

Statement by Ryan Guglietta, United States Representative, on Agenda Item 15, “Dark and quiet skies, astronomy and large constellations: addressing emerging issues and challenges,” February 11, 2025

Thank you, Chair.

We look forward to engaging on this newly established agenda item and working together to address the challenges to optical and infrared astronomy presented by the increasing number of satellites in low-Earth orbit from a wide range of countries. We have already seen the benefit satellites and satellite constellations provide, including in times of natural disaster. The United States has experienced this recently with the provision of essential communication services during the devastating wildfires in California. We therefore need to ensure a balanced approach in both safeguarding astronomy while allowing for the indispensable benefits offered by new and innovative satellites and satellite constellations.

There has been significant progress in satellite design and operation to move us closer to the International Astronomical Union’s brightness recommendation of 7th magnitude. One key observation is that there is not a one-sized-fits-all solution and that there are many factors that contribute to a satellite’s observed brightness from Earth. Additionally, it is clear that early engagement when satellites are still being designed is both useful and economical. Early modeling and testing in the laboratory can help mitigate more expensive design changes later on. Satellite manufacturers in the United States, especially within the commercial sector, have worked diligently to test and implement changes including dielectric film, dark paint, visors, operational orientation modifications, bringing satellites to lower altitudes, and sharing high-precision telemetry. It’s important to share these experiences and information on technical solutions so that others can benefit from efforts to address these challenges.

Many of the most effective solutions have been identified by commercial satellite operators committed to addressing these concerns. We have learned that, somewhat counter intuitively, making satellites more reflective by attaching a dielectric film to a flat surface preferentially reflects light away from the Earth and makes them dimmer. It can also be helpful to darken small, curved surfaces if it does not lead to thermal problems for the satellite. We have learned that in the

absence of intersatellite links, the use of a visor that reflects sunlight away from the Earth may be useful for satellites with more complex shapes. Modifying a satellite's orientation with respect to the ground can also help minimize reflected light.

While the scope of this agenda item focuses on the optical and infrared astronomical impacts, we can also learn from mitigation methods developed by the radioastronomy community. For instance, in the United States we have developed the "Operational Data Sharing" technique, where astronomical facilities and satellite operators dynamically coordinate to avoid boresight encounters using telescope pointing information. This type of dynamic coordination may also offer promise to ground-based optical and infrared astronomy sites to avoid the brightest reflections or glints.

The United States Federal Communications Commission, or FCC, has continued to include coordination with the National Science Foundation, or NSF, as a requirement for licensing. These requirements are publicly available on the FCC's website, as are annual reports filed by companies about their own implementation of mitigate efforts.

We would also highlight the importance of a multistakeholder approach to addressing these challenges. An effective, practical, and substantive solution can only be found by the space community working together. To facilitate this process, our Department of State and NSF convened a domestic discussion group of astronomers, satellite operators, academics, and other experts to discuss these challenges and feed their perspectives and ideas into our international engagements. We have found this to be an immensely useful endeavor and it has broadened our knowledge and moved us closer to finding solutions. We also welcome the "Group of Friends for Dark and Quiet Skies" and their recent conference room paper and side event, and express our sincere appreciation to Chile and Spain for their leadership in this process. The awareness, technical work, and action that this GoF has advanced cannot be overstated, and we look forward to bringing these ideas to the STSC.

Thank you, Chair.