

Annual Report for 2021

Inter-Division B-C Commission WG Site Protection

Chair: Richard Green

Co-Chair: Saeko Hayashi

Members: Elizabeth Alvarez, Zouhair Benkhaldoun, Yvan Dutil, Nalini Heeralall-Issur, Qing LIN, Harvey Liszt, Tushar Prabhu, Margarita Rosado, Ramotholo Sefako, R. Chris Smith, Jun TAO, Richard Wainscoat, Constance Walker, Haiyan ZHANG, Yongheng ZHAO

On the basis of their proposal, the Working Group on *Site Protection* and its parent Inter-Division B-C Commission of *Protection of Existing and Potential Observatory Sites* renewed for the current triennium (2021-2024) at the IAU business meeting held at the time originally scheduled for the General Assembly in 2021. These groups intend to provide a moderated forum for discussion of local issues and to encourage sharing of local experience as a general resource.

The emphasis of the Working Group and its members is on reduction of ground-based sources of artificial light at night (**ALAN**). Complementary effort on the critical issue of the impact of satellite constellations is the purview of the Executive Committee Working Group and the IAU Centre for the Protection of the Dark and Quiet Sky from Satellite Constellations.

Major Objectives:

- Support the IAU effort to obtain United Nation's endorsement of dark/quiet sky protection through the UN Committee on the Peaceful Uses of Outer Space (**UNCOPUOS**).
- Support implementation of the framework of the Dark & Quiet Skies (**D&QS**) Conference Report for observatory site protection, including regional planning based on detailed modeling, dynamic usage zones, and active lighting control.
- Provide a forum for astronomer efforts to enhance local and national legal frameworks for dark/quiet sky protection in the near zones around observatories in the context of the D&QS recommendations.
- Coordinate efforts with Commission B4 Radio Astronomy to limit radio-frequency interference at radio telescopes from ground-based interference.
- Provide the technical interface to the International Commission on Illumination / Commission Internationale de l'éclairage (**CIE**) for development of outdoor lighting standards that protect the dark sky and implementation of the D&QS framework.
- Evaluate requests for IAU endorsement of proposals for special protection status to other entities, such as International Dark-Sky Association (**IDA**).
- Educate professional colleagues about the urgency of site protection issues; provide supporting materials for their public presentations.

Dark and Quiet Skies Conference

The Site Protection Working Group through its members expended its primary effort in support of the (second) Dark and Quiet Skies Conference, co-sponsored by the IAU, the Instituto de Astrofísica de Canarias (**IAC**), and the United Nations Office of Outer Space

Affairs (**UNOOSA**). The purpose was to develop a set of policy recommendations for consideration and approval by UNCOPUOS through its Scientific and Technical Committee. The opportunity was originated by former IAU General Secretary, Piero Benvenuti, in collaboration with Simonetta Di Pippo, the former Director of UNOOSA.

The Conference Scientific Organizing Committee (SOC) was chaired by the Commission B7 President / Executive Committee WG *Dark and Quiet Sky Protection* Chair, Constance Walker, with support from UNOOSA staffer, Nathalie Ricard. The original intention was to hold the conference in person in Santa Cruz de La Palma, Spain in early October, 2021, but because of travel and other restrictions from the volcanic eruption, the conference was held virtually, with more than 900 global registrants.

The outcome of the process was

- a technical document, *Dark and Quiet Skies II for Science and Society* (https://www.iau.org/static/science/scientific_bodies/working_groups/286/dark-quiet-skies-2-working-groups-reports.pdf),
 - a 'Working Paper' (https://www.unoosa.org/res/oosadoc/data/documents/2022/aac_105c_11/aac_105c_11_396_0_html/AC105_C1_L396E.pdf),
- with summary recommendations formatted for consideration by UNCOPUOS.

The D&QS2 ALAN Working Group was one of three topic-focused working groups which met several times over the course of the spring and summer of 2021 in order to prepare draft reports for presentation and to plan the format of their topic at the Conference in October. (The other two were on satellite constellations and radio astronomy.) The input from the workshop participants was then taken into account in producing the versions of the technical document and Working Paper referenced above.

The D&QS2 ALAN Working Group recommendations and documents focused on implementation, based on the hard-won technical consensus of Dark and Quiet Skies I. The D&QS1 and 2 Working Group membership included participants from lighting engineering and lighting manufacturing associations, as well as experts in astro- and nature tourism, environment and human health. Three ALAN Working Group members disagreed with the consensus outcome from D&QS1 as containing too many compromises and could not support the final recommendations as presented in the D&QS2 Working Group report. However, the implementation plan was a strong consensus based on principles of good lighting, and including the forward-looking concepts of regional lighting management and active control enabling active lighting zone requirements.

Commission C.B7 and its Site Protection WG members played very active roles in the research and development of the report. IAU officers and members of other commissions are listed in parentheses.

Richard Green (co-chair), James Lowenthal (co-chair), (Antonia M. Varéla Perez (co-chair)), Zouhair Benkhaldoun, Andreas Haenel, Casiana Muñoz-Tuñón, Salvador Ribas, Connie Walker.

The April, 2022 meeting of the UNCOPUOS Scientific and Technical Subcommittee included a two-hour virtual symposium to present dark and quiet skies issues to the delegates. The Working Paper received support, so that the item will be on the agenda for further discussion and action next year, although the emphasis will be on satellite constellations, as discussed in the EC Working Group report.

Interaction with CIE

The Site Protection Working Group is the practical organizational interface for IAU to the international lighting engineering organization, CIE. There is a strong basis for joint advocacy for good outdoor lighting practices and practical research that further the aims of protecting the dark sky. Their CEO participated in the D&QS2 SOC. The fourth co-chair of the D&QS2 ALAN Working Group was from the CIE. Richard Green presented a summary of that WG report to CIE Division 4. Richard Wainscoat is IAU's official liaison to the CIE, and participates in some of their Technical Committees. An MOU is under development to formalize the shared goals and modes of interaction between the two professional societies.

Focus Meeting at the IAU General Assembly in 2022

A major means of implementing the goal of educating astronomers on the issues of dark and quiet skies is through Focus Meetings at the IAU General Assemblies. The Site Protection Working Group has played an active role in the proposal and organization of the Focus Meeting now planned for August in Busan. About half the meeting will be in the 'traditional' format of highlighting current issues with ALAN and hearing about protection plans for major world observatories. The other half will be devoted to the new and rapidly growing concern about satellite constellations.

Other Implementation Actions

The major area requiring attention is facilitating communication among observatories with telescopes of all scales about their efforts to secure public support and regulatory authority for light pollution control. The stated plan in the WG proposal was to activate that section of the Commission website, provide explicit support for any initial approaches to regional lighting plans, and organize regional hubs for coordination of efforts. All of those areas will require WG effort to make progress in the remaining two years of the triennium.