STATEMENT BY THE SQUARE KILOMETRE ARRAY OBSERVATORY

The 59th session of the Scientific and Technical Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space

AGENDA ITEM 4: General Exchange of Views

Read by: Simon Berry **(**SKAO Head of Director-General's Office)

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Chair,

Thank you for allowing me the floor. On behalf of the Square Kilometre Array Observatory, I am pleased to address the 59th Session of the STSC.

We would like to acknowledge the contribution of Ms Simonetta Di Pippo as Director of UNOOSA and wish her all the best in her future endeavours, and thank the Secretariat for arranging a major multilateral event in these difficult times, and in particular for the Secretariat's assistance with our 2021 application to become a Permanent Observer.

Chair,

The Square Kilometre Array Observatory (the "SKAO") is an international intergovernmental organization headquartered in the United Kingdom and created by the entry-into-force on the 15th of January 2021 of our multilateral constitutive *Convention Establishing the Square Kilometre Array Observatory*. The Observatory Convention has been ratified by Australia, China, Italy, the Netherlands, Portugal, South Africa, Switzerland and the United Kingdom. We currently have cooperation agreements with scientific institutions in four other countries, pending their accession to the Observatory Convention. All our Members, Cooperating Partners, and Observers participate in UNCOPUOS.

Chair,

The Square Kilometre Array (the 'SKA') will be one of the largest scientific projects ever undertaken and is under development as a next generation astronomical research infrastructure for a global community, complementing a range of other major facilities either in operation or under development at the present time. Our Governing Council at the end of June 2021 gave approval for the construction in our host countries Australia and South Africa to commence, and which builds on years of pre-construction design. The science goals of the SKA are many and varied, tackling, amongst others, fundamental

cosmology and physics, the formation and evolution of stars and galaxies, and the prospects for life elsewhere in the Universe on for instance Earth-like planets.

Chair,

The SKAO supports the United Nations General Assembly initiative of 2022 as the International Year of Basic Sciences for Sustainable Development, and is a Member of the Steering Committee for the International Year. Sustainability is one of the SKAO's foundational values, with the Observatory and its partners contributing to many of the 17 Sustainable Development Goals. We will ensure that the SKAO operates in a manner which is aware of, and minimises, its environmental footprint, and that its activities are conducted in an ethical and sustainable manner, respecting the Indigenous communities and cultures around our telescope sites and around our partnership.

Chair,

The unprecedented technical challenges the SKA must overcome in the fields of networking, Big Data and high-performance computing and the subsequent development of new technologies, cloud processing, data analysis and visualisation tools are likely to yield substantial benefits in other areas of everyday life.

The SKAO held its Second Science Data Challenge ("SDC2") in 2022, seeing record participation by the global scientific community, multidisciplinary collaboration and innovative methods of data analysis to tackle a huge model data set. The Data Challenges are designed to prepare future users to efficiently handle SKAO data, so that it can be exploited to its full potential as soon as the telescopes enter early operations, and to drive the development of data analysis techniques. They also assist the Observatory and its computing partners in preparing the systems and processes needed for the network of SKA Regional Centres which will store, process and provide access to data for astronomers globally. Forty teams comprising 280 participants in 22 countries took part in SDC2, using the resources of 8 supercomputing centers from around the world.

Chair,

As the only global scientific organisation dedicated to radioastronomy, the SKAO takes its leadership responsibilities seriously. The threats and opportunities associated with the pursuit of radio astronomy science worldwide are of continuous and intense concern to the Observatory. Opportunities include accelerated technological development and education in both the science of astronomy and the engineering required to sustain it. Threats come mainly from interference, and the growth in the use of the radio spectrum for communication, navigation, remote sensing and various applied sciences. Whilst radio interference of terrestrial origin can be minimised by the careful siting and regional protection of radio-observatories in remote areas such as South Africa's Karoo and Australia's Murchison regions, airborne and spaceborne radio interference, being respectively safety related and global in nature, cannot.

The explosive growth of near Earth space systems dedicated to providing near universal internet connectivity, unfortunately brought with it radio-frequency interference issues.

Radioastronomy is of course protected in narrow bands dedicated to passive services by International Telecommunication Union regulation. However modern radio-astronomy is conducted wideband, with techniques developed to mitigate the interference from legitimate spectrum users. The advent of large numbers of rapidly moving emitters in space is new, and the existing techniques are inadequate to prevent significant losses of science capability and hence the ability of the SKAO and other radio observatories to discover new astrophysical phenomena and refine our knowledge of the known.

The SKAO has conducted extensive analyses and is now starting to make measurements of the radio emissions of the near Earth orbit constellations and has determined the following. Constellations are hard to avoid, and hence radio signals, at a level enough to reduce sensitivity to astrophysical phenomena, will be commonplace if not mitigated.

Moreover, at high levels where Observatory antennas are directly illuminated, the whole band where the signals lie will be blinded due to saturation.

The science that will be compromised or lost through this interference is significant, including studies of the evolution of stars and galaxies, the identification and mapping of simple molecules over a range of distances and epochs and searches for pulsars.

The SKA Observatory is of the view that the effects of the near Earth orbit constellations on radio astronomy, although serious and detrimental to science, can be mitigated through cooperation with industry and the participation of regulators.

The SKAO sincerely hopes that UNCOPUOS will support and facilitate the interactions necessary to arrive at the best possible mitigations and should be assured that the Observatory will undertake its part.

Chair,

The SKAO is firmly directed towards outer space science and excited about the deliberations taking place in this Subcommittee of UNCOPUOS, and stands ready to assist in any regard. The SKAO stands ready to contribute to UNCOPUOS activities such as co-hosting the new **International Astronomical Union Centre for the Protection of the Dark and Quiet Sky**. Apart from the new single item *General Exchange of Views on Dark and Quiet Skies for Science and Society*, during this 69th session we will participate in the discussions on Items 11, *Space Weather*, and 1, *Long Term Sustainability of Outer Space Activities*.

Chair, Distinguished Delegates, thank you for your kind attention, and I wish you all a productive 59th session of the Subcommittee.