



SPACEOPS 2021 VIRTUAL EDITION

THE 16TH INTERNATIONAL CONFERENCE ON SPACE OPERATIONS
3-5 MAY 2021



CONFERENCE PROGRAMME





SOUTH AFRICAN NATIONAL SPACE AGENCY

Celebrating a decade of innovative space products and services for the good of humanity



science & innovation

Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA





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MESSAGE FROM THE SPACEOPS 2021 CHAIRMAN

Dear Friends and Colleagues,

Thank you for participating in the first ever Virtual Conference on Space Operations - **SpaceOps 2021 - Virtual Edition**. The South African National Space Agency is honored to have been given this opportunity to bring the Space Operations community together in this momentous, groundbreaking event.

With this being our first online Space Operations Conference, we trust and hope that at the end of the Conference we would have delivered a successful and engaging Conference. SpaceOps has held fifteen biennial conferences hosted by various countries around the world over the years, and this time around the 16th biennial installment of the conference is being hosted for the first time virtually.

Thank you to all our delegates, speakers, SpaceOps.org members, authors, sponsors, and partner organisations, for making this conference possible.

It was our wish to meet you face-to-face, however, things dramatically changed across the world. The **SpaceOps 2021- Virtual Edition**, has attracted many participants from across the globe. We are encouraged that the “new normal” of hosting a Conference virtually has provided more people an opportunity to participate and engage in the conference, as well as space operations related conversations. Something we should all be proud of as an industry.

The programme for has been redesigned to suit a virtual format, allowing us to have more meaningful conversations during plenary sessions on pertinent matters affecting most of us in the industry, technical session where peers from the industry will be presenting well researched papers. There will also be a session dedicated to the young professionals on the 6 May, I encourage our future space leaders to participate and to see some of our colleagues, showcase their technical research.

The proceedings of SpaceOps2021, are filled with amazing content, interesting keynote speakers, engaging plenary sessions.

We hope you enjoy the Conference.

Regards,



Tiaan Strydom



The European Space Operations Centre

Demanding customers, complex missions, global pandemic:
ESA mission control keeps them flying

SPACEOPS 2021 ORGANISATIONS



The South African National Space Agency (SANSA) came into being in December 2010, but South Africa's involvement with space research and activities started many decades earlier with helping early international space efforts in the second half of the 20th century, and observing the Earth's magnetic field at stations around Southern Africa.

SANSA was created to promote the use of space and strengthen cooperation in space-related activities while fostering research in space science, advancing scientific engineering through developing human capital, and supporting industrial development in space technologies.

The research and work carried out at SANSA focuses on space science, engineering and technology that can promote development, build human capital and provide important national services. Much of this work involves monitoring the Earth and our surrounding environment, and using the collected data to ensure that navigation, communication technology and weather forecasting services function as intended.



Founded in 1951, the International Astronautical Federation is the world's leading space advocacy body with 407 members in 71 countries, including all leading space agencies, companies, research institutions, universities, societies, associations, institutes and museums worldwide.

Following its motto "Connecting all Space People" and its theme "A space-faring world cooperating for the benefit of humanity", the Federation advances knowledge about space, supporting the development and application of space assets by promoting global cooperation.



The International Committee on Technical Interchange for Space Mission Operations and Ground Data Systems (also referred to as the **SpaceOps Organization**) was formed in the realization that given the large number of people involved in space mission operations, an organized community or technical forum is needed. Since mission operations have become an increasingly large segment of space agency budgets, there is great interest in improving the capabilities and cost efficiencies of mission operations. It was in the spirit of providing the broadest possible managerial and technical interchange between space agencies, academia, and industry that SpaceOps was established.

As the premier organization serving the space operations community, SpaceOps encompasses the following areas:

- Operations-enabling technology in ground and flight systems
- Operations management
- Mission planning
- Mission management
- Cross support and interoperability
- Launch operations
- Spaceflight operations

Since its inception in 1990, SpaceOps has held fifteen biennial Conferences hosted by various countries around the world. This international forum discusses state-of-the-art operations principles, methods, and tools and provide an opportunity to foster managerial and technical interchange on all aspects of space mission operations, including such areas as robotics, human, earth orbiting, and deep space aspects of space operations.



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CONFERENCE OVERVIEW



SPACEOPS 2021 VIRTUAL EDITION

THE 16TH INTERNATIONAL CONFERENCE ON SPACE OPERATIONS
3-5 MAY 2021

Title: **The 16th International Conference on Space Operations (SpaceOps2021)**

Date: **3-5 May 2021**

Official Language: **English**

Theme: **Beyond Boundaries to Human Endeavours**

Website: www.spaceops2021.org

Hosted and organized by SANSA (South African National Space Agency), SpaceOps 2021 is an international technical forum for the space operations community to discuss state-of-the-art operations, principles, methods and tools.

This Conference is being hosted for the first time in history by an African space agency, SpaceOps 2021 and it embraces the theme, *"Beyond Boundaries to Human Endeavours"*.

This iconic Conference in the Space Industry attracts technologists, scientists, managers, and experts from various international space agencies, industries and academia. SpaceOps 2021 provides a platform to network, nurture existing relationships, build partnerships and discuss new opportunities with key global industry leaders on all aspects of space mission operations, including areas such as robotics, earth orbiting, deep space and human aspects of space operations.



Space is hard enough. **The ground solution doesn't have to be.**

Viasat Real-Time Earth: fully managed ground systems as a service.

A global leader for over 70 years, Viasat is the only ground station service provider that designs, builds, integrates, and operates its own antenna systems. From payload and TT&C to flying your satellite, Viasat Real-Time Earth (RTE) offers a secure service — in one all-inclusive price.

**Turnkey antenna systems today.
Innovating for tomorrow.**

In addition to antenna services, Viasat is innovating for tomorrow's space networking challenges — including new systems capable of lunar and cis-lunar support, and electronically-steered arrays.

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Learn more - [Viasat.com/real-time-earth](https://viasat.com/real-time-earth)



PROGRAMME AT A GLANCE

Time (UTC)	Monday 3 May 2021	Tuesday 4 May 2021	Wednesday 5 May 2021	Thursday 6 May 2021						
12:00 – 12:30	Opening Ceremony	Plenary 2 Commercial Ground Stations: New Space & Traditional Space		Students & Young Professionals Programme (SYP)						
12:30 – 13:00	Plenary 1 Space Operations during COVID-19 pandemic	Space Situational awareness: Protecting our assets in Space								
13:00 – 13:05		Coffee break	Coffee break							
13:05 – 13:30		Technical Sessions	Industry Presentation		Exhibition					
13:30 – 13:33						Coffee break	Coffee break			
13:33 – 14:00	Technical Sessions					Industry Presentation	Exhibition			
14:00 – 14:30								Technical Sessions	Industry Presentation	Exhibition
14:30 – 15:00		Technical Sessions	Industry Presentation		Exhibition					
15:00 – 15:30										
15:30 – 16:00	Technical Sessions					Industry Presentation	Exhibition			
16:00 – 16:10								Technical Sessions	Industry Presentation	Exhibition
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TECHNICAL PROGRAM

The **SpaceOps 2021 - Virtual edition** Technical Program Committee, comprises of experts from major space organizations in the world, will offer a world-class program focusing on today's achievements in space operations and outlining trends in the operations of future missions. The Conference program will bring together experienced and young professionals, as well as students, from all over the world to discuss the status and future ideas of space operations. The program will cover an impressive number of presentations in the following topics:

- Mission Design and Management (MDM)
- Operations Concepts (OC)
- Flight Execution (FE)
- Ground Systems Engineering (GSE)
- Data Management (DM)
- Planning and Scheduling (PS)
- Guidance, Navigation, and Control (GNC)
- Communications Architectures and Networks (CAN)
- Human Spaceflights and Operations (HSO)
- Cross Support, Interoperability, and Standards (CSIS)
- Human Factors, Training and Knowledge Transfer (HFT)
- Space Transportation Operations (STO)
- Artificial Intelligence for operations (AI)
- Cyber Security for Space Operations (CYB)
- Safety and Sustainability of Space Operations (SSU)
- Beyond Borders in Human Endeavour (BBO)



TECHNICAL PROGRAM COMMITTEE

TPC chair – Eugene Avenant (SANSA)

Topics	Topic Chair	Topic Co-chair
Mission Design and Management (MDM)	Young Lee (JPL/NASA)	Alice Bowman (JHUAPL)
Operations Concept (OC)	Dave Welch (LASP)	Sabrina Eberle (DLR)
Flight Execution (FL)	Mr Hubert Fraysse (CNES)	Patel, Keyur C (NASA)
Ground Systems Engineering (GSE)	Francois Jocteur-Monrozier (CNES)	Hamid Salim (MYSA)
Data Management (DM)	Zeina Mounzer (TPZ)	Dodd, Suzanne R (NASA)
Planning and Scheduling (PS)	Martin Wickler (DLR)	Vladimir Nazarov (IKI)
Guidance, Navigation, and Control (GNC)	Shinichi Nakamura (JAXA)	Fabio D'Amico (ASI)
Communications Architectures and Networks (CAN)	Brian Giovannoni (NASA JPL)	Klaus-Juergen Schulz (ESA)
Human Spaceflights and Operations (HSO)	Thomas Müller (DLR)	Cesare Capararo (altecspace)
Cross Support, Interoperability, and Standards (CSIS)	Gian-Paolo Calzolari (ESA)	Christophe Belzile (CSA)
Human Factors, Training and Knowledge Transfer (HFT)	Sean Burns (Eumetsat)	Michael Schmidhuber (DLR)
Space Transportation System (STO)	Julio Monreal (ESA)	Craig Cruzen (NASA)
Artificial Intelligence for Space operations (AI)	Gérard Galet (CNES)	Saeed Hussain Al Mansoori (MBRSC)
Cyber Security for Space Operations (CYB)	Thierry Levoir (CNES)	Kevin Marston (Eumetsat)
Safety and Sustainability of Space Operations (SSU)	Andrew Monham (Eumetsat)	Alexi Glover (ESA)
Beyond Borders in Human Endeavour (BBO)	Gladys Magagula (SANSA)	Harry Shaw (NASA)



TECHNICAL PROGRAMME

TECHNICAL SESSIONS (Day 1) - 3 MAY 2021

TIME (UTC)	PAPER NAME	TITLE	PRESENTER	ORGANISATION
13:30	Operations Concepts (OC)	Lessons Learned in the Introduction of Automation and Autonomy to International Space Station (ISS) Robotics Operations Planning	Dr. Laura Lucier	National Aeronautics and Space Administration (NASA)
13:45	Session 2	Operability on the Europa Clipper Mission: Challenges and Opportunities	Mr. Joel Signorelli	NASA Jet Propulsion Laboratory
14:00	Session 3	Parker Solar Probe Pre-Launch Mission Operations Orbit-in-the-Life Mission Simulation	Ms. Kimberly Ord	The Johns Hopkins University Applied Physics Laboratory
14:15	Session 4	Agile Aerospace: Lessons Learned from Planet Mission Operations	Ms. Deanna Doan	Planet Labs Inc.
14:30	Beyond Borders in Human Endeavour (BBO)	Operating a Crewed Spacecraft in the Age of Commercial Space Using Private/Government Partnership	Dr. Robert Dempsey	National Aeronautics and Space Administration (NASA)
14:45	Planning and Scheduling (PS)	A Rapid Retargetable Goals Driven Approach to Autonomous Spacecraft Plan Repair with Concurrent Actions	Mr. Chao Chen	Beijing Institute of Technology (BIT)
15:00	Session 7	How Galileo Planning became automated	Dr. Sandra Brogl	Spaceopal GmbH
15:15	Session 8	Use Cases and Algorithms of the EnMAP Mission Planning System	Dr. Sven Prüfer	Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)
15:30	Space Transportation Operations (STO)	Ariane 6 Launch System Combined Tests Operations	Mrs. Charline Dutertre	ESA
15:45	Artificial Intelligence for operations (AI)	Analysis of automated techniques for anomaly detection in spacecraft telemetries	Mr. Carlo Ciancarelli	Thales Alenia Space Italia
16:00	Session 11	Science Autonomy on the ExoMars mission: a Step Forward to Onboard Autonomy for Space Exploration	Mrs. Victoria DA POIAN	NASA Goddard Space Flight Center
16:15	Session 12	Polaris: A machine learning tool for telemetry data exploration	Mr. Jan-Peter Ceglarek	Libre Space Foundation

TECHNICAL SESSIONS (Day 2) - 4 MAY 2021

TIME (UTC)	PAPER NAME	TITLE	PRESENTER	ORGANISATION
13:05	Flight Execution (FE)	Robotics Instrument Deployment System Surface Operations for the InSight Mars Lander	Dr. Ashitey Trebi-Ollennu	NASA Jet Propulsion Laboratory
13:20	Session 2	InSight-SEIS instrument deployment operations on Mars	Mr. Charles Yana	Centre National d'Etudes Spatiales (CNES)
13:35	Session 3	Launch and early operations of eucropis	Mr. Miguel Lino	Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)
13:50	Safety and Sustainability of Space Operations (SSU)	The UN copuosp guidelines for the long-term sustainability of outer space activities: scope, content and implementation	Dr. Peter Martinez	Secure World Foundation
14:05	Guidance, Navigation, and Control (GNC)	Attitude control on GRACE FOLLOW-ON Experiences from the first years in orbit	Dr. Fabiana Cossavella	Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)
14:20	Session 6	Architecture and Operations of the OSIRIS-REx Independent Navigation Team	Dr. Ben Ashman	NASA
14:35	Session 7	Orbital and attitude control of Spectrum-Roentgen-Gamma observatory under technical constraints	Ms. Irina Kovalenko	IKI
14:50	Cross Support, Interoperability, and Standards (CSIS)	An International Standard Procedure for Managing Spacecraft Emergency Cross Support (SECS)	Mr. John Reynolds	European Space Agency (ESA)
15:05	Mission Design and Management (MDM)		A Holistic Approach to Ensure Safe Non-routine Operations	Avanti Communications Group plc
15:20	Session 10		Evolution of the Canadian Radarsat Satellites	Canadian Space Agency (CSA)
15:35	Human Factors, Training and Knowledge Transfer (HFT)		Distance Learning and Training Management System in 3D-IRPA: the Challenge of Remote Based Training from Space Operations to Information Security	Thorn SDS
15:50	Session 12		Training Lessons on Human Systems Integration for Flight Operations Personnel	NASA

TECHNICAL SESSIONS (Day 3) - 5 MAY 2021

TIME (UTC)	PAPER NAME	TITLE	PRESENTER	ORGANISATION
13:05	Ground Systems Engineering (GSE)	A mobile and compact control center for quick decentral satellite access	Stefan Gärtner	DLR
13:20	Session 2	Euclid's Health Monitoring System: combining and expanding ESA's operational capabilities into new use cases.	Guillermo Buenadicha	ESA
13:35	Session 3	CNES contribution to SuperCam Ground Segment: Agile development and Integration in Mars2020 Ground Segment	Anissa Bahri	CNES
13:50	Cyber Security for Space Operations (CYB)	SEC_LAB: A Secure Communications Testbed for Space Missions	Mr. Marcus Wallum	European Space Agency (ESA)
14:05	Communications Architectures and Networks (CAN)	A novel alternative to bundle protocol for handling data transmission across disruption-tolerant networks	Ms. Caitlyn Singam	University of Maryland - College Park
14:20	Session 6	NASA's Strategic Plan for a Transition to Commercial Space Communications Services for Near-Earth Users	Mr. Gregory W. Heckler	National Aeronautics and Space Administration (NASA)
14:35	Session 7	Ka-band operations at ESA with Hayabusa-2	Dr. Maria Montagna	VisionSpace Technologies
14:50	Data Management (DM)	'New questions opened by the big data in the world of the science data processing center for Gaia mission in CNES'	Mrs. Julie Guiraud	Centre National d'Etudes Spatiales (CNES)
15:05	Human Spaceflights and Operations (HSO)	Astrobee On-Orbit Commissioning, Maria Bualat	Ms. Maria Bualat	National Aeronautics and Space Administration (NASA)
15:20	Session 10	Operation and Implementation of Oxygen Production Process on Mars	Ms. Laura Fader	University of Calgary
15:35	TBC	TBC	TBC	TBC
15:50	TBC	TBC	TBC	TBC

TECHNICAL PROGRAMME

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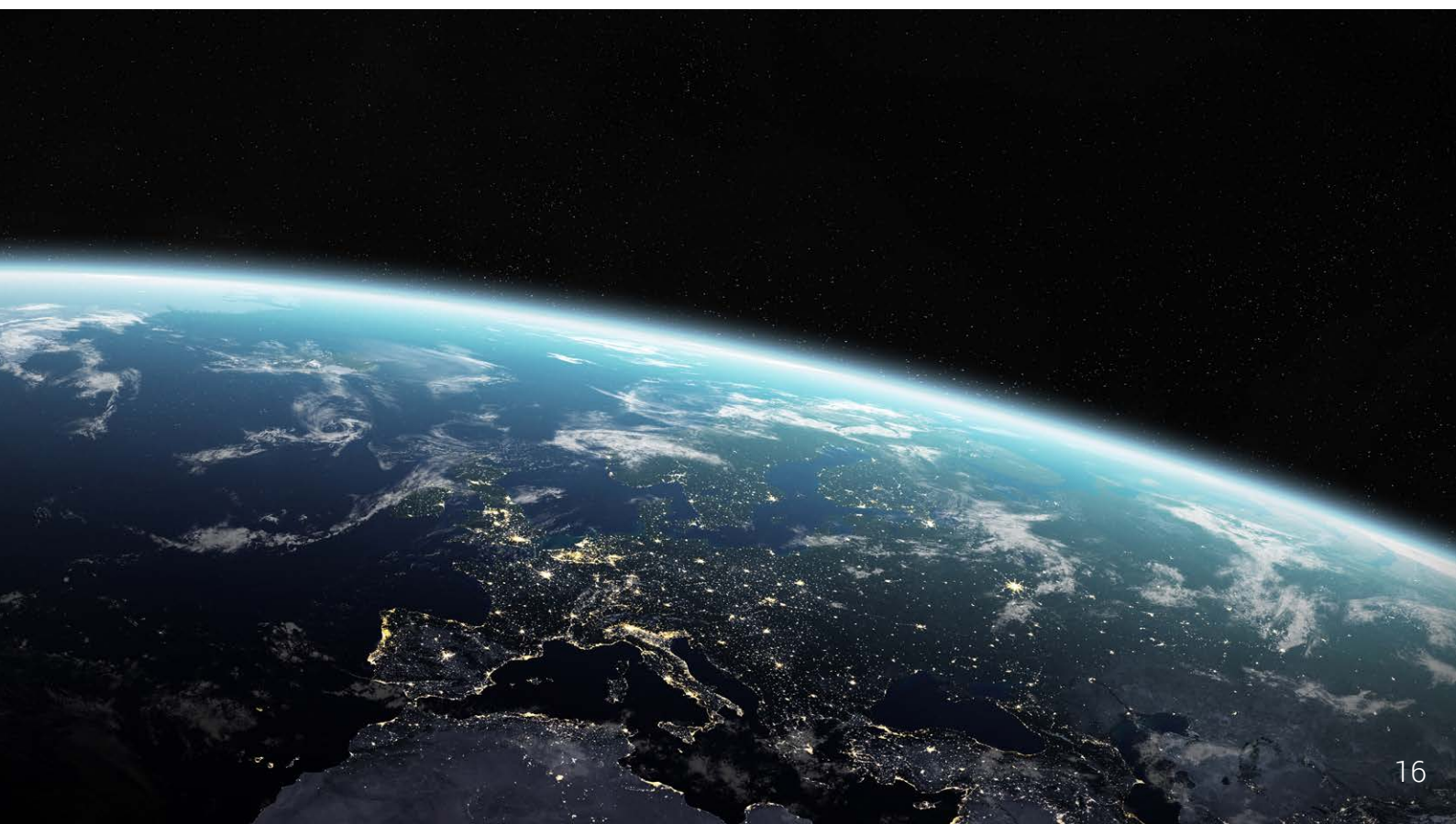
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15:20	Session 10	Operation and Implementation of Oxygen Production Process on Mars	Ms. Laura Fader	University of Calgary
15:35	SpaceOps-2021,8,x1477	The European Optical Nucleus Network	Dr. Martin Krynitz	Kongsberg Satellite Services AS
15:50	SpaceOps-2021,8,x1242	Improving ground station antenna program track angles in the absence of updated flight dynamic predictions	Mr. Christopher Stamblewski	SSC



STUDENT AND YOUNG PROFESSIONALS PROGRAM (SYP)

During the SpaceOps conference, which occurs every two years, the SpaceOps Organization, the hosting agency - which in 2021 is the South African Space Agency (SANSa) - , and the Space Generation Advisory Council (SGAC) execute the Students and Young Professionals (SYP) program. The activities of SYP are always a big success at SpaceOps, and this year we record an exceptional number of participants, also thanks to the conference being held virtually and for free. The received applications came from over 25 countries, with an increased participation of women. Like every year, three activities for SYP program are organized: a Workshop, the Speed Mentoring and, in exchange of a technical tour, this year a Space Quiz has been introduced in the program.

HARRY SHAW

Staff Engineer at NASA Goddard Space Flight Center

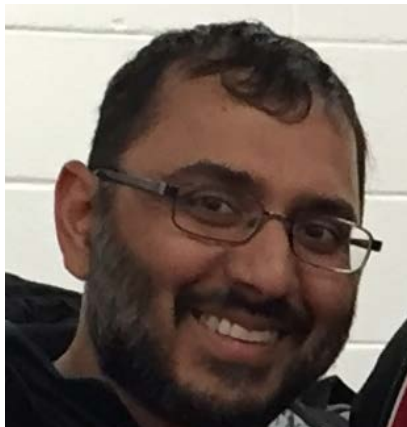


Harry Shaw is a Staff Engineer for the NASA Goddard Space Flight Center Space Network (SN) Project. The SN operates the fleet of geosynchronous Tracking and Data Relay Satellites (TDRS). He is also involved with development of CubeSats and CubeSat technologies compatible with the NASA Networks.

Dr. Shaw has over 30 years of experience in technology development, computer networking, quantum communications, information theory, microelectronics and space communications, mission planning and proposal development. Harry Shaw has a Doctor of Science in Electrical Engineering from George Washington University.

VIQAR ABBASI

Simulation Engineer at Canadian Space Agency



Viqar Abbasi has been with the Canadian Space Agency (CSA) since 2002, holding senior engineering responsibilities in support of International Space Station (ISS) robotics operations and training, space science and satellite operations, including missions such as the Near-Earth Object Surveillance Satellite (NEOSSat) and the RADARSAT Constellation Mission (RCM), and space situational awareness (SSA) activities such as CSA's Conjunction Risk Assessment and Mitigation System (CRAMS).

Prior to joining CSA, Viqar worked eight years in Canada's aerospace industry.

JESSIE NDABA

Chief Executive Officer at Astrofica Technologies



Jessie Ndaba was raised in Soweto, South Africa, my interests in joining the space sector started when I was in high school. I went on and graduated as an Electrical Engineer at the University of Witwatersrand. I have worked at CBI before taking up a position as a lecturer at Central Johannesburg College before joining the Space Internship Programme sponsored by the South African Department of Science and Technology and SunSpace. As a result of the internship programme, I earned a permanent position at SunSpace as a Satellite Design Engineer. I was also involved with the SunSpace outreach programme, in collaboration with DST/SAASTA whereby we worked with school kids from the lower level to varsity level. In particular, the outreach programme exposes the

students to space science and technology and informs them of the many benefits of humankind from space.

In 2010, I was awarded a Young Space Leadership Award from the Space Generation Congress.

In 2011, I represented South Africa at the International Space University, where I got a chance to further my studies in Space Engineering Systems. During this course I was introduced to Space Law, Space Medicine and Space Management. In 2013, we, together with other young professionals in the industry around the African continent formed the ALC-YF (African Space leadership Congress Youth Forum), and I head the Space Engineering Working Group.

In 2013, I joined Space Commercial Services as an AIT Engineer/ Space Solutions Manager. I am the member of the Space Generation Advisory Council (SGAC) and the African Space Leadership Youth Forum.

In 2017, I co-founded Astrofica Technologies (PTY)LTD, with an aim to make change in Africa using Space Science and Technology.

FRANCOIS VISSER

Chief Engineer at Africa Space Innovation Centre (ASIC) - CPUT



Francois Visser is an RF and microwave engineer with more than 20 years professional experience in the development of radio communication products for microsatellites. He is the Chief Engineer of the Africa Space Innovation Centre (ASIC) at the Cape Peninsula University of Technology (CPUT). He heads a team of engineers that develop and operate CubeSat satellites for Maritime Domain Awareness.

He completed his MEng in Electronic Engineering in 1997 at the University of Stellenbosch where he participated in the development of SunSat, South Africa's first satellite, launched in 1999. He continued working in South Africa's satellite industry, participating in the development of several satellites, including South African satellites SumbandilaSat, TshepisoSat and nSight-1.

DR. LOURENS VISAGIE

Chief Engineer at Africa Space Innovation Centre (ASIC) - CPUT



Dr. Lourens Visagie is a lecturer in the Computer Systems and Control Systems group at Stellenbosch University. He specialises in satellite engineering, and has participated in numerous satellite projects. Most notably was the Systems Engineering role he played on the nSight-1 CubeSat, developed by SCS-Space and launched in 2017.

Dr. Visagie leads a small team of post-graduate researchers, focussing on space and satellite research. He also plays an active consulting role in local space industry.

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we know what it takes to operate and deliver
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We will continue to explore new technologies that will
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global space community, from LEO to Lunar and beyond.

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SPECIAL SESSIONS

PLENARY SESSIONS

PLENARY 1

Space Operations during COVID-19 pandemic

Monday, 3 May 2021

Time: 12:30 -13:30 UTC

Topic outline:

The objective of this plenary session is to highlight and discuss the impact of the Covid-19 pandemic within the space operations and space industry. The plenary session will tackle the questions such as:

- Initially reactive due to pandemic
- What pre-cautions were taken?
- What did the contingency plans look like?
- What changes were implemented (ie remote terminals etc.)
- Concerns about cybersecurity during remote work.
- Pro-active going forward: What changes will we retain?
- Specifically like to hear from the large operations centres i.e. GSOC/ESOC/GSFC etc
- How did we deal with human spaceflight and critical support?
- How did we manage maintenance actions?

Moderator: Yunus Bhayat,
Operations Manager (SANSA)

Plenary speakers	Jose Morales <i>Head of the Earth Observation Missions Division (ESA)</i>
	Mr Claude Audouy <i>Head of Applications and European Missions Operations Division (CNES)</i>
	Kevin Marston <i>System Operations Manager (Eumetsat)</i>
	Sabrina Eberle <i>Project Manager (DLR)</i>
	Philip Baldwin <i>Operations Manager Space Communications and Navigation (SCaN) (NASA)</i>

Speaker 1



Jose Morales

*Head of the Earth Observation
Missions Division*

ESA

Jose Morales

(Head of the Earth Observation Missions Division - ESA)

Mr Morales has more than 20 years experience in the area of flight operations, working for the European Space Agency (ESA/ESOC)

He is currently the Head of the Earth Observation Missions Division within ESA's Mission Operations Department, in Darmstadt (Germany). He is responsible for flight operations implementation for ESA and the EU Earth observation missions entrusted to the Agency. Responsibilities include directing and executing flight operations in all mission phases, in particular acting as Flight Operations Director for pre-flight simulations, Launch & Early Orbit Phases (LEOP) and for critical and commissioning phase operations.

Previously to this post, he was the Head of ESA's Copernicus Flight Operations Management Office also located in Darmstadt, managing and coordinating all Copernicus Programme activities in the area of Flight Operations entrusted to ESOC

Before that, he was the Deputy Spacecraft Operations Manager of Rosetta.

Speaker 2



Claude Audouy

*Head of Applications and European
Missions Operations Division*

CNES

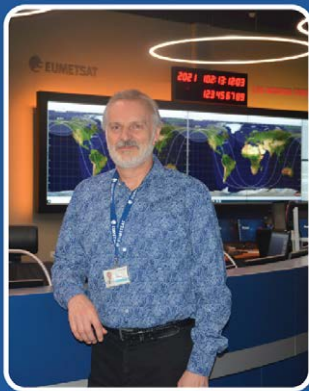
Mr Claude Audouy

*Head of Applications and European Missions Operations
Division -CNES*

Currently, Claude is the Head of Application and European Mission Operations Division. This Division, as part of CNES Toulouse Centre's Operation Department, is in charge of the preparation of operations, Launch and Early Orbit Phase, deployment and maintenance of science, applications and European satellites. Throughout these phases, the division runs and/or coordinates space segment operations to guarantee the availability of the data collection for these missions. The division is also responsible to conduct end-of-life operations including technological experiments and platforms decommissioning activities.

He directly manages or coordinates a multidisciplinary staff of c.a. 50 people) in charge of these operations and preparatory phases. Seasoned engineer and manager involved in many programmes.

Speaker 3



Kevin Marston

System Operations Manager

Eumetsat

Kevin Marston

System Operations Manager- Eumetsat

Kevin Marston is the System Operations Manager at EUMETSAT. His career spans more than 30 years of system and satellite engineering and operations, supporting a wide variety of satellite programmes and Organisations. As System Operations Manager, Kevin is responsible for ensuring continuous 24/7 system operations across EUMETSAT's programmes, as well as transitioning new programmes into Operations. Kevin has been heavily involved in EUMETSAT's COVID coordination, in terms of maintaining the operations support, with a balance of on-site and (mainly) remote engineering support, and also for the successful operations preparations and early operations of Sentinel-6 despite the limitations posed by the pandemic.

Speaker 4



Sabrina Eberle

Project Manager

DLR

Sabrina Eberle,

Project Manager - DLR

Sabrina Eberle was born in Alexandria, VA, USA. She received her masters degree in electrical engineering at the Technical University of Munich, Germany.

In 2004 she joined DLR, the German Aerospace Center where she worked at the German Space Operations Center (GSOC) in Oberpfaffenhofen near Munich. She started as an Orbit Control Subsystem Engineer for several LEO satellite missions, she was then the Flight Director for several LEOPs and became the Project Manager for an Earth Observation satellite mission. In 2015 she became the Project Manager for a German geostationary satellite mission and today she leads the team "Geostationary Satellite Missions".

She is also a lecturer at the Carl-Cranz-Gesellschaft (CCG) for "Satellite Communications" and contributes to the "Spacecraft Operations Course" at GSOC. She has made several contributions to the fields of satellite communications and mission operations including many technical publications, books and her own book titled "Satellite Communications".

Speaker 5



Phillip Baldwin

*Operations Manager Space
Communications and Navigation
(SCaN)*

NASA

Phillip Baldwin

*Operations Manager Space Communications and
Navigation (SCaN) - NASA*

As Operations Manager for NASA Space Communications and Navigation (SCaN) Program at NASA Headquarters, Philip Baldwin strives to ensure that NASA's science and exploration goals are met through its two communications networks: the Deep Space Network (DSN), which enables communication and data sharing with distant spacecraft like Mars Curiosity and Voyager 2; the Near Space Network (NSN), which shares voice and video with crews aboard the International Space Station (ISS); and the downloading and worldwide distribution of scientific data from Earth-observing satellites.

At NASA Goddard, Philip served as a Mission Manager for the Technology Enterprise and Mission Pathfinder Office (TEMPO) in the Exploration & Space Communications Projects Division at NASA Goddard. His work focused on advancing new technologies with to goal of rapid infusion into operations. His portfolio included electronically steered antenna arrays, Delay Tolerant Networking (DTN), and advanced navigation technologies. Previously, Mr. Baldwin served as the Near Earth Network (NEN) (now apartChief Engineer, leading technical and engineering teams in developing innovative solutions for the NEN and ensuring engineering best practices are followed as the independent technical authority for the NEN. Prior to joining the NEN team, Mr. Baldwin worked in the Formation Flying Testbed (FFTB), which developed mission concepts for multi-spacecraft missions. This work contributed to the successful record breaking Magnetospheric Multiscale (MMS) mission using GPS for navigation and formation flying.

Mr. Baldwin earned a Bachelors degree in Electrical Engineering from The University of Virginia. During this time working as a software contributor to UC Berkley's Center for Hybrid and Embedded Software Systems (CHESS) were he co-created a wireless sensor package that has been published in numerous journals and books and was included as undergraduate coursework for studying wireless sensor networks. This work was included in Mr. Baldwin's undergraduate thesis entitled "Modeling of Wireless Sensor networks in Ptolemy II"

PLENARY 2

Commercial Ground stations: New Space and Traditional Space

Tuesday, May 2021

Time: 12:00 -13:00 UTC

Topic outline:

Traditionally Space Operations have been the domain of public entities using networks of ground stations from a collective of space agencies and national facilities. The domain of geostationary communication has been dealt with by the respective satellite owners. The nature of satellite operations has changed however, and many public entities are constrained by decreasing budgets and changes in resources. Added to this we have a proliferation of private space initiatives, the so called 'newspace'. There are new mega constellations being deployed for telecommunications and earth observation, private human spaceflight and new countries entering the space operations domain. The challenges have changed and there is a big move towards 'outsourcing' ground operations to commercial entities with space operations becoming a 'service'. This plenary will engage both public and private space operators to highlight their changes in operating paradigm including the challenges and opportunities in this sphere.

Moderator: Mr. Raoul Hodges,
Managing Director – Space Operations (SANSA)

Plenary speakers	Klaus-Juergen Schulz <i>Head of the Ground Station Engineering Division (ESA)</i>
	Jean-Marc Soula <i>Deputy Head of Telecom, Stations networks and Alert systems (CNES)</i>
	Shayn Hawthorne <i>Space Technology Lead (Amazon web services)</i>
	Ian Jones <i>Founder and CEO (Goonhilly)</i>
	Arnulf Kjeldsen <i>Executive Vice President (KSAT)</i>

Speaker 1



Dr. Klaus-Juergen Schulz

*Head of the Ground Station
Engineering Division*

ESA

Klaus-Juergen Schulz

Head of the Ground Station Engineering Division, European Space Agency (ESA)

Dr. Klaus-Juergen Schulz is Head of the Ground Station Engineering Division, European Space Agency (ESA) / European Space Operations Center (ESOC) in Darmstadt, Germany.

Dr. Schulz is since 2009 the Head of the Ground Station Engineering Division. The division is responsible for the engineering of the multi-mission ground stations of the ESA Tracking Station Network (ESTRACK) for space communication in near Earth and Deep Space using radio frequency and optical techniques. Recent engineering efforts were expanded into the domain of sensors for space object tracking using Radar, passive and active optical means.

Dr. Schulz joined ESA in 1989 focussing on the engineering and operating of space communication systems for precursor missions of the International Space Station, and designing communication solutions for the European ISS Columbus module. In 1999 he became responsible for the operations and maintenance of the ESA Tracking Stations (ESTRACK), and brought into operation the first two ESA deep space stations. He was also the ESA representative to the Interagency Operations Advisory Group (IOAG) and instrumental in the deployment of the CCSDS Space Link Extension (SLE) cross support capability.

Dr. Schulz holds a Diploma degree in Physics from the University of Karlsruhe, Germany, and a PhD in Computer Science from the University of Zurich, Switzerland. NASA's Jet Propulsion Laboratory (JPL), California Institute of Technology.

Speaker 2



Jean-Marc Soula

*Deputy Head of Telecom, Stations
networks and Alert systems*

CNES

Jean-Marc Soula

Deputy Head of Telecom, Stations networks and Alert systems - CNES

Jean-Marc Soula joined CNES in 1984, as an engineer in Telecommunications. Since then, he has been involved in all of the developments of systems for the CNES Ground Station Network and has participated, in several positions from Network engineer to Management, to all of the over 200 satellite operations conducted from the Toulouse Space Center.

Today, Deputy Head of Telecom, Stations networks and Alert systems Department, he is in charge of the preparation of the future in the Ground Segment domain. In the last two decades, he has been the representative of CNES at the InterAgency Operations Advisory Group (IOAG) and at the Consultative Committee For Space Data Systems (CCSDS), and a member of the SpaceOps committees for more than 15 years.

Speaker 3



Shayn Hawthorne

Space Technology Lead
Amazon web services

Shayn Hawthorne, *Space Technology Lead- Amazon web services*

Shayn Hawthorne works in the Amazon Web Service Aerospace & Satellite Solutions Division as the Space Technology Leader. In this role Shayn works with Commercial and Government space customers around the world to develop innovative space system architectures that help customers use AWS to transform space. Shayn is focused on working across AWS to develop services and features that disrupt how space exploration, satellite, and launch operations are conducted and enabling space customers to share, fuse and leverage space data to improve their missions and products. Shayn is the founder of the AWS Ground Station service. Prior to joining AWS Shayn worked at the MITRE Corporation on Missile Defense and Space Operations and served in the Air Force as an engineer and space operator for 10 years Active Duty and 13 years of Reserves.

Speaker 4



Ian Jones

Founder and CEO
Goonhilly

Ian Jones *Founder and CEO- Goonhilly*

Ian Jones is the founder, CEO and significant shareholder of Goonhilly Earth Station Ltd. He is a satellite communications engineer and entrepreneur with over 30 years' experience in the industry with a background in digital satellite communications systems, RF design, earth station development and operations.

He graduated from Leeds University in 1985 in Electrical and Electronic Engineering. He developed new Digital Signal Processing satellite modems at BT Research Labs and Communication Systems Research Ltd (CSRL), leading the design of the Inmarsat Aero communication system. When CSRL was acquired by Ferranti International, Ian was promoted to Head of Satellite Engineering and subsequently Head of Business Development within the Ferranti Computer Systems Division.

In 1994 he co-founded Orbit Research Ltd where he was Managing Director and 50% shareholder. Ian was responsible for a number of innovations and new product designs for satellite communication systems including remote control monitoring systems for satellite earth stations. He led the development of a new business providing mobile health care diagnostic services via satellite and he was also responsible for a number of innovations in Education Outreach which led to the creation of the Star Centre (Keighley) and the ESA ESERO network.

In 2008 he became aware of the impending closure of Goonhilly Earth Station and worked to create a new business opportunity for the site. He founded Goonhilly Earth Station Ltd and built a successful, profitable business leasing the antennas at Goonhilly from BT and bringing them back into service. In January 2014, Ian led the team completing the successful acquisition of Goonhilly.

Ian's vision for a sustainable, profitable and diverse business at Goonhilly is rapidly taking shape with a growing client base covering all aspects of commercial satellite communications, space communication, radio astronomy, big data and data centre services, training, outreach and business co-location. His entrepreneur skills are in demand across Africa where he is involved in assisting human capital development projects at other former telecommunication centres. Goonhilly has now become an Enterprise Zone and the host of the Sat Apps Catapult South West Regional Centre of Excellence, of which Ian is the Chair.

Speaker 5



Arnulf A. Kjeldsen

*Executive Vice President
at Kongsberg Satellite Services*

KSAT

Arnulf Kjeldsen, *Executive Vice President ,KSAT*

Arnulf Kjeldsen is the Executive Vice President Strategy & Technology of Kongsberg Satellite Services (KSAT). In this position Arnulf oversees the business development and technology development at KSAT. KSAT is a world-leading provider of ground station services for satellites and maritime surveillance based on satellite data. With over 50 years of experience, KSAT's network today spans over 180 antennas at 20 ground station locations across the globe supporting space to ground communication and satellite information services.

Arnulf began his career at Kongsberg Spacetec, a company within the Kongsberg Defence and Aerospace division. During this period, Arnulf coordinated the development work on ground station capture and control systems as well as processing chains for remote sensing data. At the Joint Research Centre (JRC) in northern Italy, Arnulf was leading multiple projects within the Centre for Earth Observation, focusing on development of systems and services enabling interoperability and access to satellite data and derived products.

After returning from Italy Arnulf joined KSAT and became Chief Operating Officer and the overall responsible for the KSAT Satellite Operations business line. That involved all activities related to the development, operations, and sales of ground stations services to a wide range of satellite owners and operators.

Arnulf is an avid skier and enjoys travelling and meeting new people in space industry. Arnulf lives in Tromsø, covering all aspects of commercial satellite communications, space communication, radio astronomy, big data and data centre services, training, outreach and business co-location. His entrepreneur skills are in demand across Africa where he is involved in assisting human capital development projects at other former telecommunication centres. Goonhilly has now become an Enterprise Zone and the host of the Sat Apps Catapult South West Regional Centre of Excellence, of which Ian is the Chair.

PLENARY 3

Human spaceflight operations: Space Stations the Moon and MARS

Tuesday, 4 May 2021

Time: 16:10 -17:00 UTC

Topic outline:

Humans last travelled to the moon in the 1970's. There has however been a constant presence of humans in low earth orbit with the Salyut, Spacelab, MIR, ISS and SienYhou orbiting capsules and laboratories. The International Space Station has been the crowning achievement during this period with 20 years of continuous occupation and the collaboration of many nations.

This orbiting laboratory has been allowing for research in a microgravity environment and launchpad for many small satellites and hosting privately sponsored experiments. Now in the next decade nations and even private entities has expressed their interest to return to the moon and continue towards Mars. Some of these programs are already in advanced stages of planning with early execution already happening. This plenary seeks to engage the human spaceflight community, with specific focus on the operations requirements for these programs. We will understand the learning from the long operations of the ISS and the plans from those wanting to return to the moon and go beyond. An important focus for this discussion will be international cooperation and standards developed for these missions.(Artemisaccord)

Moderator: Mr. Eugene Avenant
Chief Engineer (SANSA)

Plenary speakers

Sami Asmar
General Secretary of the Consultative Committee, Space Data Systems (CCSDS)

Courtenay McMillian
Flight Director (NASA)

Fiona Turett,
NASA HQ Artemis representative (NASA)

Petra Mittler
Senior ESA Operations Support Engineer & Business Development Manager (DLR)

Speaker 1



Sami Asmar

General Secretary

CCSDS

Sami Asmar

General Secretary of the Consultative Committee, Space Data Systems (CCSDS)

Sami Asmar is the General Secretary of the Consultative Committee for Space Data Systems (CCSDS), a multi-national forum for the development of communications and data systems standards for spaceflight.

He is also the Manager of Strategic Partnerships and Customer Formulation in the Interplanetary Network Directorate at NASA's Jet Propulsion Laboratory (JPL), California Institute of Technology.

Speaker 2



Courtenay McMillian

Flight Director

NASA

Courtenay McMillian

Flight Director - NASA

Ms. McMillian is the Manager for the International Space Station Program's Mission Integration and Operations Office, NASA. Ms. McMillian has worked at Johnson Space Center since 1996, first as a flight controller supporting the Shuttle/Mir and International Space Station Programs, and subsequently in increasingly responsible roles for human space flight operations. She was selected as a Flight Director in 2007 and in that role led more than 500 shifts of flight operations for the International Space Station over twelve years. She led the teams that transitioned ISS to a permanent crew of six people, conducted the first set of contingency spacewalks for ISS, overhauled ISS emergency response operations, and executed the Cygnus commercial vehicle's demonstration mission. Most recently she spent two years managing FOD's support to first the ISS Program and subsequently the Commercial Crew Program.

Speaker 3



Fiona Turett

NASA HQ Artemis representative

NASA

Fiona Turett

NASA HQ Artemis representative, NASA

Fiona Turett began her NASA career in 2009 in Safety and Mission Assurance, supporting propulsion system safety for the last nine space shuttle missions. She later served as a program director for Manna Project International in Managua, Nicaragua, for a year before returning to NASA and becoming a flight controller and instructor for the space station's Motion Control System. Turett was the Expedition 56 control system lead for both crew training and real-time operations.

She then was the lead for operational integration of the Gateway outpost that will orbit the Moon and the lunar Human Landing System programs, and served as Flight Operations lead for Gateway's Power and Propulsion Element before becoming the Flight Operations integration manager for Gateway. She originally is from Rochester Hills, Michigan, and graduated with a bachelor's degree in mechanical engineering from Washington University in St. Louis.

Speaker 4



Petra Mittler

*Senior ESA Operations Support
Engineer & Business
Development Manager*

DLR

Petra Mittler,

Senior ESA Operations Support Engineer & Business Development Manager, DLR

In 1990, she joined DLR and worked in the Crew Operations department, which she was responsible at the time for preparing the German Spacelab mission D-2, a 10-day mission with 2 German and 5 U.S. American astronauts. Her task was to develop the schedule for the experiment programme. The task was to coordinate a total of 90 experiments that were to be carried out within the 10 days of flight. During the actual D-2 mission, she worked as a flight controller at GSOC, the German Space Operations Centre, in Oberpfaffenhofen.

Later, she worked as the astronaut training coordinator for the ESA mission EuroMir 95. On the German MIR 97 mission, I was responsible for the German astronaut's on-board computer to support the crew.

Since 2000, she has been working as a DLR member for the ESA Space Medicine Team, based at the European Astronaut Centre (EAC) in Cologne. Here she was responsible for the on-board implementation of medical care of ESA astronauts during their pre-, in-, and post-flight phases of the mission.

More recently, in her role as a DLR Space Operations business development team member she has taken over the project coordination of the joint ESA/DLR project LUNA. LUNA is an analogue facility that ESA and DLR plan to build together on the DLR campus in Cologne.

PLENARY 4

Space situational awareness: Protecting our assets in space

Wednesday, 5 May 2021

Time: 12:00 -13:00 UTC

Topic outline:

Space is a hostile environment. It is a resource that humans exploit for their needs in telecommunication, position navigation timing, earth sciences, astronomy, and many others. As all resources the environment need to be understood and managed to utilise to everyone's benefit. Space situational awareness is thus crucial for successful use of this resource. Two aspects are of growing importance in this domain: Space Weather and Orbital management.

Space weather plays very important part in the design of space craft as spacecraft needs to be protected against the harsh radiation environment. This plenary will look at the aspects required in spacecraft design. With our global reliance on spacecraft, nations have setup dedicated units to monitor the space environment for threats and the required actions related to different threat levels. We will listen to how they approach this task and the level of coordination between both public sector and private sector space.

Coordination is also vital in the management of separation of spacecraft in orbit and collision avoidance. This issue is now crucial as there are now many more players in the space arena from more nations and more sectors. We have the mega-constellations being deployed from commercial entities with fast turnaround and automated operations. What precautions are being taken for collision avoidance and specifically for coordination between operating entities.

Moderator: Dr. Lee-Anne McKinnell,
Managing Director Space Science (SANSA)

Plenary speakers	Juha-Pekka Luntama <i>Head of Space Weather Office, Space Safety Programme (ESA)</i>
	Mr Laurent Francillout <i>Head of Space Safety Office (CNES)</i>
	Clive Charlton <i>Head of Solution Architecture - Sub-Saharan Africa, (Amazon Web services)</i>
	David B. Goldstein (Colonel., U.S. Air Force, Ret.) <i>Principal Guidance, Navigation and Control Engineer – SpaceX</i>

Speaker 1



Juha-Pekka Luntama

*Head of Space Weather Office,
Space Safety Programme*

ESA

Juha-Pekka Luntama

*Head of Space Weather Office, Space Safety Programme,
ESA*

Juha-Pekka ("Jussi") Luntama is the Head of the Space Weather Office in ESA's Space Safety Programme. He graduated from Helsinki University of Technology in 1991 and continued working in the University as a lecturer and leader of the small satellite technology research group until 1997, when he was awarded a EUMETSAT Research Fellow position in the UK Meteorological Office. In 1998 Jussi Luntama was appointed as the Mission Scientist for the GRAS radio occultation instrument onboard the Metop meteorological satellite series in EUMETSAT HQ in Germany. In 2005 he moved from EUMETSAT to Finnish Meteorological Institute to lead the research on space weather impacts on GNSS applications. Jussi Luntama joined ESA in 2009 when he was selected as the manager of the Space Weather Segment in ESA's new Space Situational Awareness Programme, the predecessor of the Space Safety Programme that is in progress now.

Space Weather Office is responsible for all space weather related activities in ESA Directorate of Operations. The responsibilities of Space Weather Office include definition, architecture design and implementation of the ESA Space Weather System and delivery of the corresponding services. Space Weather Office is also responsible for development of software applications, ground systems, hosted payload instruments and dedicated SmallSat and nanosatellite missions for the ESA Space Weather System. The Space Weather Office is also responsible for liaising with international entities and representing ESA in international forums on space weather related topics.

Mr. Luntama is also the Mission Scientist and Mission Manager for the Lagrange mission that is in preparation to provide unprecedented space weather monitoring data for operational applications from the 5th Lagrangian point, L5.

Speaker 2



Mr Laurent Francillout

Head of Space Safety Office

CNES

Mr Laurent Francillout

Head of Space Safety Office - CNES

Laurent Francillout is Head of CNES Space Safety Office for Orbital Systems. He joined CNES in 1999 as interplanetary flight dynamics specialist for Mars Sample Return project. Then he joined ESA ATV program in the frame of ISS program where he held various position as Flight Dynamics Team leader, Spacecraft Operation Manager and Flight Director.

His mission is now to guarantee safety and sustainability of French Orbital operations and balloon flights through regulation typically French Space law certification and rulemaking. He is head of French delegation in IADC (Inter Agency Space Debris Co-ordination Committee) and chaired IADC in 2020.

He is delegate at COPUOS Scientific and technology subcommittee and is involved in IAA Space Debris Working Group and IAF Space Traffic Management group.

Speaker 3



Clive Charlton

*Head of Solution Architecture -
Sub-Saharan Africa*

Amazon Web services

Clive Charlton

Head of Solution Architecture - Sub-Saharan Africa, Amazon Web services

Clive Charlton leads a dynamic team of solutions architects, bringing the latest in disruptive, cutting-edge cloud computing technologies to bear on the difficult cost and agility problems facing public sector customers and the surrounding ecosystem of ISVs, systems integrators and resellers.

Clive's team of solutions architects supports a sales and business development team that covers public sector in sub-Saharan Africa. With over two decades of experience, Clive is a hands-on leader who leads by example with experience in building and managing high-performance teams that help accelerate the growing AWS business. He leads and mentors a team of highly talented solutions architects, helping them to set and surpass their own goals and to develop their talents and careers. Clive is a hands-on, detail-oriented, "roll-up-your-sleeves" leader with a passion for innovation and an ability to deal with ambiguity as well as an ability to scale and influence broadly.

As a head of solutions architecture for the AWS public sector in Sub-Saharan Africa, he has the opportunity to shape and deliver on a strategy to a new business unit to help customers succeed with workloads on AWS. Clive's responsibilities include supporting all public sector teams via hiring, developing and managing a team of technical SAs, to promote AWS as the best place to run these workloads, building on his broad background and technical breadth and depth in security, networking, operating systems and application architecture and a deep understanding of how applications and services are best built and operated on the AWS platform.

In addition to Clive's responsibilities as a solutions architect manager, he is an AI and machine learning specialist, acting as an expert advisor to the Council for Artificial Intelligence Research (CAIR) in South Africa. He is the technical lead for aerospace in the Middle East & Africa. Clive is also an experienced presenter for Amazon at events in South Africa and on a world stage.



Speaker 4



David B. Goldstein

*Colonel., U.S. Air Force, Ret.)
Principal Guidance, Navigation and
Control Engineer*

SPACEX

David B. Goldstein (Colonel., U.S. Air Force, Ret.) *Principal Guidance, Navigation and Control Engineer - SpaceX*

David Goldstein is a SpaceX Principal Guidance, Navigation and Control (GNC) Engineer. In this role he's an ambassador to government agencies and satellite owner/operators on SpaceX satellite collision avoidance and space safety, he leads SpaceX integration with the Space Force's 18th Space Control Squadron and NASA/CARA and he develops, codes and fields satellite GNC algorithms.

Goldstein graduated from the United States Air Force Academy with a bachelor's of science in 1988. His career covers a wide variety of Air Force technical leadership assignments including satellite science and technology, research and development, test and evaluation, payload integration, system engineering, acquisition, and launch operations. After serving 27 years in the US Air Force, Goldstein retired as a Colonel in January 2016. In his last assignment he was director of the Air Force Research Laboratory, Space Vehicles Directorate and Commander of the Phillips Research Site, at Kirtland Air Force Base.

Goldstein earned a PhD in Aerospace Engineering from the University of Colorado at Boulder and three Master's Degrees. . He has been married for over 32 years and has three children.a bachelor's degree in mechanical engineering from Washington University in St. Louis.

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A new era is dawning at EUMETSAT.

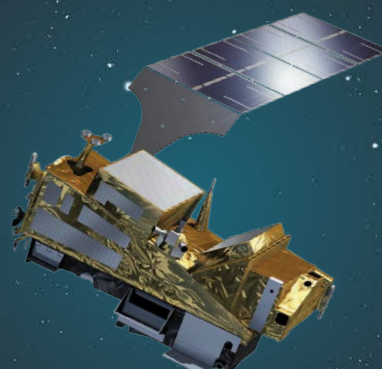
Next-generation geostationary and low-Earth-orbiting satellite systems launched from 2023 will revolutionise weather forecasting and climate monitoring. New and better instruments will provide insights into our planet faster and in higher quality than ever before.

At the same time, EUMETSAT is making its weather and climate data available to more people more easily than ever before through cloud based access services coming on stream in 2021.

EUMETSAT's satellite systems and data services support the European Commission's Green Deal in the digital age, empower European industry and enlighten and protect its citizens.



Meteosat Third Generation, carrying the Sentinel-4 instrument



EUMETSAT Polar System – Second Generation, carrying the Sentinel-5 instrument

The Sentinels are funded by the European Union's Copernicus programme.

CLOSING CEREMONY

Date: 5 May 2021

Time: 16:00 - 17:00 (UTC)

Opening of Closing Ceremony & Recap	MC Alan Committie
Highlights of the Conference	Eugene Avenant
Awards Ceremony	Greg Marlow
Flag handover ceremony	Dr. Val Munsami
Special Keynote address	Guest Speaker
Vote of thanks and closing message	Tiaan Strydom
Promote South Africa	Video



AWARDS AND RECOGNITION

THE INTERNATIONAL SPACEOPS LIFETIME ACHIEVEMENT MEDAL (LAM), 2021



Mr. Phil Liebrecht

Mr. Phil Liebrecht is presented with the International SpaceOps Lifetime Achievement Medal, 2021, for his over forty years' dedication to and advocacy for international cooperation in space operations, while directly enabling the success of human exploration and science missions through ensuring the transfer of critical information across the Solar System and interstellar space. He passionately and expertly led the complex development and operation of the NASA communications networks and demonstrated exceptional diplomacy matching American and international interests in space around the globe.

THE INTERNATIONAL SPACEOPS AWARD FOR OUTSTANDING ACHIEVEMENT (AOA) 2021



Dawn Flight Team

In recognition of exceptional anomaly recovery and saving a space mission, The NASA/JPL Dawn mission conducted spectacularly successful explorations of dwarf planet Ceres and the giant asteroid Vesta, the two largest residents of the main asteroid belt between Mars and Jupiter. The flight team brilliantly overcame immense challenges, including critical hardware failures on the spacecraft that should have prevented the mission from achieving its most important objectives.



THE INTERNATIONAL SPACEOPS AWARD FOR OUTSTANDING ACHIEVEMENT (AOA) 2021



MAVEN Mission Operations Team

In recognition of development of a new paradigm that has significant effect on the performance of a space mission or to the space operations field, the Mars Atmosphere and Volatile Evolution (MAVEN) spacecraft successfully completed a transition into a new orbit via a nearly two-month-long aerobraking campaign, making the spacecraft available to provide critical relay duties for the Mars 2020 rover and other ground missions.

The MAVEN team took a spacecraft that had never been designed for a prolonged aerobraking campaign and planned and executed a flawless transition while still preserving the spacecraft's science capabilities.

THE INTERNATIONAL SPACEOPS EXCEPTIONAL ACHIEVEMENT MEDAL (EAM), 2021



Dr. Natan Eismont

In recognition of development of a new paradigm that has significant effect on the performance of a space mission or to the space operations field, the Mars Atmosphere and Volatile Evolution (MAVEN) spacecraft successfully completed a transition into a new orbit via a nearly two-month-long aerobraking campaign, making the spacecraft available to provide critical relay duties for the Mars 2020 rover and other ground missions.

The MAVEN team took a spacecraft that had never been designed for a prolonged aerobraking campaign and planned and executed a flawless transition while still preserving the spacecraft's science capabilities.



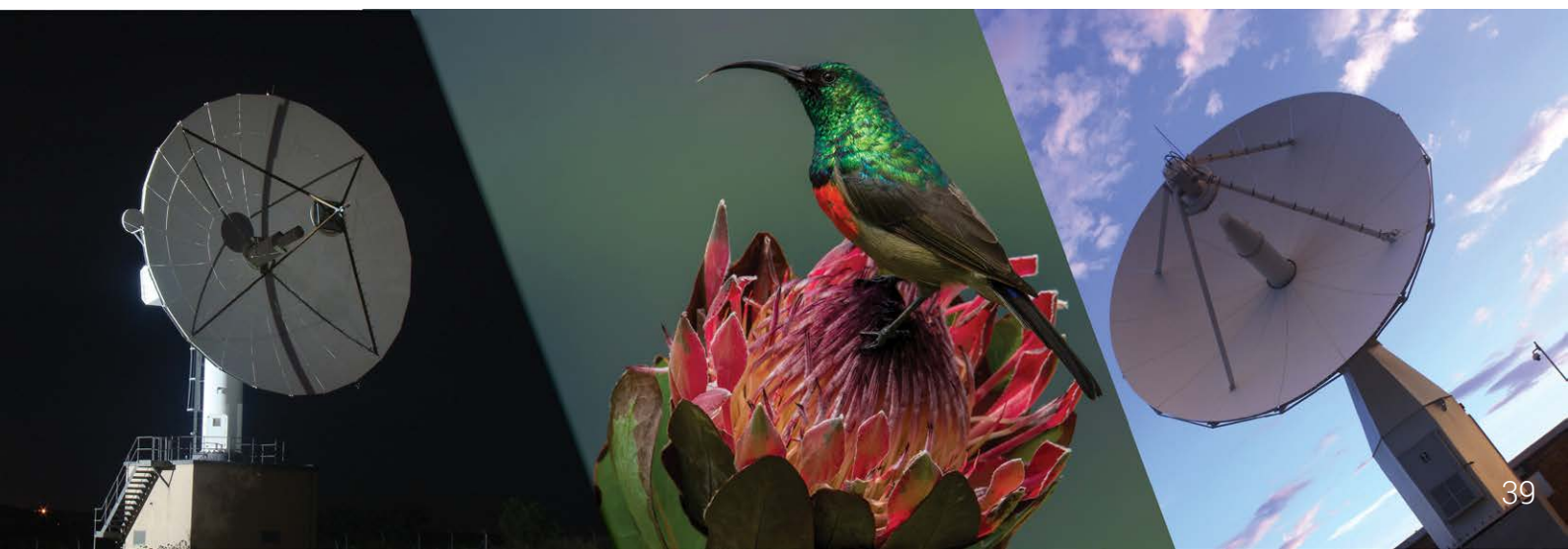


THE INTERNATIONAL SPACEOPS DISTINGUISHED SERVICE MEDAL (DSM), 2021



The 2021 International SpaceOps Distinguished Service Medal goes to M. Pierre Lods in appreciation for his involvement in the SpaceOps Organization for more than 10 year, in particular for his leadership in the organization of SpaceOps 2018 as Conference Chairman. The SpaceOps 2018 conference, held in Marseille, France, was an outstanding success with a record number of participants.

M. Pierre Lods



PAPER SUBMISSIONS

Paper ID	Paper Title	Speaker Name	Speaker Company
Mission Design and Management (MDM)			
1246	Evolution of the Canadian Radarsat Satellites	Mr. Christophe Belzile	Canadian Space Agency (CSA)
1404	Mission Design and the planning for the international Venera-D Project	Dr. Alexey Grushevskii	Keldysh Institute of Applied Mathematics of RAS
1412	Gravity assist maneuvers as a tool for broadening accessible landing areas on Venus surface	Mr. Vladislav Zubko	Space Research Institute (IKI), Russian Academy of Sciences (RAS)
1419	EDRS-C – Challenging Way of Bringing the Second Orbital Node into Space	Dr. Gregor Rossmannith	Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)
1455	A holistic approach to ensure safe non-routine operations	Mr. Lorenzo Arona	Avanti Communications Group plc
1514	Mission Design for Interplanetary Sample Return and study of Ganymede	Mr. Paras Adlakha	University of Petroleum and Energy Studies
1532	Low thrust multi-injection approach for constellation and multi-mission deployment	Mr. Vincenzo Maria Salvato	Politecnico di Milano
1587	Determination of possible landing areas on Jupiter's moon Ganymede	Mr. Andrey Belyaev	Space Research Institute (IKI), Russian Academy of Sciences (RAS)
1655	Defining Mission for twin Exploration of Europa and auxiliary Enceladus Sample Return	Ms. Aayushi Bohrey	University of Petroleum and Energy Studies

Paper ID	Paper Title	Speaker Name	Speaker Company
Operations Concepts (OC)			
1230	Automated Software for Crewed Spacecraft - Bridging the Gap from Sci-Fi to Reality	Mr. Edward Van Cise	National Aeronautics and Space Administration (NASA)
1243	Automated anomaly response for Planet constellations	Mr. Pablo Bernal-Mencia	Planet
1281	Lessons Learned in the Introduction of Automation and Autonomy to International Space Station (ISS) Robotics Operations Planning	Dr. Laura Lucier	National Aeronautics and Space Administration (NASA)
1282	Meteosat Third Generation Ground Support for Payload Calibration and Characterisation	Ms. Claudia Tranquilli	Eumetsat
1309	The Mars Terrain Simulator: an indoor analogue facility to validate and simulate ExoMars Rover Operations and to support the ExoMars Surface Mission	Mr. Maurizio Deffacis	Altec S.p.A.
1319	Preparation, validation and operations strategies for on-board software upgrade on Galileo Constellation	Mrs. Ylenia Di crescenzio	DLR-GfR
1321	"My abstract has been submitted for 2020 under the paper id number 1056 and has been updated" (Only 1 update: ExoMars 2020 to ExoMars 2022) Operation Design Based on short-term response for the RIS Instrument, on board the Exomars 2022 RO	Ms. Laura Seoane	National Institute for Aerospace Technology (INTA)
1323	Generation leap in subsea operations - learning from manned spaceflight	Mrs. Carina Helle Berg	NTNU Samfunnsforskning

1324	Doing More With Less - Impact of GAIA Mission Ground Automation for ESA's Astronomy Fleet and Beyond	Mr. Javier Hernando	European Space Agency (ESA/ESOC)
1333	Agile Aerospace: Lessons Learned From Planet Mission Operations	Ms. Deanna Doan	Planet Labs Inc.
1349	Development and Validation of the Operations Procedures and Manual, for a 2U CubeSat, EIRSAT-1, with Three Novel Payloads.	Ms. Rachel Dunwoody	University College Dublin (UCD)
1357	Enabling the Next Era of Deep Space Robotic Exploration: The General End-to-End Operations Concept and Major Required Capabilities for Autonomous Missions at the System Level	Mr. Jay Wyatt	NASA Jet Propulsion Laboratory
1400	Transition from partial to fully automated routine activities of a satellite constellation	Mr. Andrea Bechi	DLR-GfR
1423	NAVCAST enables Precise Point Positioning and Near Real Time Service Monitoring	Mr. Antonio Salonic	Spaceopal GmbH
1461	Implement Voice-user Interface in Mission Control Center	Mr. Xiangcun Ji	National Space Science Center (NSSC), Chinese Academy of Sciences
1464	Modular operations, or how to reduce mission operations complexity and errors	Dr. Abigail Ganopol	Comision Nacional de Actividades Espaciales (CONAE)
1467	DESCENT CubeSat Launch, Early Operation and Obstacles	Ms. Vidushi Jain	York University
1475	Operation Coordination Platform for Scientific Space Science Mission	Dr. Meng Bai	National Space Science Center (NSSC), Chinese Academy of Sciences
1501	OPS-SAT - The World's First Satellite Accessible by the Public Over the Internet	Mr. David Evans	ESA - European Space Agency
1515	Parker Solar Probe Pre-Launch mission Operations Orbit-in-the-Life Mission Simulation	Ms. Kimberly Ord	The Johns Hopkins University Applied Physics Laboratory
1527	Change Management and Verification of Electronic, Automated Procedures	Dr. David Kortenkamp	TRAC Labs, Inc.
1529	Fast and accurate re-planning tool under multidisciplinary constraints set	Mr. Jacopo Prinetto	Politecnico di Milano
1543	Cost Effective Operations for Mission to the Moon	Mr. Gabriele Conti	Space Applications Services N.V./S.A.
1553	A Novel concept for target of opportunity Operations For Future Missions	Dr. Gabriele De Canio	European Space Agency (ESA)
1559	A Comparison of Satellite Measurement & Control Scheduling Algorithms	Dr. Yanjie Song	National University of Defense Technology
1560	A Comprehensive Analysis of the Impact on Satellite Mission Planning Benchmark	Dr. Yanjie Song	National University of Defense Technology
1570	Operability on the Europa Clipper Mission: Challenges and Opportunities	Mr. Joel Signorelli	NASA Jet Propulsion Laboratory
1574	The evolution of the EDRS control center for automated operations of EDRS-C	Mr. Jan-Christoph Scharringhausen	Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)
1614	Concept For Operation of Komsat Information Service Open Api	Mrs. Yoon Jeong Jang	Korea Aerospace Research Institute (KARI)
1619	Soft Translatable Advanced Robot for In-Space Handling	Ms. Marissa Renteria	Space Engineering Research Center, University of Southern California
1623	Towards automation of operations for ZACube-2 - a South African maritime domain awareness SmallSat mission	Mr. Leon Steenkamp	Cape Peninsula University of Technology (CPUT)
1626	Routine contact optimization in the frame of Galileo operations	Mr. Andrea Di Carlo	DLR-GfR
1648	ESA Deep Space Tracking Network: Evolution and Cooperation	Mr. Yves Doat	European Space Agency (ESA)
1656	Potentials of Atmospheric Mining: extraction, storage and utilization of fusion fuels	Mr. Pranjal Mhatre	[unlisted]

Paper ID	Paper Title	Speaker Name	Speaker Company
Flight Execution (FE)			
1237	On the Way to Mercury: BepiColombo Mission Status	Mr. Christoph Steiger	European Space Agency (ESA)
1280	International Space Station (ISS) Robotics Development Operations Team Results in Robotic Remote Sensing, Control, and Semi-Automated Ground Control Techniques	Mr. William Watson	National Aeronautics and Space Administration (NASA)
1283	The Whitehead Manoeuvre - Gaia's Strategy to avoid Earth's Shadow during Mission Extension	Mr. Jonas Marie	LSE Space GmbH
1296	Extending the Life of NASA's Tracking and Data Relay Satellite (TDRS)-8: TDRS-8 Power Challenges and Planning for End of Mission	Ms. Carissa Brealey	National Aeronautics and Space Administration (NASA)
1308	launch and early operations of eu:cropis	Mr. Miguel Lino	Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)
1320	Operations during the science monitoring phase of InSight instruments SEIS and APSS	Ms. Agnès Jullien	Centre National d'Etudes Spatiales (CNES)
1325	Jason-2 ageing gyrometers anomalies, lessons learnt and risk mitigation operations	Mrs. Émilie Coulaud	Centre National d'Etudes Spatiales (CNES)
1332	how to backflip your satellite and other stories	Ms. Stefania Tarquini	Eumetsat
1336	Operating the Galileo Constellation: an effective routine operational strategy to handle the influence of the Polar regions on the attitude determination	Mr. Lorenzo Di Maggio	DLR-GfR
1346	Recent in-flight operational innovations for esa's gaia mission	Mr. Peter Collins	European Space Agency (ESA)
1436	MASCOT – a Mobile Lander on-board Hayabusa2 Spacecraft – Operations on Ryugu	Mr. Christian Krause	Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)
1437	HP3 – Experiment on InSight Mission – Operations on Mars	Mr. Christian Krause	Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)
1438	The challenge and consequences on mission operations after inverting a complex failure management concept in-orbit	Dr. Katrin Wirth	Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)
1486	Lessons learnt using optical observations for satellite flight dynamics operations	Mr. Raúl Domínguez González	Deimos Space S.L.
1542	My abstract has been submitted for 2020 under the paper id number 3.8.2.x609 and has not been modified: Planned end of life activities of METEOSAT-8 at EUMETSAT	Mr. Julien Rogissart	Eumetsat
1555	Robotics Instrument Deployment System Surface Operations for the InSight Mars Lander	Dr. Ashitey Trebi-Ollennu	NASA Jet Propulsion Laboratory
1563	CloudSat - From the A-Train to the C-Train	Mrs. Mona Witkowski	NASA Jet Propulsion Laboratory
1564	GRACE Follow-On Early In-flight Challenges	Mrs. Mona Witkowski	NASA Jet Propulsion Laboratory
1576	InSight-SEIS instrument deployment operations on Mars	Mr. Charles Yana	Centre National d'Etudes Spatiales (CNES)
1633	NEOSSat Operations Post-Recovery: New missions for Canada's resilient microsatellite	Mr. Viqar Abbasi	Canadian Space Agency (CSA)
1642	The End of Kepler: Fuel Challenges and End of Life Lessons	Mr. Trevor Weschler	Laboratory for Atmospheric and Space Physics (LASP) at University of Colorado
1681	Maintaining Operational Excellence into the Second Decade of the RADARSAT-2 Mission	Dr. Casey Lambert	MDA

Paper ID	Paper Title	Speaker Name	Speaker Company
Ground Systems Engineering (GSE)			
1265	High-resolution remote sensing one-stop service platform based on SOA architecture	Mrs. Liu Li	China Aerospace Science and Technology Corporation (CASC)
1274	Return Link Service Provider (RLSP)- A feed-back of one-year operational life	Mr. Maxime Fontanier	Centre National d'Etudes Spatiales (CNES)
1278	SVOM Ground Segment: Mission, Science & Instrument Centres and Validation Strategy	Mrs. Laurence Chaoul	Centre National d'Etudes Spatiales (CNES)
1288	A mobile and compact control center for quick decentral satellite access	Mr. Stefan Gärtner	Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)
1317	Euclid's health monitoring system: combining and expanding esa's operational capabilities into new use cases.	Mr. Guillermo Buenadicha	European Space Agency (ESA)
1329	Title: Monitoring the SEIS and APSS instruments of the InSight mission	Mr. Benjamin Jaillant	Telespazio France
1341	FAVOUR – A new generation of editors for the EGS-CC	Mr. Wolfgang Heinen	Rhea Group
1364	Development of the Ground Segment Communication System for the EIRSAT-1 CubeSat	Mr. Fergal Marshall	University College Dublin (UCD)
1388	NanosatCS: A Ground Control and Monitoring Software for Integration, Testing and Operation of Small Satellites	Mr. Marcelo Essado	EMSISTI
1403	SmallGEO-CC: The transition story of a satellite platform towards EGS-CC	Ms. Nieves Salor Moral	Rhea Group
1422	Layered service oriented design for M&C applications	Mr. Francesco Croce	Eumetsat
1471	Satellite ground system automation development for geostationary observation satellites	Dr. Hyunsu Lim	Korea Aerospace Research Institute (KARI)
1476	Sirius Flight Dynamics System: presentation of a standard product as a new extensible cots	Mr. Jesus Esteban-Dones	Centre National d'Etudes Spatiales (CNES)
1484	The Ground Segment engineering process for SPORT Cubesat mission operation	Mr. Carlos Leandro Gomes Batista	National Institute for Space Research - INPE
1499	MO Services and CFDP in Action on OPS-SAT	Mr. Dominik Marszk	IMS Space Consultancy
1516	Multi-Mission Operations System supporting Satellite Constellations	Mr. Kai Leidig	IRS, University of Stuttgart
1541	Multi-Mission as a Service	Mr. Mauro Pecchioli	European Space Agency (ESA)
1612	ExoMars 2020: Rover Operations Control System (ROCS)	Mr. Álvaro Ortiz	G.M.V. Space and Defence, S.A.
1637	CNES contribution to SuperCam Ground Segment: Agile development and Integration in Mars2020 Ground Segment	Mrs. Anissa Bahri	Centre National d'Etudes Spatiales (CNES)



Paper ID	Paper Title	Speaker Name	Speaker Company
Data Management (DM)			
1248	To catch them all: a generic approach for pattern detection in time series satellite telemetry data	Dr. Clemens Schefels	Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)
1251	Centralised Spacecraft Database management for future EUMETSAT missions: the Sentinel-6 approach	Ms. Elena Ancona	Eumetsat
1295	AGILE Science Operation Center at SSDC: data management from raw telemetry to online analysis tools	Dr. Carlotta Pittori	Agenzia Spaziale Italiana (ASI)
1298	New questions opened by the big data in the world of the science data processing center for Gaia mission in CNES	Mrs. Julie Guiraud	Centre National d'Etudes Spatiales (CNES)
1401	Mixing usual spacecraft information and in-flight data into a new operational documentation platform	Mr. Olivier Ruspil	Centre National d'Etudes Spatiales (CNES)
1624	In-orbit demonstration of POCKET housekeeping compression on PROBA-2	Mr. Stijn Ilse	QinetiQ Space nv

Paper ID	Paper Title	Speaker Name	Speaker Company
Planning and Scheduling (PS)			
1247	Integrated GSOp Planning Architecture	Dr. Valerio Carandente	Spaceopal GmbH
1260	Efficient Space Network Scheduling for a Degraded Spacecraft	Ms. Katie Steward	Laboratory for Atmospheric and Space Physics (LASP) at University of Colorado
1276	CNES Ground Stations Network Scheduling: Prototypes to select the best solver	Mr. Christophe Lamant	Centre National d'Etudes Spatiales (CNES)
1294	Cluster-II: A Recommendation System for Semi-Automated Scheduling of Ground Station Passes	Mr. Jakob Karg	Solenix GmbH
1306	Use Cases and Algorithms of the EnMAP Mission Planning System	Dr. Sven Prüfer	Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)
1310	How Galileo Planning became automated	Dr. Sandra Brogl	Spaceopal GmbH
1344	A Rapid Retargetable Goals Driven Approach to Autonomous Spacecraft Plan Repair with Concurrent Actions	Mr. Chao Chen	Beijing Institute of Technology (BIT)
1347	PINTA – one Tool to plan them all	Mr. Rainer Nibler	Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)
1367	Psyche Science Planning with the Science Opportunity Analyzer	Ms. Carolyn Ortega	California Institute of Technology
1381	Scheduling and Operations of the ECOSTRESS Mission	Ms. Amruta Yelamanchili	California Institute of Technology
1382	Scheduling and Operations of the Orbiting Carbon Observatory-3 Mission	Ms. Amruta Yelamanchili	California Institute of Technology

1385	Ground-based Automated Scheduling for Operations of the Mars 2020 Rover Mission	Ms. Amruta Yelamanchili	California Institute of Technology
1466	Real-time Scheduling of Astronomical Satellites Network for Target of Opportunity Observation	Mr. Dalin Li	Harbin Institute of Technology
1569	Cloud-Enabled Contact Planning and Optimization	Mr. Grant Boerhave	Maxar Technologies
1589	User Preference Optimization for Oversubscribed Scheduling of NASA's Deep Space Network	Dr. Mark Johnston	NASA Jet Propulsion Laboratory
1599	Demand Access for NASA's Deep Space Network: A New Paradigm for Operations	Dr. Timothy Hackett	Lockheed Martin Corporation
1627	CCSDS Mission Planning and Scheduling Services Opening Door for Cross-Agency Interoperability	Mr. Peter van der Plas	European Space Agency (ESA)
1634	APS: Multi-Domain Decentralized Planning for Responsive Multi-Asset Collaborative Autonomy	Dr. Neil Dhingra	Orbit Logic
1667	Data frugal machine learning for simplifying spacecraft mission planning	Dr. Matej Petkovic	Jozef Stefan Institute
1683	Evolution of the Radarsat Mission Planning System	Mr. Logan Pryor	MDA

Paper ID	Paper Title	Speaker Name	Speaker Company
Guidance, Navigation, and Control (GNC)			
1226	Visual Validation of Korea Pathfinder Lunar Orbiter Attitude Control Operations	Mr. Dawoon Jung	Korea Aerospace Research Institute (KARI)
1228	A novel multivariate sensor data analysis methodology in holistic landing site selection for interplanetary missions	Ms. Caitlyn Singam	University of Maryland - College Park
1235	Design of a Robust Low-Thrust Orbit Raising Strategy for MEO Constellation Deployment	Mr. Riccardo Di Corato	European Space Agency (ESA)
1236	Architecture and Operations of the OSIRIS-REx Independent Navigation Team	Dr. Benjamin Ashman	National Aeronautics and Space Administration (NASA)
1254	ADCS performance assessment using payload camera: lessons learned on a small satellite mission and future applications	Mr. Clément Jonglez	Technische Universität Berlin
1293	Investigation of Improved Guidance, Navigation and Control (GNC) Data for NASA's Near-Space, Direct-to-Earth Ground Stations	Ms. Chitra Patel	National Aeronautics and Space Administration (NASA)
1297	Sensor Fusion Kalman Filtering for Stability and Control of Satellite Swarms	Mr. Rahul Rughani	University of Southern California
1362	What is driving the Gaia micro-propulsion system's cold gas usage? A census of internal and external disturbances sources and their GN2 footprints.	Ms. Chloe Sivic	ESOC - European Space Agency
1386	Attitude control on GRACE FOLLOW-ON Experiences from the first years in orbit	Dr. Fabiana Cossavella	Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)
1392	Applications and Benefits of GNSS for Lunar Exploration	Dr. Benjamin Ashman	National Aeronautics and Space Administration (NASA)

1396	Optimal reaction wheel control with stiction and resonance avoidance	Mr. Tianyi Zhang	University of Manitoba
1410	A Trajectory Projection Based Hypersonic Vehicles Trajectory Tracing Guidance Method	Dr. Yinghui Gong	Science and Technology on Space Physics Laboratory
1418	Studies of a dc discharge-based micropropulsion concept for applications on small satellites	Mr. Maheen Parbhoo	University of the Witwatersrand
1482	GNSS-based navigation for a remote sensing three-satellite formation flying	Ms. Francesca Scala	Politecnico di Milano
1493	Precise Orbit Determination and Atmospheric Density Estimation at Super Low Altitude for SLATS	Mr. Takushi Sakamoto	Japan Aerospace Exploration Agency (JAXA)
1500	Orbital and attitude control of Spectrum-Roentgen-Gamma observatory under technical constraints	Dr. Irina Kovalenko	ISAE-Supaero University of Toulouse
1504	Attitude control of the disposal phase of the e.Cube mission for atmospheric data acquisition	Ms. Francesca Scala	Politecnico di Milano
1511	Achieving Microgravity Conditions using an Attitude Stabilized Free Falling Experiment - ASTER on REXUS	Mr. Björn Dierks	[unlisted]
1512	In orbit fragmentations localisation: study and characterisation of the events	Mr. Andrea Muciaccia	Politecnico di Milano
1531	Spin Stabilized Sun Pointing CubeSat for Space Geology	Ms. Naeimeh Najafizadeh	University of Manitoba
1550	Automation concept of flight dynamics operations for Korean geo-satellites	Dr. Youeyun Jung	Korea Aerospace Research Institute (KARI)
1596	Mars-Phobos multi-body regime exploitation for Martian navigation light constellation design	Mr. Daniele Barberi Spirito	Politecnico di Milano
1611	A fast strategy for inter-satellite links assignment problem in GNSS	Mr. Jungang Yan	National University of Defense Technology
1630	Bearing-Only navigation to support proximity operations on cis-lunar non-keplerian orbits	Mr. Michele Ceresoli	Politecnico di Milano

Paper ID	Paper Title	Speaker Name	Speaker Company
Communications Architectures and Networks (CAN)			
1242	Improving ground station antenna program track angles in the absence of updated flight dynamic predictions	Mr. Christopher Stamblewski	SSC
1252	Autonomy for Deep Space Communication and Navigation	Dr. Les Deutsch	NASA Jet Propulsion Laboratory
1268	CNES Multi-mission stations: Automatic preventive and predictive maintenances	Mr. Sebastien LACOUR	Centre National d'Etudes Spatiales (CNES)
1269	Truncated ARQ Statistical Link Analysis for Dynamic Links	Dr. Kar-Ming Cheung	NASA Jet Propulsion Laboratory
1279	The SNOWBEAR project: performance and statistics analysis of the 26-GHz Earth-observation receive channel for a ground station at Svalbard	Mr. Filippo Concaro	European Space Agency (ESA)
1300	Towards Implementation of Delay-Tolerant Networking in the ESA Ground Segment	Dr. Felix Flentge	European Space Agency (ESA)
1304	How web-based voice communication system clients can change operation in mission control	Mrs. Anja Bertard	DLR (German Aerospace Center)
1316	Comparing Carrier Acquisition and Tracking systems in presence of high Doppler frequency	Dr. Dariush Divsalar	Jet Propulsion Laboratory - California Institute of Technology

1326	Implementing Delay/Disruption Tolerant Networking for NASA's Plankton, Aerosol, Clouds and Ocean Ecosystem (PACE) Mission	Mr. David Israel	National Aeronautics and Space Administration (NASA)
1327	LunaNet Architecture and Concept of Operations	Mr. David Israel	National Aeronautics and Space Administration (NASA)
1355	Variable Data Rate Process	Dr. Howard Garon	National Aeronautics and Space Administration (NASA)
1358	Comparison of Type 2 versus Type 3 Carrier Tracking Loops under High Dynamic Signal Conditions	Prof. David Morabito	NASA Jet Propulsion Laboratory
1366	Ground Segment Operations Concept for the Orion Artemis-2 Optical Communications System	Ms. Nikki Desch	National Aeronautics and Space Administration (NASA), Goddard Space Flight Center
1372	Extending the Licklider Transmission Protocol to Multi-Band Links	Mr. Marc Sanchez Net	NASA Jet Propulsion Laboratory
1373	Space Communications in Support of the Artemis Program	Mr. Philip Baldwin	National Aeronautics and Space Administration (NASA)
1375	The CubeSat Communication Platform (CCP) - Mission Overview and ConOps	Mr. Cory Vaska	University of Alaska-Fairbanks
1376	Gbps High Speed Antenna Arraying for Ground-Based Network	Dr. Howard Garon	National Aeronautics and Space Administration (NASA)
1393	An Augmented Ground Station Architecture for Spacecraft-Initiated Communication Service Requests	Dr. Adam Gannon	National Aeronautics and Space Administration (NASA)
1409	Communications and Cybersecurity Technology Enabling Extended Human Spaceflight	Ms. Sienna Williams	National Aeronautics and Space Administration (NASA), Goddard Space Flight Center
1477	The European Optical Nucleus Network	Dr. Martin Krynitz	Kongsberg Satellite Services AS
1498	Ground station delay determination for accurate ranging in the ESA Deep Space Antennas	Dr. Fabio Pelorossi	LSE Space GmbH
1507	NASA's Strategic Plan for a Transition to Commercial Space Communications Services for Near-Earth Users	Mr. Gregory W. Heckler	National Aeronautics and Space Administration (NASA)
1530	NASA Deep Space Network Commitments for Human Missions to the Moon and Beyond	Mrs. Kathleen Harmon	NASA Jet Propulsion Laboratory
1557	An enhanced network environment with software-defined network	Mr. Hyun Chul Baek	Korea Aerospace Research Institute (KARI)
1590	NASA's Deep Space Network: Automation in the Follow-the-Sun Era	Dr. Mark Johnston	NASA Jet Propulsion Laboratory
1601	A novel alternative to bundle protocol for handling data transmission across disruption-tolerant networks	Ms. Caitlyn Singam	University of Maryland - College Park
1605	On the use of Pseudo-Noise Ranging with high-rate spectrally-efficient modulations	Ms. Barbara Ripani	Politecnico di Torino
1613	Designing the communication links for a GEO SATCOM system	Ms. Elena Egodino	G.M.V. Space and Defence, S.A.
1629	Distributed Space Traffic Management Solutions with Emerging New Space Industry	Ms. Luisa Buinhas	Vyoma GmbH
1647	Kiruna, ESA Polar Station Evolution Roadmap	Mr. Guillermo Lorenzo Ten	European Space Agency (ESA)
1657	Ka-band operations at ESA with Hayabusa-2	Dr. Maria Montagna	VisionSpace Technologies
1477	The European Optical Nucleus Network	Dr. Martin Krynitz	The European Optical Nucleus Network
1242	Improving ground station antenna program track angles in the absence of updated flight dynamic predictions	Mr. Christopher Stamblewski	SSC

Paper ID	Paper Title	Speaker Name	Speaker Company
Human Spaceflights and Operations (HSO)			
1259	My abstract has been submitted for 2020 under the paper id number 1024 and has not been modified. AMO-EXPRESS-2.5: Crew Autonomy Onboard the International Space Station	Mrs. Angela Haddock	National Aeronautics and Space Administration (NASA)
1377	Compacted Granulars – How a rigid 2-months, 3-runs planned science experiment on ISS evolved into a flexible 20-run, 9-months mission	Mr. Alex Karl	Space Applications Services N.V.
1430	designing a console for future space operations	Mr. Alexander Seidel	The Pennsylvania State University
1518	Astrobee On-Orbit Commissioning	Ms. Maria Bualat	National Aeronautics and Space Administration (NASA)
1544	Designing Autonomy into Interfaces for Long-Duration Missions	Mrs. Brooke Allen	National Aeronautics and Space Administration (NASA)
1600	Operation and Implementation of Oxygen Production Process on Mars	Ms. Laura Fader	University of Calgary
1651	Space Outpost: Operations for Engineering center of Martian Habitat	Mr. Abhishek Jain	University of Petroleum and Energy Studies
1652	Remotely Operating Robotic Systems using Human-Readable Procedures with PHARAOH	Dr. Stephen Hart	TRAC Labs, Inc.
1653	Power Station design for Martian Space Habitat	Mr. Paras Adlakha	University of Petroleum and Energy Studies
1663	Multi-Mission/Universal Closed-Loop EVA Thermo-Control System	Dr. Boris Yendler	[unlisted]
1670	PLUMMRS: A collection of Plan Ledgers and Unified Maps for Multi-Robot Safety	Dr. Ana Huaman Quispe	TRAC Labs, Inc.

Paper ID	Paper Title	Speaker Name	Speaker Company
Cross Support, Interoperability, and Standards (CSIS)			
1232	The Use of the CCSDS Unified Space Data Link Protocol on All Space Links	Mr. Greg Kazz	National Aeronautics and Space Administration (NASA)
1258	Results of modeling algorithms for obtaining correlated data, described in the Orange Book CCSDS 551.1-0-2 «Correlated Data Generation»	Mr. Valery Vorontsov	Federal Space Agency (ROSCOSMOS)
1302	Diving into Quality Space or on how Quality of Service and Quality of Experience can enhance the User Experience for Mission Operations Communication	Dr. Falk Schiffner	German Aerospace Center (DLR)
1378	The Ground Segment: A proposal Framework based on concepts of Dynamic Management of the Space Link Extension Protocol Services.	Mr. Antonio Cassiano Julio Filho	Instituto Nacional de Pesquisas Espaciais (INPE)
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