

Development In Africa with Radio Astronomy - Overview

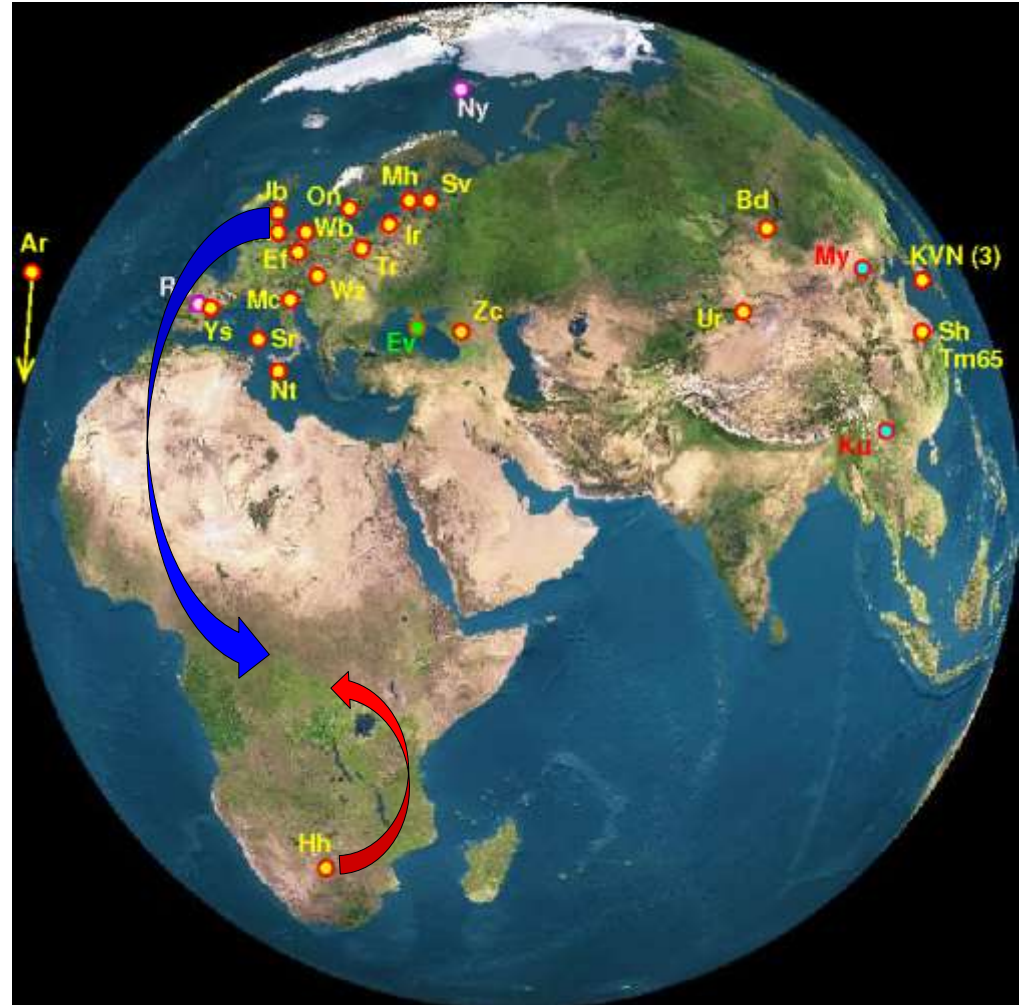
Prof Melvin Hoare
University of Leeds, UK



The DARA Project



- Joint UK-South Africa Newton Fund project
- £814k of UK Newton funding for period Jan 2015 – Mar 2017
- Resources matched by South Africa



UK-SA Partnership



UK



S
A



science
& technology

Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA



National
Research
Foundation

UK Academic Partners



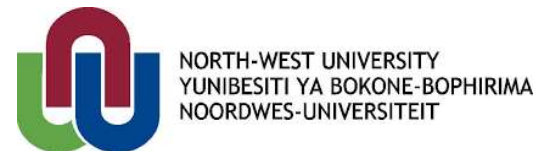
- World leading radio astronomy research groups



- Soon to be joined by:



South African Partners



UNIVERSITY of the
WESTERN CAPE



African Partners



Industrial Partners



- Industrial partners who are experienced entrepreneurs
- Expose trainees to related industries such as space science and satellite communications



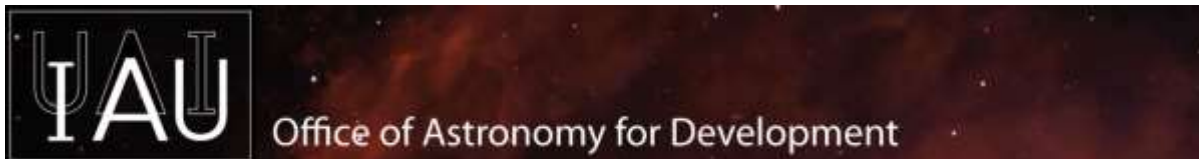
Outreach Partners



- Train the basic trainees to build up a network of local outreach providers in country
- Build regional collaborations via IAU OAD Regional Offices



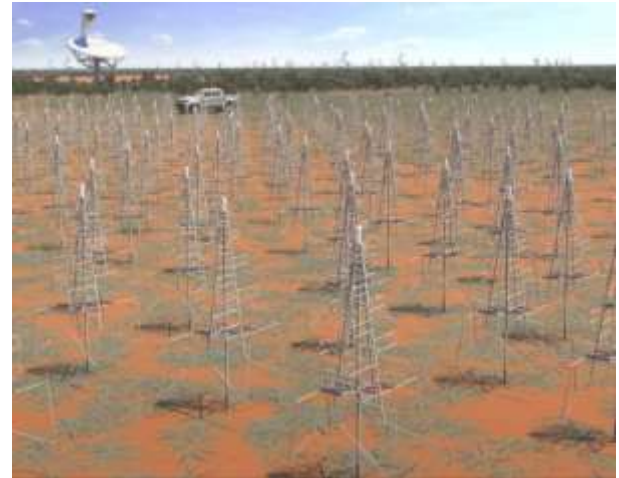
Outreach
Partners:



International Context



- The next generation radio telescope is the Square Kilometre Array
- A low-frequency array of 130,000 dipoles to be built in Australia
- A mid-frequency array of 200 dishes to be built in SA by 2023
- Build out from the MeerKAT array of 66 x 13.5 m dishes under construction

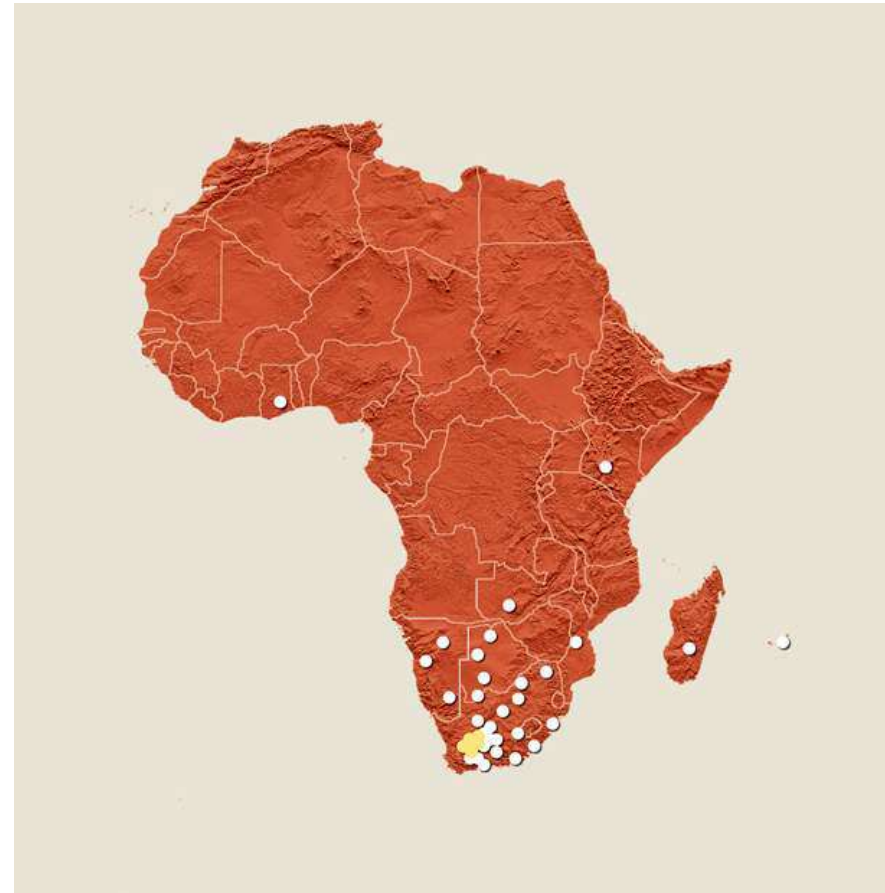


SKA Phase 2

- ~2000 dishes located across Africa by ~2030
- Located in 8 partner countries
- Biggest ICT project in the world



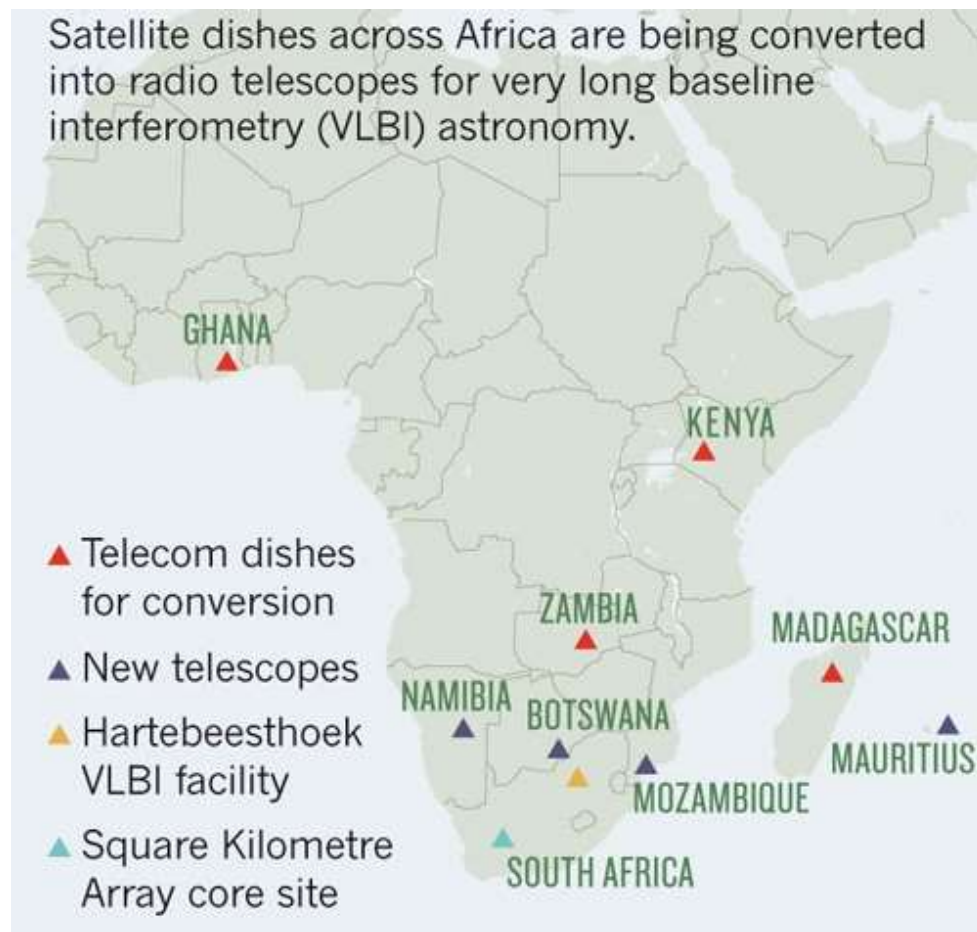
Square Kilometre Array, South Africa



African VLBI Network (AVN)



- Prior to the SKA a network of dishes is being established in the partner countries by SKA-SA
- This will form a very long baseline interferometer (VLBI) network in Africa



Project Structure



- Basic Training Programme
 - An introduction to radio astronomy for graduates
- Advanced Training Programme
 - MSc and PhD places in the UK
- Big Data Training Programme
 - Joint summer schools and JEDIs with other fields such as bioinformatics, space science and commercial data



Big Data Africa Summer School

Cape Town, 2 – 12 April 2017

With Practical Data Science Applications to Astronomy & Bioinformatics



The Big Data Africa Summer School aims to introduce **fundamental data science tools & techniques** to talented young science graduates across a range of disciplines, who have an interest to develop their skills and knowledge in working efficiently on extremely large datasets in any research environment.

All selected students are expected to work on a practical computational project in one of the themed areas of Astronomy or Bioinformatics before and during the school with their results to be presented to a panel at closing of the school.

Summer school is made possible by the following partnering organizations :



Who can apply :

- Only students from the 8 SKA Africa Partner countries will be considered – **Botswana, Ghana, Kenya, Madagascar, Mauritius, Mozambique, Namibia, Zambia;**
- Students currently in the **Final Year of their BSc Undergraduate / Honours degree** in Astronomy / Astrophysics / Bioinformatics / Biology / Computer Science/ Computer Engineering / Physics / Applied Mathematics;
- Intermediate to advanced programming skills will be advantageous to the applicants.

APPLY NOW

Deadline : 5 December 2016

Advanced Training



- A number of fully funded PhD and Masters places are being awarded at both UK and SA universities
- 3 UK PhD, 4 UK MSc awarded funding so far



Evolution of DARA



- Started with a £180k Royal Society funded project in Ghana from Aug 2014 to Jul 2017



DARA Phase 1



- Year 1 (Jan 2015 – Mar 2015)
 - Funding for computers, books, pulsar backend
- Year 2 (Apr 2015 – Mar 2016)
 - Basic training starts in Zambia and Kenya
 - Advanced training starts in UK and SA
- Year 3 (Apr 2016 – Mar 2017)
 - Basic training starts in Namibia/Botswana
 - Big data summer school
- Years 4 and 5 funded (Apr 2017 – Mar 2019)
 - £100k per year from UK matched by SA

DARA Phase 2



- UK doubles size of Newton Fund
- New 4 year DARA project (Apr 2017 – Mar 2021)
 - An 8-fold increase as funding ramps up to £800k per year
 - In-kind match from South Africa
 - Extend to all AVN countries



DARA Phase 2



- Extend basic training programme to Madagascar and Mozambique starting in Sep 2017
 - Run unit 2/3 practical training three times per year
 - Zambia & Namibia/Mozambique in HartRAO
 - Kenya & Ghana in Ghana
 - Madagascar & Mozambique in HartRAO
 - One large annual network training meeting
- New PhD and MSc training places in UK starting Oct 2017
- New MPhil training places in Mauritius starting Apr 2018

DARA Goes European

- 125k Euro Jumping JIVE project
- Funds trainers from EU radio observatories to help with the DARA basic training
- Funds a seminar series to advertise DARA programme
- Funds African students to attend EU radio astronomy training events
- Funds staff exchanges between EU and AVN countries
- [ASTRON placements (LOFAR)]



DARA is Branching Out



- A sister project: DARA Big Data has been funded alongside DARA2
- £1.5M over 4 years
- Researching synergies in big data techniques with other areas such as climate change, sustainable agriculture, disaster management, smart cities, etc.
- PhDs and MScs in UK and SA in radio astronomy and other areas
- Joint workshops

DARA Goes Global



- 1 year pilot project in Thailand led by Mark Thompson
 - Seminar series
 - 2 week radio astronomy summer school
- 3 year project to follow
 - Linked to construction of new 40 m radio telescope by 2022
 - Possible extension to Malaysia, Indonesia, Vietnam in collaboration with China, Japan and Korea
- £400k 2 year project in Mexico led by Angela Taylor
 - Feedhorn manufacture and digital spectrometer development
 - Feasibility study for conversion of 32 m antenna

DARA in Latin America



- £400k telescope conversion and receiver project in Mexico
- £400k big data project in Colombia
- Potential new training project in Peru from 2018



Summary



- DARA is seen as a big success by the UK Government
- DARA is expanding to cover all AVN partner countries
- DARA is secure until 2021
- DARA collaboration is expanding in the UK and EU
- DARA is expanding to other parts of the world

