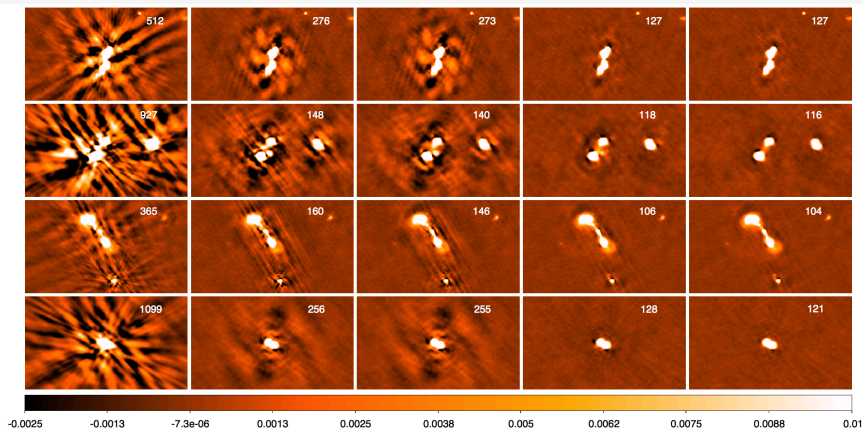


Surveys KSP – Facet calibration workshop update

Timothy Shimwell (on behalf of John Mckean)



Facet calibration

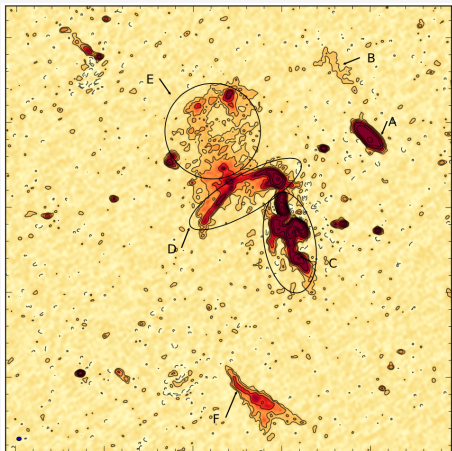


Direction dependent calibration (Weeren et al. arXiv:1601.05422 and Williams et al. MNRAS submitted)

Facet calibration workshop: Aims

The April 2015 facet calibration workshop facilitated many scientific projects. 8 months later a second workshop was planned to:

- Test new CITT developed automated pipelines
- Further test the facet calibration procedure.
- Expand the facet calibration user base.
- Calibrate ≈ 10 fields to produce thermal noise limited images at full resolution that are ready for science.



Example output from the April 2015 workshop. Thermal noise limited images at 5" resolution.

Facet calibration workshop: Preparation

Automated pipelines developed within the CITT by David Rafferty, Andreas Horneffer, Stefan Frohlich and Tim Shimwell use the pipeline framework that comes with the LOFAR software.

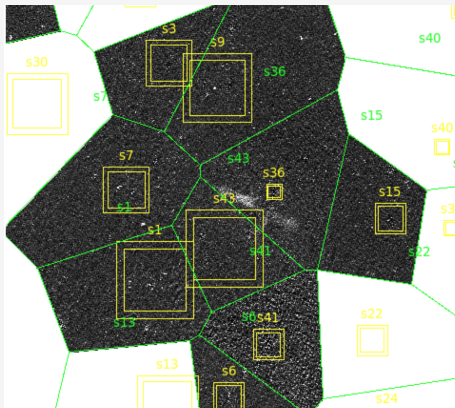
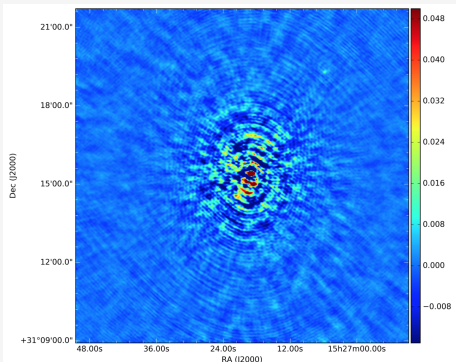
Pipelines are very easy to configure on different systems and they handle data tracking, parallel execution and are resumable.

<https://github.com/lofar-astron/prefactor>

The pipeline is stable and takes about 3 days to run. It produces about 500Gb of source subtracted calibrated data that is ready for facet calibration

Facet calibration workshop: Workshop

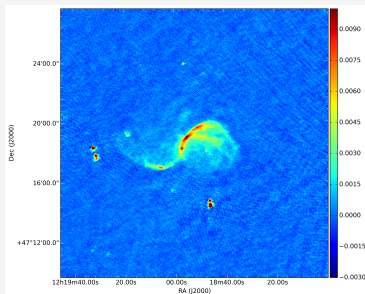
- Decide on facets and calibrators
- Learn how to operate scripts
- Begin facet calibration



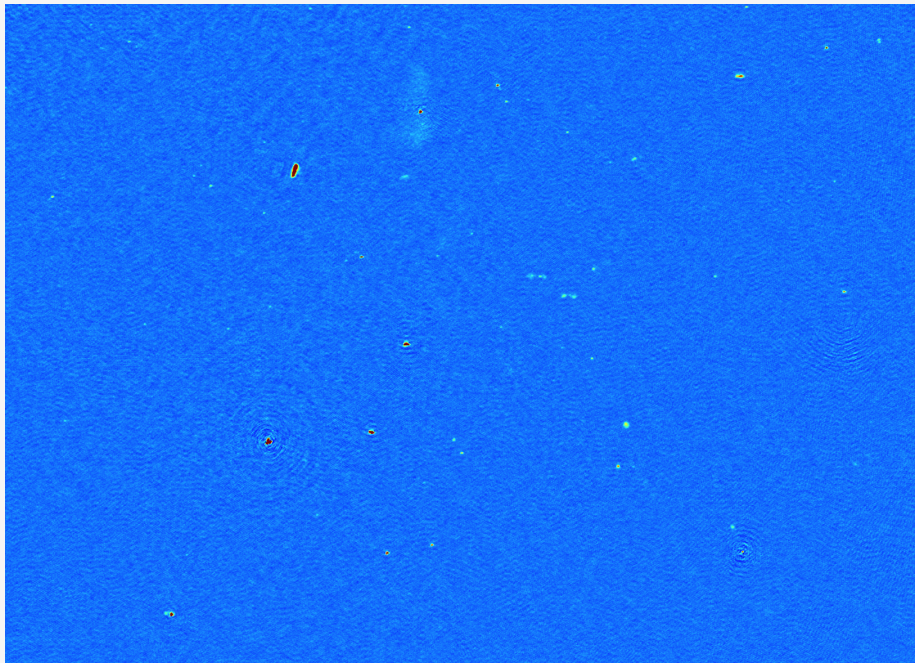
Courtesy Alex Clark

Facet calibration workshop: Results

- Automated facet calibration preparation pipelines work well
- Facet calibration successfully calibrated at least one facet from 10 datasets
- Worked at low declination and on both complex objects and bright objects.
- Still need to address difficulties with incredibly complex galactic fields and datasets where ionosphere conditions are very poor.

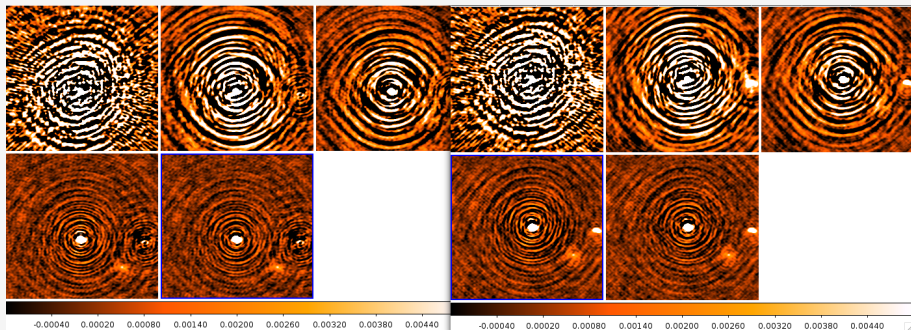


Top: Facet calibrated NGC 4258.
Bottom: Chandra, VLA and Hubble composite (NASA).



Facet calibration workshop: Results

Automated facet calibration routine FACTOR (developed within CITT by David Rafferty) directly compared with manual scripts.



Facet calibration workshop: Next steps

- Continue to collaborate on projects over email and survey ksp wiki to produce fully calibrated datasets – several months of work
- Use experience to improve the completely automated (pre-facet and FACTOR) pipelines.
- Being progression from manual facet calibration scripts to FACTOR – CITT workshop next week
- Begin to routinely facet calibrate the ≈ 200 pointings of Tier-1 data – initial work starting now.
- Can we continue to reach the thermal noise with 50+hrs of data? – efforts ongoing
- Attempt facet calibration on LBA data – Leiden LBA busy week (Leah Morabito)