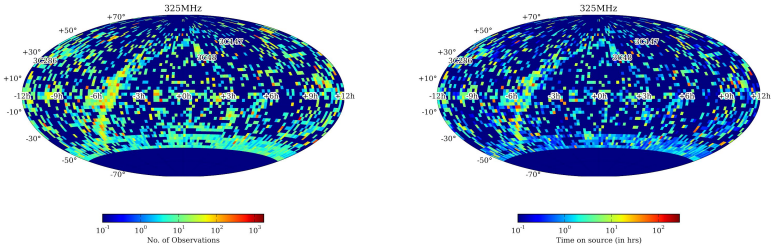
GMRT Archive Processing Project (P4-7)

Shubhankar Deshpande[†], Yogesh Wadadekar[†], Huib Intema[‡], B. Ratnakumar[†], Lijo George[†], Rathin Desai[†], Archit Sakhadeo[†], Shadab Shaikh[†], C.H. Ishwara Chandra[†], and Divya Oberoi[†]
National Center for Radio Astrophysics (TIFR), [‡]Leiden Observatory, Leiden University

NCRA • TIFR

Background

- The GMRT archive on NAPS hosts >120 TB of interferometric data which are being served to users as visibilities.
- We were looking to provide users with “first look” (worst case) and “science ready” (best case) images for all GMRT observations, along with metadata about quality.
- A pipeline optimised for GMRT data (SPAM by Huib Intema) is available. SPAM has been thoroughly tested for the GMRT ADR1 data release at 150 MHz and with other datasets at 235, 325, 610 MHz bands for GHB/GSB.

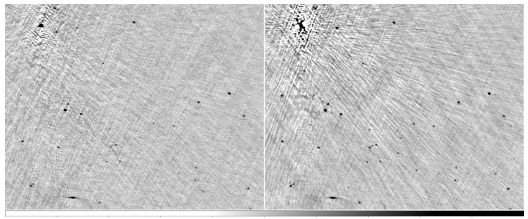


(a) Number of observations (b) Time on source (in hrs)

Implementation

SPAM:

- Python module that provides an interface to AIPS via ParselTongue and ObitTalk. Data reductions are carried out by scripts that execute AIPS tasks
- SPAM now also includes a fully automated pipeline for reducing legacy GMRT observations at 150, 235, 325 and 610 MHz.
- SPAM was used to process 150 MHz data over ~30,000 square degrees of sky from the TGSS survey carried out with GMRT.



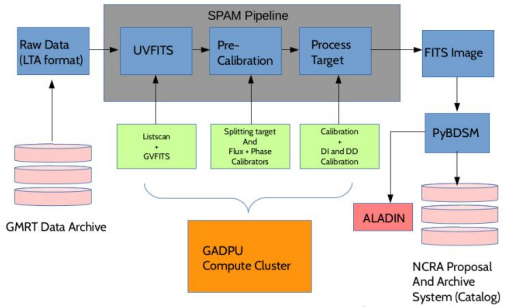
XMMLSS field, 325 MHz, Cycle 20, PI: Wadadekar

i. SPAM processing, greatly reduces artifacts around bright sources (direction dependent calibration).

ii. Normal processing through AIPS

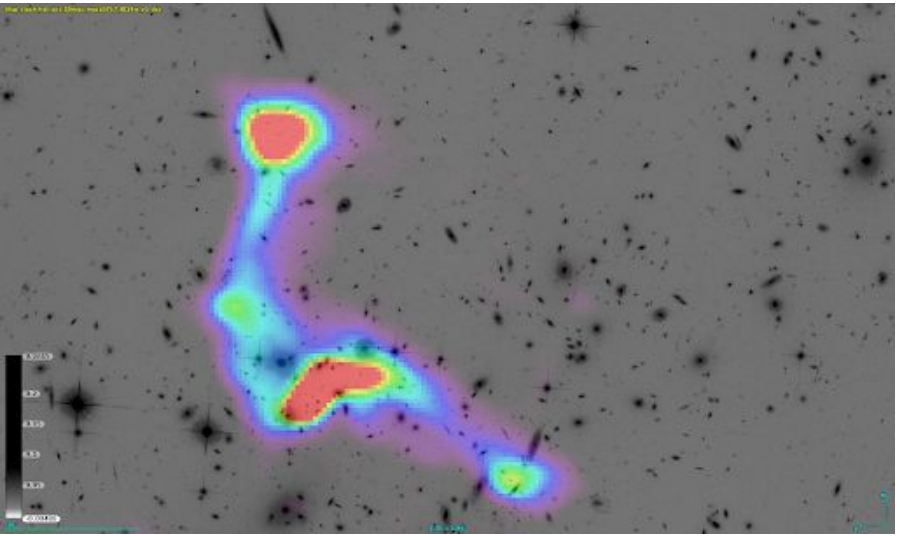
Beowulf Cluster:

- Cluster of COTS machines /w 16GB RAM, 128GB SSD, and 8-core i7-2600 CPU @ 3.40GHz
- Master node acts as file server for the compute stack - AIPS, SPAM, Obit, Parseltongue (NFS exported to compute nodes)
- Bookkeeping database designed with a suitable schema that provides an accurate snapshot of the processing status and provide insight about potential failures (either due to poor data quality or pipeline limitations)

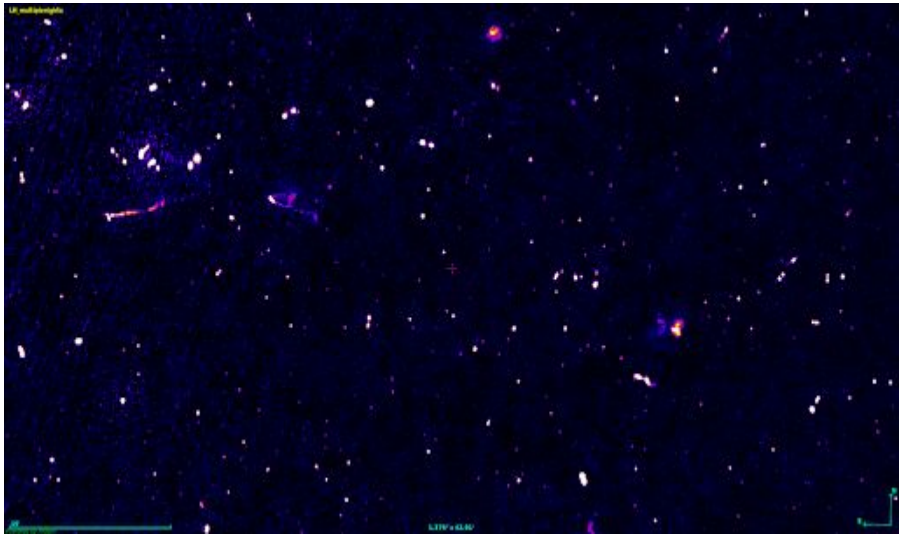


GARUDA imaging synthesis pipeline cluster architecture

Results

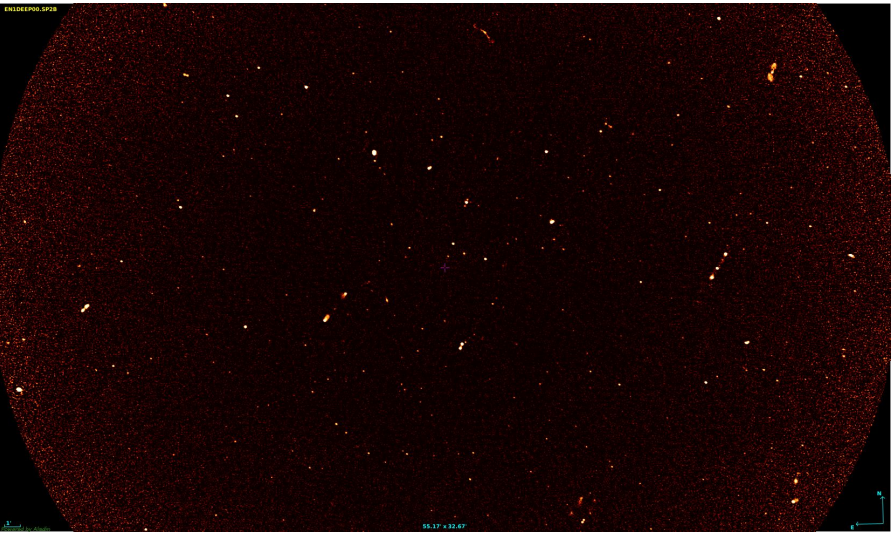


MACS 0717 (HST F814W) with 610 MHz image overlaid. 4 colliding clusters at z ~ 0.55, radio image RMS 29 microJy/beam, PI: Mamta Pandey-Pommier

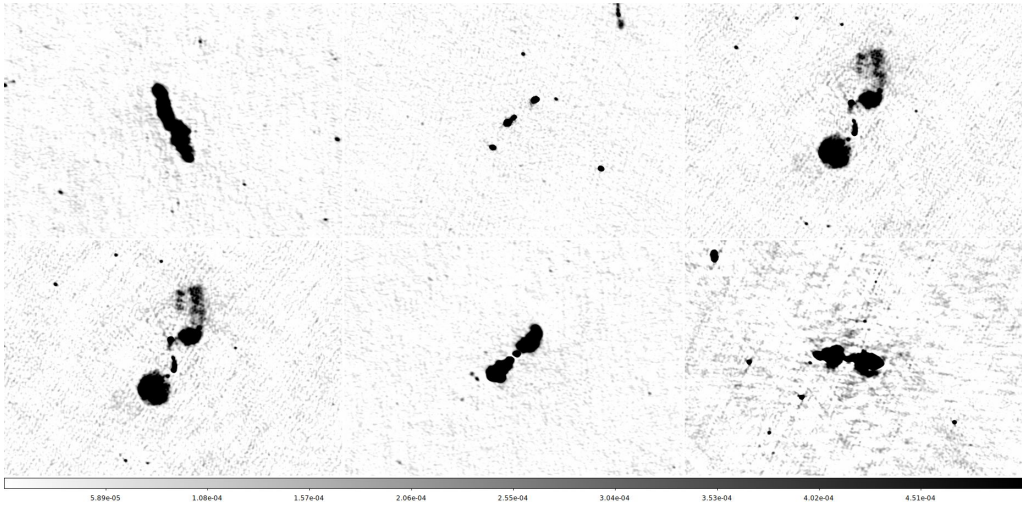


Portion of a 325 MHz Lockman Hole image, rms 60 micro-Jy/beam. >5000 radio sources seen over ~12 deg2 (PI: Wadadekar)

Results

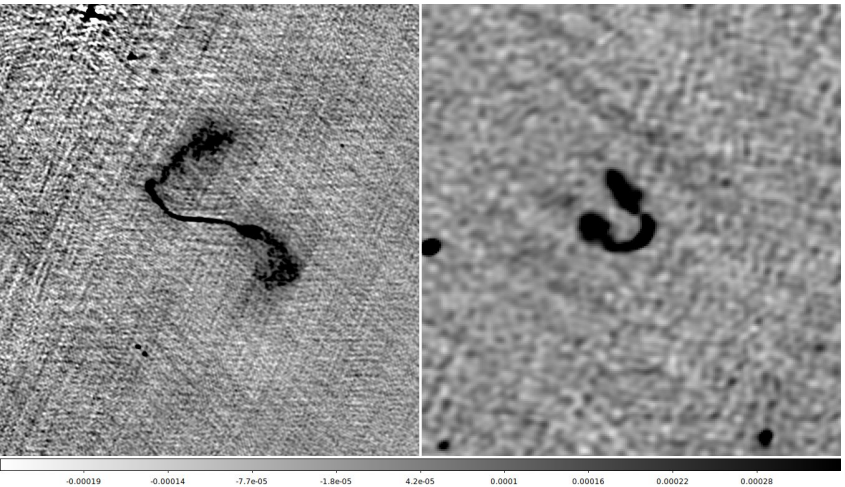


Deep image of the ELAIS-N1 field, Cycle 20, 610 MHz, 30 microJy/beam RMS, PI: Taylor

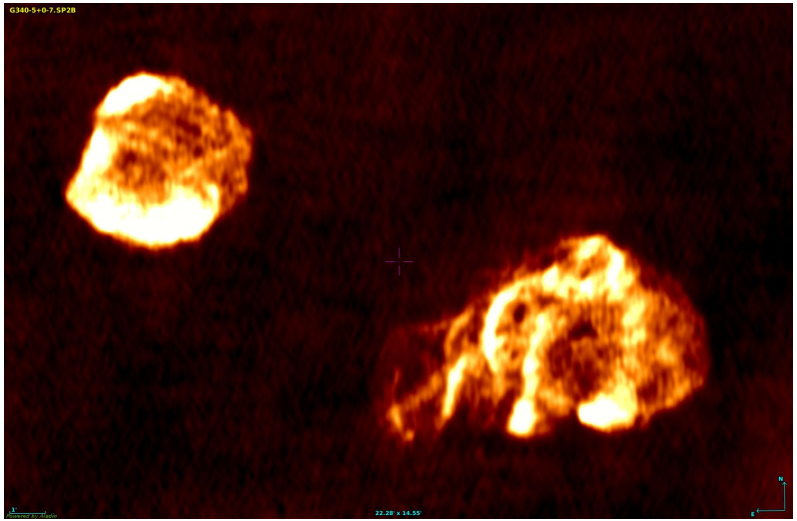


Hundreds of radio galaxies will be images in our project. This is a sampling of a few of them.
Radio Galaxies, Proposal 23_056, PI: Sumana Nandi

Results



Peculiar radio galaxies in the XXL-N field
Cycle 23, PI: Somak Raychaudhary



Supernova remnants at the centre of our galaxy, Cycle 24, PI: S Roy, 32
MHz

Our first data release is expected in the first quarter of 2019 (*http://naps.ncra.tifr.res.in/goa*)

Thank You!

Contact: shubhand@cs.cmu.edu

Shubhankar Deshpande[†], Yogesh Wadadekar[†], Huib Intema[‡], B. Ratnakumar[†], Lijo George[†], Rathin Desai[†], Archit Sakhadeo[†], Shadab Shaikh[†], C.H. Ishwara Chandra[†], and Divya Oberoi[†]
National Center for Radio Astrophysics (TIFR), [‡]Leiden Observatory, Leiden University

NCRA • TIFR