

Slovakia, Item 6, Space Debris

61st Session of the Scientific and Technical Subcommittee

(January 29 – February 9, 2024)

Madame Chair, Distinguished Delegates,

Allow me to present the recent accomplishment of the Slovak Republic to the work related to Agenda Item 6: Space debris. The focus of space debris research in Slovakia is dedicated to physical characterization of space debris objects to assess their impact on the space, atmospheric and ground environment.

The Faculty of Mathematics, Physics and Informatics, Comenius University in Bratislava, Slovakia (further only Faculty) performs optical observations of space debris with its optical passive telescope equipped with the 70cm parabolic mirror. This telescope is used for observations of space debris objects situated in low-earth orbit regimes, through geosynchronous orbits up to the cis-lunar region to improve the information about objects' dynamical, physical, and spatial distribution properties for space safety applications. Observations are conducted in the framework of activities of the European Space Agency (ESA), in collaboration with the private sector, as well with partners from abroad. Acquired data are used to identify the objects' reflectance properties such as albedo and size. Given research can be used to estimate the negative impact of light reflected from the object on the night sky quality. By using different spectral type photometric filters and a spectrograph, The Faculty is investigating surface reflectance properties of space objects as a function of wavelength which is directly related to the material properties, as well as the application of machine learning methods to distinguish objects according to their brightness properties, a method which allows the classification of space objects' shape and surface reflectance properties.

Additionally, two new re-entry events of rocket upper stage and a satellite have been detected by chance by the global all-sky meteor network AMOS operated by Comenius University Bratislava. One event occurred above Australia, while the second event occurred above Slovakia. It is a first type of such event captured in our location. Obtained have been recordings from AMOS cameras, always from at least two different locations simultaneously. Comenius University continues adapting its internal tools dedicated to the data reduction of meteor events to process such video recordings to extract the scientific data. This is performed within the framework of European Space Agency activity. The to-be-developed procedure is used for future re-entry events predictions and on-ground risk assessment. Thanks to sixteen AMOS stations deployed around the world on four different continents, it is expected that the AMOS network will be detecting re-entry events on monthly basis in the close future.

Madam Chair, distinguished delegates,

Thank you for your attention.