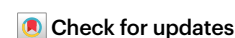


A historic XXXII IAU General Assembly for a lasting African legacy

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The XXXII IAU General Assembly, held for the first time on the African continent from 6–15 August 2024, marked a historic milestone in the global astronomy community. Driven by a bold vision, the event highlighted Africa's growing scientific capacity, and embodied the African spirit of Ubuntu, emphasizing accessibility, impact, and sustainability.

'It's time for Africa!' This has been the rallying call since 2018 when the International Astronomical Union (IAU) announced that its XXXII General Assembly (GA) would be held, for the first time in the more than 100 year history of the IAU, on the African continent. For the African astronomical community and the host organization, the National Research Foundation (NRF), this presented an exceptional opportunity to showcase the incredible scientific capacity within the continent and to connect like never before with the rest of the world's astronomers. For the IAU it was an opportunity to bring global attention to Africa and to push forward its goal of being a truly international organization, having its GA finally taking place on all six populated continents of the world. In the aftermath of this significant event, we reflect on its impact on astronomy in Africa, as well as the impact of Africa on astronomy.

Why did we bid for this?

Over the past three decades, there has been a steady growth of astronomy in Africa. Notably, South Africa's investment in astronomy soon after the end of apartheid has placed the continent on the world stage, with projects such as the Southern African Large Telescope (SALT) and the successful bid to host part of the Square Kilometre Array (SKA). This achievement paved the way for the MeerKAT radio telescope and the construction of SKA-mid^{1,2}. The bold and visionary choice of South Africa to place a focus on astronomy during those early years of a new democracy was driven by a spirit of hope and determination. Though South Africa's monetary commitment to astronomy was relatively small, the principle of this investment was significant. This decision was about inspiring the nation with something far beyond the day-to-day challenges of poverty, unemployment and inequality. It was about showing the world, and the citizens themselves, that the country (and in fact, the whole continent) was capable of producing some of the best research and best research infrastructure in the world – and they did. This investment reached far beyond South Africa, across the

whole continent, playing a key role in building human capital by training astronomers from various African countries. This collaborative approach was evident during the bid for the SKA, with a strong emphasis on involving SKA Africa partner countries. In the same spirit, South Africa led the bid to host the IAU GA, once again bringing the entire continent together. The bid was presented to the IAU as an African one, led by South Africa, and it was notable that when announcing the hosts of the 2024 IAU GA in Vienna, then-President Ewine van Dishoeck stated that it would be hosted in Africa – not Cape Town, not South Africa, but Africa. This announcement in 2018 began six years of rallying the African astronomy community and setting up what has come to be referred to as an 'audacious' vision for what this single event should strive to, and, by all accounts so far, did largely achieve (Fig. 1).

Rallying a continent towards 2024

Days after the 2018 announcement that the IAU GA would at last come to Africa, a small group of astronomers drafted the initial pages of *Vision 2024*. A rallying cry to think big about what could be achieved for Africa with the IAU GA, this document was circulated openly among astronomers, students and communicators across the continent and beyond. The push for big-picture thinking went far beyond the GA, and the community stretched its imagination to what astronomy on the continent should look like long after 2024. This vision was presented at many international astronomy meetings and was typically met with great support. The impact of the IAU GA had begun long before the official hosting agreement was even signed.

In 2019, the South African Department of Science, Technology and Innovation (DSTI) funded a pan-African event to bring together astronomers from across the continent, following initial discussions in Ethiopia at the 2018 Middle East and Africa Regional IAU Meeting. The main purpose was to look critically at the state of astronomy in Africa and, in particular, at the existing African Astronomical Society (AfAS), which had been relatively inactive since its launch in 2011. This meeting, which was simply called "Astronomy in Africa", resulted in a relaunch of AfAS and election of a new Executive Committee, now with a fully staffed secretariat based in South Africa and funded by DSTI. Through AfAS and its various committees, the journey towards 2024 now had a driver³.

AfAS would go on to host several pan-African engagements and activities, including an annual conference, the most recent one being held in Morocco, just a few months before the GA, which allowed the African community to consolidate its efforts and finalize preparations for the IAU GA. This continental professional society not only brought together the existing African astronomy community in the

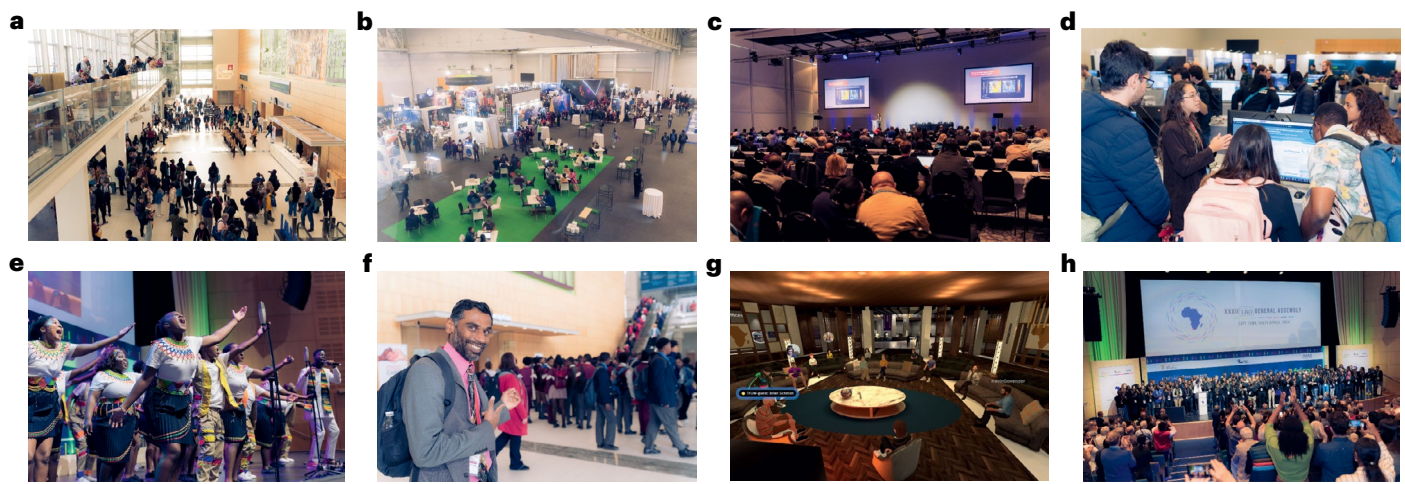


Fig. 1 | Representative images from the IAU GA. **a**, Attendees being welcomed on the first day by the iThemba Youth Choir. **b**, View of the physical exhibition hall, towards the exhibitor booths and meeting areas. **c**, Programme sessions ran throughout the venue across eight parallel streams covering a broad range of astronomy-related topics. **d**, The custom hybrid poster setup enabled scientific discussion between those in person and online, showcasing over 1,800 posters across the course of the GA. **e**, African culture was highlighted and celebrated

throughout the programme, especially in the opening and closing ceremonies. **f**, Over 28,000 learners were reached as part of the GA education and outreach efforts, including about 1,000 learners visiting the venue itself. **g**, Online-first events offered as part of the GA included tours, networking sessions and fireside chats, such as the one pictured here with Brian Schmidt (see also ref. 4). **h**, The GA was made possible by a large, diverse and dedicated organizational effort, some of whom filled the stage during the closing ceremony.

years leading up to the IAU GA, but pushed forward its growth through scholarships, research support, prizes, and scores of education and public engagement events. All of this was fuelled by Vision 2024 and the eager anticipation of the world's astronomers convening in Africa.

Organizing the event with an African spirit

The African continent is known for many things, but there are few more inspiring than the ubiquitous spirit of innovation, determination and resilience. Underlying this is the foundation of caring for one's community and recognizing that we are who we are because of the people around us – a principle rooted in the philosophy of 'Ubuntu'. As this was to be the first IAU GA on the African continent, we strived to showcase this culture alongside the rich scientific aspects of the meeting. Three pillars guided our organizational process: accessibility, impact and sustainability. By establishing and reflecting on these pillars, we defined a series of key objectives, such as open access, societal impact, hybrid conferencing, and more. From the outset, we committed ourselves to delivering on these objectives, often driving innovation and finding the necessary resources to achieve our goals.

From a technological perspective, this IAU GA boasted several 'firsts', as it forced out-of-the-box thinking (see ref. 4 for more details). For example, it was the first open-access IAU GA, with sessions streamed live on YouTube for free. We were able to employ a creative solution to the hybrid poster session that enabled presenters and viewers to interact online and in person. Posters and abstracts remain available on the GA website and indexed on the [NASA Astrophysics Data System](#). As another avenue to foster relationships between online and in-person participants, a partnership with "The Future of Meetings" (TFOM³) led to the development of a virtual reality (VR)-compatible immersive online space using the platform Spatial, offering both structured events and an online venue for organic social interaction.

In addition to the structured conference setting in the Cape Town venue, there were also spaces available for unconference gatherings

and side activities where participants could hold workshops, hackathons, and other unstructured events. From the floor of the exhibit hall, a live radio broadcast (Radio Astro) streamed for eight hours a day each day of the IAU GA, popularizing the science of the conference and the contributions of its delegates. Finally, by including an African craft market called 'Jabula' (meaning 'happy') on the conference venue premises, this IAU GA had a positive impact on local small businesses, underscoring the importance of community. The conference also provided free childcare, and an extensive programme of social events ensured that participants had opportunities to engage with each other on a cultural level. Many participants mentioned the recognition of the humanity of scientists as a highlight of the conference.

Meeting our objectives was no small task. It required that everyone – from our core team members to the service providers to the IAU itself – had to be willing to step out of their comfort zones. We encountered many barriers within the usual conferencing industry, such as limited flexibility in conference formats and high costs. These industry norms often conflicted with our goals, and we were frequently told that many of our objectives were simply not possible. It sometimes required drastic measures to overcome such obstacles but above all, it required the spirit embodied in Nelson Mandela's famous quote, "It always seems impossible until it is done." If one takes a principled decision that makes something non-negotiable (for example, hybrid conferencing to ensure accessibility), then the planning and budgeting must all take shape around that principled decision. The constraints that the conferencing industry places on events of this size have to be challenged, negotiated and addressed to achieve better outcomes for the sake of the communities that these events aim to serve. In this spirit, it must be noted that the widespread model of impossibly high registration fees, especially for those in developing regions, also needs critical reflection as we try to make future meetings more inclusive. Were it not for generous sponsorships received, as well as quid pro quo arrangements with participants to contribute to the organization

in exchange for registration waivers, we would not have been able to bring together as many people as we did.

The motivation behind these endeavours was not simply to show the world what Africa is capable of but also to demonstrate to the organizers of future astronomy meetings what is possible with some creative thinking and goals that put the community first. The openness of the IAU to new ideas and innovation for their GA must be acknowledged, as their support and trust in the local organizers remained steadfast. The incredibly large organizing team comprising staff, volunteers and partners also have to be acknowledged with the utmost of fervour. Without their tireless, passionate, dedicated efforts, none of this would have been possible.

Reaction of the community

As the organizers of this event, we can only describe the overwhelmingly positive reactions of the community as humbling. Although detailed feedback remains to be analysed, there have been almost unanimously positive messages of support and congratulations that flowed in during and after the event, with participants expressing appreciation for the world-class venue, the kindness and support from the organizing team, the numerous social, outreach and networking opportunities, the dedication to accessibility through fully hybrid sessions, childcare, and many other aspects.

However, there were also significant challenges. For example, several participants faced frustrations and challenges in obtaining visas. Most of these cases were addressed through interventions by colleagues in the South African government. Geopolitics also proved an obstacle, as some refused to attend due to South Africa's stance on the Israel–Palestine conflict. One of the most difficult challenges the organizing team faced was the high registration fees. We note that the fees were roughly the same as other IAU GAs and large international astronomy meetings, but these were simply unaffordable for many African astronomers and those from developing regions (another reason that open access was important). The cost and large carbon footprint of travel were also restrictive, which made the virtual option an essential means of participation for many. The demand for fee waivers and travel grants was extremely high, with over 1,400 requests for support. During the event itself, many challenges had to be addressed on the fly. These included session chairs often failing to acknowledge online participants; some logistical and technical issues affecting the hybrid poster session; a handful of positive COVID tests; and criminal activity in some areas around the venue. In the end, organizers attempted to deal with every situation quickly and responsibly, with the participants in mind, and this was reflected and appreciated in much of the participants' feedback.

The high demand for grants, in addition to the baseline costs of running a large-scale conference, placed a heavy burden on the budget. About one month before the event, there were far fewer paid registrations than anticipated, which, if left unchecked, would have amounted to a substantial deficit. To ultimately balance the budget, the organizing committee worked hard to increase the contributions from our sponsors and negotiate lower costs with suppliers. All of this was accomplished without sacrificing key elements of the conference.

In the end, however, the astronomy community's response to the first GA in Africa far outweighed any logistical issues. For years leading up to the event, we have enjoyed the invaluable support from astronomers worldwide who have been more and more willing to explore collaborations with African astronomers. The European Astronomical Society and American Astronomical Society have been particularly supportive, with both organizations encouraging a significant African

presence at their conferences in the years leading up to IAU GA. These opportunities for engagement, through events like the session on Africa–Europe Collaborations in Astronomy (2022) and the Astronomy Session at the US–Africa Summit (2022), were both key side events driven strongly by AfAS, have not only helped to connect astronomers in Africa with some of the leading international organizations but have also made the international astronomy community more aware of the many possibilities for collaboration. This awareness and engagement undoubtedly contributed to the incredible response to our call for exhibitors and participants at the first IAU GA in Africa. It also inspired numerous individuals to contribute to crowdfunding initiatives such as the LSST-DA's IAU Travel Fund for African Astronomers, and the 'donate a registration' option for paying participants to support their peers' attendance. The attendees of the IAU GA also responded in numbers to a call for participation in education and outreach initiatives, with over 600 participants signing up to visit schools and give public talks. There is little doubt that the relationships and collaborations sparked before and during the IAU GA will continue well into the future.

Impact and legacy

The formal programme of the IAU GA comprised 6 scientific symposia, 12 focus meetings, 6 working group meetings, 9 division meetings and 5 institutional meetings over 8 days. By the end of the conference, 2,648 participants (2,045 in-person and 603 virtual) from 107 countries (28 African countries), of which 647 were students (500 in-person and 147 virtual), joined 211 oral and 16 poster hybrid sessions. In addition, participants enjoyed social and side events, including 16 'online-first' events, targeting the large number of virtual participants.

Thanks to support from the IAU and generous contributions from donors such as the Simons Foundation, individual contributions through LSST-DA's crowdfunding initiative, the South African DSTI, and several embassies and high commissions, a total of 901 grants were awarded. These grants enabled many participants to attend from around the world, with approximately 474 registration fee waivers and grants specifically allocated to African participants.

There were 20 sponsors and 43 exhibitors in a large and engaging exhibition hall that included an unconference space and side meeting rooms. The bespoke VR-compatible immersive online conference venue built on the platform Spatial had over 4,200 views, and there were over 1,100 active members on Slack, with 262,000 messages sent from 18 July to 18 August. From 6–15 August, the open-access streams on YouTube had 17,900 views and 326 new subscribers to the channel. There were 7,200 unique viewers, with a total watch time of 2,700 hours. Since the channel's launch in February until 22 October, it has gained 25,300 views, 418 new subscribers, 10,100 unique viewers, and 3,400 hours of total watch time. The social media efforts included a campaign across Flickr, Facebook, Instagram, Twitter/X, Bluesky, LinkedIn, and TikTok, reaching a total of 1.9 million people, with 44% of that during the GA period. The average engagement rate, excluding YouTube and Flickr, was around 11%, calculated using reach and interaction metrics specific to each platform. Media coverage was extensive, with media monitoring services reporting a total media circulation of 87,993,115 (total media circulation refers to the cumulative reach or potential audience size across all media outlets that covered the event).

With the help of participants who volunteered to be a part of the GA's extensive outreach and education programme, these activities reached around 28,000 school learners, 85 targeted educators and 3,800 members of the public. The many outreach activities will continue, with a large team of astronomy 'ambassadors' emerging from

the IAU GA. One of the first tasks for this group will be delivering the 100 hybrid poster systems (comprising a 40" screen, Raspberry Pi computer, webcam, mouse and keyboard) to 100 schools, in partnership with the Western Cape Education Department, enabling remote teaching and further engagement activities. For a detailed overview of the outreach activities for this conference, see ref. 6.

Students who assisted with the organization in exchange for a fee waiver continue to rave about the event, emphasizing how the opportunity to attend has significantly impacted their careers. For some, it provided invaluable exposure to leading experts, cutting-edge research, and networking opportunities that have opened doors to further study, collaborations, and career advancement in astronomy.

Conclusion

The IAU GA brought together the largest number of African attendees for any academic astronomy conference, exposing this community to the latest science, the largest astronomy organizations and some of the best scientists in the world, with several of the scientific symposia and focus meetings chaired, or having strong SOC participation, by African astronomers. For the scientists, students and broader astronomy community of the world, the resources emerging from this meeting, such as the recordings of talks and posters, will remain accessible indefinitely. AfAS was at the centre of organizing this event, in partnership with the official host organisation, the NRF, and thus will ensure the legacy of the first IAU GA in Africa.

It is our hope, as the organizers of this unprecedented astronomy conference, that future large meetings adopt similar principled positions on issues such as accessibility, impact and sustainability (see ref. 4 on the innovation enabled by emerging technologies for this conference). We hope that we have demonstrated what is possible when we, as a community, are bold in our ambitions to drive astronomy forward and to push towards a bigger picture that may sometimes deviate from the status quo. We hope that we have demonstrated that the challenges we may face along the way, no matter how insurmountable they may seem, can be overcome in order to realise our impact both on astronomy and society. Above all, we hope we have shown the importance and benefits to astronomy in pushing the boundaries of what is considered possible; not only in our science, but just as importantly, in how we meet and collaborate. That while it is the science that drives us, it is our humanity that unites us. That it is our shared skies, shared friends and shared experiences that bind us together, regardless of distance, and never is it more apparent, or more important to remember this, than when planning the largest gatherings of our community.

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Competing interests

The authors declare no competing interests.