

Text of the intervention by Piero Benvenuti under Item 13 on Wednesday 21st – morning session

Conference Room Paper A/AC.105/C.1/2021/CRP.17

Madame Chair, Distinguished Delegates

I am presenting here the Conference Room Paper “Recommendations to Keep Dark and Quiet Skies for Science and Society”, which has been co-signed by the Delegations of Chile, Ethiopia, Jordan, Slovakia, Spain and by the International Astronomical Union.

Astronomy is not only the most ancient and fascinating of natural sciences, it has also been instrumental in discovering how nature behave. We owe to astronomy, if we have been able to launch satellites and if are here today talking about the peaceful use of outer space.

Astronomy needs unobstructive and undisturbed access to the observation of cosmic phenomena and that is why COPUOS in 2017 approved the organization of a conference aimed at studying all possible protections of dark and quiet skies.

Because of COVID-19 the conference in person had to be postponed to next Fall, but an on-line precursor was organized last October and produced a comprehensive document, prepared by 85 international experts. The document analyses all sources of artificial interferences that affects the pristine visibility of the sky and makes a number of recommendations that can mitigate their negative impact.

The Conference Room Paper that is presented today is an executive summary of the full report.

The negative impact on a dark and quiet sky can be classified under three main categories:

1. The artificial light at night (aka ALAN) used to illuminate urban areas.
2. Radio-wavelength transmission.
3. The deployment of tens of thousands of satellites in Low Earth Orbit (LEO).

It is obvious that, while ALAN requires local regulations, the impact of LEO satellites and of radio transmission can only be discussed at international level.

Indeed, the impact by the satellite constellations is the most germane to the COPOUS mission and, because of the limited time available, I will discuss this aspect only, leaving the issue of ALAN and bioenvironment to the CRP readers.

The main facts, that were illustrated this morning in more details in the Technical Presentation by Constance Walker, are the following:

- It is estimated that in the order of 100,000 satellites could be launched into LEO in the coming decade.
- That means that up to 5,000 satellites will be present overhead at any time at a typical observatory location.
- The visibility of the sunlit satellites' will be greatest at low elevation and during twilight, but increasing the orbit altitude over 600 km will increase their visibility all night long.
- The bright trails of the satellites will severely affect the astronomical observations and their brightness can saturate the telescopes' detectors.
- All type of astronomical observations will be affected, but the most serious impact will be on deep, wide, extragalactic imaging and on the detection of Near-Earth objects (NEOs). E.g., it is estimated that up to 30-40% of the images taken by a wide field telescope like the US LSST telescope at the Vera C. Rubin Observatory would be adversely impacted. Also, the COPUOS supported International Asteroid Warning Network will be deeply affected.

There is no time to enter into a detailed description of all the recommendations contained in the CRP, however the most relevant one is to formulate satellite licensing requirements, guidelines and operational standards that take into account the impact on all stakeholders, astronomers and citizens included.

Indeed, the interaction with some of the space companies that are currently involved in the planning and deployment of LEO satellites' constellations have proved to be very fruitful: we do hope that this constructive collaboration will continue and followed also by all other space entities.

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it is clear that the case of the satellites constellations is a very complex one and poses new and unexpected challenges: a reasonable compromise must be achieved between the technological advancement aimed at connecting the entire world and the safeguarding of science. Considering the inherent difficulties and the urgency to achieve such a compromise, the delegations that are presenting this CRP propose that a specific Agenda Item on the protection of Dark and Quiet Skies is established for the next STSC meetings in order to monitor the evolution of the situation. They also propose that the task to analyse the CRP recommendations and to study their possible implementation is assigned to UNOOSA.

Before concluding, let me answer to a couple of very relevant questions that were raised by some delegations.

1. Some asked why we are proposing a specific Agenda Item instead of including the protection of dark and quiet skies in the more general one of the Long Term Sustainability of Outer Space Activities. The reason is that what is at stake here, is

the Long Term Sustainability of Astronomical Research, that, from what we saw, although connected to space activities, it is substantially different from them. That is the rationale for asking a distinct, specific Agenda Item.

2. Some delegations argued that the issues of radioastronomy concern more the International Telecommunications Union rather than STSC and COPUOS. While this is true and it has been the case for what concerns the protection of radio bands, the large increase of transmitting satellites and the high power of space radars, are posing new threats to radioastronomy that fall more under the competence of space operators rather than that of the ITU. Indeed the CRP presents only two recommendations to protect radioastronomy and they both concern the satellites' design and operation

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in conclusion, this CRP presents a number of recommendations that, if implemented, will allow basic science to progress for the benefit of the world society. The co-authoring delegations, Chile, Ethiopia, Jordan, Slovakia and Spain, together with the International Astronomical Union, appeal to the sister delegations to support their proposal to establish a specific STSC Agenda Item on the protection of the Dark and Quiet Skies for Science and Society and to assign the task of studying the implementation of the CRP recommendations to the UNOOSA. We would like to thank here the delegations that so far have expressed support to our proposal and we welcome all favourable statements to follow.

Thank you for your attention