

Draft Programme

Day 1 – Saturday, 7th May 2022

BST	EDT	PDT	Section	Title	Description	Speaker
11:00	06:00	03:00		Welcome		Dr Paul A. Daniels <i>President, Federation of Astronomical Societies, UK</i> 
11:05	06:05	03:05	Overview	An Introduction to Megaconstellations	We have the sense of being at a point of dramatic change, whether for good or for ill. How did we get here, and where might we be going next? This opening talk will set the challenge of megaconstellations in a historical perspective, and also in the broader context of the idea of space environmentalism. We will briefly lay out the themes which other speakers will explore.	Prof Andy Lawrence <i>Regius Professor of Astronomy, University of Edinburgh, UK</i> 
11:30	06:30	03:30	Operators	SpaceX Satellites and the Night Sky	Since the initial launch of SpaceX Starlink satellites in 2019, SpaceX has collaborated with astronomers in the US and internationally to assess the impact of Starlink on astronomical observations, and to identify, develop, field and test mitigations. The goal of Starlink is to provide high-speed, low-latency broadband connectivity across the globe, including to locations where internet has traditionally been too expensive, unreliable, or entirely unavailable. SpaceX firmly believes in the importance of a natural night sky for all of us to enjoy, which is why we have been working with leading astronomers around the world to better understand the specifics of their observations and engineering changes we can make to reduce satellite brightness. With both space sustainability and mitigations for astronomy in mind, we have pushed the state-of-the-art in key technology areas to address this new engineering challenge, and are striving to be the world's most open and transparent satellite operator. SpaceX will present an overview of Starlink satellite operations and the work we've done to minimize the impact on astronomy.	David Goldstein <i>SpaceX Principal Engineer California, USA</i> 
11:55	06:55	03:55		Responsible Constellations	Leadership in Responsible Space must encompass the adoption of responsible design and operational practices alongside market access incentives. Recent years have seen the introduction of a new era of commercial space activity, driven by advancements in technology, increases in private investment, and reductions in satellite manufacturing and launch costs. Small satellites are being launched in unprecedented numbers, and proposals for large, low-Earth-orbit (LEO) constellations are a reality. This new era of space activity is expanding space-based global communications, remote sensing, and a host of novel services that promise new opportunities for economic development, global education, rural healthcare, location-based services, and advancements in environmental science. For the global space economy to flourish and to realize these opportunities, we must preserve a safe operating environment.	Maurizio Vanotti <i>Vice President, Space Infrastructure & Partnerships, UK</i> 
12:20	07:20	04:20		40 Minute Lunch/Breakfast		
13:00	08:00	05:00	Challenges	Space Debris environment	Space debris environment: mitigation and its evolution with large constellations	Dr Hélène Ma <i>SST Test and Validation Engineer, RHEA System GmbH for ESA/ESOC</i> 
13:25	08:25	05:25		Flying Through Polluted Skies	The impact of space debris around our planet is not just felt by astronomers on Earth but is an ever-present challenge of daily life for those charged with keeping the satellites in the skies above our heads safe, one which will only be magnified by the advent of megaconstellations. Thomas will share his experience of what it's like piloting a spacecraft through these fields of junk, how we keep our satellites safe, what the impact is on the science missions we rely on and how space weather adds yet another element of difficulty to an already demanding situation.	Dr Thomas Ormston <i>Sentinel-1 Deputy Spacecraft Operations Manager, ESA</i> 
13:50	08:50	05:50		Space Traffic Control	There is an increasing need for effective Space Traffic Control in order to manage the growing numbers of objects in Earth orbit, both active satellites and space debris. The talk will suggest measures that can be taken by satellite operators, licensing authorities, and companies which are developing space surveillance networks in order to deliver a sustainable environment for future space operations.	Stuart Eves <i>Director, SJE Space Ltd, UK</i> 
14:15	09:15	06:15		Q&A		Dr Robert Massey & Panel
14:35	09:35	06:35		15 Minute Break		
14:50	09:50	06:50	Challenges	The environmental consequences of industrializing Earth orbits	Low Earth Orbit is being developed rapidly and unsustainably. While such development is increasingly being recognized as a major stressor on the satellite operational environment, it also has direct implications for environments on Earth. For example, the construction and maintenance of large satellite constellations will affect Earth's atmosphere through rocket exhaust products. The steady, high rate of satellite re-entries, driven by the short operational lifetimes of satellites in large constellations, will further cause significant elemental abundance loading of the upper atmosphere, far exceeding natural abundance loading from meteoroids for some important materials. This talk addresses several of these issues and their consequences, highlighting a growing collective action problem that connects the Earth and orbital space environments.	Prof Aaron C. Boley <i>Canada Research Chair in Planetary Astronomy Associate Professor at University of British Columbia, Canada Co-director of the Outer Space Institute</i> 
15:15	10:15	07:15		Satellite light pollution: an emerging threat to global night skies	The human use of the orbital space near the Earth entered a new era in May 2019 with the launch of the first objects in the 'Starlink' satellite constellation by the private commercial space company, SpaceX. In the three years since, the number of functional satellites in orbit has more than doubled, raising the specter of the rapid proliferation of new space debris. Various companies have proposed the launch of hundreds of thousands of new objects into low-Earth orbit in the remaining years of the 2020s. While astronomers have to date been largely concerned with the effects of bright streaks or trails of light in their images, I will present evidence of another kind of "light pollution" associated with these objects, which is their contribution to the diffuse brightness of the night sky. I will explain the theory underpinning models of this effect; their sensitivity to different input parameters; and what they imply about satellite impacts to overall night sky brightness at this point in time. Finally, I will discuss predictions of the models that may help ultimately mitigate effects of satellites and space debris on astronomy.	Dr John C. Barentine <i>Principal Consultant, Dark Sky Consulting LLC, Arizona, USA</i> 
15:40	10:40	07:40	Challenges	The impact of megaconstellations on heritage and Indigenous relationships to the night sky.	Humans have long gazed up in wonder at the starry night sky. Across the world, and throughout time, people have found meaning in the predictable patterns of celestial objects visible in a clear, dark night sky. With the advent of widespread artificial light at night, skyglow and light pollution have gradually decreased the visibility of the stars and the Milky Way, particularly in urban locales. Yet in remote areas, it is still possible to experience relatively pristine skies. However, the advent of large satellite constellations stands to irrevocably alter the night sky worldwide, permanently altering our view of the universe and our relationship with it.	Jessica Heim <i>Cultural Astronomer PhD student, University of Southern Queensland, Australia</i> 
				Indigenous Communities have had relationships with the night sky since time immemorial. Elders and knowledge holders have protected these relationships through ceremonies and tellings. These relationships are now in harm as the night sky changes with each added object that masks the original tellings. <i>As respect for their culture, we have agreed with Doug and Juan-Carlos that we will not record this part of the talk and, in consequence, it will not form part of the post-webinar YouTube video.</i>	Doug Sinclair <i>Ojibways of Onigaming, Health counselor, Knowledge keeper and ceremonialist, Canada</i> Dr Juan-Carlos Chavez <i>Research Investigator, Blue Marble Space Institute of Science, Seattle, USA and Indigenous of Sonora Desert inter-tribal knowledge messenger</i> 	
16:10	11:10	08:10		10 Minute Break		
16:20	11:20	08:20	Challenges	The Challenge of Megaconstellations in an Environmental Context	In the 55 years since the Outer Space Treaty came into existence there has been substantial growth in the number of space objects, and the ways in which space has been utilised to improve life on Earth. Earth orbit has become a fundamental infrastructure for human life on Earth. Megaconstellations are continuation of these developments. This has been facilitated by space law, but Megaconstellations in particular and the general proliferation of space objects in Earth orbit present a number of challenges. There are legal challenges around, licencing and liability, regulation and control but there are also broader environmental and society challenges. This talk will examine these challenges.	Dr Thomas Cheney <i>Lecturer of Space Governance, AstrobiologyOU, Open University, UK</i> 
16:45	11:45	08:45		Overcoming Legal Challenges to a Sustainable Space Future	The emergence of mega-constellations ignited a latent conflict between the growth of commercial satellites and the preservation of a sustainable space in Earth's orbital environment. Over the last few years, the resulting perturbations became manifest within the space legal paradigm. On one hand, government seeks to encourage growth in the commercial space sector through "streamlined regulations." Elsewhere, after years of deliberations, government recognizes the need to more forcefully mitigate space debris and ensure effective SSA and STM. Recently, threats to space access by astronomers, scientists, and anyone who appreciates an unencumbered night sky imposed a real need to manage Earth's orbital environment. Given these diverse interests, there exist real challenges to efficient and equitable regulation of space. Unless overcome, these challenges may overwhelm and cause Earth to become planet-locked. This presentation will identify many of these challenges; address those that are reasonable and effective, and those that are not; propose a regulatory lens by which to view the future; and, offer solutions to a viable and sustainable space future.	Charles L. Mudd Jr. <i>Principal, Mudd Law, Illinois, USA Adjunct Professor (Space Law), Quinnipiac University, USA</i> 
17:10	12:10	09:10		Q&A		Dr Robert Massey & Panel
17:40	12:40	09:40		Close of Day		Dr Paul A. Daniels