ASTRON

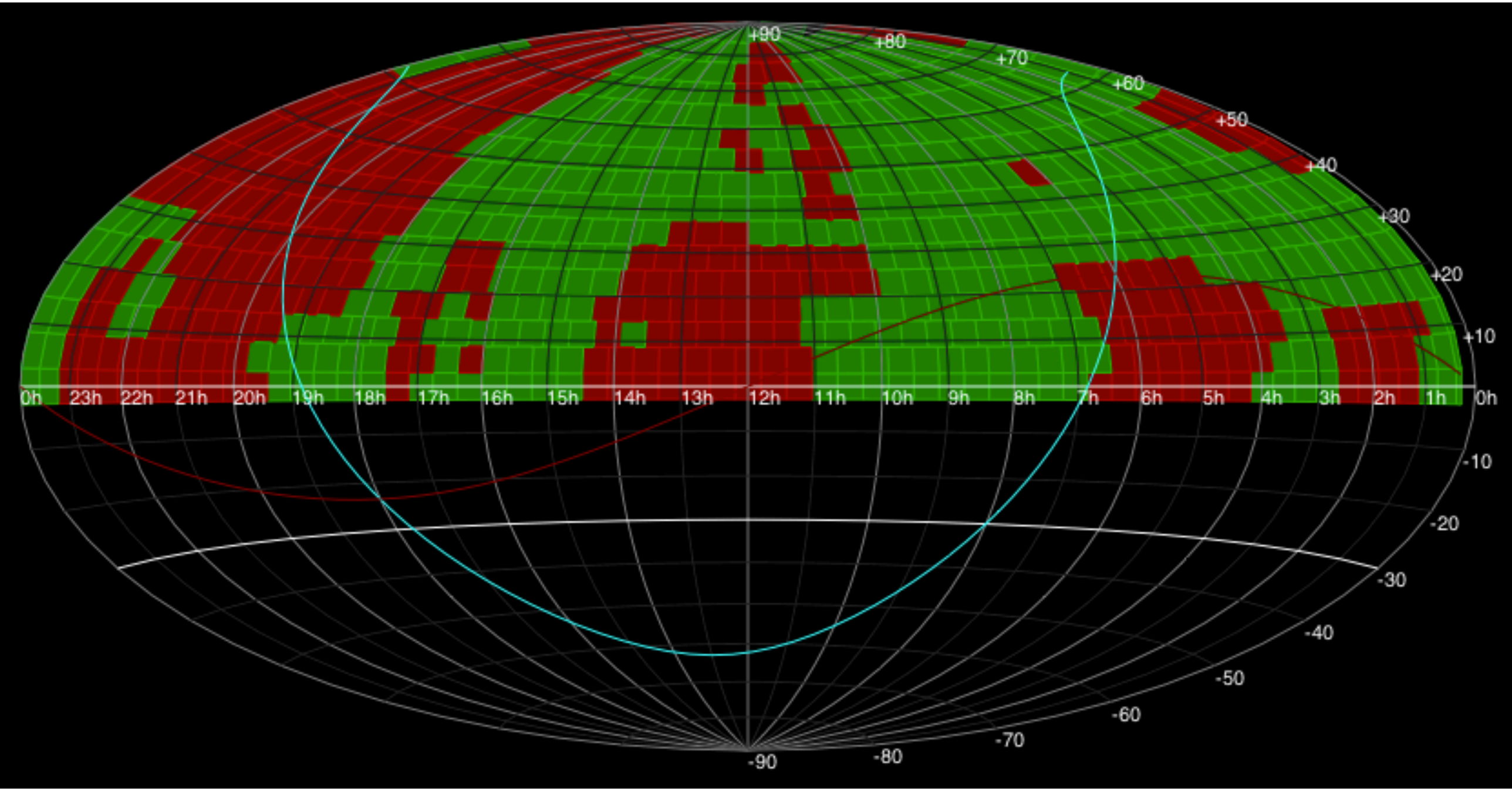
Netherlands Institute for Radio Astronomy

MSSS Update

George Heald
(on behalf of the MSSS Team)
LSM, 7 March 2012

MSSS Status

- MSSS-LBA: 438/660 fields observed = 66% complete



Short aside: ionospheric event

GNSS@ROB – Ionospheric Ev

gnss.be/Atmospheric_Maps/ionospheric_event_22012012.php

Royal Observatory of Belgium
GNSS Research Group

ABOUT
- Who we are
- Projects

TUTORIALS
- GPS, GLONASS, GALILEO, ...
- How GNSS Works
- Positioning & Timing
- GNSS Networks
- Coordinate Systems
- Atmosphere
  - Ionosphere
  - Troposphere

RESEARCH@ROB
- Antarctica
- Troposphere
- Ionosphere
- Time Transfer
- Atomium

DATA AND PRODUCTS
- GNSS Data
- Ionospheric Maps
  - Dynamic
  - Static

LOGIN

IONOSPHERIC EVENT 22-01-2012

Contact: iono@oma.be

An interplanetary shock wave was detected by ACE the 22/01/2012 at 05:15 UT (source: www.sidc.be). The Earth's ionosphere above Europe was disturbed from the 22/01/2012 at 06:00 UT to the 23/01/2012 at 05:30 UT.

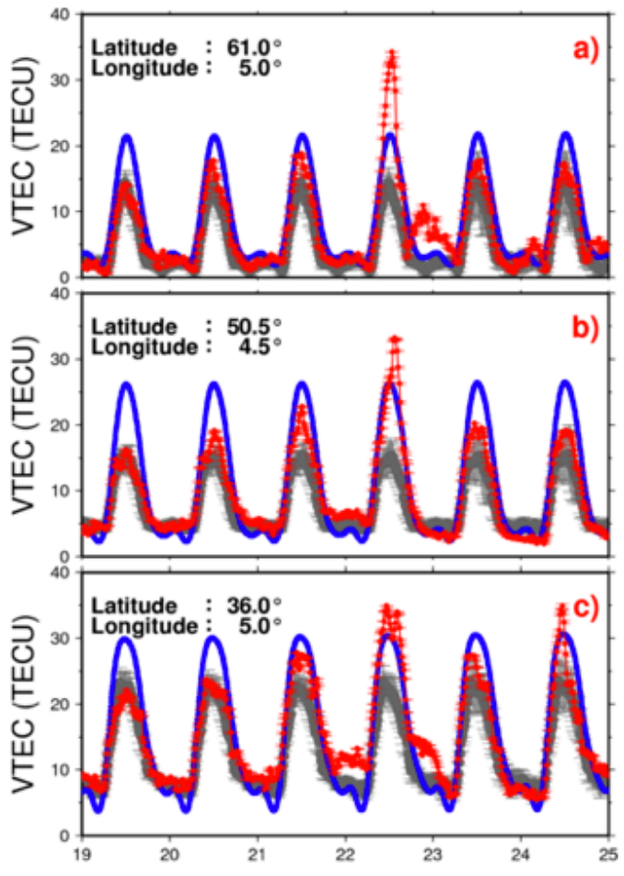


Figure 1: VTEC time series

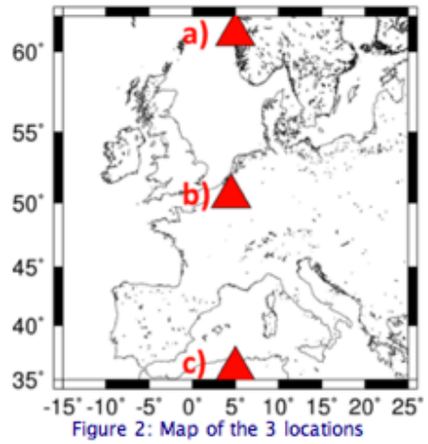


Figure 2: Map of the 3 locations

Figure 1 shows the time evolution of the Vertical Total Electron Content (VTEC) time series (***in red***) extracted from the near-real time 15-min VTEC maps at 3 different locations (see Figure 2):

a) Northern part of the map (top)
b) Brussels (middle)
c) Southern part of the map (bottom)

Also shown, the model based on the median from the 15 previous days (***in grey***), and the IRI 2011 [Bilitza et al. 2011] model (***in blue***).

More informations:

- the 15 min VTEC maps during this event : here
- comparison with the median of the last 15 days :here
- about the CME : www.sidc.be

MSSS Progress Reports

- New reports available since last LSM:

2012 Week 8

Present: Oscar Martinez, Mike Bell, Tom Hassall, Gosia Pietka, Jess Broderick

- Report on the analysis of demixed data for the L227+69 field at 74 MHz (Michael Bell, Tom Hassall and George Heald)
- Report on the analysis of the L227+69 and L243+69 fields at 60 MHz (Jess Broderick and Gosia Pietka)

2012 Week 9

Present: Oscar Martinez, V.N. Pandey, Charlotte Sobey, Björn Adebahr, Yvette Cendes, Peeyush Prasad

- Report on L086+69 and 3C196 (Björn Adebahr)
- Report on overlapping fields L227+69 and L243+69 (Charlotte Sobey & Yvette Cendes)
- Report on TEC calibration of L227+69 (Peeyush Prasad)
- pandeymartinez-week9-v1p1.pdf on automatic baseline statistics and detection of bad stations (Oscar Martinez & V.N. Pandey)

- Keep up-to-date on the LOFAR wiki (MSSS section) - note that progress reports are typically posted on Monday following the previous week's work

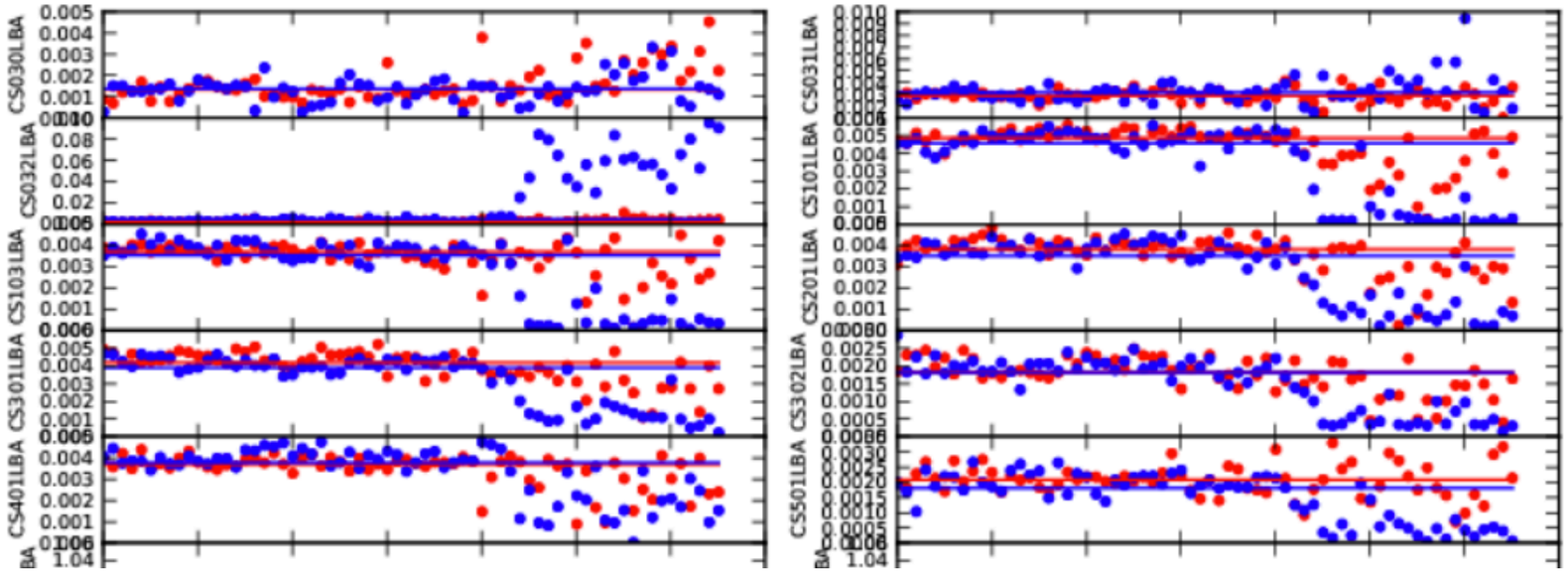
Key developments

- ID and removal of badly behaving stations
- Data processing is almost entirely automated
  - small set of scripts to go from demixed pipeline data to a set of 8 2-MHz broadband images covering 30-74 MHz, each of which are approx. near VLSS resolution, sensitivity (no selfcal yet)
  - these scripts are informing further pipeline development
- Images made with awimager now regularly produced
  - field-to-field consistency indicates array beam ok to first order
  - potential MSSS-to-VLSS inconsistency may be due to a subtle processing error, needs to be verified

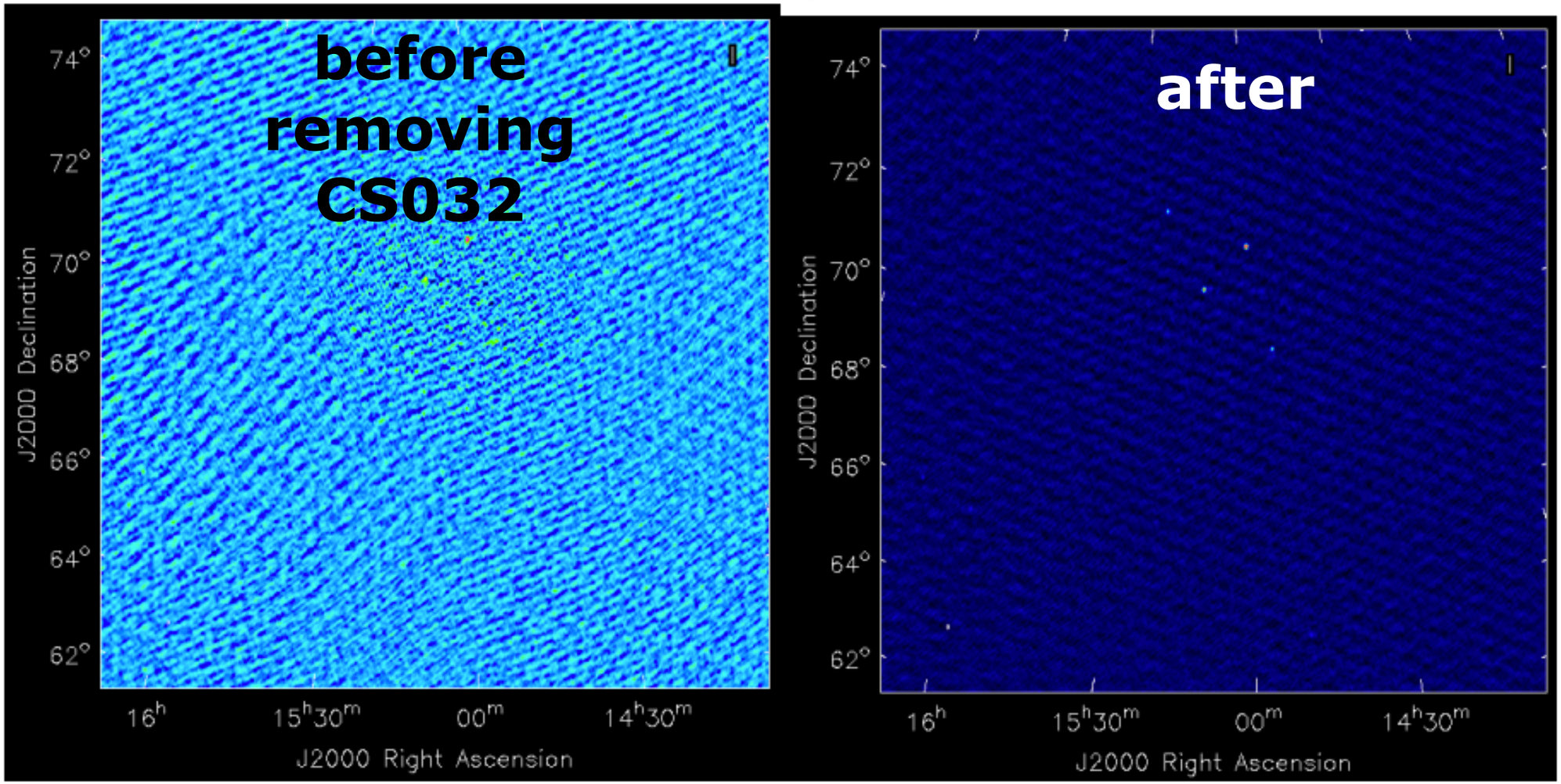
I. Removal of bad stations

- Key step: identification and removal of bad stations

Gain amplitudes

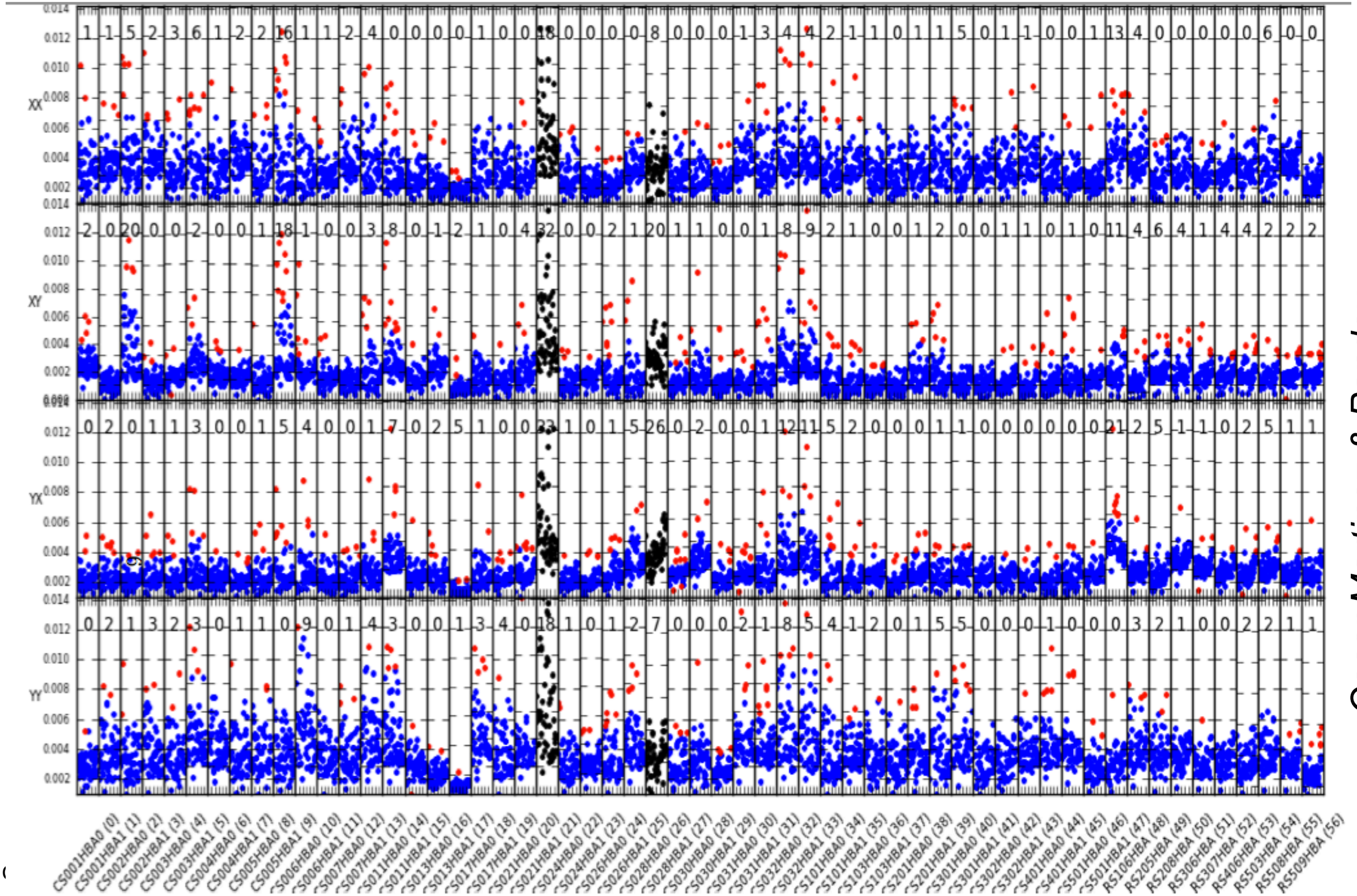


Mike Bell & Tom Hassall



I. Removal of bad stations

- New scripts auto-identify bad stations (then remove w/ `msselect`)



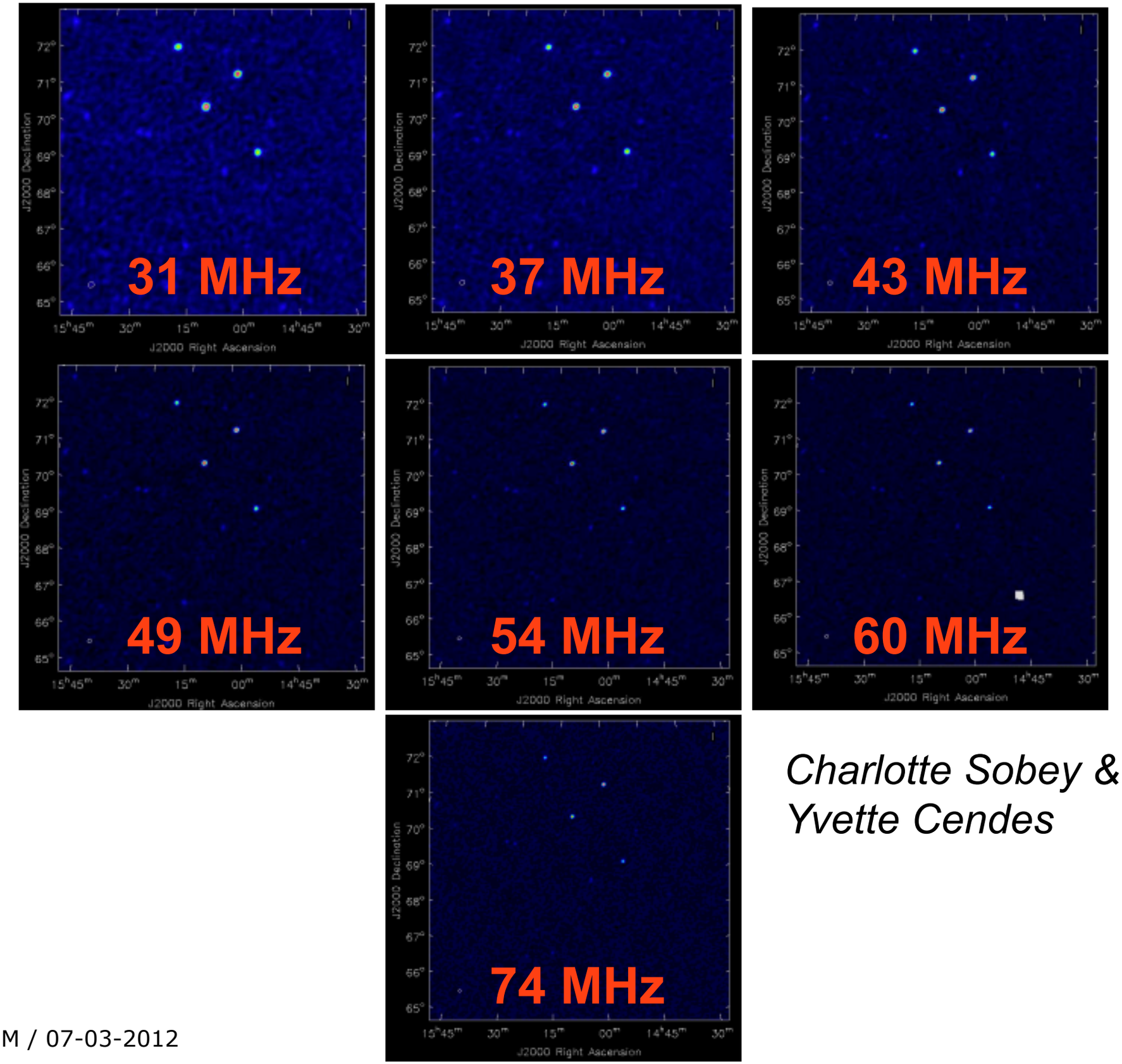
Oscar Martinez & Pandey

II. Image production

- Flagging & demixing (done automatically by calibrator & target pre-processing pipelines)
- collection of data onto work node
- calibration of cal-beam and replacement of outlier amplitudes
- application of gains to target, combination into 2MHz bands
- identification of bad stations and removal
- phase-only calibration against VLSS catalog extraction
  - *NB: TEC tests show unstable solutions during bad snapshots (Peeyush Prasad)*
- combination of time snapshots and imaging

All done using a sequence of a few automatic scripts

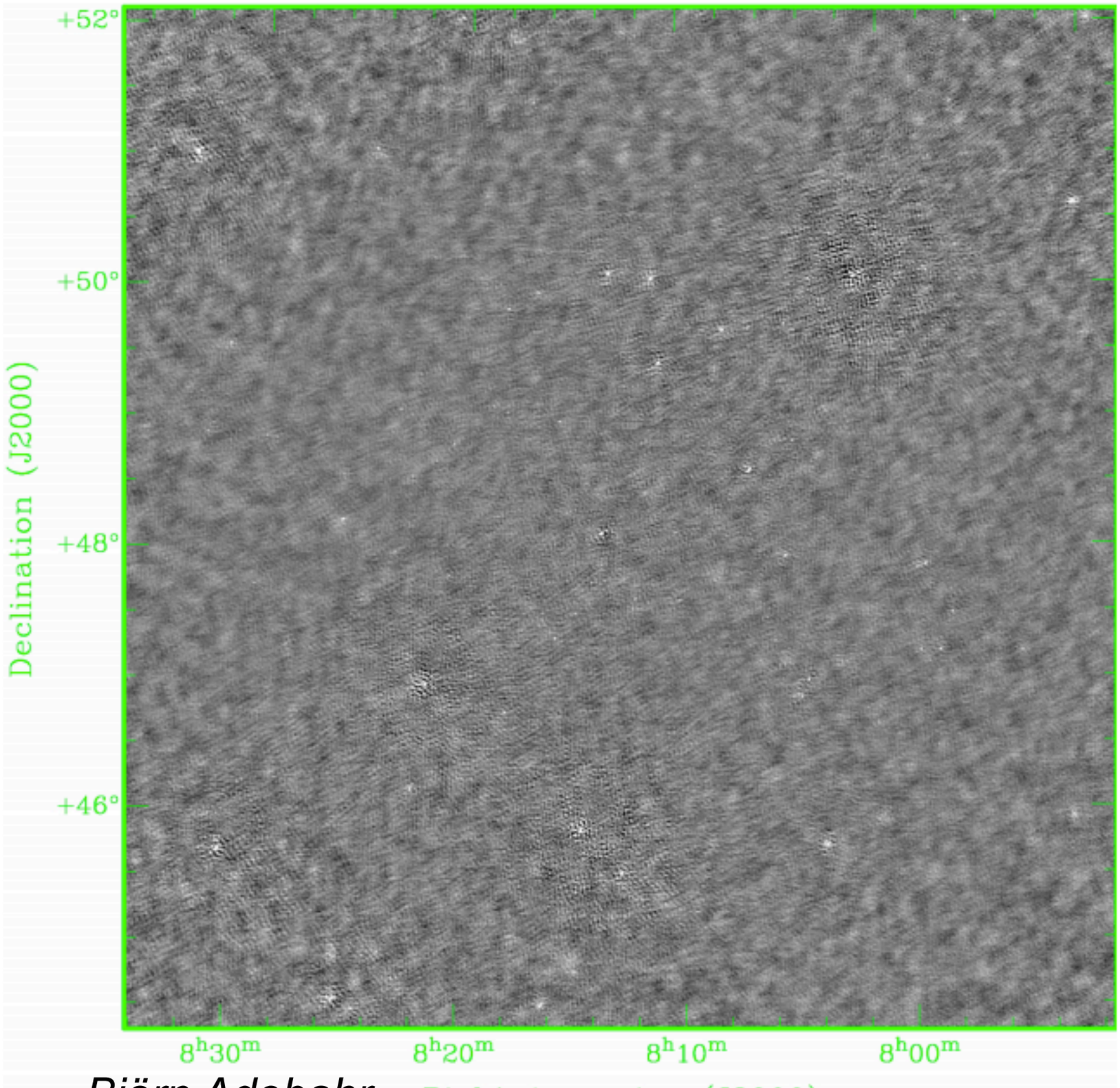
II. Image production



Charlotte Sobey & Yvette Cendes

II. Image production

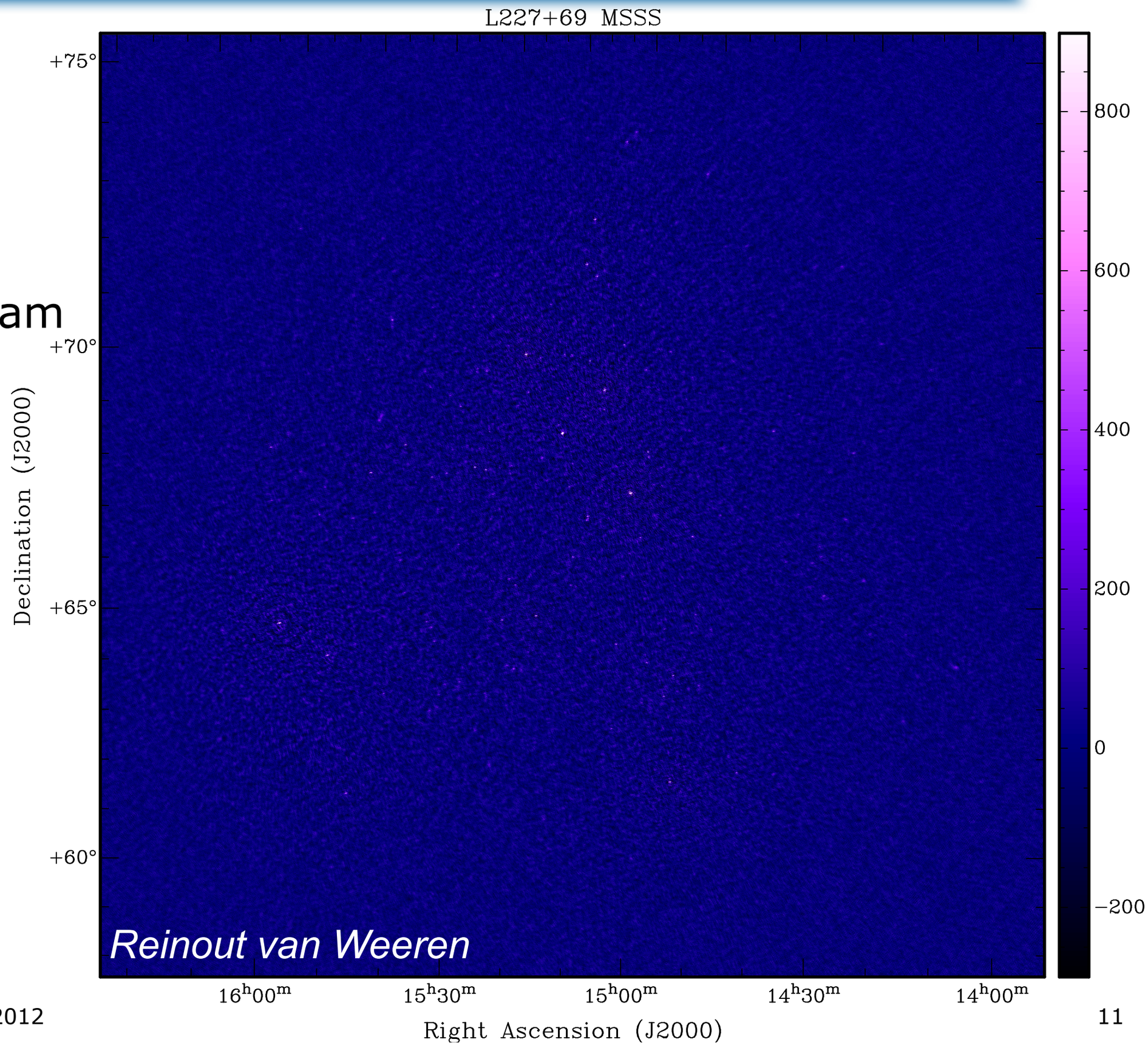
- 3C196 field
- Note no selfcal
- Image noise ~100 mJy/beam
- 3C196 is ~150 Jy
- Artifacts from bright field sources...
- Beamsize ~53″x24″ (but it was a long awimager job...)



Björn Adebahr

II. Image production

- HUGE image (7200^2 pixels)
- Noise level 50-80 mJy/beam
- Beamsize ~43″x38″
- 68 MHz
- ~200 sources detected
- Still no selfcal



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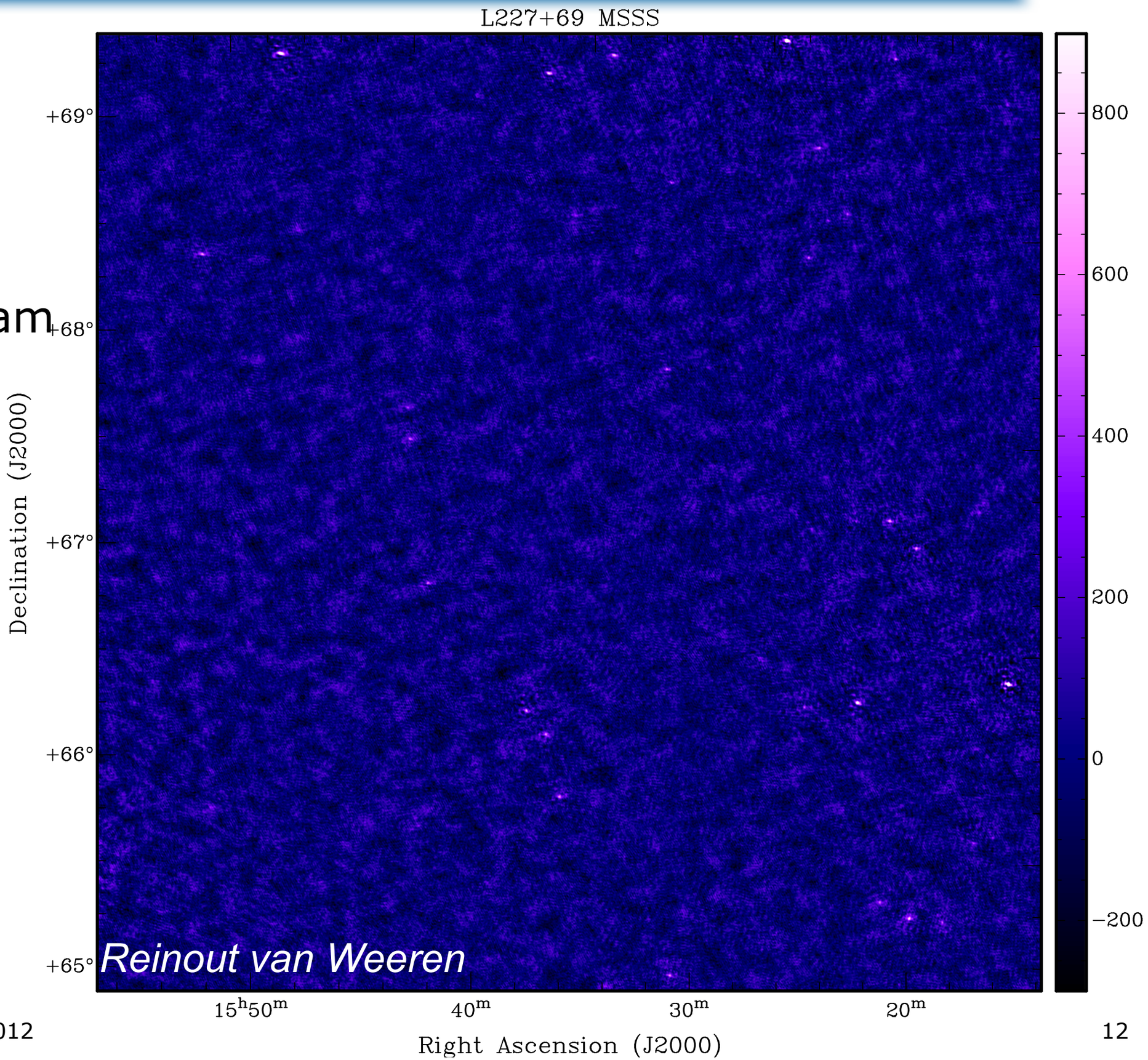
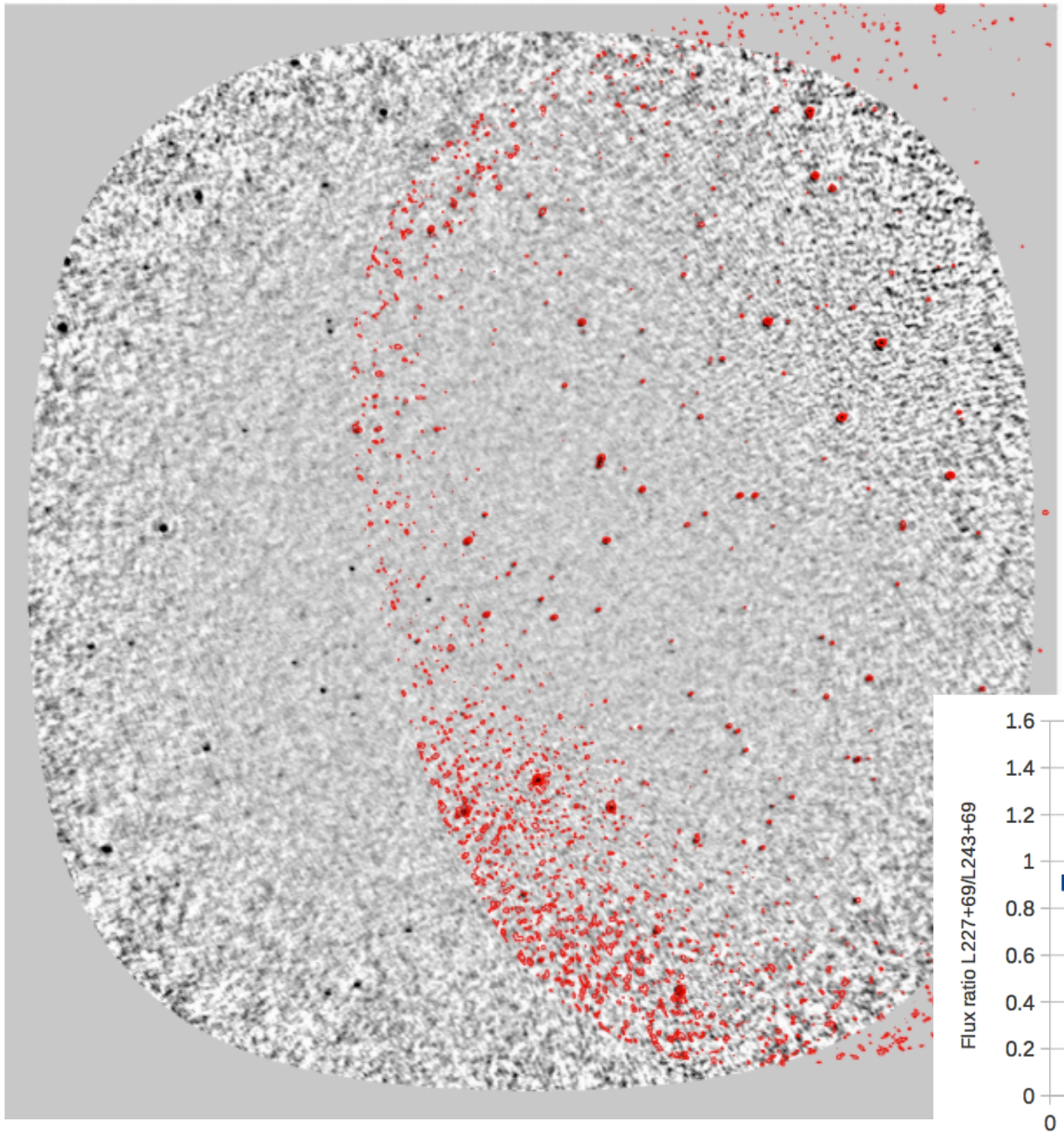


III. awimager & beam issues

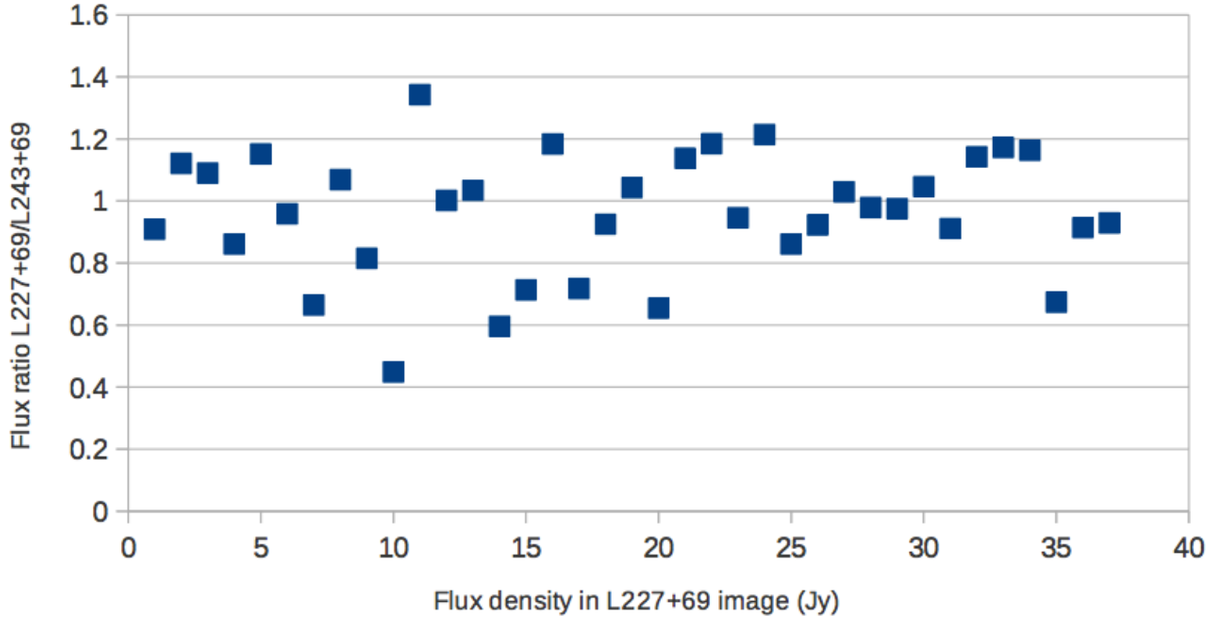
- Overlapping fields L243+69 and L227+69



George Heald / LSM / 07-03-2012

Source fluxes between fields agree on average; large scatter may be due to beam errors and lack of selfcal step

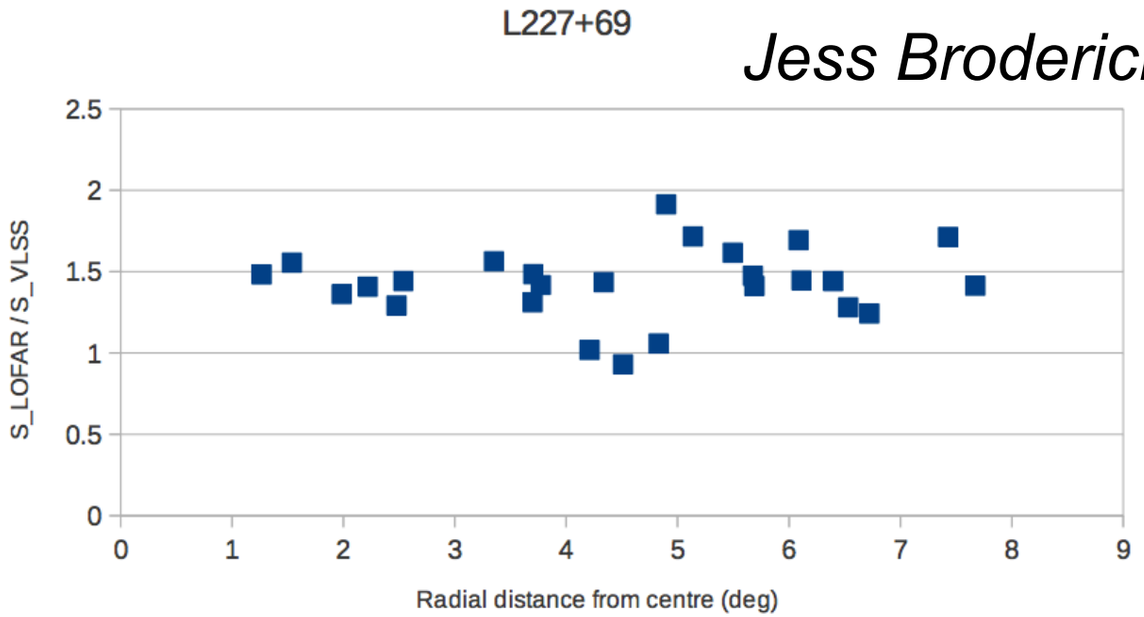
Jess Broderick & Gosia Pietka

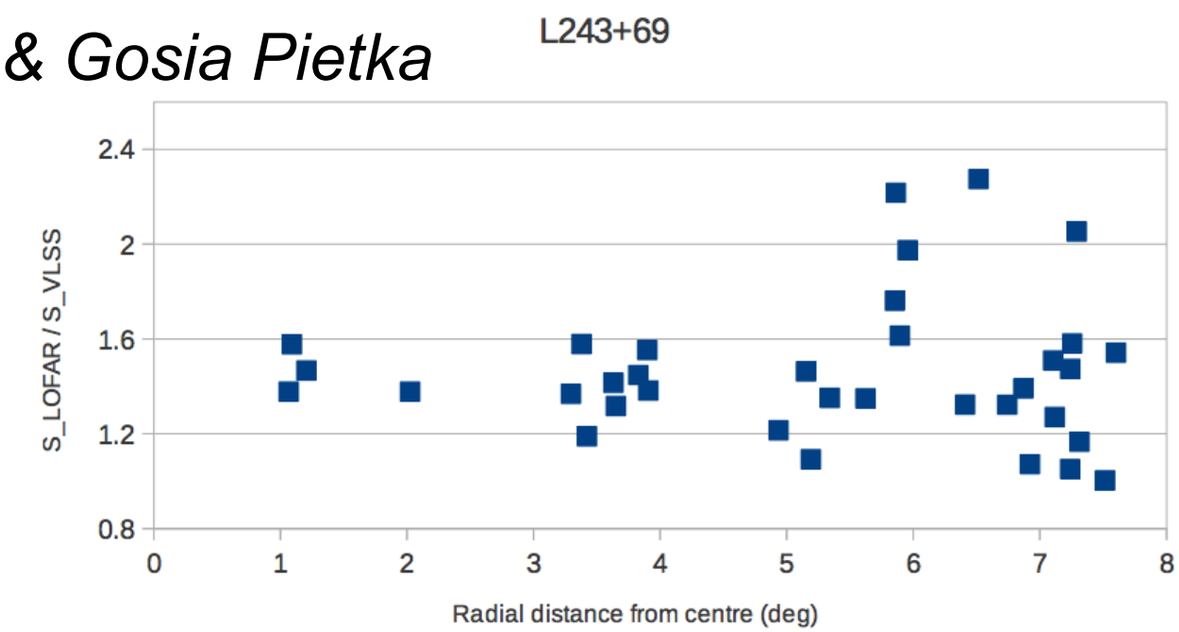


III. awimager & beam issues

- Comparison L227+69 and L243+69 (BAND5=60 MHz) with VLSS
- Average spectral index would be ~-1.6 (MSSS fluxes too high)

Jess Broderick & Gosia Pietka





- Subtle BBS-parset error discovered at the end of last week: element beam correction was being applied to the data *twice*
  - This may be the cause of the offset; investigation ongoing this week to confirm or discount this possibility

Take home message

- MSSS images can be produced with reasonable processing
- Still without selfcal, but VLSS-like (x8 simultaneous bands!)
- Lots left to do....