

Record of the Fifth Ministerial Forum of the African Square Kilometre Array (SKA) Partner Countries (2018)

1. Ministers and representatives of the governments of Botswana, Ghana, Kenya, Madagascar, Mauritius, Mozambique, Namibia, South Africa and Zambia met on 16 October 2018 in Cape Town, South Africa, as the African SKA consortium that is preparing for the eventual implementation of Phase 2 of the global SKA project in their countries.
2. Their purpose in meeting was to review progress against three joint flagship projects – namely the African SKA, the African VLBI Network (AVN), and the Big Data Africa initiative – through which the African SKA partnership is preparing itself for the implementation of SKA Phase 2.
3. The Ministers received presentations on the status of the above projects, on progress in implementing joint communication and funding strategies, and on human capital development activities. The Forum took note of developments on the international SKA project and its timelines. Partner countries also noted the successful launch of MeerKAT, and looked forward to visiting the site.
4. The Ministers believe good progress is being made in (a) human capital development initiatives, (b) establishment of relevant institutional arrangements, (c) formulation of new academic programmes around physics and astronomy, (d) site selection processes, (e) the roll-out of high performance computing capability, and (f) science engagement and outreach. The Ministerial Forum also noted various benefits beyond astronomy in the socio-economic domain that were alluded to by partner countries.
5. The Ministers noted with appreciation an offer from South Africa to encourage further development of astronomy in partner countries beyond specific radio astronomy projects, by supporting the development of national astronomy strategies in partner countries, and assistance in procuring affordable optical astronomy telescopes suitable for undergraduate teaching and training of astronomy. South Africa will engage partner countries on a case-by-case basis, as they express interest in this offer.
6. An overview of the status of AVN initiatives in each country was also presented. Partner countries noted that the implementation of the AVN project was proceeding in slightly different ways across the consortium, in alignment with the agreement at the last meeting of the Ministerial Forum that the exact manner in which the AVN project would be rolled out would be determined on a bilateral basis. Nonetheless, there is clear evidence of important progress in all partner countries.

7. With regard to site selection activities, the Ministers noted that several site surveys were done in Ghana, Madagascar, Botswana and Mauritius, and specific engagements on SKA remote sites continue on a bilateral level between SA and each partner country, as had been agreed at the 4th meeting of the Forum.
8. All partner countries reported financial constraints that hampered the full rollout of the AVN project, which further underscores the importance of designing a bespoke approach on a bilateral basis on how to take forward the development of radio astronomy capacity in each partner country.
9. With the eventual operationalisation of the Kuntunse AVN dish in Ghana and the establishment, therefore, of a continent-wide two-dish interferometer (the HartRAO dish in South Africa being the second one), the prospects for AVN science within the partnership increase significantly. In this regard, the Ministers requested the South African Radio Astronomy Observatory, in consultation with the Ghana Radio Astronomy Observatory, to develop a framework that would encourage such joint intra-partnership scientific collaboration. This framework should address details of how project proposals would be invited and scientifically evaluated, and would need to make recommendations on funding, within the protocols and procedures that normally apply to astronomy infrastructures. A report should be submitted to the Working Group and the Steering Committee at their meeting in 2019.
10. The Ministers were informed that throughput rates of students on the SKA HCD programme are much better than for the national average in South Africa, and they noted that a total of 127 students from partner countries have benefitted from the HCD programme to date, of 136 African students overall. A total of 14 graduated with Honours, 32 with Masters and 24 with Doctoral degrees thus far. Given the significant imbalance in gender demographics, the Ministers agreed that nomination and selection of beneficiaries should prioritise woman applicants wherever possible.
11. The South African Radio Astronomy Observatory (SARAO) will send detailed information to partner countries on students supported through the bursary programmes, so that partner countries can follow up with the individuals concerned in order to enhance the likelihood that they will return to their home countries.
12. The Ministers took note of the Development in Africa through Radio Astronomy (DARA) programme, which was specifically designed to support the African SKA and AVN projects. Funded by South Africa and the United Kingdom (through the Newton Fund), this programme has established an extensive scope of astronomy outreach and training projects across all partner countries in a series of tri-lateral arrangements. The DARA programme is making very valuable contributions to strengthen radio astronomy in partner countries.

13. The Ministers noted the importance of the Big Data Africa project for both astronomy as well as more general preparations for the fourth industrial revolution.
- The Ministers believe good progress is being made on the rollout of the cyber infrastructure and training, but moving forward emphasis must be placed on identifying scientific projects that can effectively utilise this infrastructure.
 - Given the significance of Big Data and cyber infrastructure in economic development, at both national and regional levels, it was agreed that South Africa and Namibia would explore ways of integrating the Big Data Africa activities in SADC into the SADC Industrialisation Strategy, taking into account prior work within SADC, and would liaise with the other partner countries in SADC. Kenya will explore a similar intervention in East Africa, and Ghana in West Africa. The Ministers agreed to try and secure presentations on this work at meetings of regional bodies as well as the African Union.
 - The Ministers congratulated Botswana on securing the hosting of the International Data Week conference.
14. It was reported to the Ministers that South Africa had funded participation by all partner countries in the IAU “Communicating Astronomy with the Public” Conference in Japan in March 2018, as part of the Multiwavelength Astronomy Public Participation Programme (MAPPP) under the Communication and Awareness Strategy. The next phase of MAPPP, however, has been costed at USD91 500, which SARA0 is unable to underwrite, meaning that the next phase must be co-funded with partner countries. It was agreed that partner countries would need to fund their own participation.
15. The Ministers noted that improvements need to be made at the national level in all partner countries in respect of funding for science in general, and astronomy specifically. In the meantime, efforts to raise funds must be coordinated across the partnership, and all partners should continue to stress the need for investment in infrastructure for the fourth industrial revolution, in their engagements with relevant development partners and with regional and continental organisations in Africa. In consultation with other partner countries, South Africa will further refine various options for taking forward and securing funds for the AVN project within the context of this partnership, in order to enhance its sustainability.
16. The Ministers noted the following development, in particular:
- Botswana: significant efforts under way to boost astrophysics at the Botswana International University of Science and Technology (BIUST), and rollout of the two-dish interferometer and high performance computing infrastructure at the University of Botswana are progressing. Botswana is also making advances in open data and open science, and is in the process of finalising the Space Science Strategy.
 - Namibia: a professor has been appointed to occupy the joint Research Chair in Astronomy/Astrophysics to be shared between North-West University in South African and the University of Namibia. The University of Namibia has conducted a

stakeholder consultation on the envisioned Master's degree in Physics planned for 2019. The Space Science Council under NCRST continue to be operational.

- Ghana: a paper was published on testing the accuracy of the Ghana dish both as a single dish and as part of the European VLBI. Rollout of high performance computing infrastructure and relevant training programmes is under way. Ghana is also finalising the space policy and strategy.
- Kenya: Kenya signed the MoU in May 2018, completing the process of the MoU. Kenya will also soon be receiving the high performance computing infrastructure. Universities in Kenya have partnered to acquire and operate two 7,2 metre radio dishes for radio astronomy training.
- Madagascar: the dish site has been cleaned and repaired and is ready to commence conversion. The Malagasy Radio Astronomy Observatory (MRAO) has been established and its headquarters are located in the Ministry of Higher Education and Scientific Research.
- Mauritius: a national SKA steering committee with key stakeholders has been put in place and is also coordinating investments in big data initiatives – these include a research laboratory on big data, machine learning and artificial intelligence that is being established at the University of Mascareignes.
- Mozambique: significant efforts are under way to boost astrophysics at the Eduardo Mondlane University through the rollout of the two-dish interferometer and computer lab, as well as the rollout of high performance computing infrastructure through MORENET.
- South Africa: construction of the 64-dish MeerKAT telescope was completed on time, and the facility is already producing impressive scientific results. Through a merger of radio astronomy facilities (SKA SA, HartRAO and AVN) the South African Radio Astronomy Observatory (SARAO) has been established.
- Zambia: a national SKA steering committee with key stakeholders has been put in place and is also coordinating SKA/AVN activities in outreach, high performance computing and the envisaged conversion programme. A local school has been identified to be established as a centre of excellence for STEM education advancement.

17. The Forum congratulated South Africa on the successful bidding to host the General Assembly of the International Astronomical Union (IAU) in South Africa in 2024, the first time in Africa, and agreed that partner countries would explore with the IAU's Office of Astronomy for Development ways in which they could support this initiative. The Ministers also took note that it was now possible for countries to join the IAU as observers, and congratulated Ghana, Madagascar and Mozambique for already having done so.

18. The next Ministerial Forum and Senior Officials' meeting will be held at a time and place still to be determined.