser systems, laser component engineering and metrology issues. He is a member of the ISO sub-committee charged with writing standards for laser and electro-optic systems and components, SPIE, American Astronomical Society and AIAA. Dr. Arenberg holds a BS in physics and an MS and PhD in engineering, all from the University of California, Los Angeles. He is the author of over 100 conference presentations and publications, and holds 11 U.S. Patents in a wide variety of areas of technology with US and foreign patents pending.

Captain Kevin Bernard | Royal Canadian Air Force

Capt Bernard joined the Canadian Armed Forces (CAF) in 2009 and began his studies in Physics and Space Sciences at the Royal Military College of Canada. After graduation in 2013, he undertook his training to become an Aerospace Engineering Officer and upon his trade graduation in 2014, he was posted to Defence Research and Development Canada (DRDC). While at DRDC, he performed payload and mission planning for the Near Earth Object Surveillance Satellite (NEOSSat) and began part-time studies towards a M.A.Sc. in Aerospace Engineering, which he completed in 2019. In 2017, Capt Bernard was posted to the Canadian Space Operations Center (CANSPOC) where he performed the duties of the Space Situational Awareness (SSA) Officer alongside a team to provide assessments of on-orbit events to senior leaders within the CAF. In 2020, Capt Bernard was posted into his current role as the Operational Requirements Manager for the Surveillance of Space 2 (SofS 2) Project; the follow-on project to the CAF's Sapphire satellite currently contributing to the United States' Space Surveillance Network.



Debra Facktor | Head of U.S. Space Systems at Airbus U.S. Space

Debra Facktor is responsible for leading Airbus U.S.'s Space Systems, which includes managing the National Security Space and Space Exploration line of business in the U.S. She is a member of the Airbus OneWeb Satellites board. Prior to joining Airbus U.S., Debra was Vice President and General Manager of Strategic Operations for Ball Aerospace, leading the company's Washington DC operations, strategic development, and marketing and communications. Debra is actively engaged as an advisor and mentor in the aerospace community, and is a fellow of AIAA, the American Astronautical Society (AAS) and an academician of the International Academy of Astronautics (IAA). Debra received her bachelor's and master's degrees in aerospace engineering from the University of Michigan, and is an alumna of the International Space University summer session program in Strasbourg, France.



Tony Frazier ([@tfraz06](#)) | Executive Vice President of Global Field Operations at Maxar

Tony Frazier joined Maxar in 2017 after its acquisition of DigitalGlobe and serves as the Executive Vice President of Global Field Operations. In this role he leads all sales, business development, and services delivery activities for the company outside of the Canadian market. Prior to this role Mr. Frazier served as President of Radiant Solutions. Mr. Frazier served as Senior Vice President, General Manager of DigitalGlobe's Services business from 2013 and led GeoEye's Marketing and Communications team since 2010, prior to its acquisition by DigitalGlobe in 2013. Prior to GeoEye, Mr. Frazier served as Senior Director of Product Management at Cisco Systems, where he brought to market emerging technologies core to Cisco's video and collaboration strategy. Prior to Cisco, Mr. Frazier held senior marketing roles at Infor, iPhrase Technologies an MIT start-up acquired by IBM, and pcOrder.com. Mr. Frazier

began his career in strategic consulting at Bain & Company. Mr. Frazier holds a Bachelors of Systems Engineering from the University of Pennsylvania and an MBA with distinction from Harvard University.

Janet Kavandi ([@JanetKavandi](#)) | Senior Vice President, Space Systems Group at Sierra Nevada Corporation

Dr. Janet L. Kavandi serves as Senior Vice President in the Space Systems Group at Sierra Nevada Corporation (SNC) in Louisville, Colorado. There, she is responsible for the company's space programs, including the Dream Chaser® spaceplane, which is under contract to deliver supplies to the International Space Station beginning in 2021. Dream Chaser is a winged vehicle and the only resupply vehicle capable of landing on a commercial runway.

Prior to her current position, Dr. Kavandi served as director of the National Aeronautics and Space Administration's John H. Glenn Research Center in Cleveland, Ohio. In this position, she was responsible for planning, organizing and directing the activities required for cutting-edge research on aerospace and aeronautical propulsion, power, and communication technologies. Previous to accepting the director's position, Dr. Kavandi served as Glenn's deputy director.

Before her time at Glenn, Dr. Kavandi worked at NASA's Johnson Space Center in Houston, Texas, where she served as the director of Flight Crew Operations. In this role, she was responsible for the Astronaut Corps and aircraft operations at Ellington Field. Dr. Kavandi also served as the deputy director of the Health and Human Performance Directorate, where she was responsible for the NASA flight surgeons and human research investigations on the International Space Station (ISS).

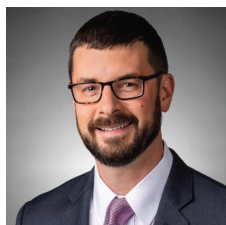
Dr. Kavandi was selected as a NASA astronaut in December 1994 as a member of the fifteenth class of U.S. astronauts. During her time in the Astronaut Office, she supported International Space Station payload integration, capsule communications, robotics and served as deputy chief of the Astronaut Office. She is a veteran of three space flights, serving as a mission specialist on STS-91 in 1998, STS-99 in 2000 and STS-104 in 2001. Dr. Kavandi has logged more than 33 days in space, traveling more than 13.1 million miles in 535 Earth orbits.

Born in Springfield, Missouri, she earned a Bachelor of Science degree in chemistry from Missouri Southern State University in Joplin, a Master of Science degree in chemistry from the Missouri University of Science and Technology in Rolla, and her doctorate in analytical chemistry from the University of Washington in Seattle.

Dr. Kavandi has been recognized with two Presidential Rank Awards, two NASA Outstanding Leadership Medals, two Exceptional Service Medals, three NASA Space Flight Medals, and NASA's highest award, the Distinguished Service Medal.

Dr. Kavandi and her husband, John, have two adult children.





Joe Landon ([@joe_landon](#)) | Vice President, Advanced Programs Development, Commercial Civil Space at Lockheed Martin

Joe Landon serves as Vice President of Advanced Programs Development for Lockheed Martin's Commercial Civil Space line of business. He leads an organization accountable for new business growth, strategy development and enterprise collaboration for human spaceflight, robotic deep space exploration, communication satellite solutions and weather and remote sensing markets.

Previously, Joe co-founded and served as Chairman of the Board of Space Angels, the leading source of capital for space startups. Joe also served as Chief Financial Officer of Planetary Resources where he built the company's finance team, and under his leadership, the company secured financing from some of the world's leading private and institutional investors before the company was acquired in 2018.

Joe graduated from Embry-Riddle Aeronautical University with a BS in Engineering Physics. He earned an MS in Aerospace Engineering from the University of Southern California and an MBA from Harvard Business School.

Bernadette Maisel | Senior Director, Program Initiatives at Space Foundation

Maisel is currently the Senior Director – Program Initiatives for the Space Foundation in Colorado Springs, Colorado, where she coordinates and manages a wide range of Space Foundation activities, including program content for major events, the prestigious space awards program, customer engagement with international delegations and VIP guests at the annual Space Symposium. Throughout the year, she supports the senior leadership team on a number of efforts in support of the Space Foundation's strategic plan.

Since joining the Foundation in 2008, she has devoted herself to successful execution of a multitude of services, including reception management, data management and reporting, and attendee registration at Space Foundation events, particularly the annual Space Symposium. Bernadette also managed visitor admissions and the retail store in the Space Foundation Discovery Center. She is an active member of the Colorado Springs Rising Professionals organization, where she served as the Vice Chair of the Professional Development Committee, working to educate and promote professional development with young business professionals in the Pikes Peak region. In 2015, she was selected as honorary commander for Lt. Col. Terrill McCall, Commander, 22nd Space Operations Squadron, a role designed to increase public awareness and understanding of Schriever Air Force Base, its missions, people and programs, and to build relationships with members of the local community. In 2016, Maisel was nominated by the Southern Colorado Women's Chamber of Commerce for "Young Professional of the Year". In 2018, she was selected by the Colorado Springs Business Journal (CSBJ) to receive the Rising Stars Award, the city's most prestigious award for professionals under the age of 40. In 2019, Maisel became an Alumni of Leadership Pikes Peak.





Katherine Monson ([@KatherineMonson](#)) | Chief Executive Officer at Kongsberg Satellite Services (KSAT)

Katherine Monson is the CEO of KSAT Inc. for Kongsberg Satellite Services (KSAT). KSAT is a world-leading provider of ground station services for satellites, rocket launchers, and experimental spacecraft – supporting over 96% of commercial satellites launched into NGSO during the last two years. With over 50 years of experience, KSAT's network today spans over 180 antennas at 20 ground station locations across the globe (including Pole to Pole coverage from Antarctica to the Arctic), and is constantly expanding. KSAT is proud to be the behind-the-scenes bridge

back to earth, supporting the vast majority of space companies, agencies, and start-ups.

Katherine began her career in aerospace as an early member of Spire Global. During her tenure at Spire, Katherine led the Ground Station department, building out a global network of infrastructure to download data from the constellation of over forty spacecraft.

Katherine is an avid hiker, and enjoys learning new languages and exploring new places. She lives in Boulder County, Colorado.

James Morhard ([@jmorhard](#)) | Deputy Administrator at National Aeronautics and Space Administration

James Morhard was nominated by President Trump and confirmed to be NASA's 14th Deputy Administrator. He was sworn in on October 17th, 2018.

Jim helps provide overall leadership, planning, and policy direction. He performs duties and exercises powers delegated by the Administrator, assists him in making final agency decisions, and acts in his absence to govern NASA operations. Jim also is responsible for articulating and representing the agency's vision.

Prior to his tenure with NASA, Morhard was the U.S. Senate Deputy Sergeant at Arms. He began his career as an analyst for the Secretary of the Navy, where he reviewed procurement and research and development programs. Beginning in 1991, Jim served on the Senate Appropriations Committee, working on the Defense and Military Construction, and Commerce, Justice, State Subcommittees.

In 2003, he became Chief of Staff of the whole Senate Appropriations Committee, where he worked with House and Senate Leadership, the Office of Management and Budget, and the White House to pass the 2004 and 2005 Omnibus Appropriations bills.

Jim earned his B.S. degree in accounting from St. Francis University, an M.B.A from George Washington University, and a Juris Doctor from Georgetown University.





Clay Mowry ([@ClayMowry](#)) | Vice President for Global Sales, Marketing, and Customer Experience at Blue Origin

Clay Mowry is Vice President for global sales, marketing and customer experience at Blue Origin, a private space company developing launch vehicles and technologies that dramatically improve access to space for people and payloads. His mission is to provide customers with safe and affordable commercial space transportation services using the reusable New Shepard & New Glenn launch vehicles.

Clay came to Blue Origin from Arianespace, Inc. where he served for 15 years as Chairman and President. As the leader of Arianespace's U.S. subsidiary, he was responsible for managing sales, marketing, strategy, communications and government relations activities in the region.

He also served for six years as the founding Executive Director for the Satellite Industry Association (SIA), a non-profit alliance of satellite operators, manufacturers, and ground equipment suppliers.

Prior to his role at SIA, Clay worked as a commercial space industry analyst and Senior International Trade Specialist with the U.S. Department of Commerce's International Trade Administration.

Clay Mowry received a Master of Business of Administration from Georgetown University in Washington, D.C., and a Bachelor of Arts in politics and government from Ohio Wesleyan University in Delaware, Ohio.

In addition to his work at Blue Origin, Clay is the Vice President of Finance for the International Astronautical Federation. He currently serves on the advisory boards of Via Satellite magazine and the Space Generation Advisory Council. Clay is also the founder and Chairman of the Future Space Leaders Foundation, a non-profit organization dedicated to the career development of young space and satellite industry professionals.

Mark Muktoyuk | Senior GNC Systems Engineer at Astroscale U.S. Inc

Mark Muktoyuk has 16 years aerospace industry experience and holds a Master's Degree in Applied Mathematics. Mark has worked with Raytheon Company, Odyssey Space Research, and Sierra Nevada Corporation before his current role with Astroscale U.S. Inc. His experience includes guidance algorithm design, performance verification, project management, simulation baseline management, flight software, and the systems engineering, integration, test and deployment of integrated hardware/software products.





Scott Pace | Executive Secretary at National Space Council

Dr. Scott Pace is the Executive Secretary for the National Space Council. The Council is chaired by Vice President Michael Pence. He began this position in August 2017. Dr. Pace was formerly the Director of the Space Policy Institute and a Professor of the Practice of International Affairs at George Washington University's Elliott School of International Affairs from 2008-2017. From 2005-2008, he served as the Associate Administrator for Program Analysis and Evaluation at NASA. Prior to NASA, Dr. Pace was the Assistant Director for Space and Aeronautics in the White House Office of Science and Technology Policy (OSTP).

From 1993-2000, Dr. Pace worked for the RAND Corporation's Science and Technology Policy Institute (STPI). From 1990 to 1993, Dr. Pace served as the Deputy Director and Acting Director of the Office of Space Commerce, in the Office of the Deputy Secretary of the Department of Commerce. He received a Bachelor of Science degree in Physics from Harvey Mudd College in 1980; Masters degrees in Aeronautics & Astronautics and Technology & Policy from the Massachusetts Institute of Technology in 1982; and a Doctorate in Policy Analysis from the RAND Graduate School in 1989.

Dr. Pace received the NASA Outstanding Leadership Medal in 2008, the US Department of State's Group Superior Honor Award, GPS Interagency Team, in 2005, and the NASA Group Achievement Award, Columbia Accident Rapid Reaction Team, in 2004. He has been a member of the US Delegation to the World Radiocommunication Conferences in 1997, 2000, 2003, and 2007. He was also a member of the US Delegation to the Asia-Pacific Economic Cooperation Telecommunications Working Group, 1997-2000. More recently, he served as a private sector advisor to the U.S. Delegation to the UN Committee on the Peaceful Uses of Outer Space in 2009, and 2011-17. Dr. Pace was a member of the NOAA Advisory Committee on Commercial Remote Sensing (ACCRES) and served as a senior advisor to the Position, Navigation, and Timing (PNT) Advisory Board for the U.S. PNT Executive Committee.

Dr. Pace is a former member of the Board of Trustees, Universities Space Research Association, a former Trustee of the Summer Science Program Inc., a Member of the International Academy of Astronautics, and an Associate Fellow of the American Institute of Aeronautics and Astronautics.

Davide Petrillo | Executive Director at Space Generation Advisory Council

Davide Petrillo has currently been appointed as the Space Generation Congress (SGC) 2020 Deputy Manager within Space Generation Advisory Council (SGAC). His professional experience brought him to London (UK) as a Business Manager for Alten Ltd, global management consulting company that provides strategy, consulting, digital, technology and operations services focused on the Aerospace field. Davide has a M.Sc. in Aerospace Engineering from the University of Padova, Italy. Previously, he was the Team Leader of FELDs Experiment selected by the European Space Agency (ESA) for the Drop Your Thesis! 2014 programme. FELDs tested a tethered electromagnetic soft docking technology in microgravity conditions at the Drop Tower of the Centre of Applied Space Technology and Microgravity (ZARM) in Bremen, Germany. In 2015, he won the "Hans Von Muldau Team Award" for the best team project that took place in Jerusalem at the 66th International Astronautical Congress (IAC). Davide joined SGAC in 2016 and has been appointed as part of the 3rd E-SGW organizing team and also the SGC 2018 organizing team as part of the Working Group team specifically focused on the organization and management of the Special Track "Bridging the Space Divide" Working Group. In conclusion, after the SGC 2019 experience, Davide will be promoted as the Event Manager for the next SGC 2020 that will take place in Dubai, UAE. This event will be focused on the concept of sustainability and environmental impact in order to increase public awareness about the engagement with sustainability principles and sustainable living.





Lieutenant Commander **Benjamin Piggott** | Royal Australian Navy

Lieutenant Commander Ben Piggott is the Staff Officer for Space Policy at Navy Headquarters, where he is responsible for coordinating the Navy's capability development and policy responses for military space applications. Previously, he has worked on the planning and execution of space-supported naval operations, in both operational headquarters, and at sea in submarines. He's contributed on several SGAC reports to UN COPUOUS, dealing with diverse aspects of space policy including ownership and risk for space commerce and applying space technology for humanitarian applications. Ben chairs the Future Strategic Leaders Program at the Institute for Regional Security, a Canberra-based think-tank. He holds a BSc in chemistry, and a Master of Space Operations from the University of New South Wales,

where he is currently an Adjunct Lecturer.

Flight Lieutenant Mark Platt | Royal Air Force

Flight Lieutenant Mark Platt joined the RAF in November 2007, graduating from Initial Officer Training at the RAF College Cranwell in July 2008. Following this he undertook specialisation training for Identification Officer at the then School of Fighter Control at RAF Boulmer from July 2008 to May 2009. He was then posted to RAF Fylingdales to become a Crew Commander on the Ballistic Missile Early Warning System radar based there. After 2 years on shift duties, Flight Lieutenant Platt was posted to Number 1 Air Control Centre based at RAF Scampton in May 2011. After re-qualifying as Identification Officer he undertook an upgrade to Surveillance Director of the UK's Air Surveillance and Control System. It was during this tour that he undertook 2 deployments to Falkland Islands, 1 as Duty Watch Officer in the Control and Reporting Centre "Griffin" and the second as the Aide-de-Camp to the Commander, British Forces South Atlantic Islands.

In Apr 2015 he started the Aerosystems Course, a Masters level year-long course designed to prepare graduates for roles in Test and Evaluation, Acquisition or Requirements management. Completing the course in Feb 2016, he was posted to Number 56 Sqn based at the Air Warfare Centre, as the Airspace Battle Management Test and Evaluation Flight Command and Control system team leader. A 3-year tour here saw him oversee Test and Evaluation support to Command and Control system procurements and operational assessments of radar deployments and system updates. Posted to the Air Command Capability portfolio in September 2019 he took up post as SO3 Space Capability Development, with special responsibility for industry liaison, Defence Science and Technology support and Force testing and concept development through wargaming.

Captain Tasia Reed | U.S. Space Force

Captain Tasia Reed is currently serving as a Mission Management Operator assigned with the 2nd Space Warning Squadron, 460th Space Wing at Buckley Air Force Base, Colorado. Previously, she was a Mission Commander assigned to the Aerospace Defense Facility – Colorado (ADF-C) where she conducted missile warning operations for U.S. Strategic Command (USSTRATCOM). Cpt Reed was also a prior enlisted Cyber Systems Operations technician and was stationed at Ft. Meade, Maryland and Spangdahlem Air Base, Germany. Tasia has also completed research in U.S. strategic deterrence and space policy, and co-authored and presented a paper at USSTRATCOM's 2019 Deterrence and Assurance Academic Alliance Conference and Workshop. She currently holds a B.A. in Philosophy from Southern Illinois University Edwardsville, a M.S. in Political Science from the University of Nebraska-Omaha, and will complete her M.S. in Space Studies from American Military University in August 2020.





Kirk Shireman | Vice President, Lunar Exploration Campaign, Commercial Civil Space at Lockheed Martin Space

Kirk currently serves as the Vice President for the Lockheed Martin Luna Exploration Campaign, a position he has held since joining Lockheed Martin in July 2020. LEC is responsible for the development of the Ascent Element of the Human Lunar System's National Team. The LEC is also responsible for the development of future systems and vehicles to support Human space Exploration on the lunar surface, in lunar orbit and beyond.

Prior to joining Lockheed Martin in July 2020, Kirk served as the International Space Station (ISS) Program Manager. He was responsible for the overall management, development, integration and operation of the ISS. This nearly \$3B per year, 15-nation program encompasses the design, manufacture, testing and delivery of complex space flight hardware and software and its integration with modules from the international partners into a fully functional and operating permanently manned ISS. In addition, Kirk

was responsible for policy development, international partner negotiations and the overall safety and health of the crew and on-orbit vehicle.

Previously, Kirk served as the deputy director of NASA's Johnson Space Center. In his position, he worked with Johnson Center Director Ellen Ochoa to manage one of NASA's largest installations, with nearly 14,000 civil service and contractor employees – including those at White Sands Test Facility in Las Cruces, N.M. – and an annual budget of approximately \$5.1 billion and helped oversee a broad range of human spaceflight activities.

Prior to his role as deputy center director, Kirk served as deputy ISS program manager from 2006 to 2013. In this position, he was responsible for implementing Program policies, planning and directing the Program's development and operations, managing the integration of all elements of the Program into one functional system, and ensuring effective cost control of the Program.

Kirk also served as the chair of the ISS Mission Management Team, where he was responsible for all aspects of on-orbit operations of the ISS. He was responsible for the overall management and integration of all Program operations elements, including the United States and international partners. Primary focus was the operations elements supporting the performance of the real-time and near real-time missions.

In March 2019, Kirk received the National Space Club Astronautics Engineer Award. He has also been recognized with NASA's Outstanding Leadership Medal, NASA's Exceptional Achievement Medal for successful integration of the ISS's Russian elements, the Silver Snoopy award in 1990, and the Presidential Rank Award twice 2010 and 2017. In 2013, Shireman received the Eagle Manned Mission Award for his outstanding leadership of the ISS from the National Space Club at its 56th Annual Robert H. Goddard Memorial Dinner in Washington D.C.



Gwynne Shotwell | President and COO at SpaceX

As President and COO of SpaceX, Gwynne Shotwell is responsible for day-to-day operations and managing all customer and strategic relations to support company growth. She joined SpaceX in 2002 as Vice President of Business Development and built the Falcon vehicle family manifest to more than 100 launches, representing more than \$10 billion in business. Shotwell is a member of the SpaceX Board of Directors.

Prior to joining SpaceX, Shotwell spent more than 10 years at the Aerospace Corporation, holding positions in Space Systems Engineering, Technology and Project Management.

She was promoted to the role of Chief Engineer of an MLV-class satellite program, managed a landmark study for the Federal Aviation Administration on commercial space transportation, and completed an extensive analysis of space policy for NASA's future investment in space transportation.

In addition to being named the 2018 Satellite Executive of the Year, Shotwell was awarded the AIAA Goddard Astronautics Awards as well as the American Society of Mechanical Engineers Ralph Coats Roe Medal. Fortune Magazine placed Shotwell at #42 on their list of the World's 50 Greatest Leaders in 2018 and Forbes named her #70 on their list of Power Women in 2017. In 2014, Shotwell was appointed to the United States Export Import Bank's Advisory Committee and the Federal Aviation Administration's Management Advisory Council. Shotwell was elected to the honorable grade of Fellow with the American Institute of Aeronautics and Astronautics.

Through leadership in both corporate and external science, technology, engineering and math (STEM) programs, Shotwell has helped raise over \$1.8 million for STEM programs reaching thousands of students nationwide.

Shotwell received, with honors, her bachelor's and master's degrees from Northwestern University in Mechanical Engineering and Applied Mathematics, and serves on their Board. She has authored dozens of papers on a variety of space related subjects.

Cory Springer | Director of Weather and Environment at Ball Aerospace

Cory Springer is the director of weather and environment for Ball Aerospace. Springer is a member of Ball's Strategic Operations organization in Arlington, VA. He is responsible for collaborating across the Ball business units developing business strategies, and engaging customers on company satellite programs related to Earth remote sensing, meteorology, oceanography, space weather and climate.

Prior to Ball, Springer served over 24 years with the U.S. Navy as a Meteorology and Oceanography Officer. He spent significant time in operational positions, both at-sea and ashore. Highlights include serving as the aircraft carrier, USS John F. Kennedy, METOC officer, Military Deputy in Naval Research Laboratory's Marine Meteorology Division in Monterey, California, Director of Operations for the Navy's European Weather and Ocean Center in Rota, Spain, and Director of the Navy-NOAA-U.S. Coast Guard National Ice Center, in Suitland, Maryland, in addition to multiple tours on the OPNAV staff in the Pentagon, including a period as the Military Deputy to the Oceanographer of the Navy, who is responsible for developing resource plans and policies for the Navy's Meteorology and Oceanography forces. Springer retired in the grade of Captain. Springer holds a B.S. in oceanography from the U.S. Naval Academy, Annapolis, Maryland, and a M.S. in meteorology and physical oceanography from the Naval Postgraduate School, Monterey, California.





Ron Sparkman | Digital Content Strategist at Space Foundation

Ron Sparkman is one of Space Foundation's newest editions as the organization's Digital Content Strategist, as well as the Space Foundation Discovery Center's Chief Curiosity Correspondent. In these roles, he leads the organization's social media team, hosts livestreaming events like Space4U Live and Universal Live with industry leaders, produces engaging video content such as Space Symposium 365 with team member Slade Bradbury, and much more.

Ron is also the Founder & Editor-in-Chief of Stardom, a space media company, with the mission to make space science more approachable & accessible to everyone on the planet. Via this platform, Stardom's international team covers space news, science communication events, rocket launches, space & science museums, and more. As well,

he is also the co-creator of I Love Mars, one of the largest communities for fans of the Red Planet on social media.

Ron is also Communications and Social Media Manager at Explore Mars, Co-founder of the Out Astronaut Project, the host of The Mars Society's Red Planet Radio, an Advanced Academy graduate of Project PoSSUM, the citizen-scientist astronautics program, and does or has contributed to a number of other space science social media brands like Fun Fact Science, PoSSUM 13, and more.

Major Steven Jordan Tomaszewski | The Aerospace Corporation / USAF

Major Steve Jordan Tomaszewski is a space intelligence officer in the United States Air Force Reserve currently assigned to the 310th Operations Support Squadron at Schriever Air Force Base, Colorado as the Chief of Intelligence Analysis. He has a background supporting space intelligence in the National Security Agency, National Geospatial-Intelligence Agency, Defense Intelligence Agency, Joint Chiefs of Staff, and U.S. Special Operations Command. He also supports The Aerospace Corporation as a senior project leader providing national security space strategy, policy, and oversight. He holds a Bachelor's degree in Political Science from the U.S. Air Force Academy and a Master's degree in Policy Analysis from Indiana University.



Johann-Dietrich "Jan" Wörner ([@janwoerner](https://twitter.com/janwoerner)) | Director General at European Space Agency

Johann-Dietrich 'Jan' Wörner became the ESA Director General on 1 July 2015. From March 2007 to June 2015, he served as Chairman of the Executive Board of the German Aerospace Center (DLR) and was head of the German delegation to ESA from 2007 to 2015. From 2012 to 2014, he served as Chairman of the ESA Council.

Jan Wörner was born in Kassel, Germany, in 1954. He studied civil engineering at the Technical University (TU) Berlin and TU Darmstadt, from where he graduated in 1985. In 1982, as part of his studies, he spent one year in Japan, investigating earthquake safety of nuclear power plants. Until 1990, Mr Wörner worked for consulting civil engineers König und Heunisch.

In 1990 he returned to TU Darmstadt, where he was appointed as a professor of Civil Engineering and took over as Head of the Test and Research Institute. Before being elected as President of TU Darmstadt in 1995, he held the position of Dean of the newly established Civil Engineering Faculty. Jan Wörner headed the university from 1995 to 2007 and succeeded in making it the first autonomous university of the Federal Republic of Germany.

Jan Wörner has been awarded numerous prizes and positions, such as the Prize of the Organisation of Friends of Technical University Darmstadt for 'outstanding scientific performance'. He was also appointed to the Berlin Brandenburg Academy of Sciences and to the Convention for Technical Sciences (acatech) and is a representative of the Technical Sciences Section of the Leopoldina, the national academy of sciences of Germany.



Jan Wörner has received honorary doctorates from New York State University at Buffalo (USA), technical universities of Bucharest (Romania) and Mongolia, the Saint Petersburg University for Economics and Finance (Russia) and École Centrale de Lyon (France). He has received the Federal Cross of Merit (Officer's cross, 1st class) of the Federal Republic of Germany for his continuous efforts regarding the next generation of scientists and Germany as a location for Science, Technology and Engineering. He has furthermore been awarded the honours of Knight of the French Légion d'Honneur.

Jan Wörner was Vice President of the Helmholtz Association and also a member of various national and international supervisory bodies, advisory councils and committees. He was a member of the administrative boards of École Centrale Paris, École Centrale de Lyon, TU Berlin, the Instituto Superior Técnico, University of Lisbon, the Arts and Music University in Frankfurt and has been a member of a number of supervisory boards including Carl Schenck AG, Röhm GmbH, TÜV Rheinland AG and Bilfinger SE.

Badri Younes | Deputy Associate Administrator and Program Manager for
NASA SCA_N at National Aeronautics and Space Administration

Mr. Younes is presently the Deputy Associate Administrator and Program Manager for Space Communications and Navigation (SCA_N). He is responsible for NASA's space communications and navigation infrastructure and services, as well as data standards and spectrum. Mr. Younes manages the SCA_N Program Office at NASA Headquarters and oversees all NASA telecommunications and navigation projects and networks, including NASA's Space Network (SN), Near-earth Network (NEN), and Deep Space Network (DSN). Mr. Younes is also responsible for the development of enabling technologies critical to meeting the Agency's vision for an integrated SCA_N architecture aligned with NASA's future space exploration needs.



Prior to returning to NASA in 2007, Mr. Younes was the Department of Defense (DoD) Director for Spectrum Management with responsibility for spectrum policy and strategic planning and implementation. Under his leadership, the Department has successfully negotiated major win-win agreements with the FCC, NTIA, and US private sector. He had successfully led the DoD spectrum management organization to become more proactive in addressing RF and spectrum issues. Mr. Younes was instrumental in transforming the management and use of the electromagnetic spectrum within and outside the Department.

Mr. Younes' experience spans over thirty-five years of leadership in microwave and RF systems engineering and technology. His interpersonal skills and rich linguistic ability have been instrumental in furthering US objectives. He has over twenty years of involvement in various forums of the International Telecommunications Union (ITU), and has provided direct support to US ambassadors to a number of World Radio Conferences (WRCs).

In addition to his many professional individual and team awards, Mr. Younes is also a recipient of the 2005 Meritorious Presidential Rank Award. He is a member of Tau Beta Pi, engineering honor society. He holds a Masters in Electronics Engineering from Catholic University of America and had completed all his PhD requirements except for the dissertation.



B) Panelists for October 24th Pre-Event



Kyle Acierno ([@Kyle_Acierno](#)) | CEO at Ispace Technologies

Kyle Acierno is an international expert in commercial space and a specialist in lunar exploration. He acts as the CEO of ispace technologies US, and previously served as the Vice President of Global Sales & Strategy in Tokyo as well as the Managing Director of ispace Europe. ispace managed the front-running competitor in the Google Lunar XPRIZE, Team Hakuto and has raised over \$120M USD to build a lunar transportation system, including a lander and a rover. ispace plans to have its first privately financed mission to the Moon in 2022.

Vanessa Clark ([@Vanessa_J_Clark](#)) | CEO at Atomos Space

Vanessa Clark is cofounder and CEO of Atomos Space, a space startup based in Denver Colorado. Originally from Australia, a physicist and aerospace engineer by training, Vanessa worked in Germany for Airbus Defense and Space and DLR (the German Aerospace Centre). She worked in advanced rocket and spacecraft design, participating in projects including MEGAHIT – a European-Russian nuclear electric space tug. Relocating to the US in 2015, she led rocket engine development for programs including Artemis. She cofounded Atomos Space in early 2018 with her husband William, with the goal to solve one of the biggest problems in the space industry: getting mass to high orbits or to deep space.



Jeff Guido | Direct of Special Projects at Planet

Jeff Guido is the Director of Special Projects at Planet where he coordinates R&D programs while onboarding new missions to the Planet strategic roadmap. Prior to his current role, Jeff has been a program manager, satellite operator and developer for Planet, Google and the US Air Force touching all life stages of a space program including inception, source selection, development, test, launch, early operations and sustainment. Jeff received his BS in Electrical Engineering from Cornell University and his MS in EE from University of Colorado, Colorado Springs.



Stephan Reckie ([@sreckie](#)) | Executive Director at Global Entrepreneurship Network (GEN) Space

Stephan is the Executive Director of Global Entrepreneurship Network (GEN) Space, a global network of ecosystems for Astropreneurs. He is also the co-founding CEO of Angelus Funding, a trust-based global angel network investing in innovative and meaningful opportunities, he is a World Business Angel Forum Senator and a member of the Global Business Angels Network. Stephan is also the co-founding CEO of Edge of Space, a company enabling STEM access to space, and CEO of Transform Poverty Global, a non-profit focused on addressing global poverty along with climate change. Stephan serves on the board of directors of numerous impactful companies, including Spring Health India, University Corporation for Atmospheric Research (UCAR) and has personally made 39 investments since 2012. He is an adjunct professor at the Daniels College of Business at the University of Denver, teaching entrepreneurial presentation

and sales skills. And prior to angel investing, Stephan served in several international executive roles.

He holds a Bachelor's and Masters degree in Electrical Engineering from Tufts University. A second-generation Armenian Russian and a true native New Yorker, today, he is fluent in 5 languages. Stephan enjoys travelling the world, having flown over 8 million miles, the equivalent of 16 moon missions! He is also a driven volunteer for several impactful organizations and is an active community leader. He resides in Golden, Colorado with his family today.

Bonnie Rosen | Program Manager at Techstars Starburst Space Accelerator

Bonnie Rosen is the Program Manager to the Techstars Starburst Space Accelerator, with a focus on the next generation in space technologies in partnership with the US Air Force, NASA's Jet Propulsion Laboratory, Lockheed Martin, SAIC, Maxar Technologies, and Israel Aerospace Industries-North America. Prior to joining Techstars, Bonnie was a consultant to start-ups across multiple industries, including media, blockchain, e-commerce, and mobility. She began her work with start-ups as Director of Strategic Partnerships at FEM Inc. (acquired by Nielsen), a Disney Accelerator alumnus. Bonnie previously was Senior Counsel and later Executive Director of Business Development at Viacom Media Networks and is a founding officer of the Children's Media Association of LA.



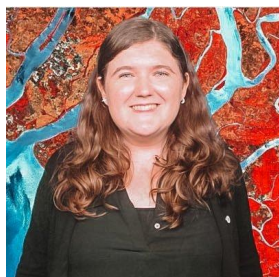
Janice Starzyk ([@JaniceStarzyk](#)) | Vice President of Commercial Space at Bryce Space and Technology

As Vice President of Commercial Space at Bryce Space and Technology, Janice Starzyk helps government and commercial customers solve long-term problems using market analytics. She has extensive experience in the space industry and has directed commercial strategy and market intelligence activities in her prior roles at United Launch Alliance and International Launch Services. At Futron Corporation, Janice Starzyk worked with a range of civil, military and commercial space industry customers. She received her Bachelor of Science in Foreign Service from Georgetown University. She holds a Master of Arts in economics and international relations from the Johns Hopkins School of Advanced International Studies, a Master of Business

Administration from Tulane University, and a Magister de Administración from Universidad Icesi in Cali, Colombia. For more than a decade, Janice Starzyk has provided community leadership and support to local STEM education programs as a board member of the Washington Space Business Roundtable.

C) ORGANISING TEAM

For more than a year, amazing volunteers put countless hours during their early mornings, lunch breaks, and evenings to assemble together the SGFF, and this year SpaceGen Summit, great experience. A big thank you to the wonderful SpaceGen Summit Organizing Team!



Tara Halt (USA) | Manager

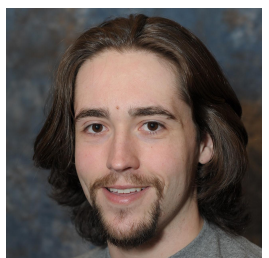
Tara Halt currently works on a contract at the FAA Office of Commercial Space Transportation and lives in the DC Metro area. Tara graduated from George Washington University with a Master's in International Science and Technology Policy with a focus on Space Policy and from Embry-Riddle Aeronautical University with a Bachelor of Science in Commercial Space Operations. Previously, Tara worked for Bryce Space and Technology as an Aerospace Analyst and has interned at the Commercial Spaceflight Federation, FAA, and NewSpace Global. Tara first became involved with SGAC, when she attended the Space Generation Congress in Jerusalem. Ever since, Tara has been an active member of SGAC and served on the organizing teams for Fusion Forum (2016, 2018, 2019), and the Space Generation Congress (2016). Tara was recognized as a Future Space Leader Grant Winner in 2016.



Kristin Shahady (USA) | Deputy Manager

Kristin Shahady is a Systems Engineer at Ball Aerospace in Colorado working as a data analyst for satellite mission data. She has a Bachelor's degree in Astrophysics from Florida Institute of Technology and is pursuing her Space Studies Masters at University of North Dakota.. In 2015, Kristin worked for Lockheed Martin Missiles and Fire Control as a systems engineer. She was accepted as a delegate for 2016's Space Generation Fusion Forum which led to her current job at Ball Aerospace. Since then, she's served on many SGFF organizing teams, won the 2017 Move an Asteroid competition, and was NPOC for the US from 2018-2020.

Previously, she worked for the Kennedy Space Center's education program. She had an internship with Space Telescope Science Institute working with top scientists in the field to optimize Hubble archived data. Throughout school she researched the orbital geometry of circumbinary planets using Kepler data. She is on the employment committee for American Astronomical Society encouraging astrophysicists to participate in the aerospace industry.



Dave Borncamp (USA) | Delegates Team

Dave Borncamp is currently a Software Developer at Decipher Technology Solutions where he works on microservice development using mostly Python, Java, Scala, and Golang to expand the microservices offered by Decipher. His main focus so far has been on Natural Language Processing where he has prototyped, designed, and produced several services.

Previously, he was a Senior Research and Instrument Analyst at Space Telescope Science Institute (STScI) where he worked on the Hubble Space Telescope's Advanced Camera for Surveys instrument team. His work mostly focuses on instrument calibrations to keep the camera and telescope producing the highest possible quality data. For his science, the main focus was on characterizations of Pluto and Kuiper Belt Objects. Before that he was at the Southwest Research Institute where he worked with Marc Buie and Leslie Young to characterize Pluto and discover KBO's for the New Horizons Mission to look at after it passes Pluto, and continued into his graduate work in Computer Science.



Manwei Chan (USA) | Programs Team

Manwei Chan is an NSF Fellow and PhD Candidate in Aerospace Engineering at MIT. He wants to mature the commercial space ecosystem, eventually allowing more people and projects to utilize space. For his Master's degree, he wrote a guidance algorithm that would allow satellite servicing vehicles to dock with a tumbling object. While in graduate school, he consulted for OrbitFab, a start-up working to establish an in-space gas station infrastructure. He is also a 2019 Matthew Isakowitz Fellow, and while at NanoRacks, developed strategies for commercial space station applications. Outside of academics he is involved with STEM

outreach, running the MIT Space Seminar and other events to get the community excited about space. In his free time, he likes to ski, hike, and play football (soccer).



Ashwati Das (Australia, India, USA) | Programs Team

Ashwati Das is a systems engineer at NASA JPL for the Europa Clipper mission. She graduated with her Ph.D. from Purdue University, focusing on blending machine learning techniques with trajectory design. She has also contributed towards mission design trade studies for the Mars Sample Return and Europa Lander concepts at NASA JPL, and towards mission architecture analysis for future Moon/Mars mission concepts with NASA Marshall. She is a passionate space advocate, and loves helping with and leading events in the community that create awareness of our space endeavors. She also finds it fulfilling to work

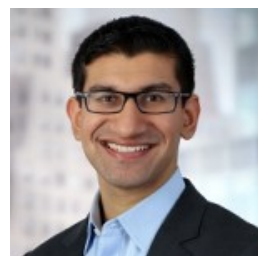
with the younger generation to inspire them to join the space journey!



Alex Drozda (USA) | Communications Team

Alex Drozda is a project manager at the University of Nebraska-Lincoln, where he manages a group hiring engineering students to complete research equipment development for labs on campus and prototypes for industry. This position allows him to actively work as manager, designer, and educator, and he thoroughly enjoys the opportunity to help students learn practical skills and gain work experience. He also engages in business development for the group, building networks to find new customers and recruit skilled students; it's almost like running a mini-startup. Alex graduated with a degree in Mechanical Engineering with a Minor in Robotics from UNL, and gained experience through research opportunities

and internships at NASA Ames Research Center and Masten Space Systems. Those internships allowed him to take several multi-day road trips across the country solo, and he enjoys hiking, reading, rock-climbing, swing dancing, organizing community events, and philosophizing whether ketchup counts as a fruit smoothie.



Ajeet Hansra (USA) | Programs Team

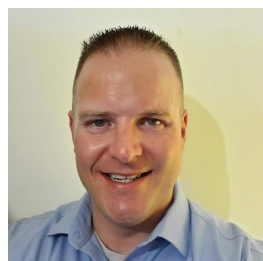
Ajeet Hansra is an investment professional at New Mountain Capital, a New York based alternative asset manager which manages private equity, public equity, and credit funds with over \$20 billion in aggregate capital commitments. He currently focuses on private equity investments in the aerospace & defense, healthcare IT and financial services sectors. He previously served as a business analyst and as the Deputy Chief Of Staff to the Global Managing Partner at McKinsey & Company, a global management consulting firm. He has also served as SGAC's Treasurer and ECOSOC Coordinator. Ajeet graduated from Duke University in Durham, North Carolina, with a degree in Mechanical Engineering.



Mclee Kerolle (USA) | Communications Team

Mclee (pronounced Mac-lee) Kerolle is a graduate of the International Institute of Air and Space Law at Leiden University where he wrote his Masters thesis on the regulation of commercial spaceports worldwide. He worked at the International Association for the Advancement of Space Safety (IAASS) where his responsibilities focused on researching third party liability issues associated with commercial human spaceflight. In addition, he has served as the Executive Secretary for the Space Generation Advisory Council and as rapporteur for the 54th Session of the Legal Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space. While he is awaiting bar admission,

Mclee recently started a position as a contributing writer for *Astroprenuers* and is assisting the Institute of Caribbean Studies in developing a Caribbean space agenda.



Brian Kester (USA) | Communications Team

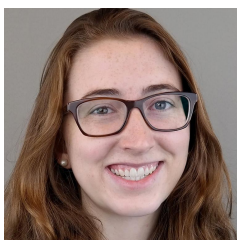
Brian Kester is a Major in the United States Air Force and was recently accepted for transition to the Space Force. He is currently serving as a Deputy Program Manager in the Directorate of Special Programs at the Space and Missile Systems Center in Los Angeles, California. He has a Bachelor's degree in Astronautical Engineering from the Air Force Academy, a Master's degree in International Science and Technology Policy with an emphasis in Space Policy from George Washington University, and a Master's degree in Astronautical Engineering from the Air Force Institute of Technology. Previous assignments include the National Air and Space Intelligence Center as an all-source

intelligence analyst and teaching astronautical engineering and space operations classes at the Air Force Academy. During his off-duty time, he is a husband, father of three, and the Founder and President of the Falcon Theater Foundation, which is a non-profit organization supporting theatrical arts at the Air Force Academy.



Joseph Levine (USA) | Programs Team

Joseph Levine is a Data Science Consultant at Booz Allen Hamilton, based in Washington, DC. During his studies at the University of St. Andrews, Joseph traveled with the State Department to Kolkata, India to learn Bangla before graduating with a first class degree in economics. He also has continued work with an NGO that applies telecommunications and cashless banking inside Afghan rural communities. Joseph joined SGAC in 2017, and served on the SGC 2019 logistics team, in Washington DC. In early 2019, Joseph was awarded the Patti Grace Smith Scholarship for promising young professionals in the commercial space industry.



Maureen McNamara (USA, Ireland) | Logistics Team

Maureen McNamara recently graduated from the University of Colorado Boulder with a major in Integrative Physiology and a minor in Space. She also obtained a minor in Leadership Studies through CU's Presidents Leadership Class. While in college, Maureen was a 2019 Brooke Owens Fellow at the aerospace consulting firm Avascent in Washington, DC. Maureen aims to combine her interests in space and medicine by becoming a physician and practicing aerospace medicine in the future. Maureen has been accepted to medical school and will begin in the fall of 2021.



Claudiu Mihai Tăiatu (Romania) | Delegates Team

Claudiu Mihai Tăiatu is a Romanian lawyer, he graduated in 2017 from the Adv. LL.M. of Air and Space Law at the International Institute of Air and Space Law (IIASL), Leiden University, The Netherlands and in 2018 from the International Space University (ISU), Space Studies Program (SSP18). Currently, he is working with the European Space Policy Institute (ESPI) in projects related to space law and policy. He is a member of the International Astronautical Federation (IAF) Workforce Development-Young Professionals Programme Committee (WD-YPP) and part of the SGAC Space Law and Policy Newsletter Team. He was awarded in 2017 with the IISL Prof. Dr. I.H.Ph.

Diederiks-Verschoor Award for his research on Space Traffic Management. In 2018 he was awarded at the Space Law Essay Competition “Legal Aspects Relating to Satellite Constellations” organized by the ECSL, ESPI and DLR. He completed several internships at the Regulatory Affairs Department of OneWeb, the ITU BR, ESPI and UNIDROIT.



Viha Parekh (Australia, India) | Delegates Team

Viha Parekh is a structural engineer working on the development of next-generation commercial aircraft platforms at The Boeing Company. Currently on secondment in Seattle, USA, she started working with Boeing in Melbourne, Australia. Upon graduating from the University of Queensland with a Bachelor of Mechanical and Aerospace Engineering in 2015, Viha was the first Australian to be named in Aviation Week’s ‘20 Twenties’ list. She first became involved with the SGAC as a recipient of the Australian Space Generation Innovators Award to the 2017 SGC. After her first experience of the SGFF last year, she looks forward to another successful SGFF.



Tasman Powis (Australia, UK) | Programs Team

Tasman Powis is an Australian expat, currently completing his PhD at Princeton University within the Mechanical and Aerospace Engineering Department. His research focus is on the modelling of low temperature plasmas, including advanced spacecraft propulsion concepts. He also researches regulations and policy related to the use of nuclear power systems in outer space, with the aim of motivating their peaceful, safe and reliable application. Tasman is a long time SGAC member and since his first SGC in Naples 2012, is fortunate to have attended numerous SGAC events. He is excited to pursue another opportunity to give back to the SGAC community!



Karen Rucker (USA) | Logistics Team

Karen Rucker works at Ball Aerospace as a Spacecraft Radio Frequency Engineer in Boulder, Colorado. She is passionate about antenna design and space communication. Previously, Karen was a 2017 Brooke Owens Fellow at HawkEye 360 and has also interned at NASA Kennedy Space Center and Lockheed Martin. She graduated magna cum laude with a B.S. in Electrical Engineering and a minor in Mathematics from Texas Tech University in 2019. She is currently pursuing her M.S. in Aerospace Engineering from the University of Colorado at Boulder, focusing on remote sensing and radio frequency engineering for aerospace.



Simon Shuham (UK) | Delegates Team

Simon Shuham is a propulsion engineer at Blue Origin helping to design the BE-4 and BE-3U engines. Simon has a B.S. in Mechanical Engineering from Harvard College and an M.S. in Aerospace Engineering from University of Colorado Boulder. Simon is involved in a variety of aerospace and STEM groups including SGAC, AIAA, SEDS, and Seattle's Museum of Flight. For SGAC, Simon serves on the Strategic Partnerships Team and was a delegate for the 2019 Fusion Forum.



D) DELEGATES



Chimira Nicole Andres
| European Space
Agency
Calling from: The
Netherlands
During my Masters
work, I used the
Canadian High Arctic
as a planetary analogue

for Mars and my team and I got attacked by a
polar bear!



Amelia Batcha | NASA
Johnson Space Center
Calling from: United
States
I've eaten delivery pizza
that was ordered from
the International Space
Station.



Radim Badsí |
Groundspace SAS
Calling from: France
I'm currently working on
my second space
startup



Trevor Bennett |
Starfish Space
Calling from: US
My family delivered a
Christmas Tree to the
White House during
the Clinton
presidency.



Elizabeth Barrios |
University of Central
Florida
Calling from: United
States
In addition to my passion
for the aerospace
industry, I have a passion
for fitness and am a USA
Weightlifting trainer.

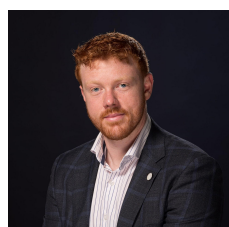


an architect!

Becca Browder |
Massachusetts
Institute of
Technology
Calling from: United
States
I started undergrad with
the goal of becoming



Michael Barton | a.i.
solutions
Calling from: United
States
I've worked on missions in
LEO, GEO, and at L1.



connoisseur.

Christopher Capon |
UNSW Canberra / Space
Service Australia
Calling from: Australia
Space start-up founder.
Outdoor enthusiast.
Bacon & egg roll



Sam Condie | Global Affairs Canada (Dept. of Foreign Affairs)

Calling from: Canada
Long term goal is to run the Antarctic Ice Marathon (average wind

chill temperature of -20 C... who's in?)

Emma Barratt

Calling from: United Kingdom

I'm a UK based cognitive scientist, interested in the ways in which our brains function, adapt, and can be supported in space environments.

Brennan Bok | L3Harris

Calling from: United States

My great grandfather and grandmother Bart and Priscilla Bok discovered Bok Globules; dark nebulae in which stars are formed.

Miekkal Clarkson | Advanced Space

Calling from: United States

My love for engineering extends into fiber-arts like knitting and sewing fashion garments or theatrical costumes, letting me mix my technical and creative skills.

Dennis Daub | DLR

Calling from: Germany

I traveled to Baikonur to watch a Soyuz launch to ISS.



William Crowe | High Earth Orbit Robotics

Calling from: Australia
I'm a huge asteroid nerd

Daniel Dowd | University of Colorado Boulder

Calling from: United States

I love to rock climb and play metal guitar, but not at the same time.



Anthony DeCicco | Northrop Grumman
Calling from: United States

My research was in asteroid deflection and I lead cryo systems for Artemis.

Remy Derollez | Loft Orbital & Stanford University

Calling from: United States

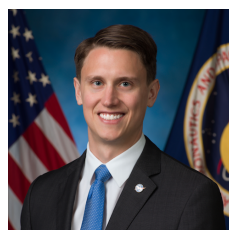
I organized a conference with the first French woman that went into Space, participated in the AMOS dialogue on SSA and am currently working towards making Space simpler at Loft Orbital.



Kelsey Doerksen | Planet

Calling from: United States

The tallest mountain I've hiked had a 3,500-foot elevation gain!



Clark Esty | NASA

Calling from: United States

Over the summer of 2016, I hiked and summited Mt. Kilimanjaro.

Victoria Fethke | University of Pennsylvania

Calling from: Germany

I love scuba diving, especially at night, which I first learned while attending high school in Vietnam.



Sara Flenniken
Calling from: United States
I once met Joe Namath, but didn't realize until an hour later.



Ben Gamble |
AstroBen/SGAC/UCL

Calling from: United Kingdom
I flew a plane on my own, before I drove a car on my own!

Grace Graham | Utah State University, ABL Space Systems
Calling from: United States
I've met Buzz Aldrin and he's touched my moon shaped necklace!

Mimi Houston | Space for Humanity
Calling from: United States
My current research explores the social dimensions of international environmental treaty-making through statistical and critical/epistemological analysis. I am also writing about the Overview Effect and working or Space for Humanity.



Shayna Hume |
University of Colorado Boulder
Calling from: United States
I collect old newspapers from the Apollo era.



András Illyés |
President at BME Cosmos Society, SGAC NPoC for Hungary
Calling from: Hungary
My goal is to be an astronaut! I work on active electromagnetic orientation control and

we develop solid propellant rockets in a great team.



Ryan Jandoli |
University of Central Florida
Calling from: United States
I'm currently a CWEP at Lockheed Martin as well as leading an 8 person student team to build a hybrid rocket with a target of 2000ft!



Pierre-Alexis Joumel |
Airbus Defence and Space

Calling from: Germany
Big fan of SGAC since the SGC2014!

Mary Grace Kalnay | Loft Orbital
Calling from: United States
Before working in the space industry, I trained as a professional ballerina.



Renata Kommel | A3 Technology Inc
Calling from: United States
I've attended UN meetings as part of government, industry, and civil society

organizations.



Swetha Kotichintala |
SGAC/Exobotics
Calling from: United Kingdom
Designed and launched India's first ever CubeSat and now working with a company developing CubeSat compatible Lunar Rovers!



Harry Laird | ABS
Calling from: United States
I am an avid blackjack player and card counter.

Ksenia Lisitsyna | **Precious Payload**

Calling from: UAE
I've just started kombucha manufacturing in Abu Dhabi!



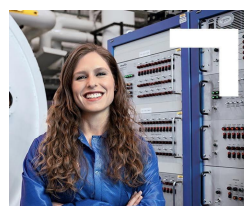
Ashley Kowalski | The
Aerospace Corporation
Calling from: United States
I have traveled to over 50 countries and am proficient in four languages. I perform in musicals, theater, and film productions in LA during my free time.



Jacob Loeffdahl | Self
Employed
Calling from: Denmark
I love building LEGO, recently built the LEGO ISS



Alina Kunitskaya
University of British Columbia
Calling from: Canada
I have experienced both microgravity (on a parabolic flight) and hypergravity (up to 6 G's).



Staten Longo | Northrop
Grumman Space Sector,
Stevens Institute of
Technology
Calling from: United States
I am a Systems Engineer at Northrop Grumman supporting the Habitable and Logistics Outpost (HALO) program, the first habitable element of the NASA Lunar Gateway.



Andrew Kurzrok |
Amphenol Times
Microwave Systems
Calling from: United States
I've driven completely across three continents.



Emma Loudon | **Yale University**
Calling from: United States
In quarantine I adopted two kittens named Nebula and Oso!



Adam Marcinkowski | Colorado School of Mines/Lockheed Martin
Calling from: United States
I fenced for 12 years and competed internationally. I'm also a big geek for linguistics, history, and fantasy.



Mercedes McCarthy | North Carolina State University
Calling from: United States
I spent 6 weeks in Peru with an NGO building a wind turbine to donate to a rural community without electricity



Katherine Melbourne | Ball Aerospace
Calling from: United States
I am currently training for a 50 mile run in March!



Sumana Mukherjee | University of Bremen
Calling from: Germany
My life revolves around space!



Swarnajyoti Mukherjee | Politecnico di Milano
Calling from: Italy
Part time chef in home, full time mis-interpreter of the universe, young multidisciplinary Space Engineer and entrepreneur from India, student from Italy staying in Luxembourg.



Mariam Naseem | Euroconsult
Calling from: Canada
I worked in an oil rig in Russia for over a year



Golda Nguyen | Massachusetts Institute of Technology
Calling from: United States
If you visit the California Science Center, you can find my (very small) face on the info card in front of one of the exhibits.



Cian O'Regan | SGACI, International Space University, Cork Institute of Technology
Calling from: Ireland
I recently began my PhD studying how astronauts can utilise a combined Augmented Reality/Speech Recognition system to perform tasks on long duration space missions.

Saira Roxana Obith Williams
SGACI/ Texas Tech University Costa Rica
Calling from: Costa Rica
I am an afro indigenous woman in love with Space, I love to dance following the Caribbean flow and I have a stunning smile.



Rachel O'Connor | Ball Aerospace
Calling from: United States
I am training to be a competitive figure skater!



Oliver Paxton | Australian Youth Aerospace Association
Calling from: Australia
I am currently a PhD candidate in experimental hypersonics in Australia. I love musicals and finding new mountains to hike and

explore!

Oscar Ojeda | Purdue University
Calling from: USA
Oscar has been part of analog missions and currently is pursuing his private pilot licence. He loves to cook, play music, and hopes to go to space one day.



Karina Perez | Aerospace Industries Association

Calling from: United States
I've worked in entertainment,

government, and private sector.

Alice Pais de Castro | SGAC
Calling from: Portugal
Alice majored in Physics and later took her Master degree in Astrophysics and Space Instrumentation. Currently, she is working in the Smallsat Industry and before that she was a Young Graduate Trainee at ESA, working in Technology Management.



Adriana Pliego | Meritorious Autonomous University of Puebla BUAP
Calling from: Mexico
Biomedical Engineer and Neuroscientist, I am deeply interested in human adaptation to

gravity shifting environments. I do research on providing spatial orientation with noninvasive stimulation.



Chidimma Oruche | SGAC
Calling from: Nigeria
Chidimma is a Space Enthusiast who is interested in seeing a safer world.



Chelsea Partridge | Lockheed Martin
Calling from: United States
I am an engineer on the Orion spacecraft and am President of the Missile, Space, and Range Pioneers.



Zaid Rana | Concordia University
Calling from: Canada
Over the course of my undergraduate program, I have worked on 7 satellite missions: 4 have

flown to space and the remaining 3 are planned to be launched in the next 2-8 years.



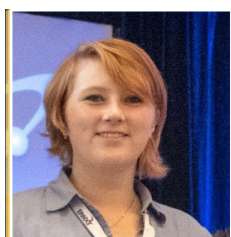
Luc Riesbeck | Astroscale
US

Calling from: United States
I once spent a summer cooking my way through an entire French cookbook!



Oscar Rosas | Armada Aeronautics

Calling from: United States
A fun fact about me is that when no one's watching I read out loud. Plus, if I were a fruit I would be an avocado: not to acid, not to sweet, and originally from Mexico.



Sara Roman | Kent State University

Calling from: United States
I had the opportunity to participate in the first John Glenn Memorial Symposium as a representative of SCaN.



Brendan Rosseau | Booz Allen Hamilton

Calling from: United States
Brendan wrote his thesis on the evolution of human use of space, and even got to handle a first-edition Copernicus during his research!



Marco Romero | ISAE SUPAERO/ Angolan office for Space Affairs

Calling from: France
Ballistic and Navigation satellite specialist and Space System Engineer at the Angolan Space Program. Developed

several space Education comic book and Space STEAM, enabling the NewSpace Ecosystem in Angola and responsible of 6 Start-ups.

Michelle Russell | Lockheed Martin

Calling from: United States
In addition to being a full time engineer, I am also in a professional tap dance performance company!

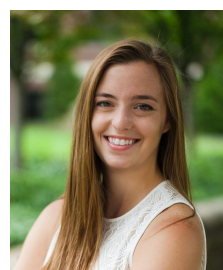
Mehak Sarang | MIT Media Lab + Harvard Business School

Calling from: United States
I'm an avid skier and have been skiing since I was 2 years old despite being from Illinois, one of the flattest states in the USA.



Rob Ronci | Caelus Foundation

Calling from: United States
Rob has lived, worked, and studied across 4 continents and is focused on bringing space back down to Earth for all people.



Sara Sanders | Lockheed Martin Space

Calling from: United States
I have climbed all 58 fourteen thousand foot mountains in Colorado! 48 were completed with one of my dogs.



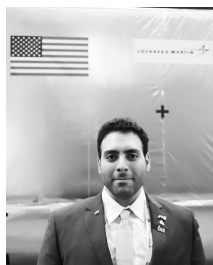
Manny Shar | Bryce Space and Technology
Calling from: UK
Space is the place



Jeffrey Stuart | NASA Jet Propulsion Laboratory
Calling from: US
I'm certified as a private pilot and as a SCUBA diver.



Alexander Sweetman | Lockheed Martin Space
Calling from: United States
The best compliment I ever received was being called a "Renaissance Man" by my boss thanks to all my weird art projects.



Mina Takla | CosmoX, Inc.
Calling from: Egypt
I care about space sustainability, space resources, climate change, human rights, and I love Jazz. I believe the Moon is the next Silicon Valley. It's my Northstar.

Zied Tayeb | MyelinS
Calling from: Germany
Zied Tayeb is a research scientist at the Technical University of Munich with 5 years of experience in software development and robotics. He is the CEO and co-founder of MyelinS whose mission to provide revolutionary software technology for space exploration



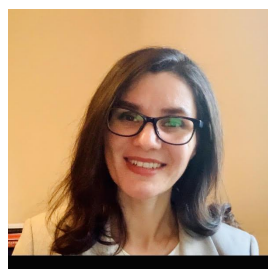
Vienna Tran | The University of Adelaide
Calling from: Australia
I'm researching artificial gravity and whether it can help reduce muscle loss in space.



Johanna Erika Valdueza | Colorado School of Mines
Calling from: United States
Erika is studying part-time in Colorado School of Mines Space Resources Program while working full-time at a financial firm in New Jersey. She has Bachelor of Science degree in Geology and Master of Science degree in Applied Earth Sciences. She is a geologist and an amateur astronomer.



Katherine Vega | Ball Aerospace, CU Boulder
Calling from: United states
I've started 2 startups in the last 3 years.



Alina Vizireanu | British Interplanetary Society, British Cartographic Society, SGAC, AGI
Calling from: United Kingdom
Exploring the world and the outer space fascinated me since very little, taking on the path to become a Geographer being predictable. I am now a Geospatial, Earth Observation and IT Professional, committed



Anna Voelker | The Ohio State University Department of Astronomy
Calling from: United States
In January, I am starting a PhD in England for Astrobiology Education! My focus is on disability

inclusion in the search for life beyond earth.



Surya Vohra | SEDS
Calling from: United States of America
I'm currently out in Van Horn, Texas conducting testing for Blue Origin's

BE-4!



Jaclyn Wiley | Bryce Space and Technology
Calling from: United States
I used to provide photo coverage at KSC & CCAFS launches.



Melodie Yashar | SEArch+

Calling from: United States
Two-time winner of NASA's 3D-Printed Habitat Design Challenge



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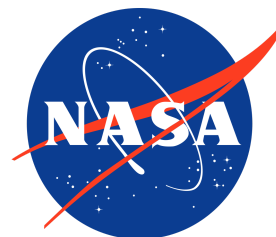
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