

# IAU Working Group on Global Coordination of Ground and Space Astrophysics

## Annual Report 2022-23

*Working Group Co-Chairs : Roger Davies & Rachel Somerville*

This report has three parts:

- (i) a commentary on the organisation of the programme of the Working Group and specifically on the sessions at the Busan General Assembly.
- (ii) the summary of those sessions including, as an appendix, the programme.
- (iii) the proposal and plan for the next Kavli Workshop *Probing the Universe from Far-IR to mm wavelengths: future facilities and their synergies* to be held in Caltech, Pasadena. March 26-28, 2024.

### Commentary

Overall the sessions were well attended in-person and the online participation was good. The online presentations went well without major issues. One limitation was that online 'speakers' generally only attended the session they spoke in. Discussion was largely initiated in the room, with less from online participants, despite regularly seeking input from them. Several sessions would have benefitted from having more time for discussion.

There were four Working Group sessions:

**Session I:** Large facilities in the 2020's and beyond (ground and space). Moderator: Debra Elmegreen

**Session II:** Global coordination for the next decade of science. Moderator: Roger Davies

**Session III:** Global Coordination for Multi-messenger astronomy. Moderator: Richard Green

**Session IV:** Archives & Access Moderator: Ajit Kembhavi

The way these sessions were organised has evolved over the last couple of General Assemblies.

For session I we invited speakers to provide an overview of the ground based and space programmes, rather than having a sequence of speakers from the major international and national agencies each describing their own programme. We identified three speakers to cover ground-based projects, space missions and co-ordination between the two. Each provided an excellent overview, managing to summarise the relevant extensive programmes succinctly. This was the first time we had identified non-agency speakers to summarise the status of space and ground based projects. It transpired that as a consequence senior agency people were largely missing from the sessions. This definitely compromised the usefulness of the discussions arising from this session. We need to find a way to ensure the participation of key figures in future – that is likely to involve reverting to the previous style, which will require more dedicated time, at the expense of sacrificing other topics.

In session II we started with a discussion of the presentations in session I which covered the degree to which large projects plan to provide curated data openly and the need for co-ordination between space and ground based observations to be planned many years in advance of launch. An interesting topic arose: how will students and early career researchers be trained to work in large collaborations? And how will the sociological accommodations to recognise those that make pivotal contributions, but who are not PhD

astronomers, be made. While this has been an issue for some time in several technical specializations, the importance of very large collaborations for generating ground breaking results, and the emergence of the critical role of techniques such as data science and AI/machine learning, has underscored the need for new avenues to recognise multi-disciplinary contributions, beyond papers in the astronomical literature alone.

Session II continued with five talks designed to explore critical areas of astrophysics where future advances are expected. A common theme was the challenges of bringing together diverse data sets to address specific problems. This included uniformity of calibration across different surveys, multiple jeopardy of multi-wavelength and time critical observations, and the need to bring together ground and space-based data to address key problems.

Session III on the global coordination of multi-messenger astronomy opened with a discussion of the Kavli-IAU Workshop on the *International co-ordination of multi-messenger transient observations in the 2020s and beyond* held in Cape Town in February 2020. It continued with presentations on gravitational wave astronomy from ground and space; multi-messenger investigations triggered by neutrino alerts, gamma ray events and cosmic ray detections. A panel discussion followed with participants each asked to identify one scientific problem in multi-messenger astrophysics that is ripe for progress in the next decade and consider (i) what data are needed to make that progress? (ii) what facilities and coordination mechanisms are in place to get those data? (iii) what further facilities and coordination mechanisms would be required for full realization?

Session IV on Archives & Access comprised two panel discussions led by presentations from leaders in these areas. The presentations themselves were interesting and are reported in the attached paper but in the ensuing discussion it was not always straightforward for online participants to contribute as much as those in the room. Perhaps there is a better way of organising this, or perhaps this is an inherent limitation of hybrid discussion that spans a wide range of communities.

### **Notes and actions for the Co-Chairs and IAU**

The Korean organisers did a terrific job of supporting these sessions. The online participation was well organised and as effective as any we have experienced. Despite these efforts the large time difference between Korea and both Europe and America was a practical limitation to the number of online participants.

We collect together here the key lessons we learned from organising these sessions together with some issues that the co-chairs will brainstorm about over the next few months (items 1-9) and some issues for the IAU to ponder (10-11) and some for both.

1. The in-person sessions were well attended by a variety of people.
2. Online presentations worked remarkably well.
3. Online speakers usually only attended the session in which they were speaking.
4. Discussion was largely initiated in the room with less from online participants, despite regularly seeking input from them.
5. This was the first time we had identified non-agency speakers to summarise the status of space and ground based projects as well as space-ground synergy. Those chosen did an excellent job but a consequence was that senior agency people were largely missing from the sessions. We need to rectify this in future.

6. Panel discussions in hybrid format did not work so well – despite good facilities it was hard for online panel members to contribute equally.
7. Several sessions would have benefitted from having more time for discussion.
8. The co-chairs need to involve other Working Group members in the organisation and chairing the sessions.
9. The co-chairs plan to re-consider the format of the sessions so that we do a better job of reaching those individuals who can be influential in addressing the issues that arise in these discussions.
10. Partly because of the way we chose to organise these sessions, key individuals involved in governance and leadership roles, such as Agency Heads and Directors of Observatories, project managers etc., were less well represented than at previous GAs. As their presence is vital if we are to have a productive discussion, the Co-chairs will ponder on how to address this for Cape Town.
11. These WG meetings are to do with the organisation and co-ordination of astronomy globally. Unlike the Symposia associated with the GA, they are not primarily scientific research meetings. It is unrealistic to expect participants to have to pay the "full fare" of GA registration if this is the only, or primary, reason for them attending. The "day pass" process we had to use for the Busan meeting was terribly inefficient, and limited the number of online participants.

The first Appendix is a summary of the sessions of the Working Group held in Busan.

The second Appendix is a copy of the successful proposal for the next Kavli Workshop *Probing the Universe from Far-IR to mm wavelengths: future facilities and their synergies* to be held in Caltech, Pasadena. March 26-28, 2024.