

# Development through Radio Astronomy Global Network



Melvin Hoare

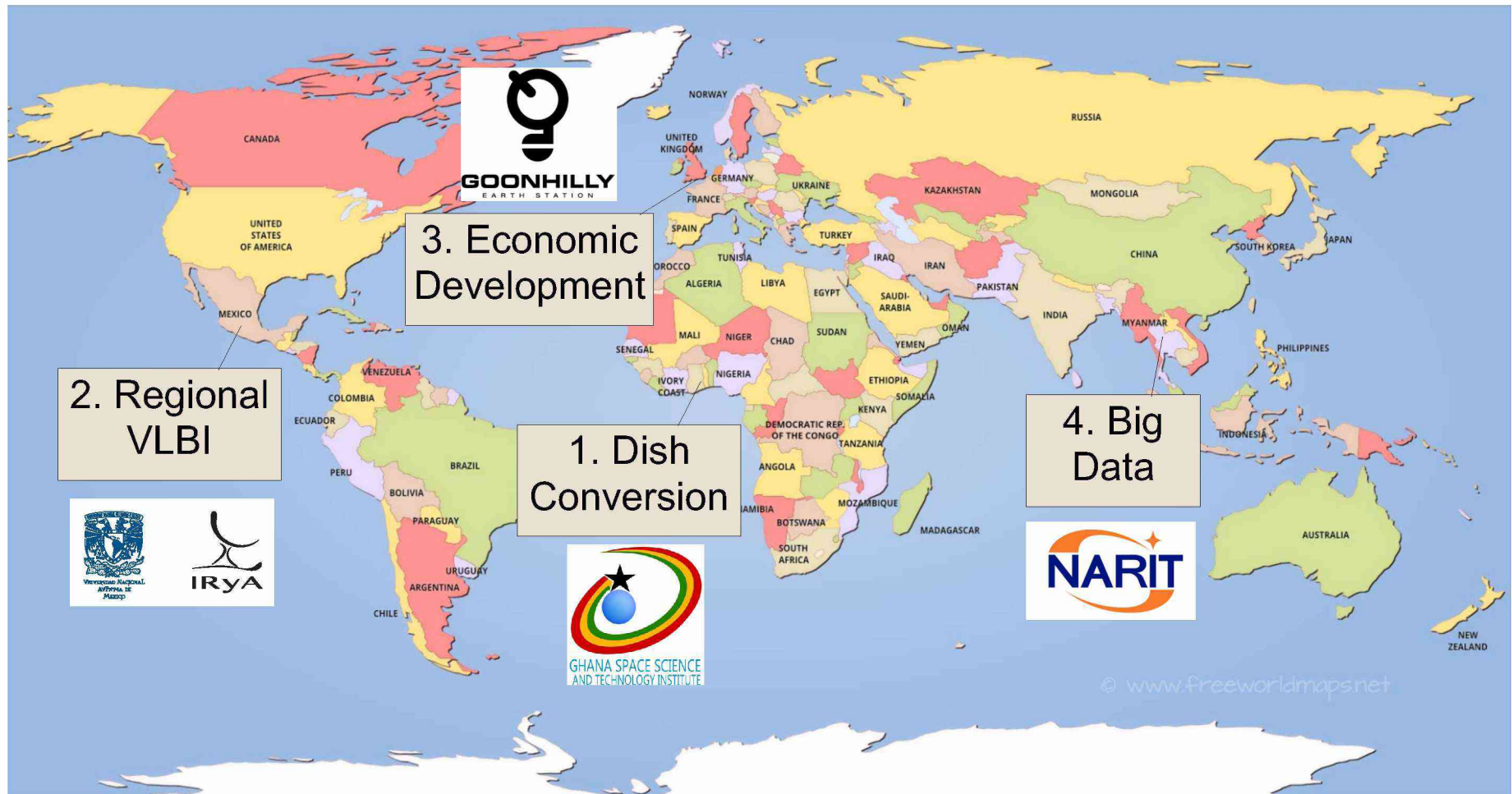
University of Leeds

UK

<https://dragn.info>



# Four International Workshops





# Dish Conversion Workshop

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- 21-25 January 2019, Accra, Ghana
- 24 different countries represented



# Regional VLBI Workshop

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- 25 February – 1 March 2019, Mexico City
- 30 developing countries represented





# A GCRF Project

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- The Global Challenges Research Fund uses the UK Government's Overseas Development Assistance (ODA) budget to fund research that addresses challenges in low- and middle-income countries



Science & Technology  
Facilities Council

UK Research  
and Innovation

# Origins of this Project

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- Bringing together several bilateral projects that are funded by the UK's Newton Fund – another ODA programme – that are ongoing in:
- Africa
- Latin America
- S E Asia



# The DARA Project

- UK- South Africa radio astronomy training project in 8 AVN/SKA Partner countries



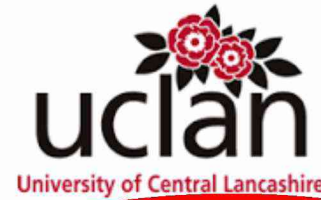


# DARA UK Partners

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University of  
Hertfordshire **UH**





# Newton Fund Projects

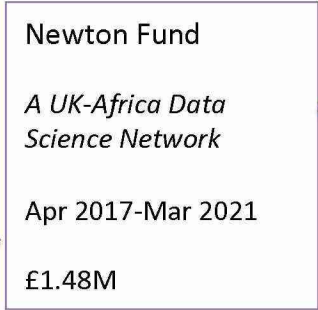
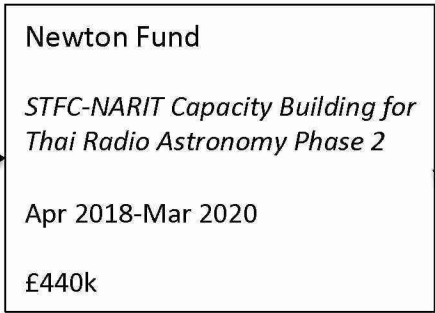
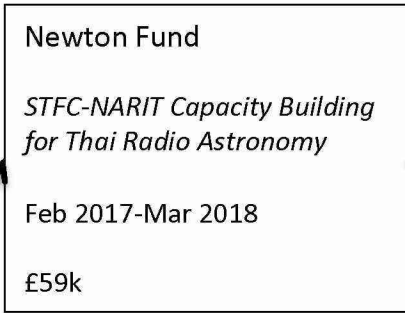
- UK – Thailand
  - Radio astronomy training project
- UK – Mexico
  - Radio astronomy instrumentation
  - Dish conversion project at Tulancingo
- UK – Colombia
  - Big data training project

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S E Asia

Global



Africa

Latin America





# Economic Development Workshop



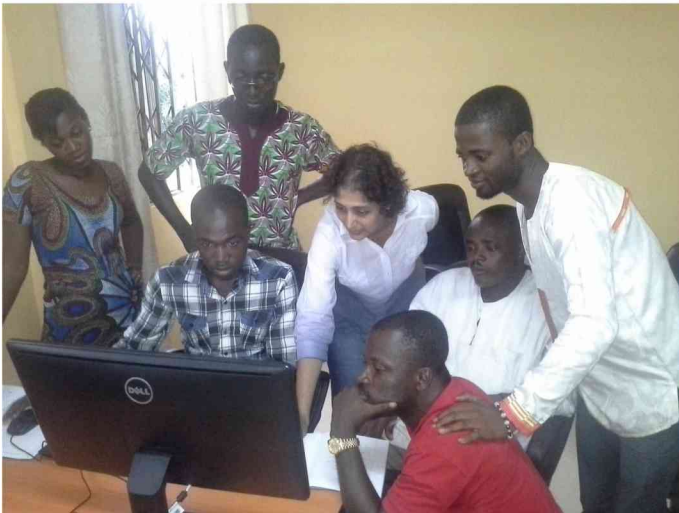
- What are the opportunities for job and wealth creation by establishing radio astronomy expertise and facilities in low- and middle-income countries?
- Colocation of
  - Satellite communications business
  - Remote sensing applications
  - Deep space communications
  - Innovation hubs
  - Data centres and data science
  - Other related scientific instruments, e.g. geodesy
  - Outreach centre

# UN Sustainable Development Goals

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- 4.4 to “substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship”





# UN SDGs

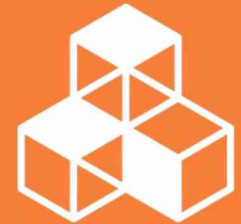
- 9.5 to “enhance scientific research, upgrade the technological capabilities of industrial sectors,...encouraging innovation and substantially increasing the number of research and development workers,...and...research and development spending”.



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**9** INDUSTRY, INNOVATION  
AND INFRASTRUCTURE

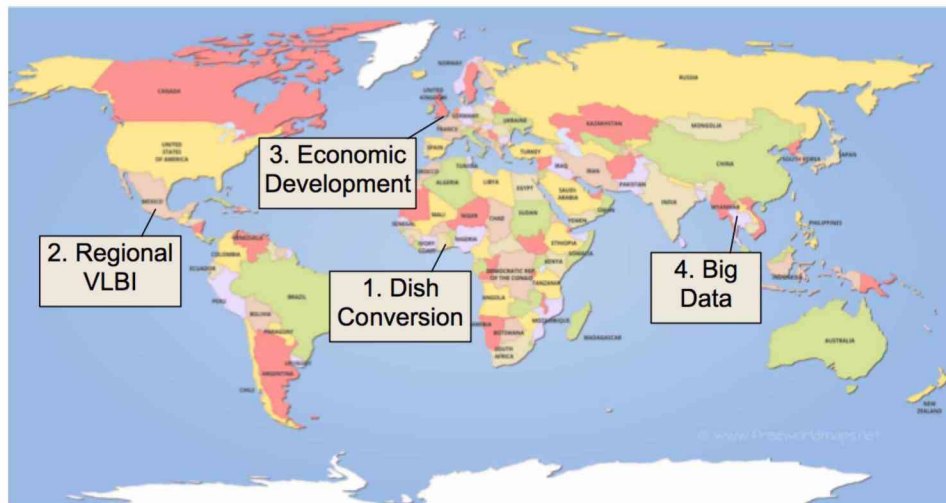


# UN SDGs

- 17.6 to “enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge sharing on mutually agreed terms”.



**17** PARTNERSHIPS  
FOR THE GOALS



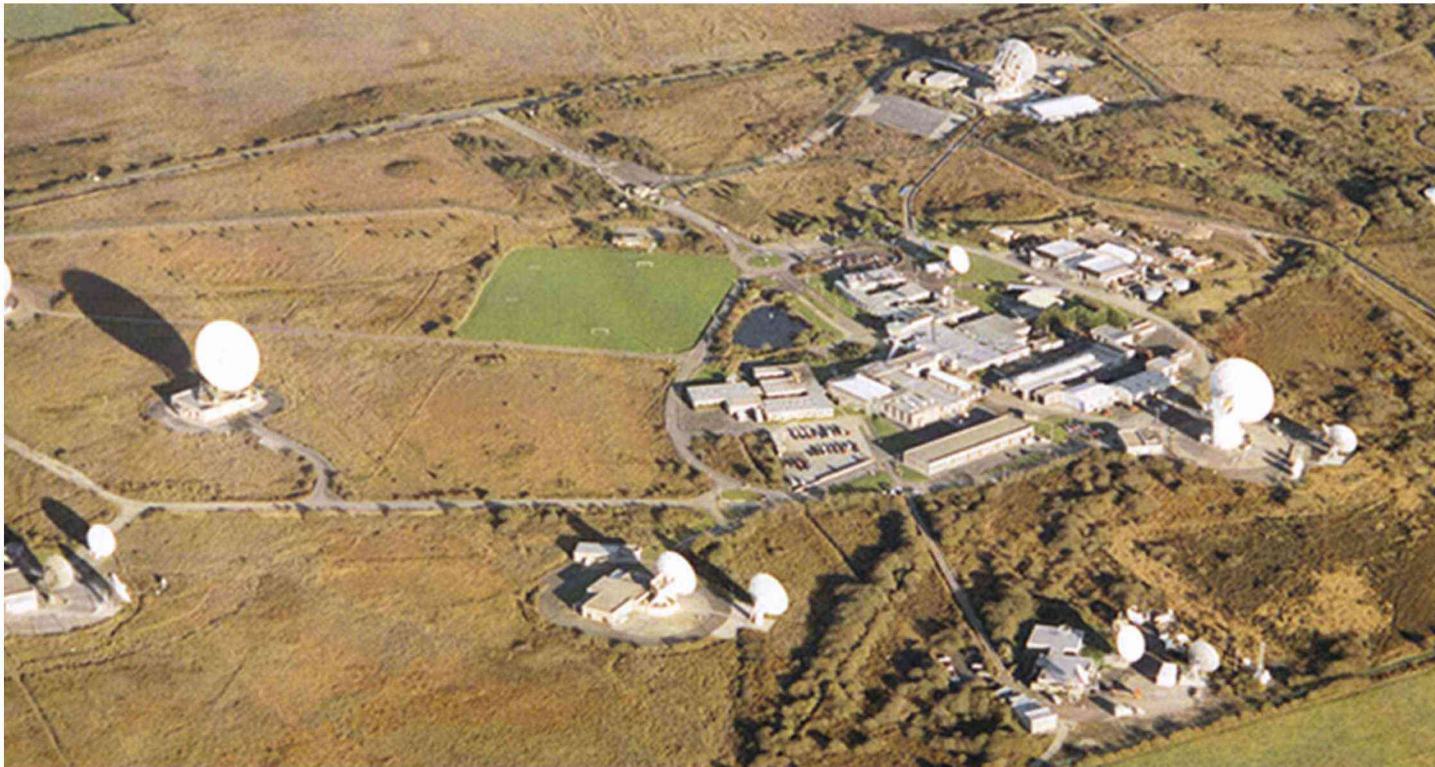


# Goonhilly Earth Station

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- Ex-BritishTelecommunications (BT) site now owned by the small business Goonhilly Earth Station Ltd (GES)
- Leased site in 2011. Bought site in 2014



# University Consortium (CUGA)



- Agreement with the Consortium of Universities for Goonhilly Astronomy (CUGA) to use two of the 30 m class dishes for radio astronomy



- Other contributions by:





# Goonhilly 1

- 26 m
- Use at L-band with spare e-MERLIN receiver at prime focus
- Mount for receiver being designed and built by UCLan in consultation with GES and Manchester

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# Goonhilly 3

- 29 m
- Use at C-band with a new receiver built by Oxford – see talk by Jones

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# Goonhilly + e-MERLIN

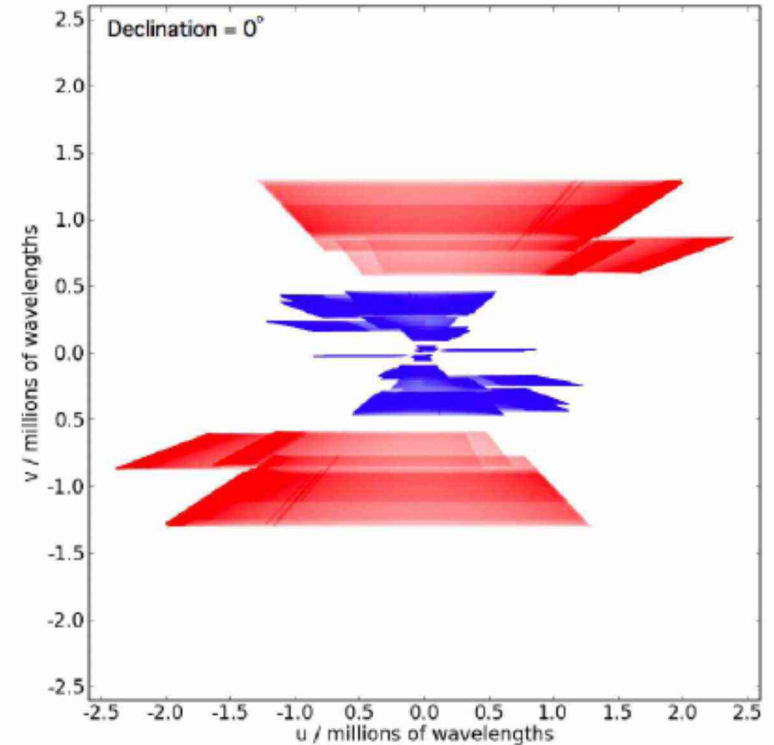
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# Goonhilly + e-Merlin

- Greatly improves beam shape for equatorial and southern targets for joint studies with ALMA and other ESO telescopes

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Heywood et al. 2011 arXiv1103.1214

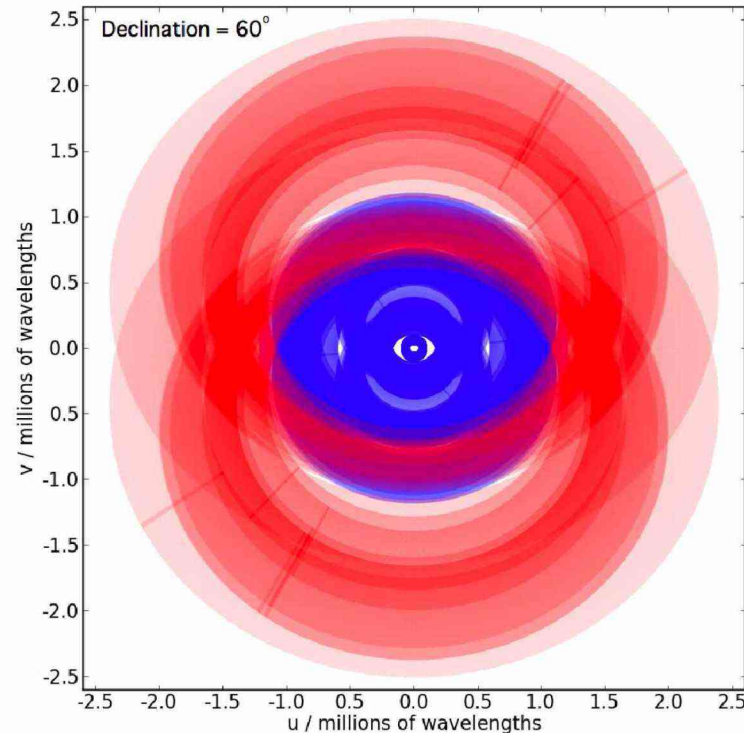


# Goonhilly + e-MERLIN

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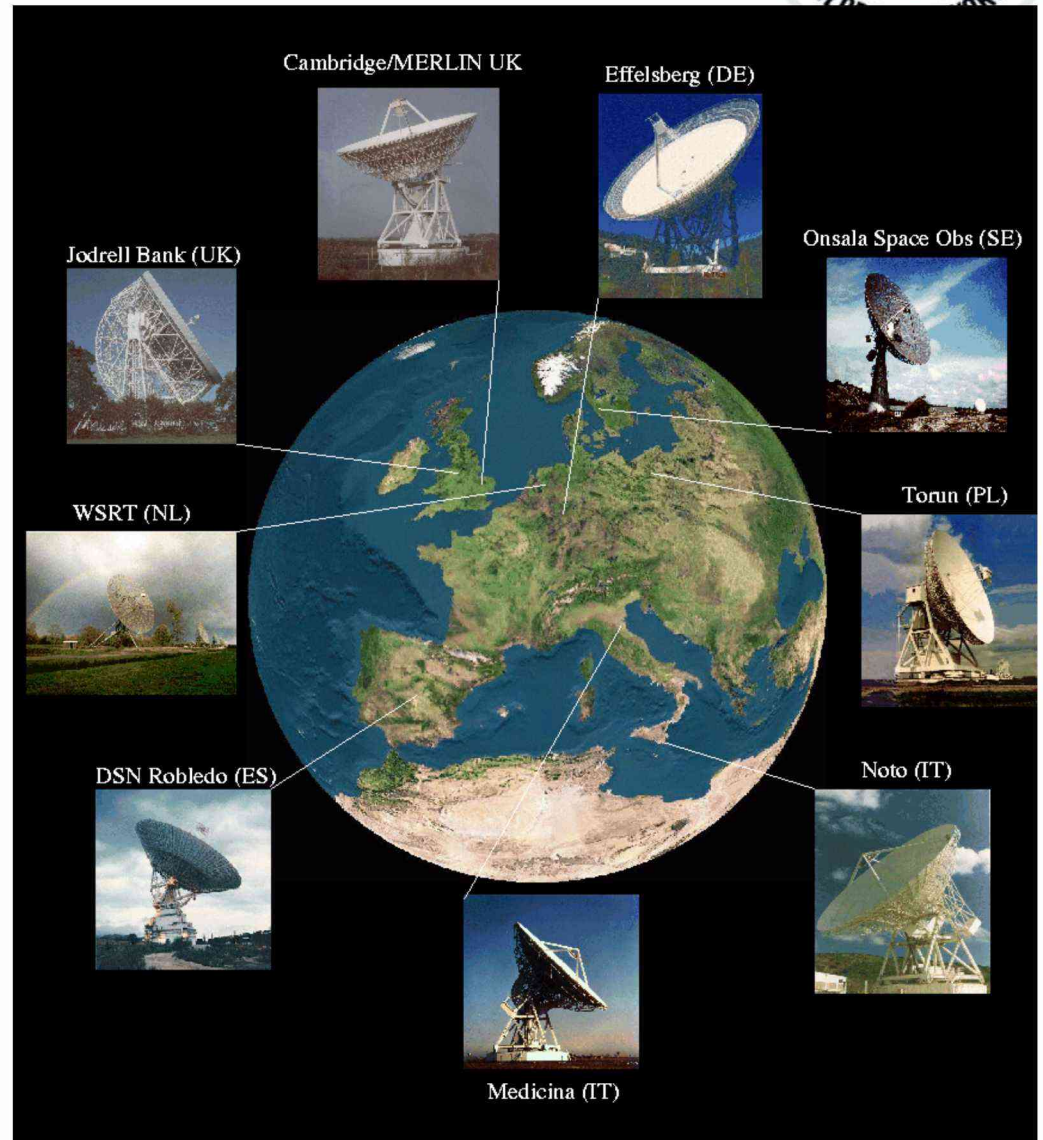
- Adding Goonhilly doubles the baseline of e-MERLIN from 200 to 400 km



Heywood et al. 2011 arXiv1103.1214

# Goonhilly + EVN

- Goonhilly's baselines also fill a gap in uv coverage between e-MERLIN and the EVN network



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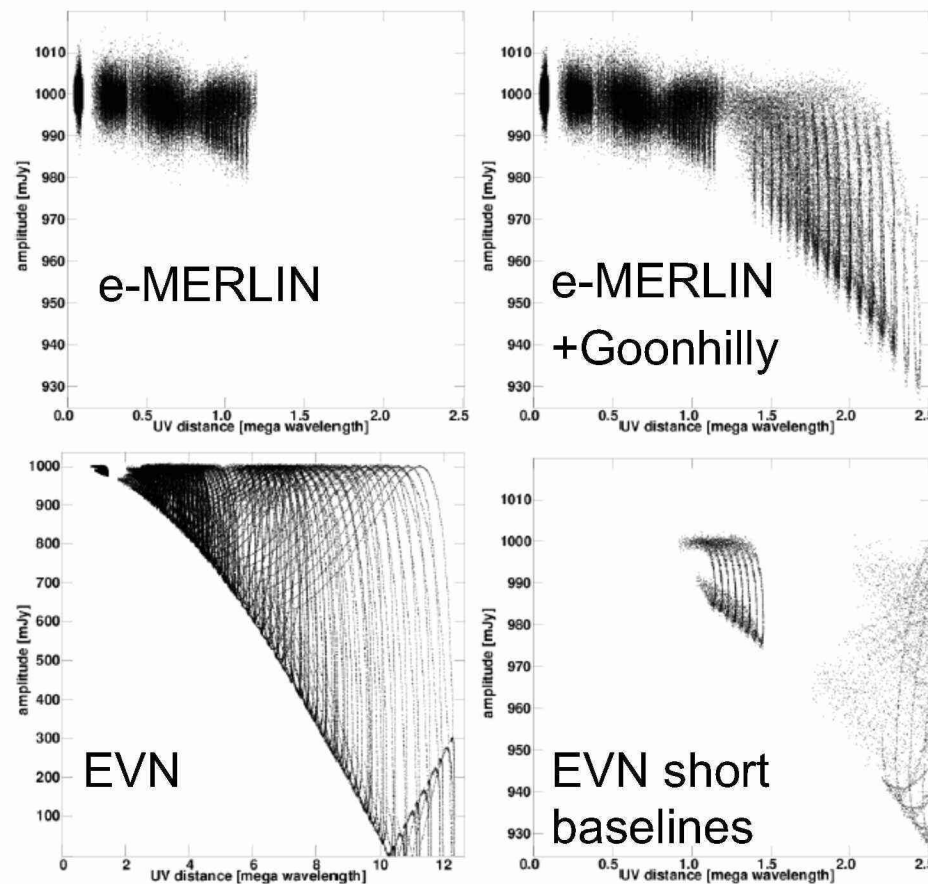


# Goonhilly + EVN

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- Goonhilly's baselines fill a gap in the uv coverage between e-MERLIN and the EVN network



Kloeckner et al.  
2011  
arXiv1103.3600



# Motivation for Conversion

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- Addition of Goonhilly dishes to e-MERLIN will significantly enhance its resolution and synergy with ALMA
- Single-dish monitoring research programmes
- Training telescope for students
- Collaboration provided basis for current DARA and GCRF radio astronomy activities

