

Activities in Namibia

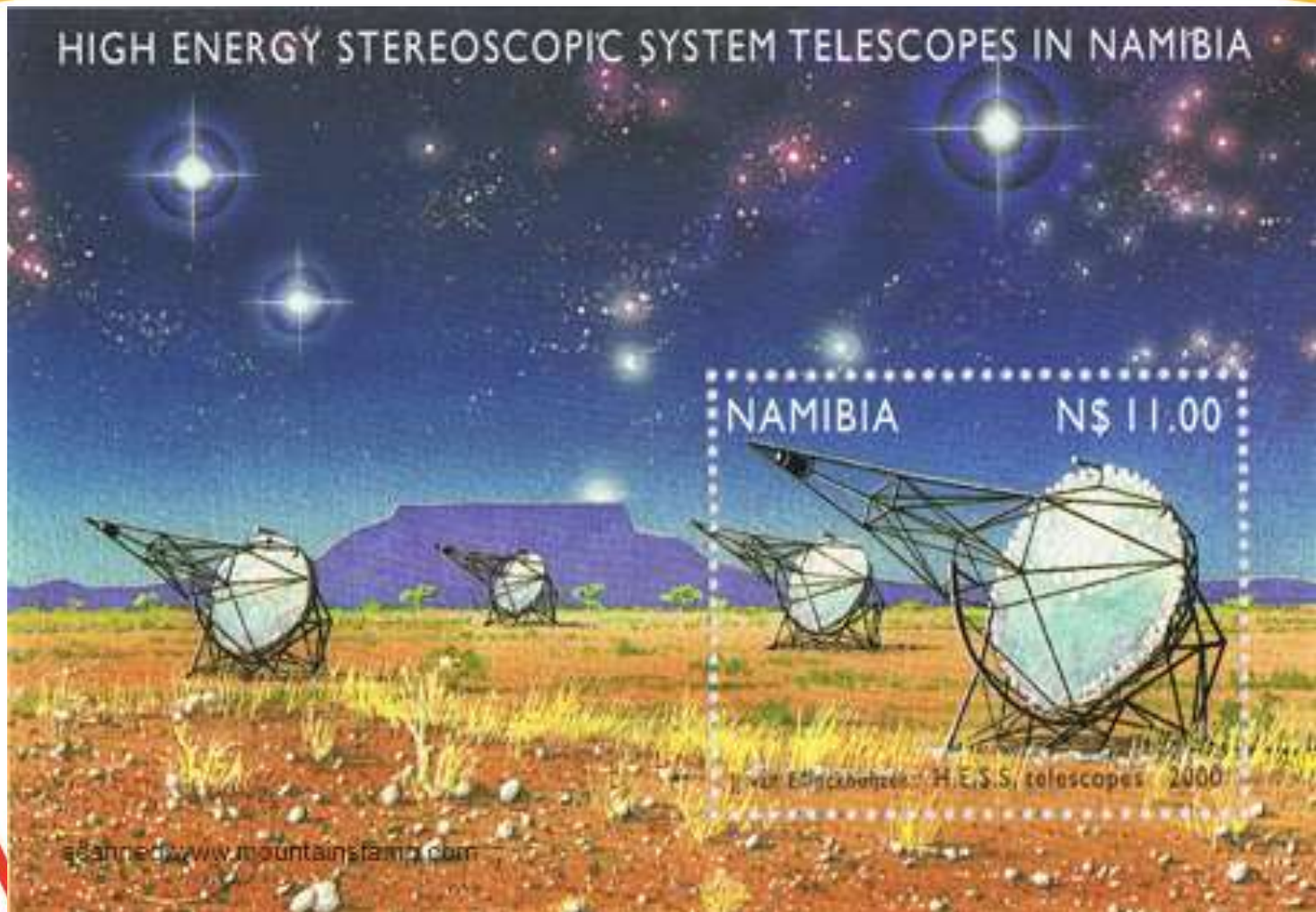
Rhodri Evans (Michael Backes)
University of Namibia

DARA Network Event, 27-29 March 2017

Department of Physics (2017)

- Astrophysics & Space Science research Group
 - R Steenkamp, PhD (HoD)
 - M Backes, PhD (Coordinator: Astro Group, PG Training)
 - Rh Evans, PhD (new staff – starting next week)
 - E Kasai, MSc (PhD ready to submit at UCT)
 - ID Davids, MSc (PhD in advanced stage)
 - K Shiningayamwe, MSc (2017, just started PhD)
- Projects: H.E.S.S., SKA, AVN, AMT

Gamma-ray Astronomy



Radio Astronomy: SKA



Square Kilometre Array

- Core array in Karoo, South Africa
- Several outposts spread over Africa
- Total reflector surface $\sim 1\text{km}^2$

SKA: Namibian Participation

- **Namibia on governmental/agency level involved**
- **Support for training through UK-SA Newton Fund**
- **2 High Performance Computing clusters being set up:**
 - **768 cores, > 1TB RAM each**
collaboration: CHPC (Cape Town)



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- **MeerKAT single-dish telescope
to be build in 2017 for
African VLBI network (AVN)**

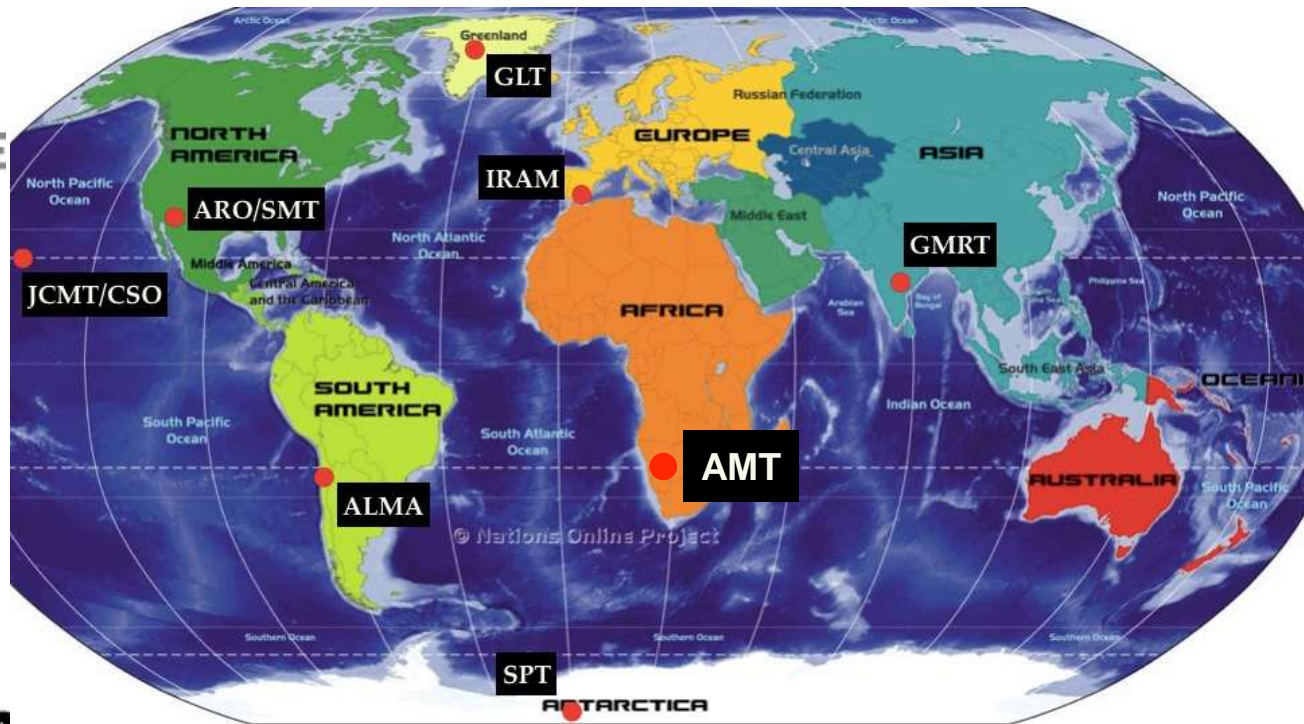


The Galaxy's supermassive BH

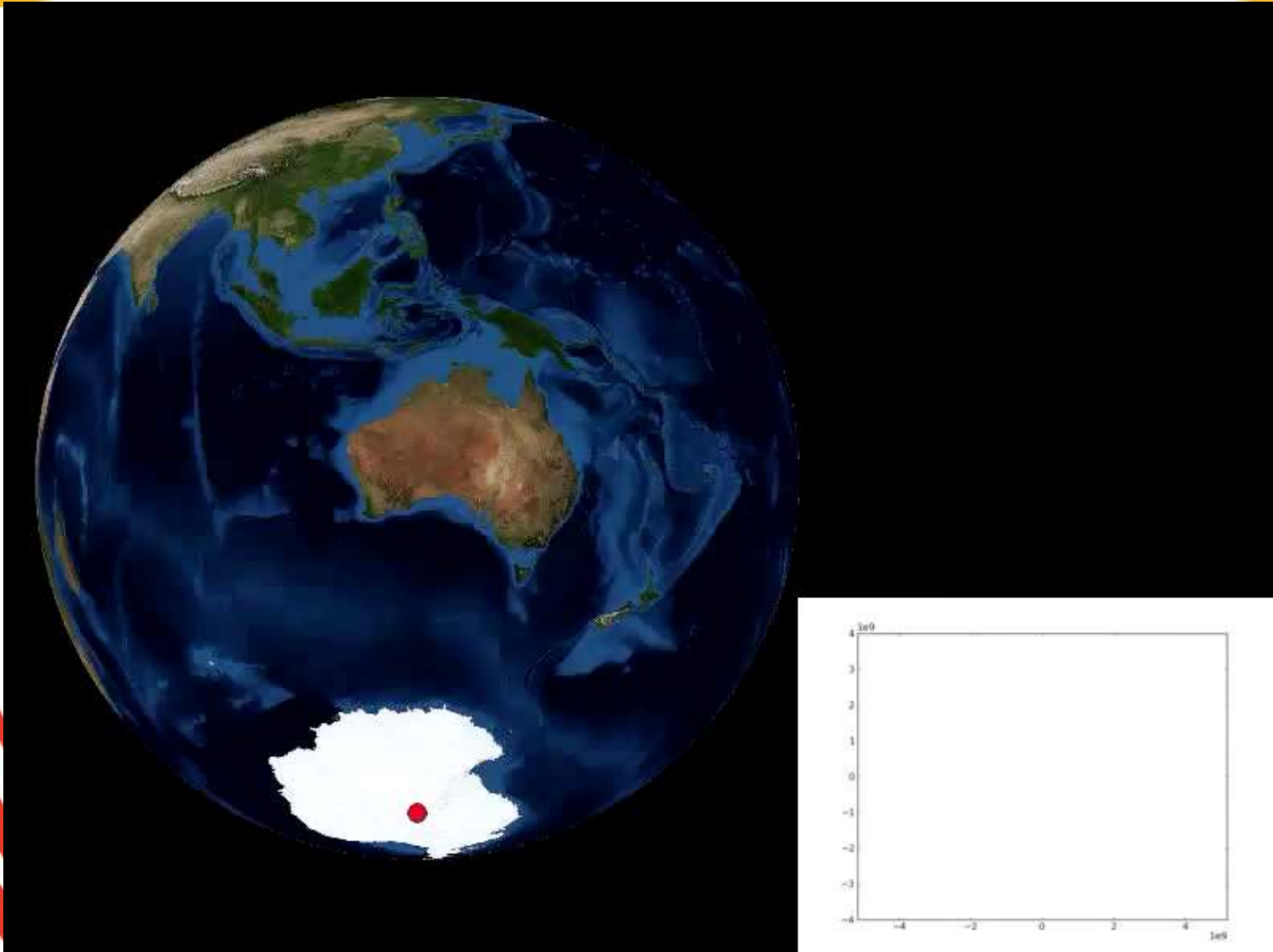
- Now overwhelming evidence for a black hole at the centre of the Milky Way
- Mass measured to be ~ 4.5 million solar masses
- The calculated event horizon at a distance of 8kpc subtends an angle of ~ 10 micro arcsecs
- The only wavelengths which can image the "shadow" of this event horizon (using VLBI) are millimetre wavelengths
 - A baseline of $\sim 6,500$ km

Africa Millimetre Telescope

Radboud University, MPIfR Bonn, HartRAO, Onsala, UNAM

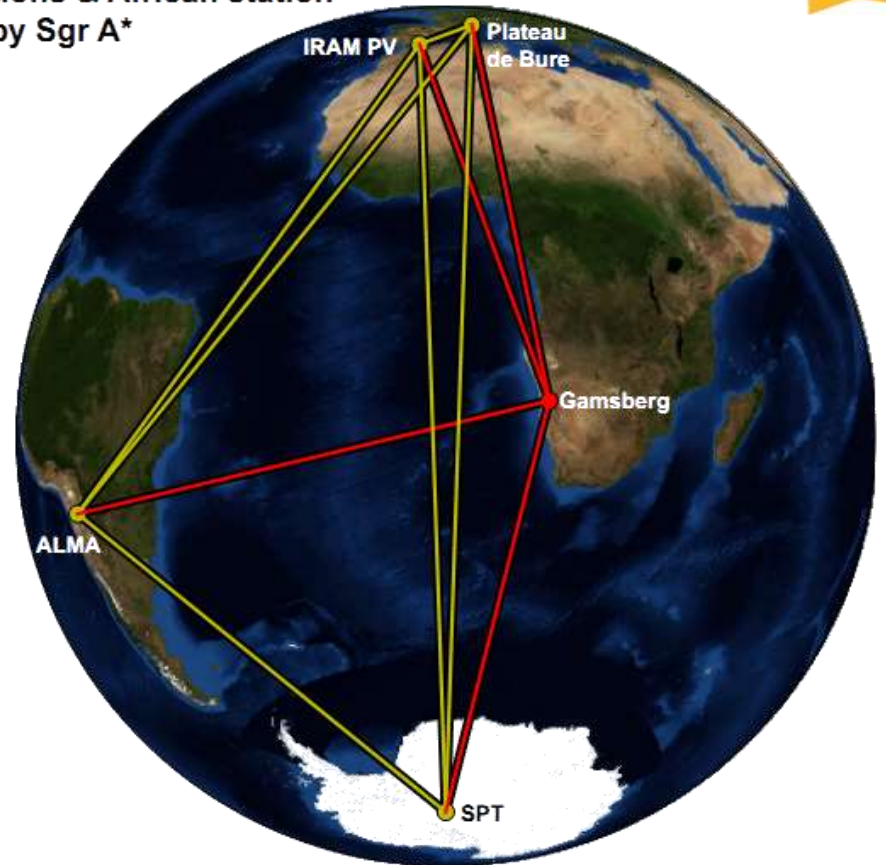
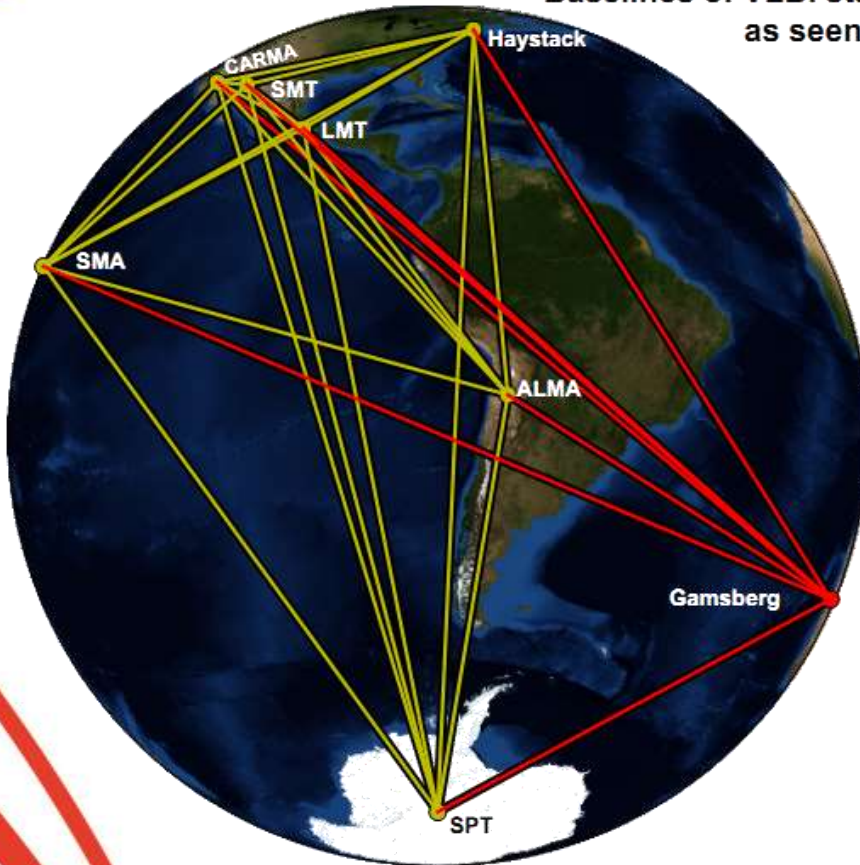


The AMT is a vital link



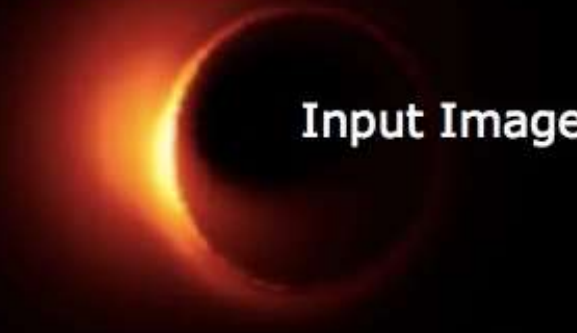
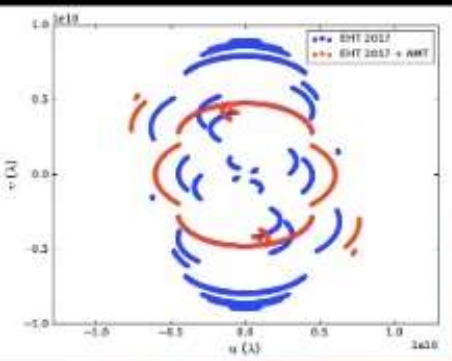
Event Horizon Telescope + AMT

Baselines of VLBI stations & African station
as seen by Sgr A*



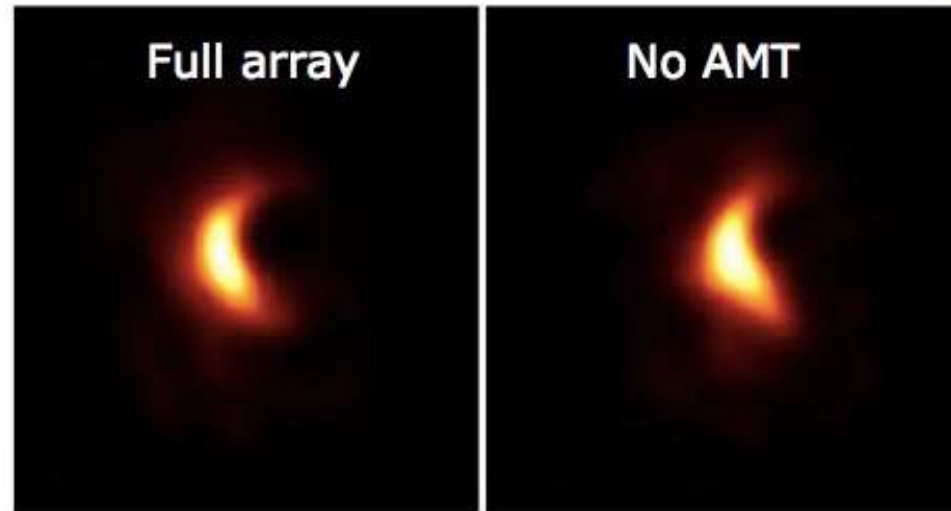
Namibia connects to all the high-sensitivity telescopes: IRAM Pico Veleta (PV), NOEMA (Plateau de Burre); ALMA; LMT

The importance of the AMT



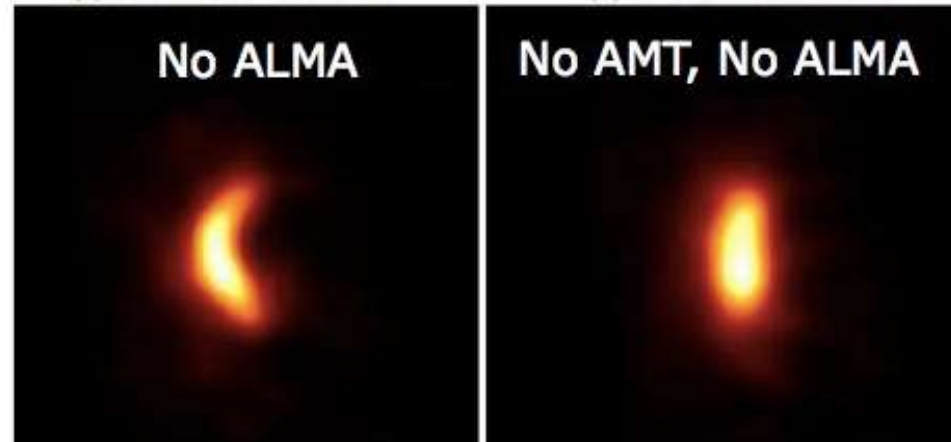
Input Image

- Includes source variability
- Multiple days of observing
- Averaging, smoothing, scaling of visibilities
- De-blurring of scattering



(a) Full array; MSE 0.0753

(b) No AMT; MSE 0.0991



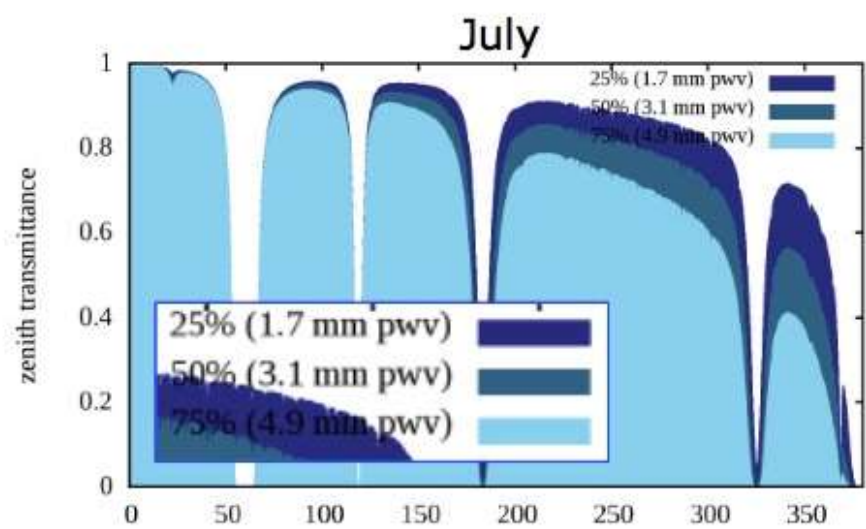
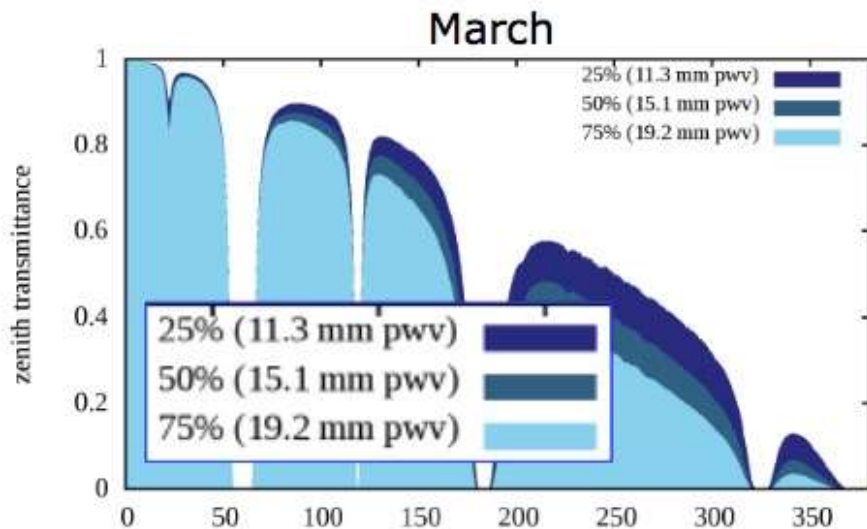
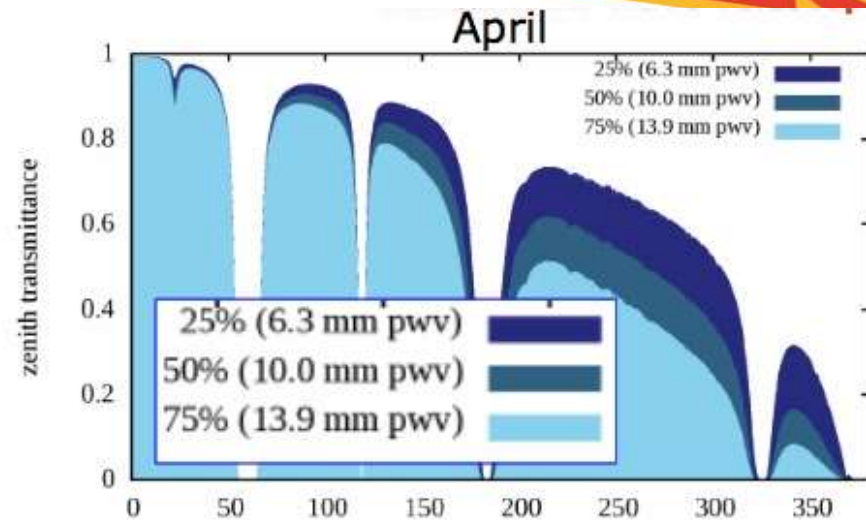
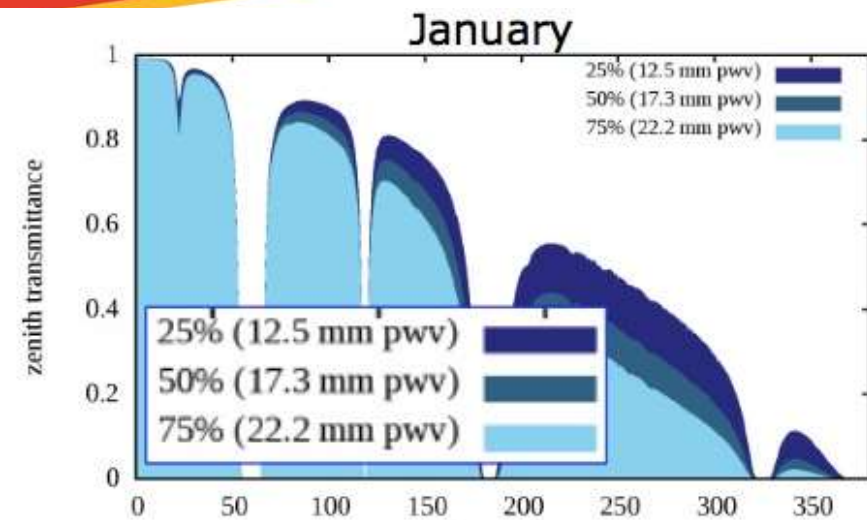
Mt. Gamsberg (2,347 m)



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Gamsberg prelim site testing



x-axis = Frequency in GHz

1mm=300 GHz

Other developments



- **MoU with North-West University Potchefstroom**
- **Joint Research Chair in Multi-Wavelength Astronomy:**
 - joint call by SA NRF and NCRST. Applications submitted
 - waiting for feedback
 - will include post-doctoral and PhD student positions
- Development in Africa with Radio Astronomy
- MoU with Radboud University Nijmegen:
was signed early October 2016

Current Status: Nam – SA

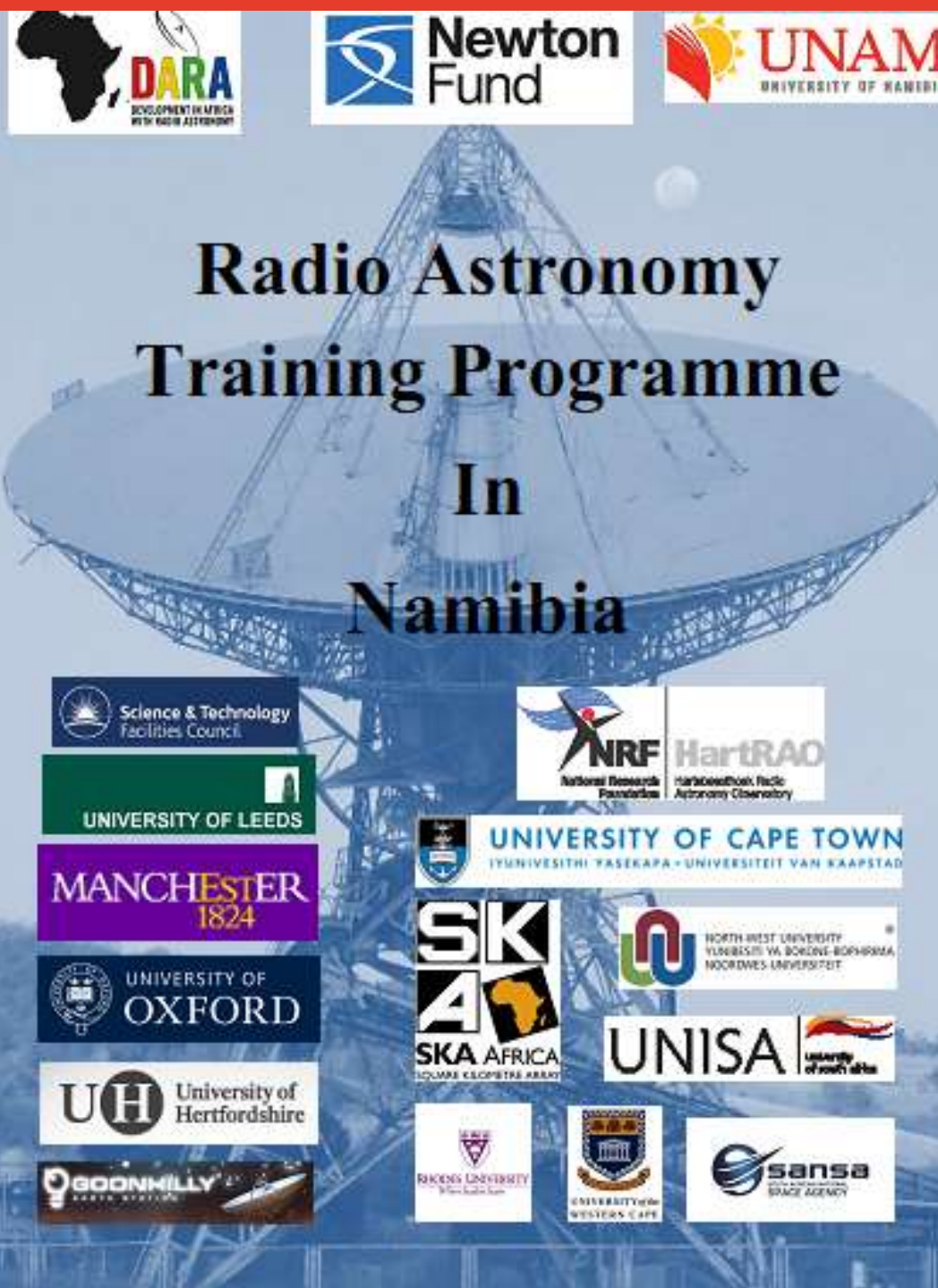


Bi-lateral Ministerial Meeting, August 2014:

- Both committed themselves to enhancing the human capacity for developing a global competitive scientific and technological community in support of Astronomy & Space Science

Astronomy

- MoU with
- Joint Research
 - joint
 - wait
 - shall
- Development
- MoU with



The poster features a large radio telescope dish in the background. At the top, logos for DARA (Development in Africa with Radio Astronomy), Newton Fund, and UNAM (University of Namibia) are displayed. The central text reads "Radio Astronomy Training Programme In Namibia". At the bottom, a grid of logos includes the Science & Technology Facilities Council, University of Leeds, Manchester 1824, University of Oxford, University of Hertfordshire, University of Cape Town, NRF (National Research Foundation) and HartRAO (Hartbeespoort Radio Astronomy Observatory), SKA Africa (South African Radio Astronomy Observatory), North West University, UNISA (University of South Africa), RIKENS UNIVERSITY, University of the Western Cape, and sansa (South African National Space Agency).

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astronomy:
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DARA training (January 2017)

3-17 January. Garret Cotter (Oxford), Markus Böttcher (North West University)



Radboud University branching out to Namibia

Date of news: 4 October 2016

The Vice Chancellor of the University of Namibia, Prof. Lazarus Hangula and Prof. Gerard Meijer, president of the executive board of Radboud University, signed a Memorandum of Understanding today. This collaboration is a further step in the internationalisation of the Radboud University and a step in the development of research education in Africa.



Summary



- UNAM is
 - appointing new staff
 - increasing its graduate student programme
 - Africa Millimetre Telescope and EHT
 - DARA
 - MeerKAT and SKA
 - MoU with North-West University Potchefstroom
 - MoU with Cardiff University (Phoenix Project)
 - MoU with Radboud University
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