



# SWISS MWA PLANNING

Emma Tolley – SKACH Winter Meeting – 23 January 2024

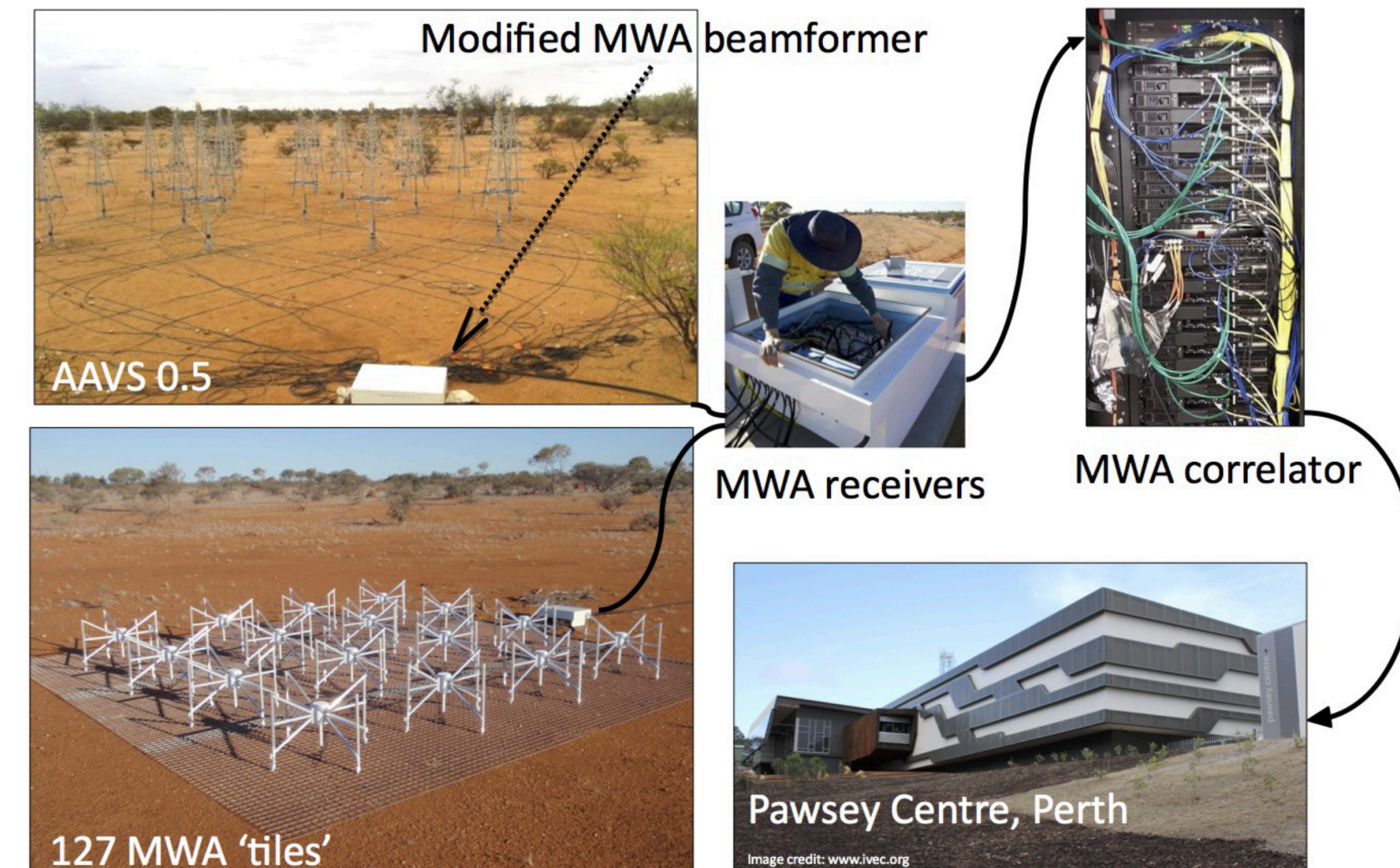
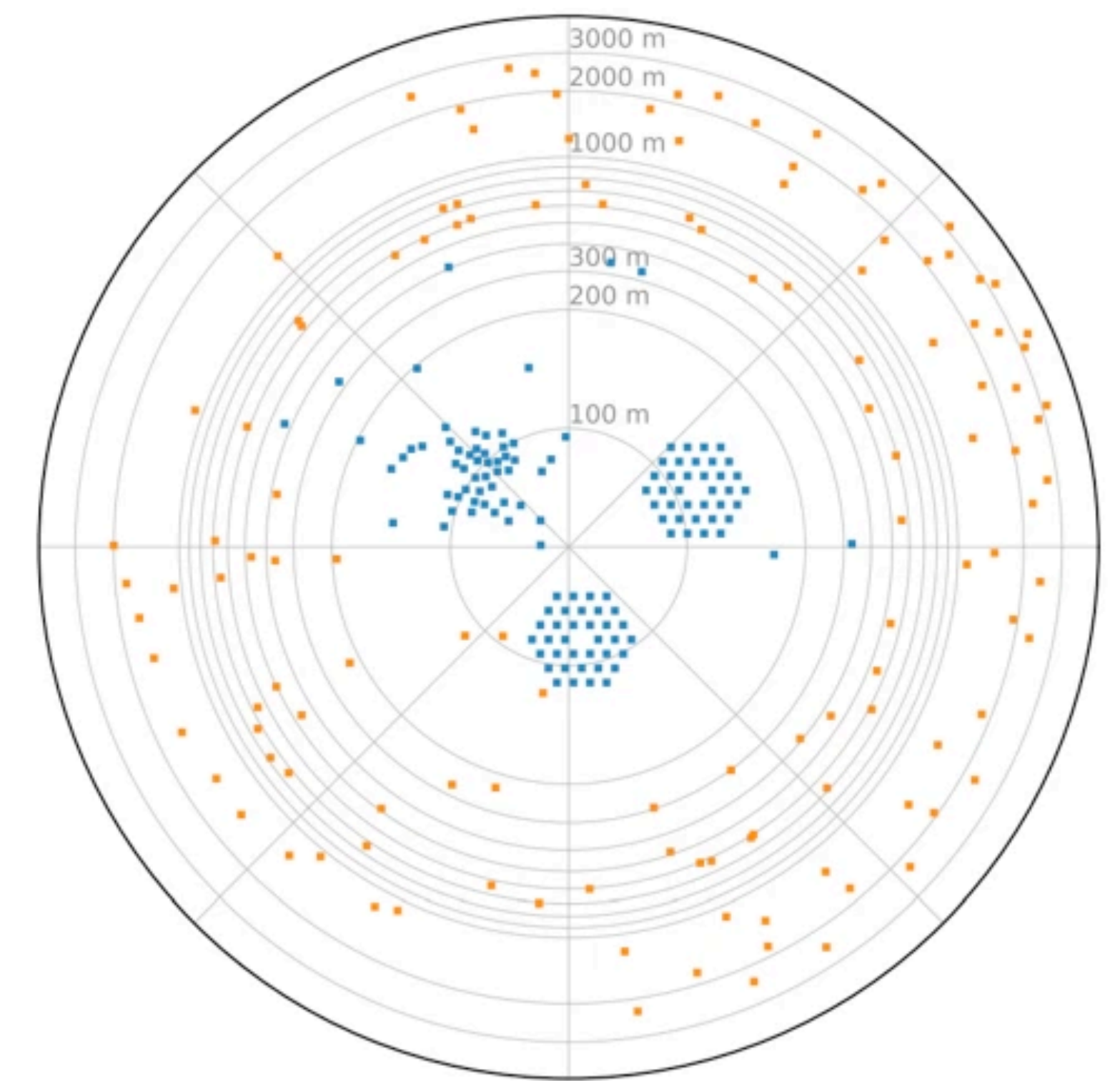
# MURCHISON WIDEFIELD ARRAY (MWA) TELESCOPE

- MWA is a radio telescope composed of 4,096 antennas tuned to receive signals from the sky between 70 and 300MHz => **low-frequency**
- MWA is the only low frequency **SKA Precursor\***
  - \*pathfinder technology on SKA site
- Started in 2013, currently in Phase III (2021-2030)

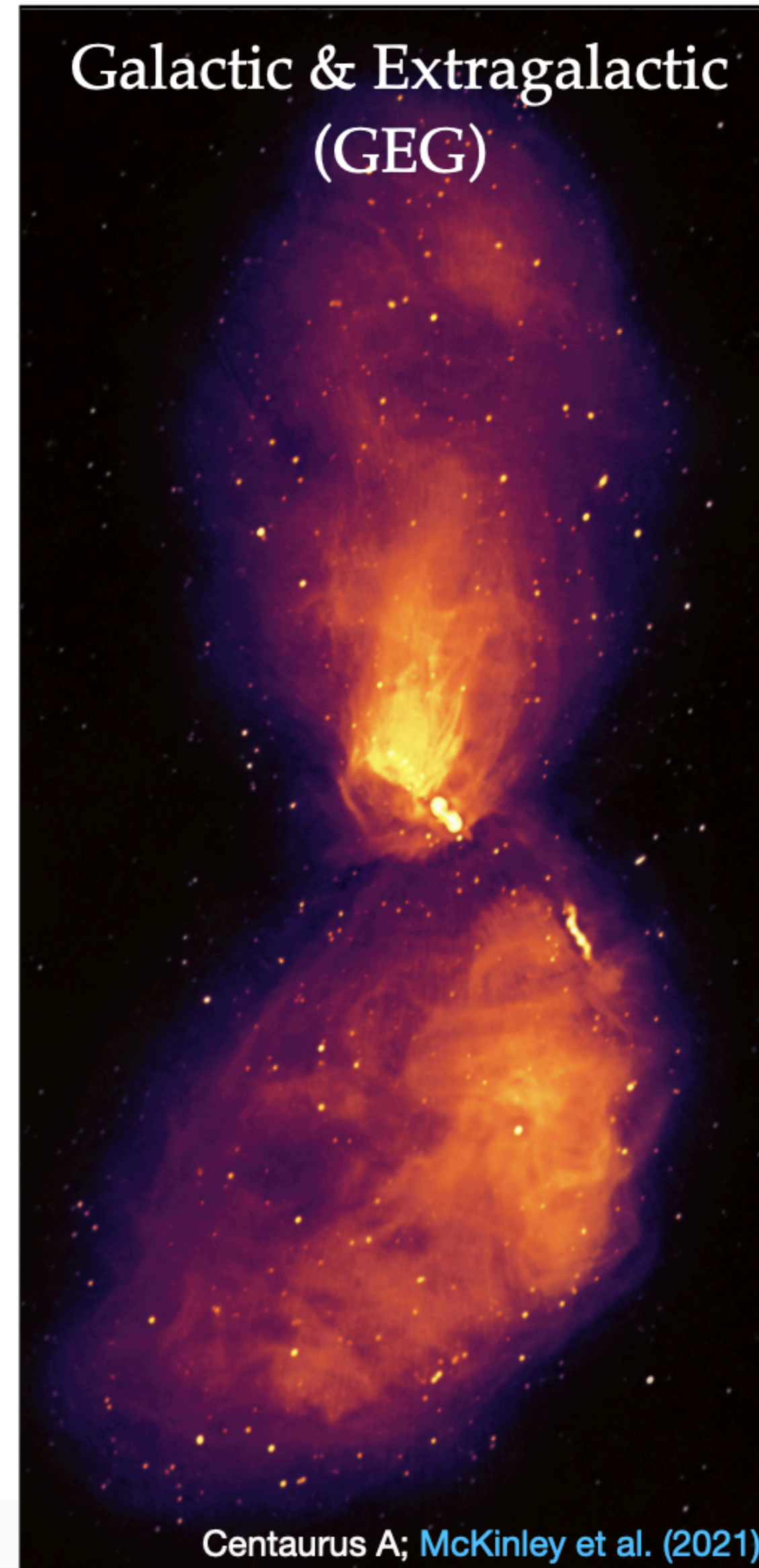
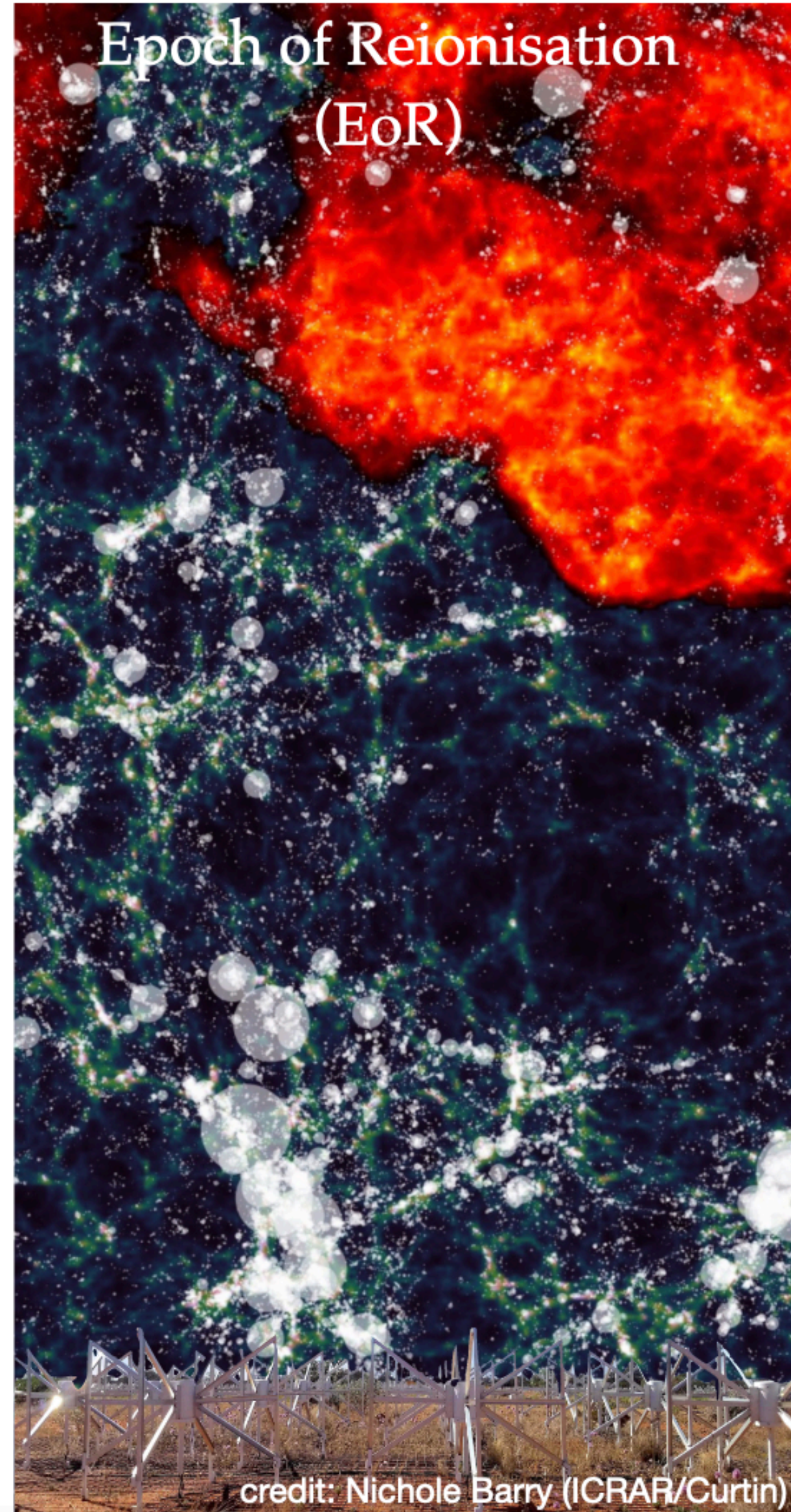


# MWA PHASE III

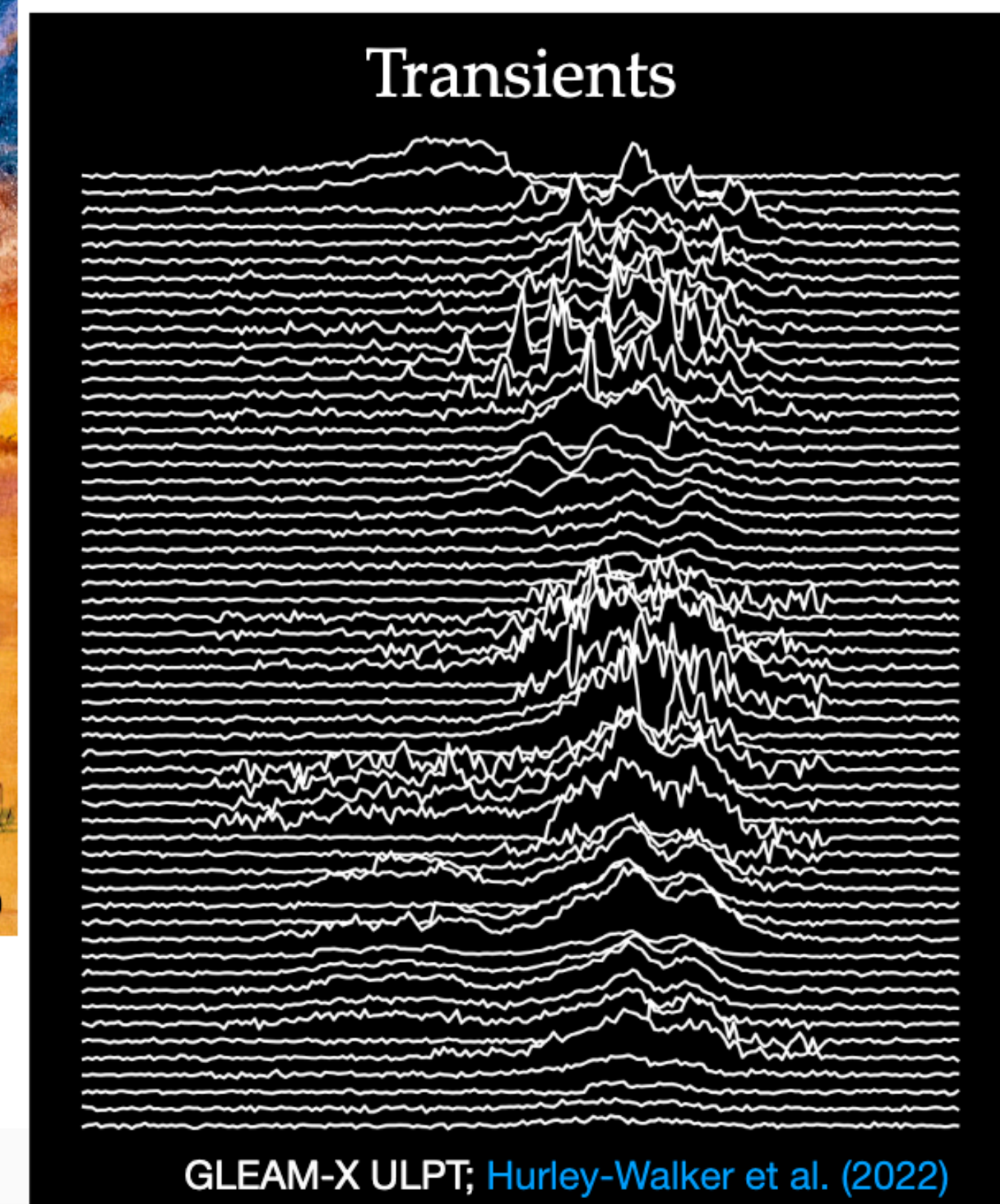
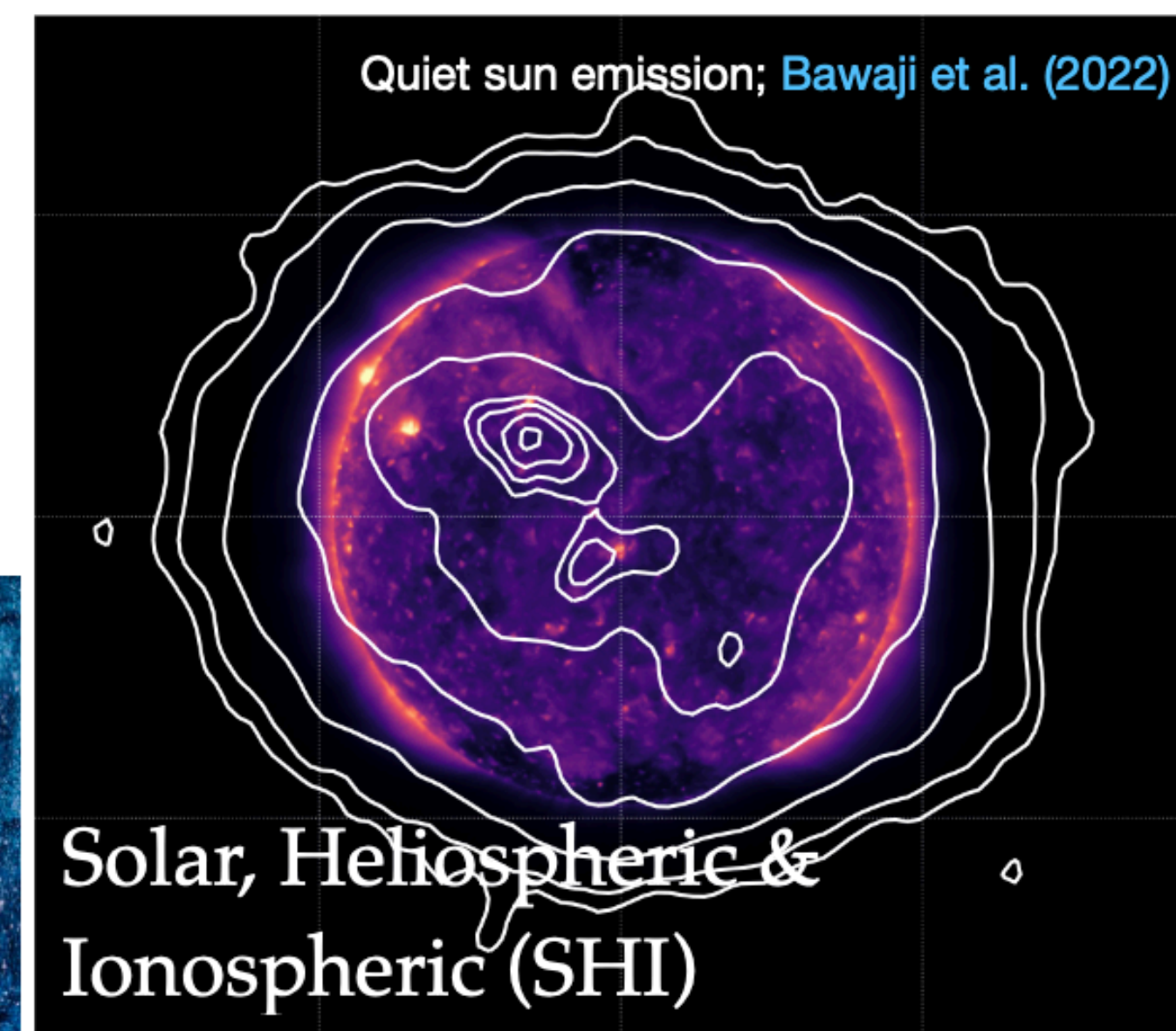
- New MWAX correlator deployed and operational
- 256 tiles (16 antennas each), all correlated, supported by new receivers
- “Design features” of existing receivers fixed, much better for the EoR
- Twice the sensitivity, four times the data, even better uv coverage, more flexible modes and parallel paths for signal processing as MWAX evolves.
- \$7.7M AUD of NCRIS operations announced this year, Plus \$4M AUD from MWA partners for Phase III (now including Switzerland!)



# MWA SCIENCE WORKING GROUPS

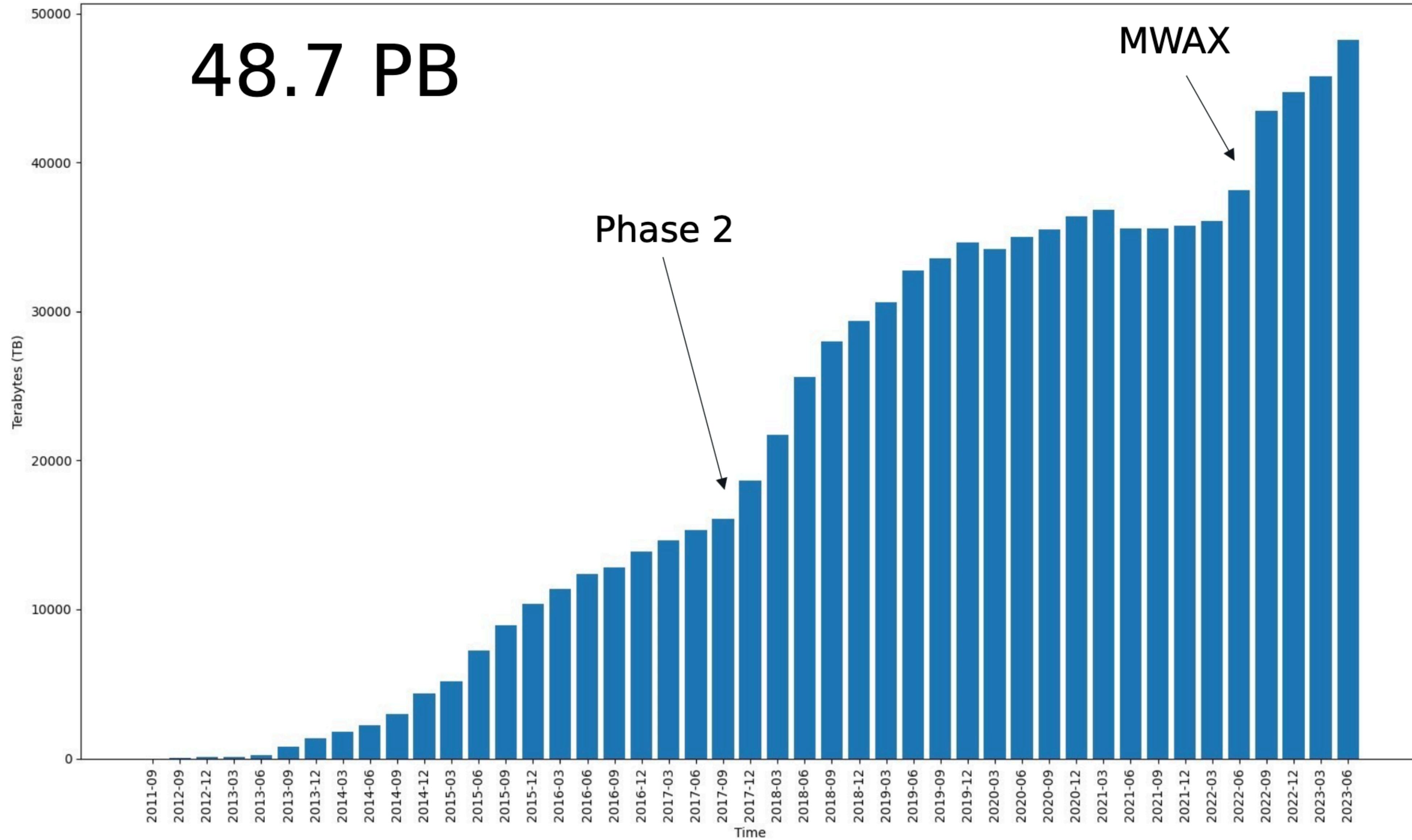


Slide credit: Chris Riseley



# MWA ARCHIVE

Greg Sleap



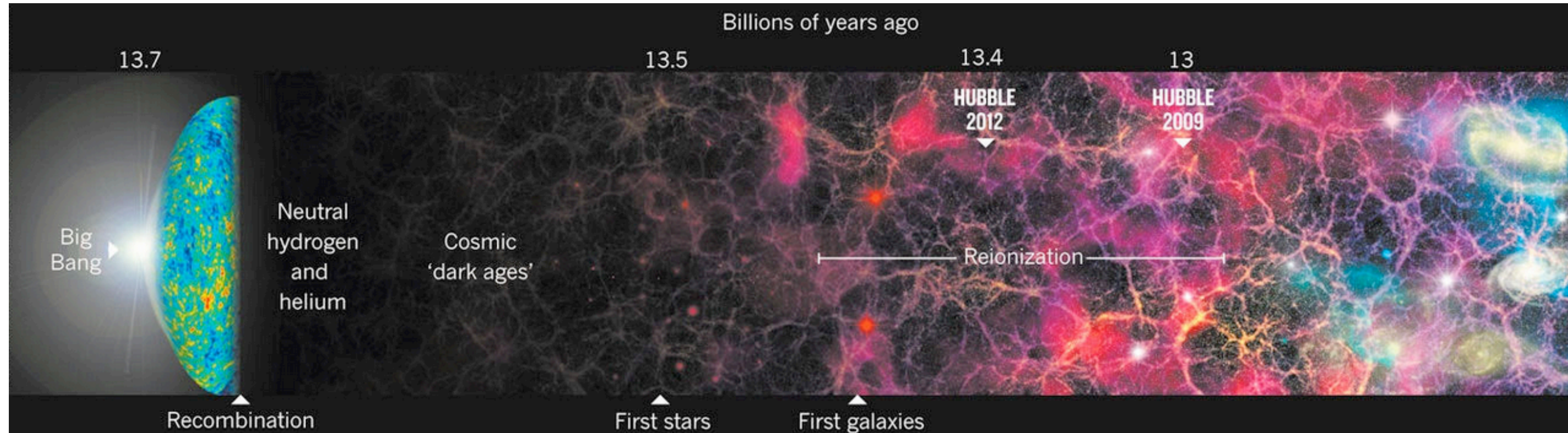
48.7 PB

MWAX

Phase 2

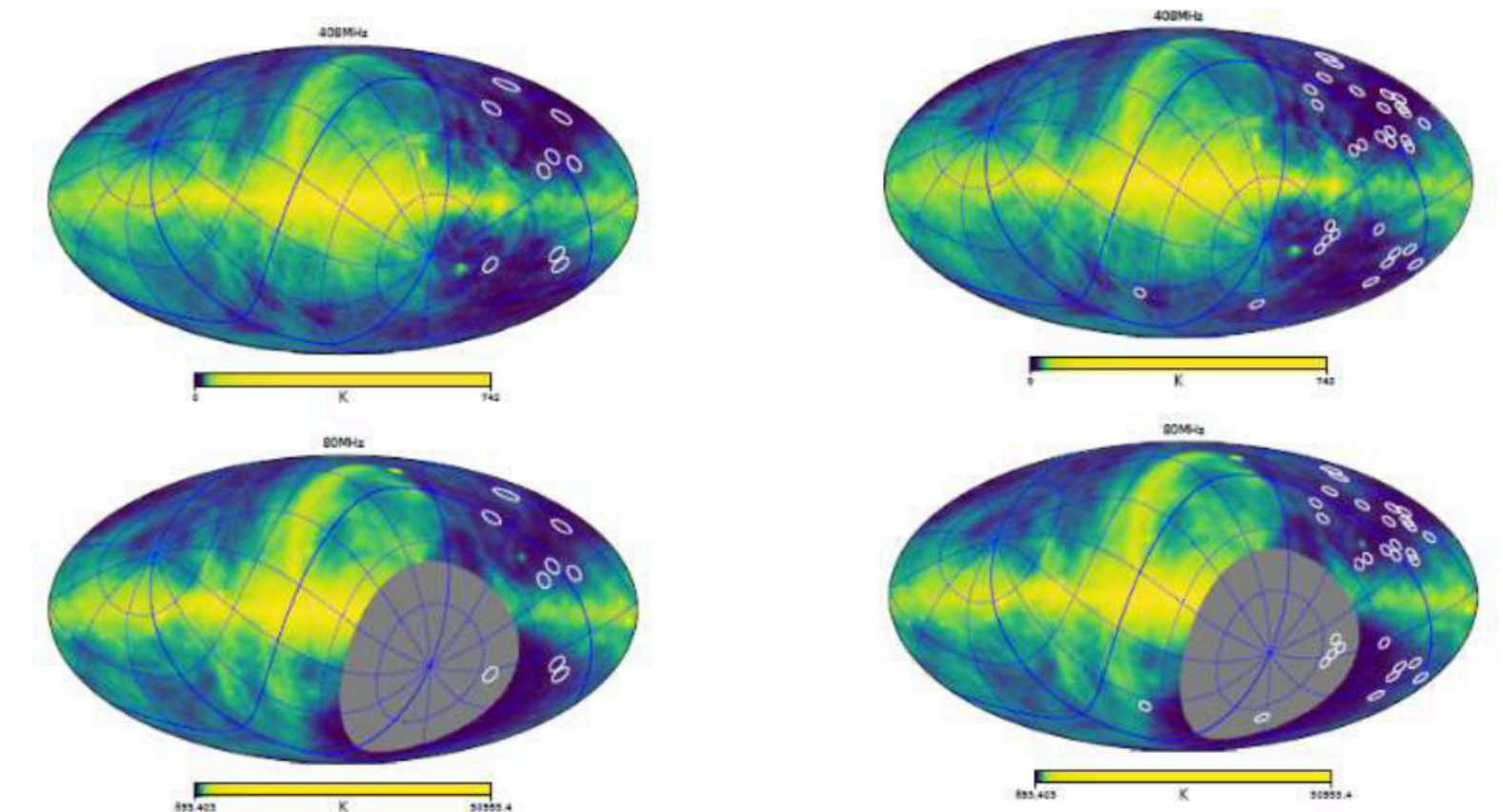
# MWA AS AN SKA PRECURSOR

## The Epoch of Reionization (EoR)



- Key science project for SKA-Low
- MWA view of the Southern Sky used to determine observing fields of SKA-Low
- Also develop methods & expertise for running an EoR experiment

Pre-selection of the Candidate Fields for Deep Imaging of the EoR with SKA1-Low - Qian (Cathie) Zheng (SHAO)



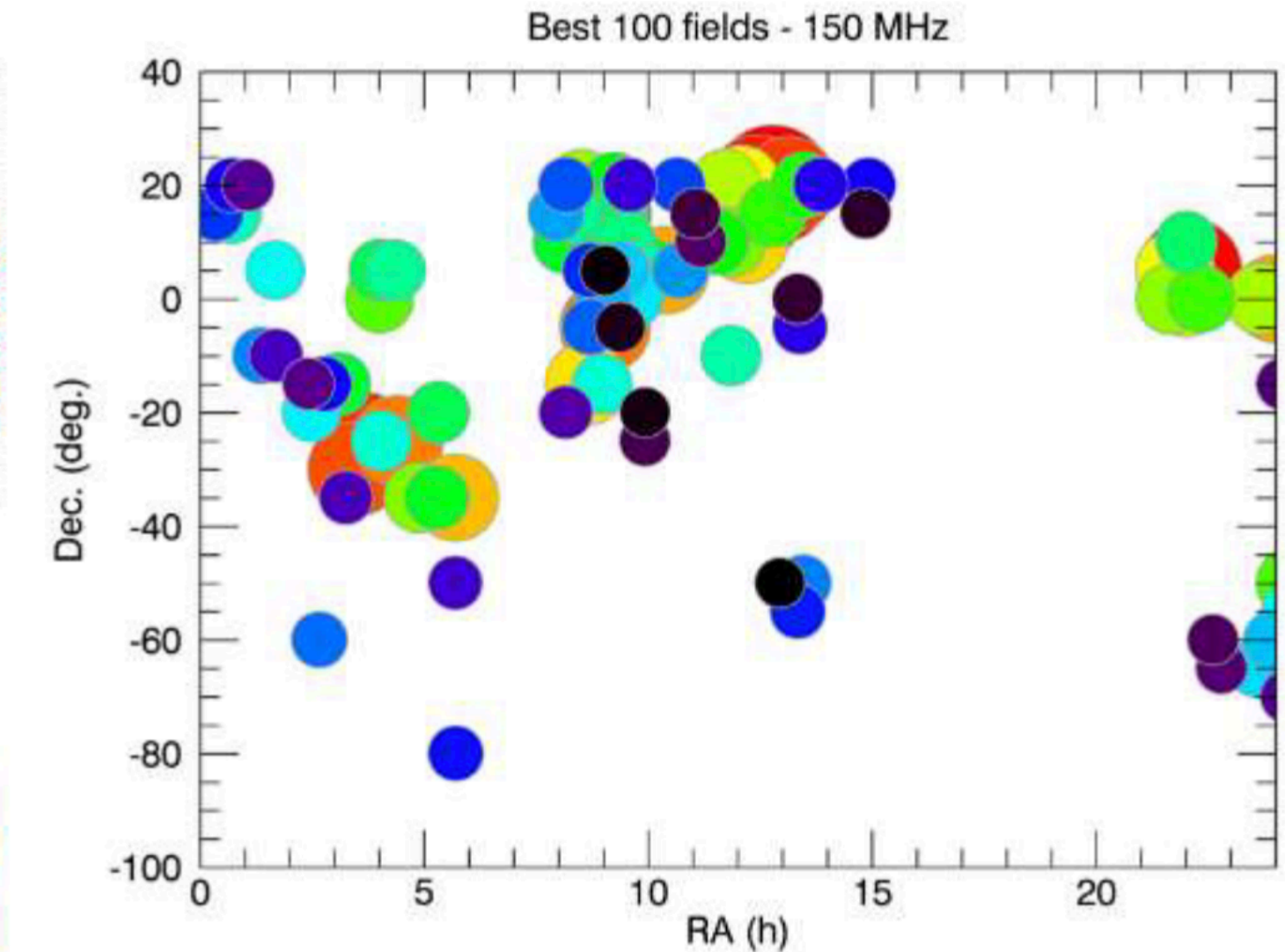
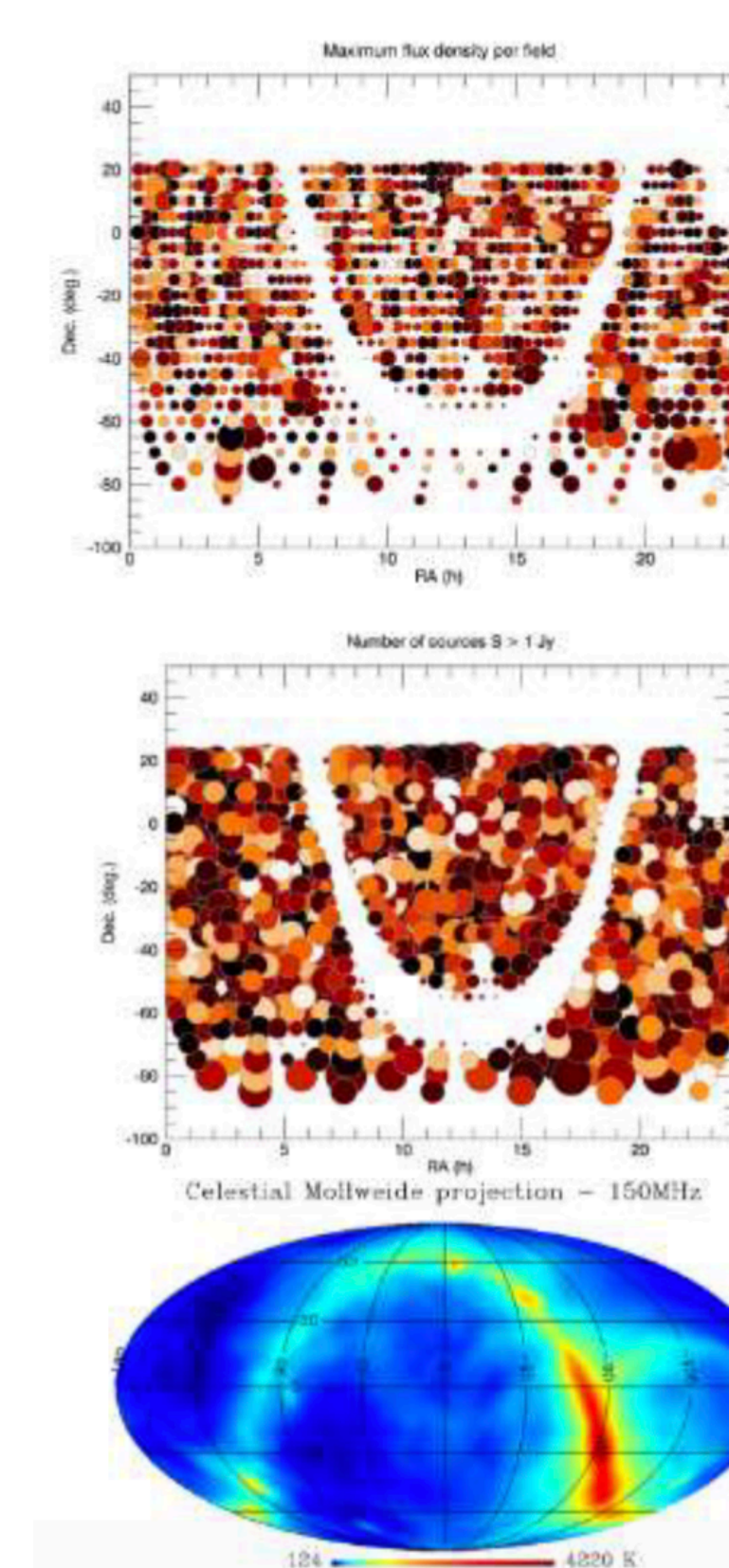
S<6 Jy, 40 square degrees

S<3 Jy, 20 square degrees

# MWA AS AN SKA PRECURSOR

## Pulsars & transients

- Pulsar survey of southern sky: input data for SKA
- Discovery of new pulsars
- Ultra-long period magnetars
- Value of the archive (discovering new signals in archived data: <https://www.nature.com/articles/s41586-023-06202-5>)

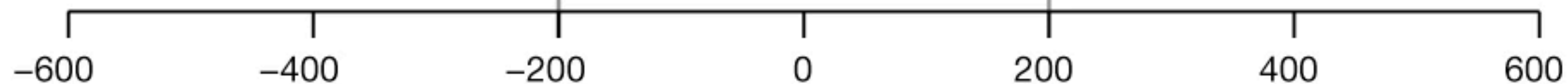


Trott 2017 (IAU proc.)

13:38 6 August 2022  
13:19 6 August 2022  
13:21 28 April 2001  
11:30 28 April 2001  
22:12 23 September 1988



13:43 6 August 2022  
13:24 6 August 2022



Time (s)

# MWA AS AN SKA PRECURSOR

## Sky Catalogs



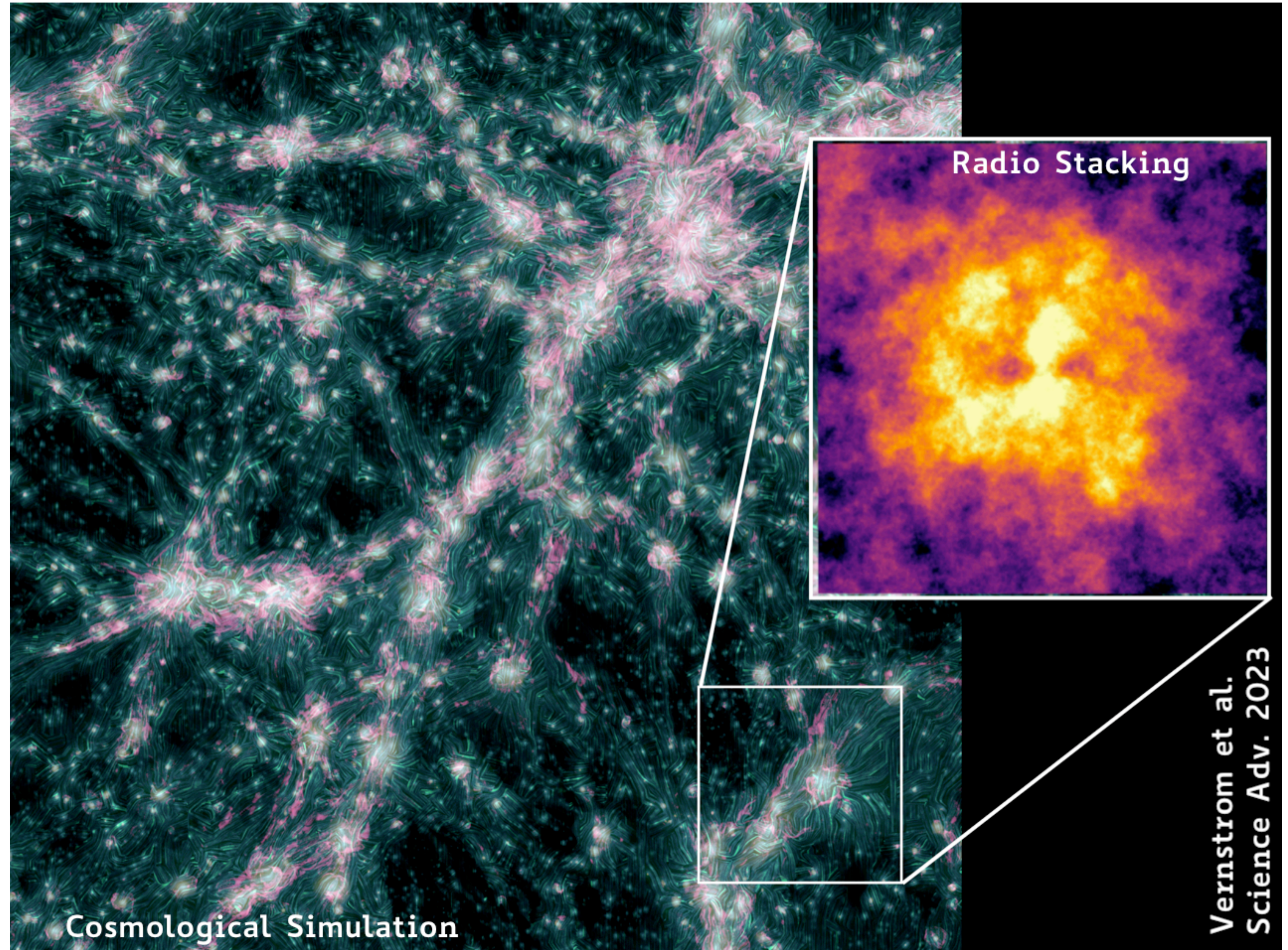
- GLEAM, GLEAM-X and LoBES will be primary catalogues for initial SKA-Low calibration
- POGS (GLEAM polarization catalogue): First all-sky low-frequency polarimetry survey, Influential in SWG planning for SKA-Low



# MWA AS AN SKA PRECURSOR

## Cosmic magnetism & Cosmic Web

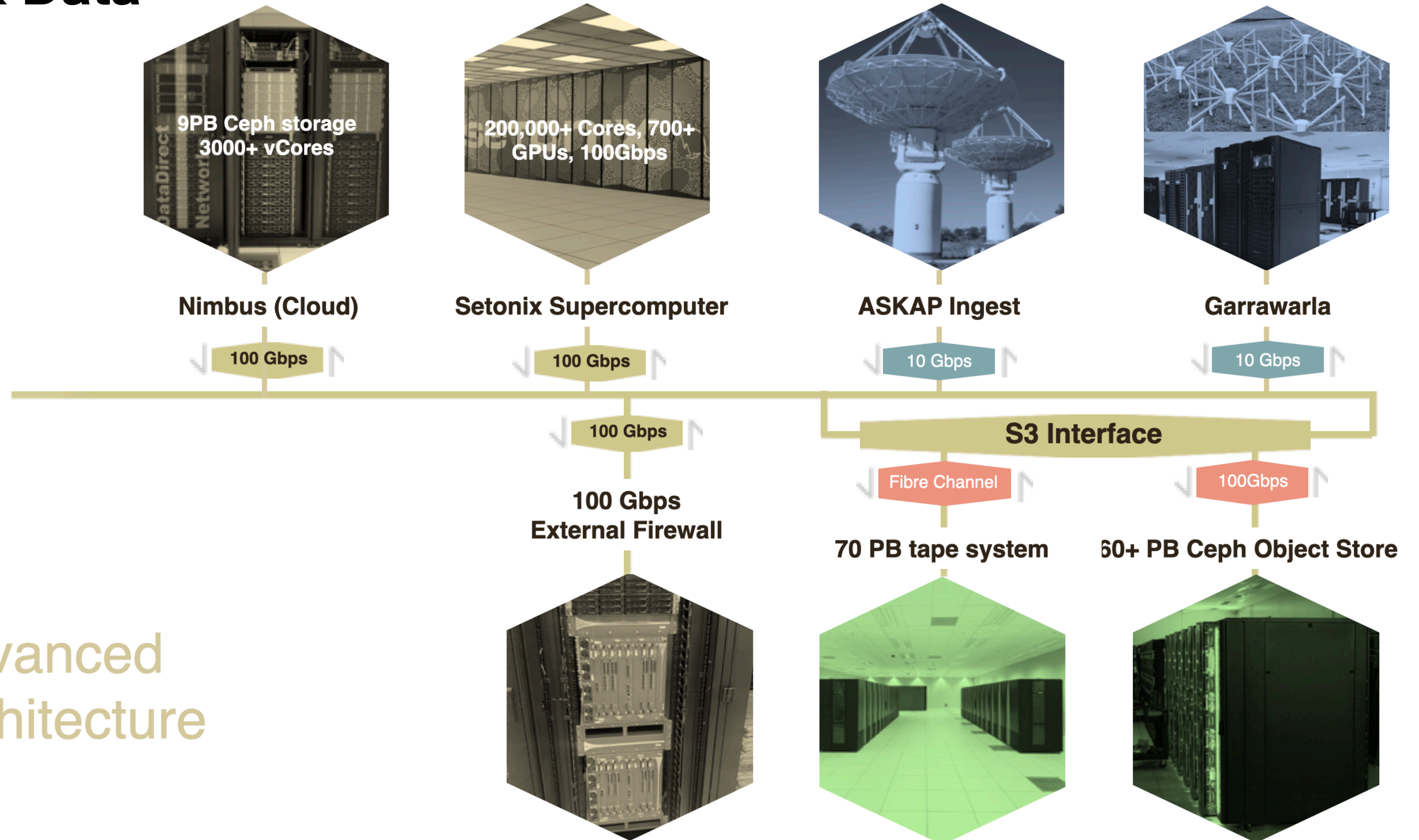
- Role in first statistical detection of cosmic web filaments (arXiv: 2101.09331)
- Value of low frequency surveys, publicly available data, large scale



# MWA AS AN SKA PRECURSOR

## Computing & Data

Mark Gray and Ugo Varetto



Advanced architecture

# SWITZERLAND & MWA

- **February 2023:** Formed a preliminary consortium of interested Swiss researchers
- **March 2023:** presented our membership application to the MWA board, which was approved unanimously
- **December 2023:** Deed of accession signed by all parties, **Switzerland officially joins MWA**
- Working on drafting formal collaboration agreement for **Swiss consortium:** EPFL, ETHZ, CSCS, FHNW, ISSI, UniBas, UZH, ZHAW
  - University representatives are the same as SKACH board members
  - Emma Tolley is the MWA board member for Switzerland
- **MWA Project meeting in Switzerland** August 28-30
  - Will include some hands-on data analysis session from other MWA members

# MWA MEMBERSHIP

- MWA members get access to the [wiki](#), can join science working groups, submit observing proposals, etc
- If you would like to be a member, talk to your SKACH board rep!
- For **onboarding**, check out the [MWA FAQ](#) and the last [MWA project meeting slides](#)
- How to get involved now? Join one of the science working groups

## Current Swiss MWA membership list

Emma Tolley	EPFL
Jean-Paul Kneib	EPFL
Mark Sargent	ISSI
Alexandre Refregier	ETHZ
Michele Bianco	ETHZ
Victor Holanda	CSCS
Lucio Mayer	UZH
André Csillaghy	FHNW
Elena Gavagan	ZHAW
Florina Ciorba	UniBas
Aurel Schneider	UZH