



Netherlands Institute for Radio Astronomy

Introduction to LOFAR

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LOFAR - Key Facts

- Low Band Antenna (LBA; 10--90 MHz) - simple dipoles.
- High Band Antenna (110-240 MHz) - tiled array.
- 48 MHz bandwidth (large fractional bandwidth) - single beam.
- 240 sub-bands x 0.2 MHz (64 channels).
- Beams formed in software and multiple beams can be formed.
- Automated pipeline to process the data.



Core stations - 24 Dutch

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Core stations - 6 station superterp

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Remote (16) & International (8+) stations

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A pan-European array

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- 32 stations validated (20 core, 7 remote and 5 International)

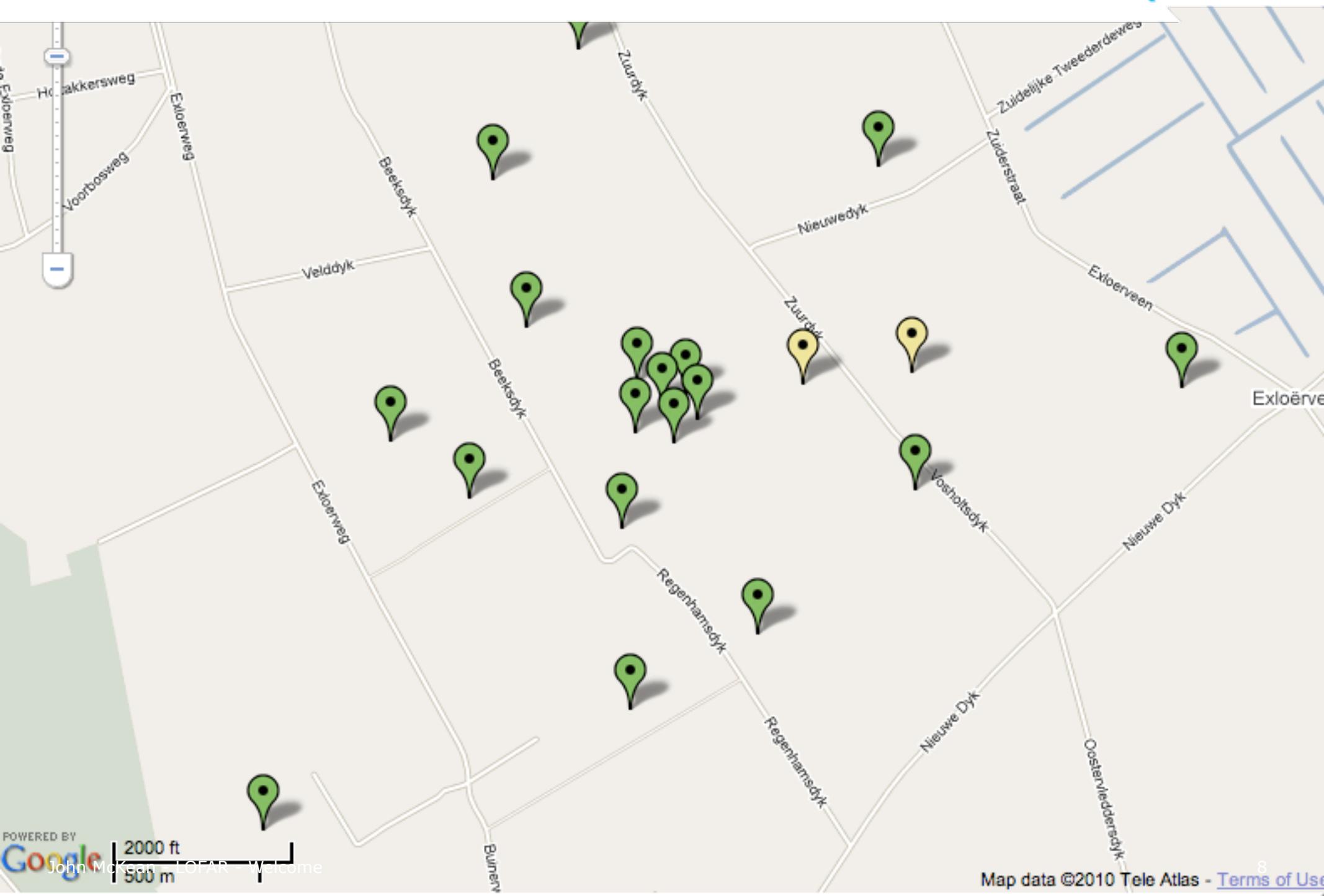
A pan-European array

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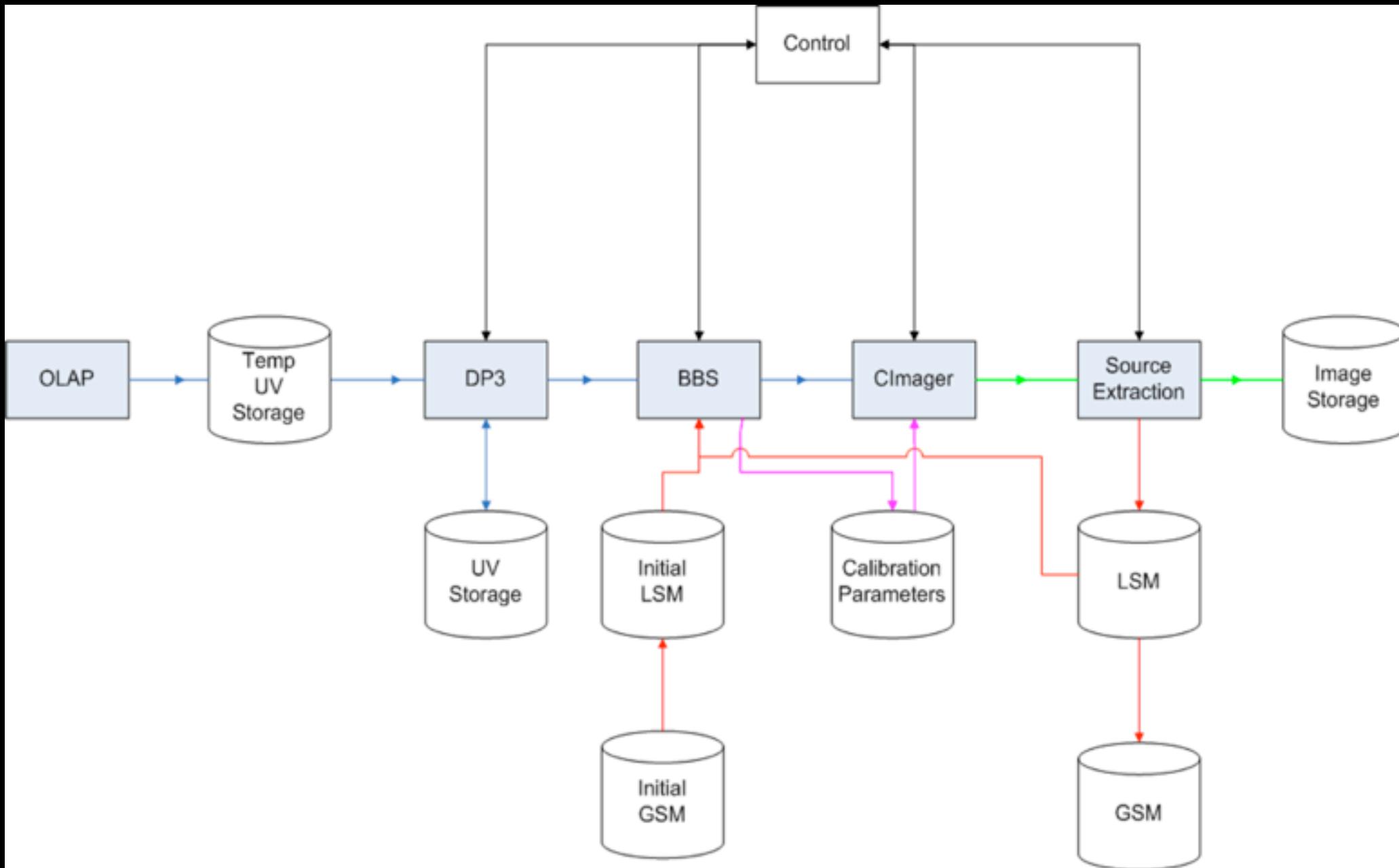
A pan-European array

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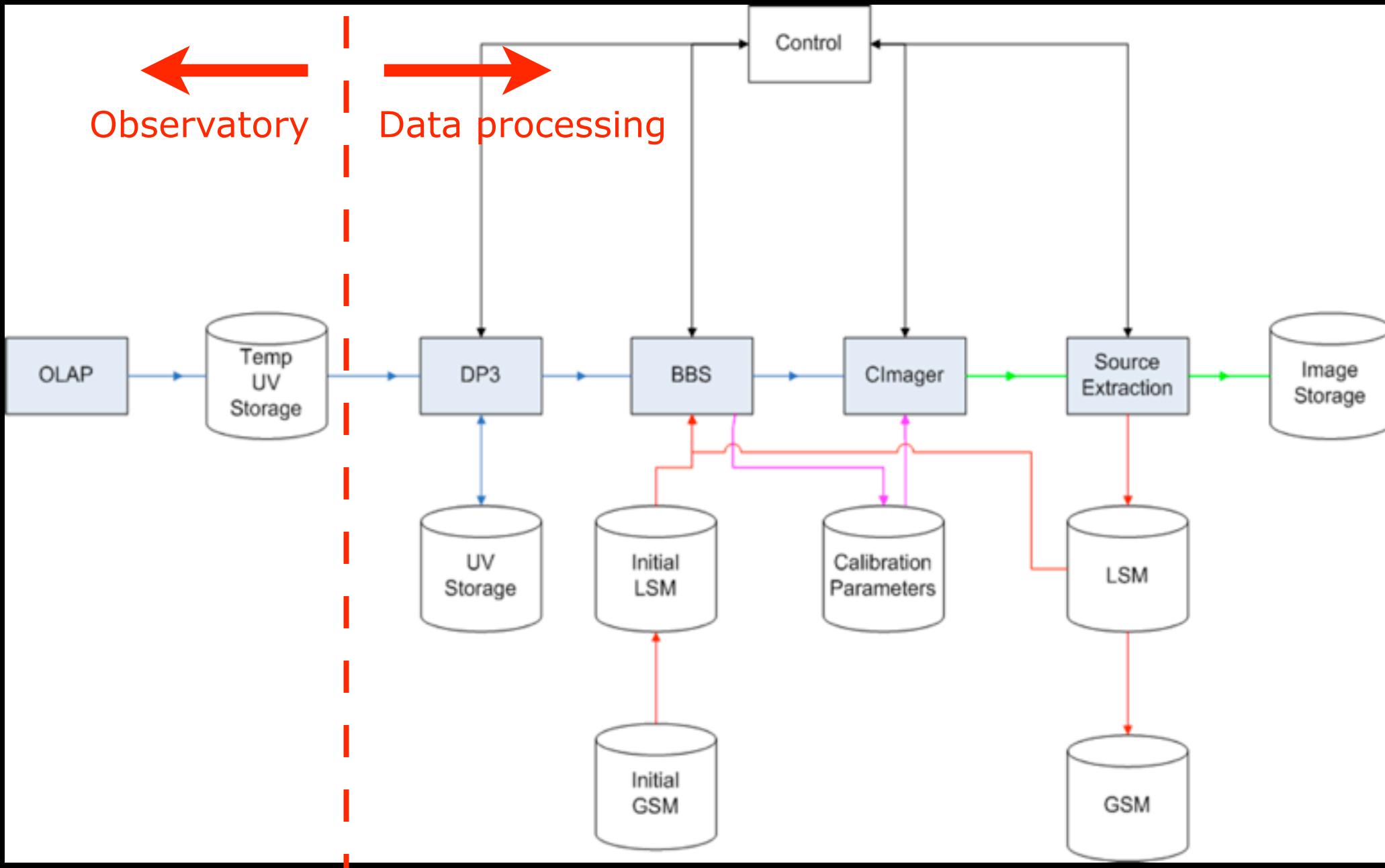
LOFAR imaging pipeline

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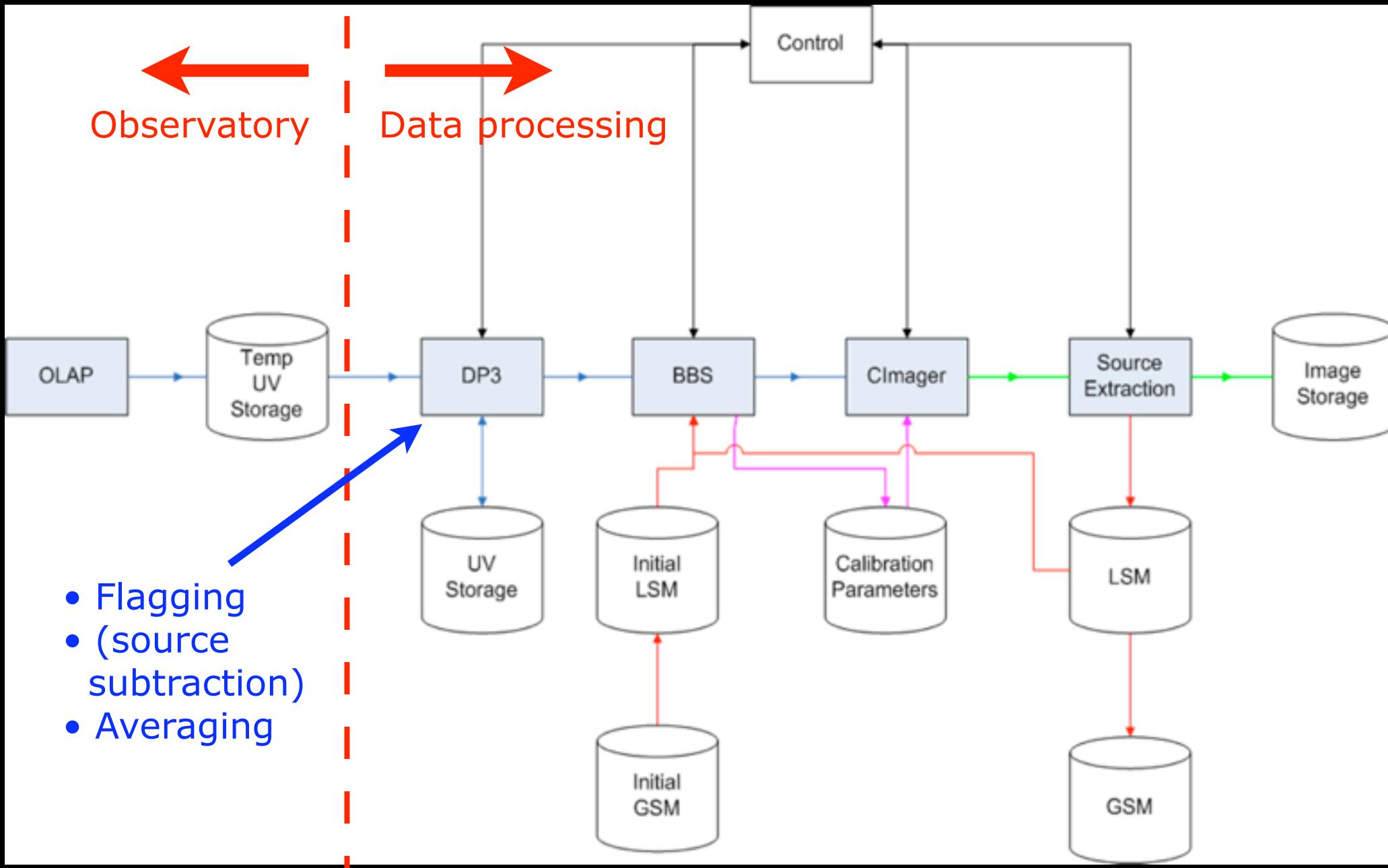
LOFAR imaging pipeline

ASTRON



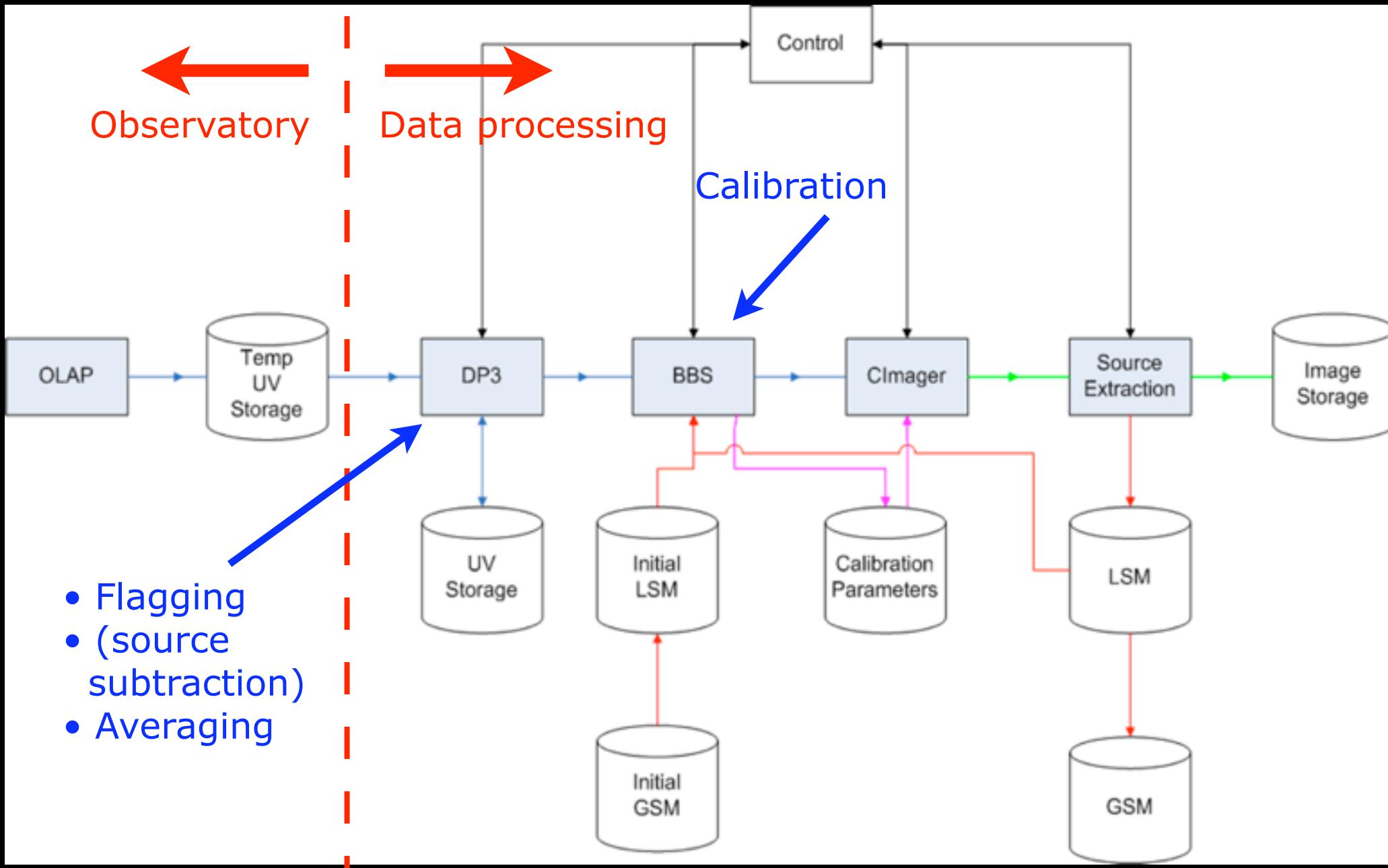
LOFAR imaging pipeline

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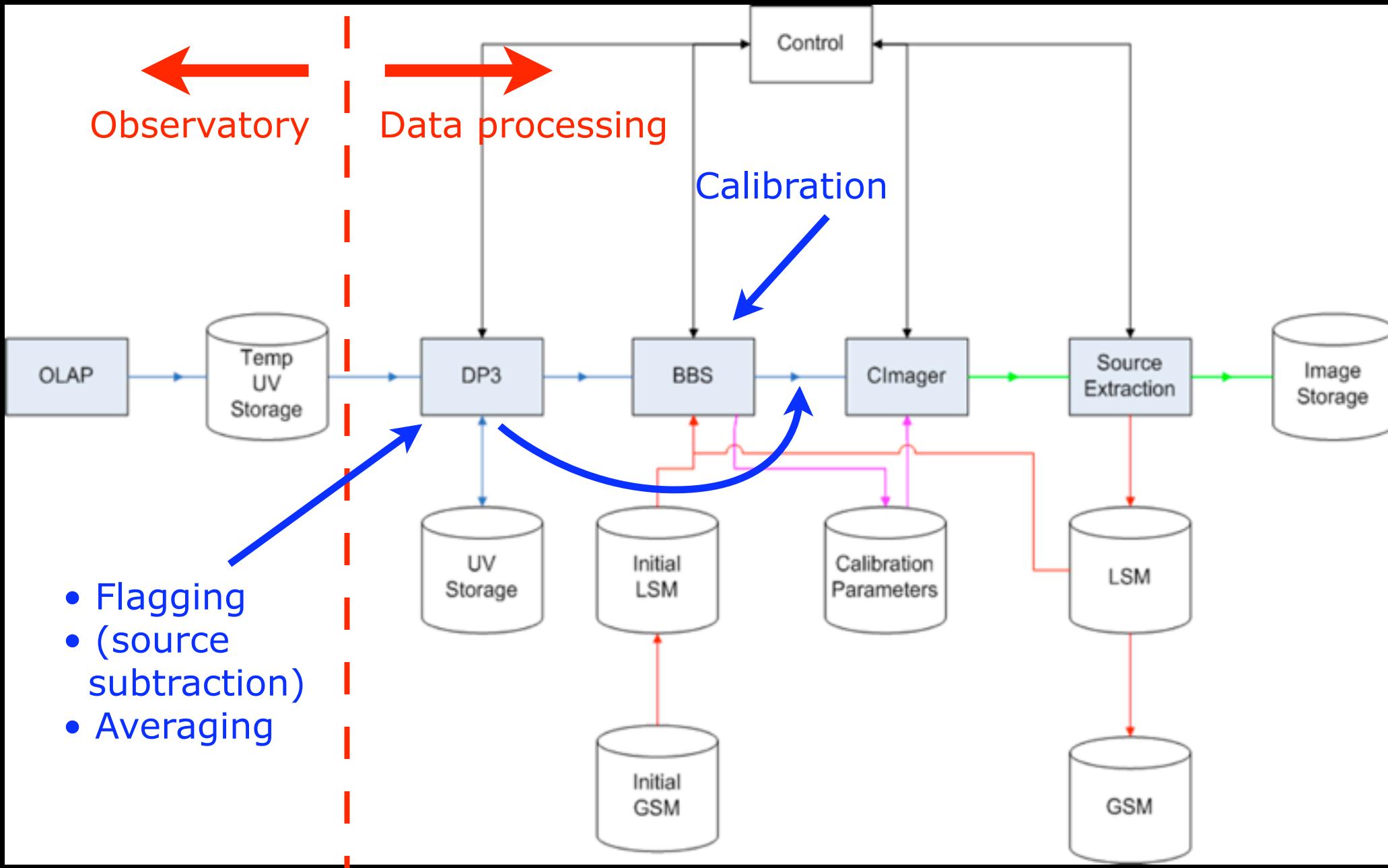
LOFAR imaging pipeline

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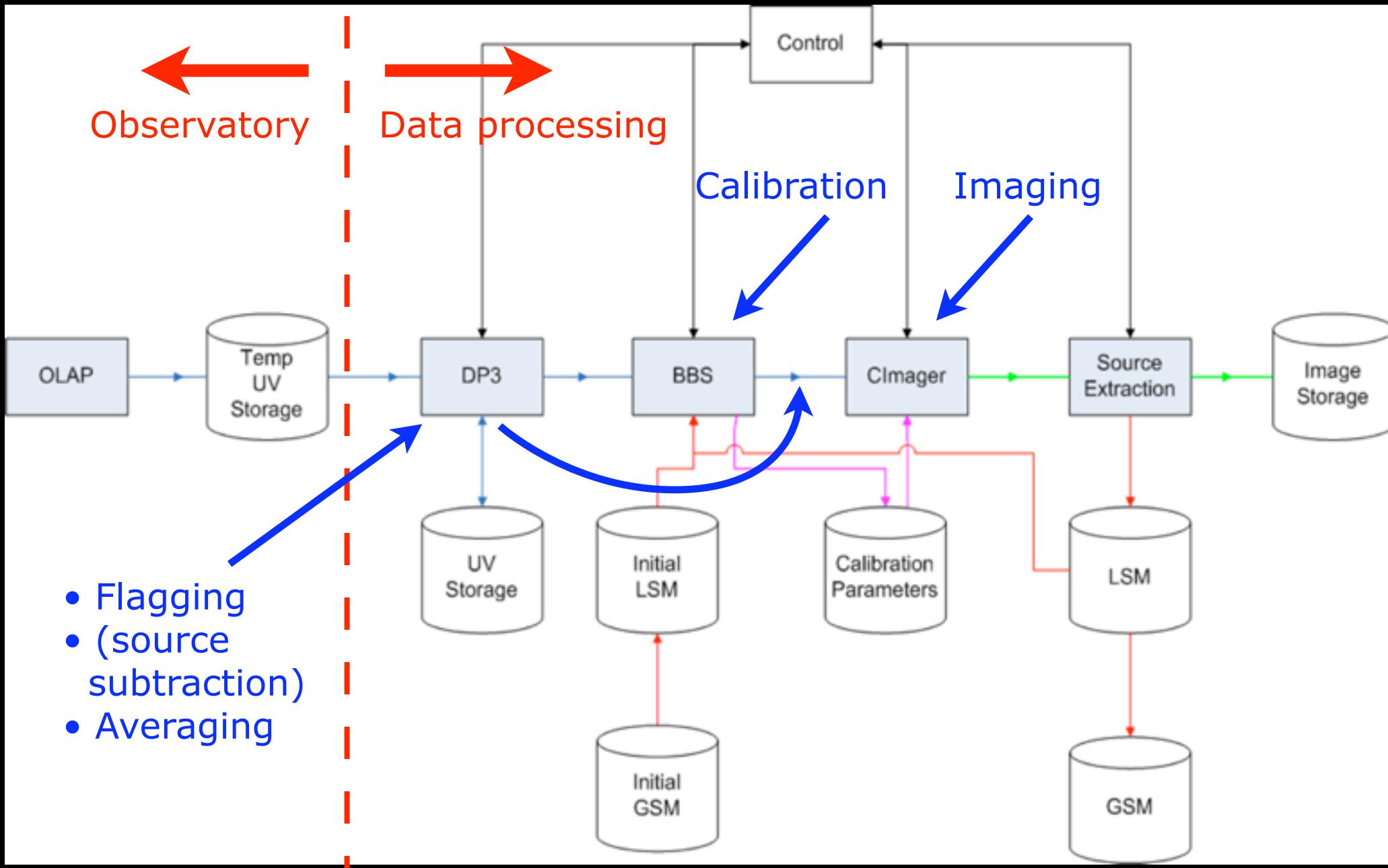
LOFAR imaging pipeline

ASTRON



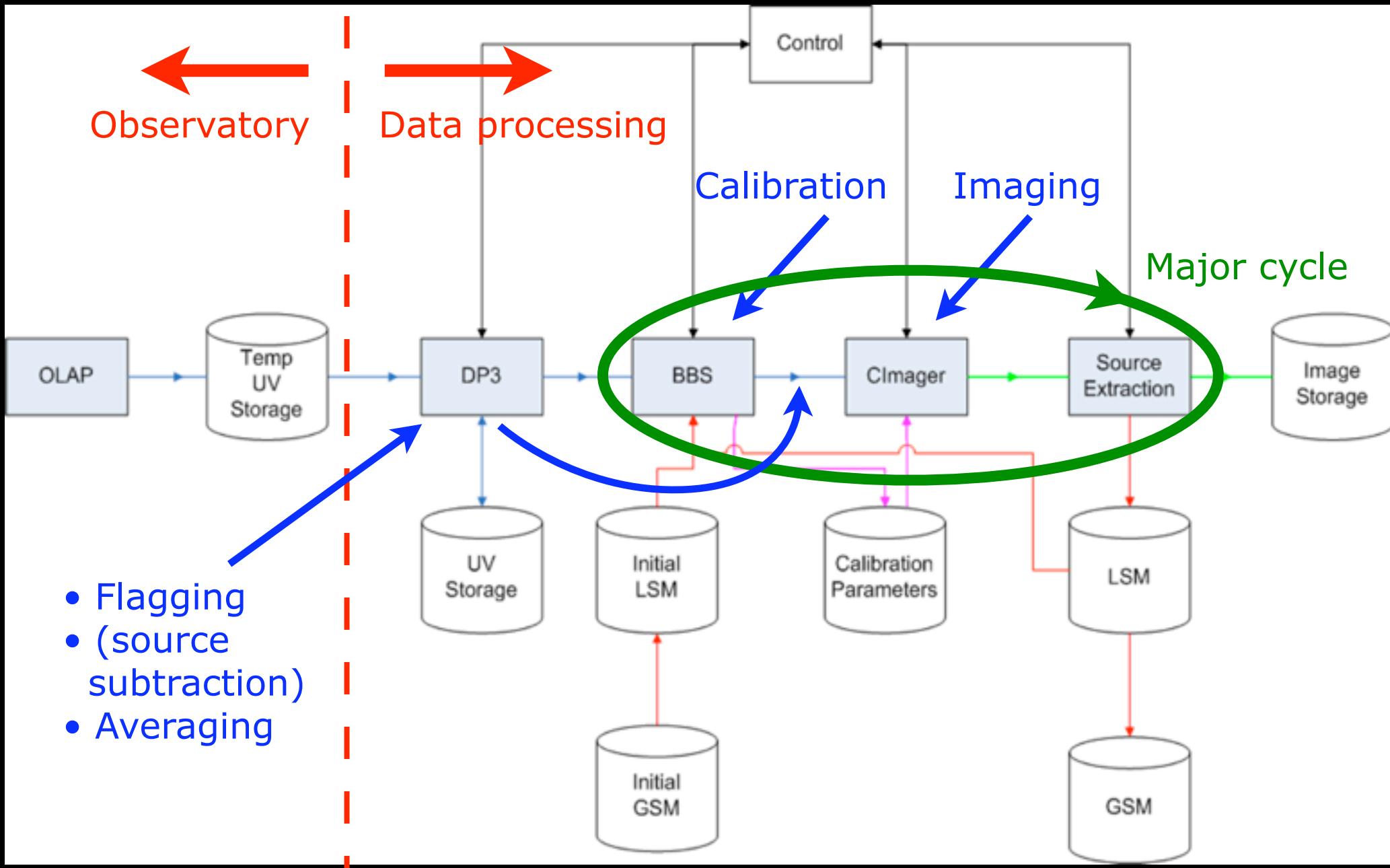
LOFAR imaging pipeline

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LOFAR imaging pipeline

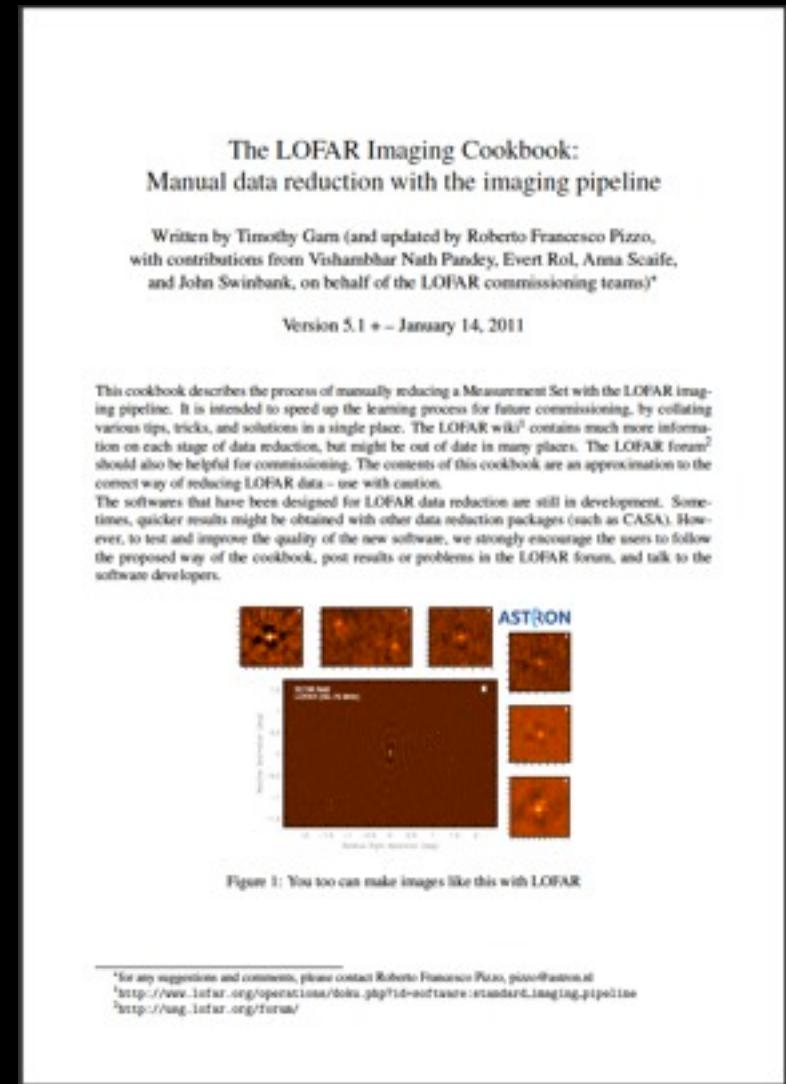
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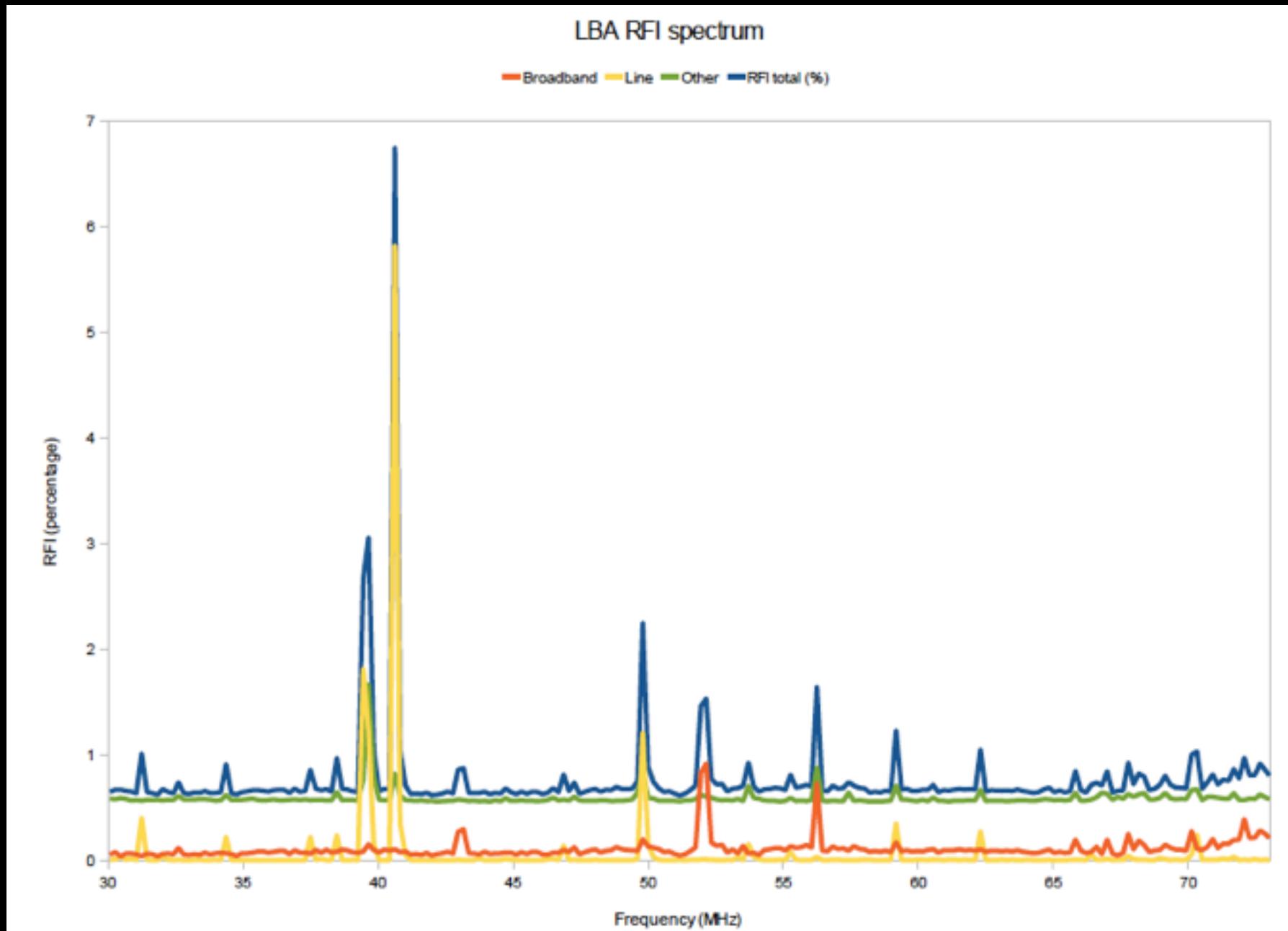
LOFAR imaging cookbook

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- Full details of the data reduction process can be found in the LOFAR imaging cookbook.
- Please send any updates or suggestions to Roberto.

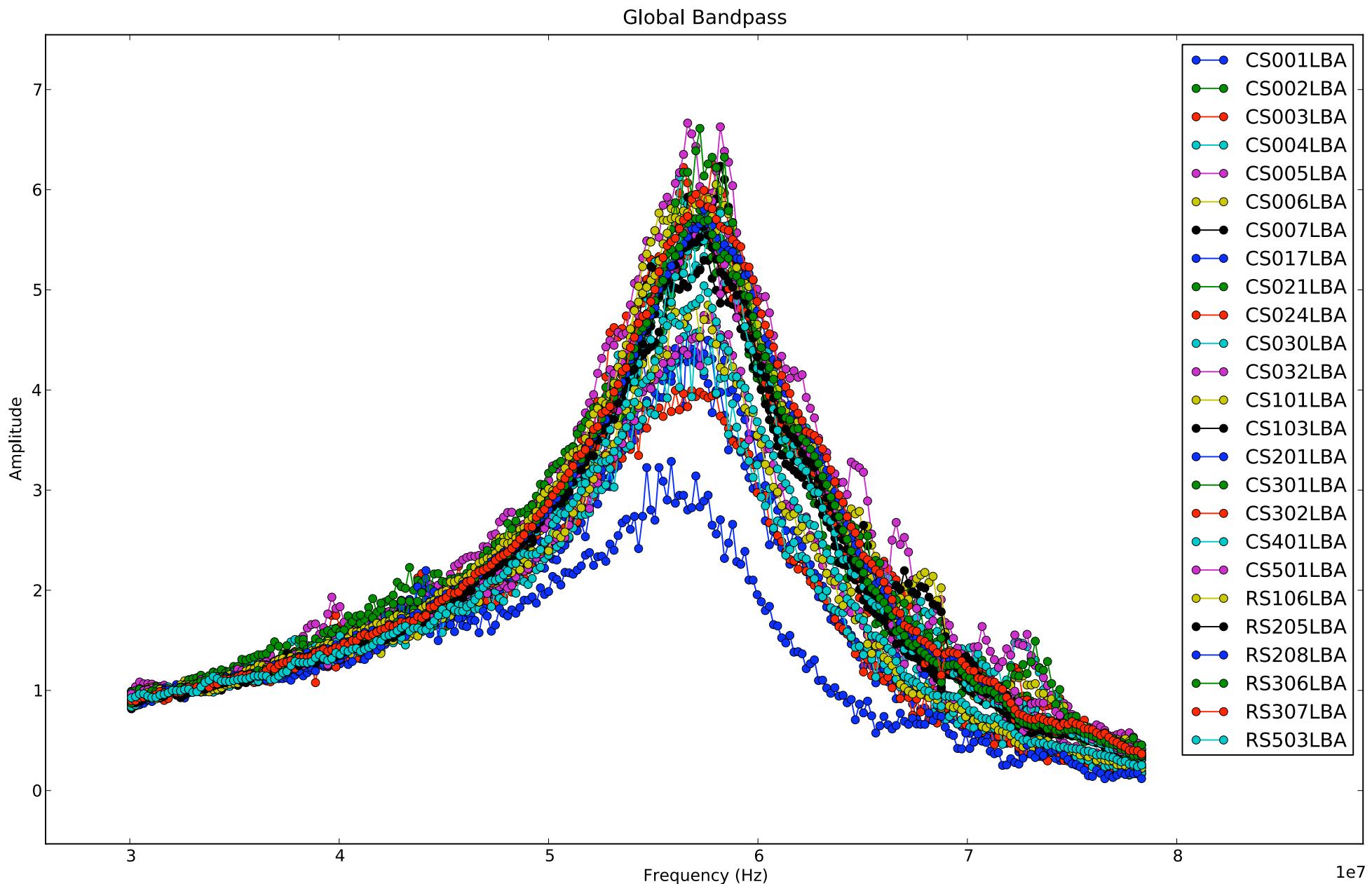


<http://www.astron.nl/radio-observatory/lofar/lofar-imaging-cookbook>



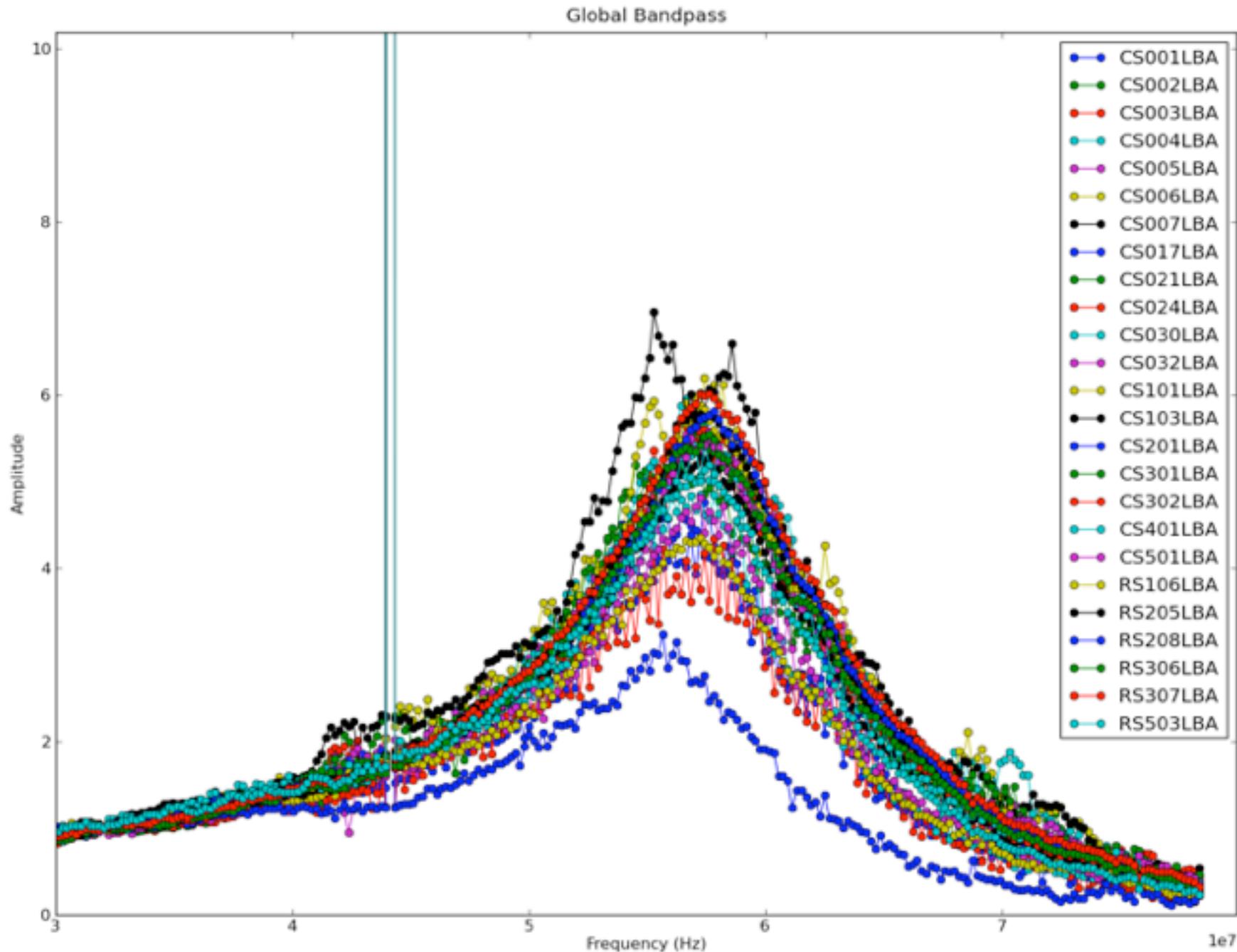
The LOFAR bandpass

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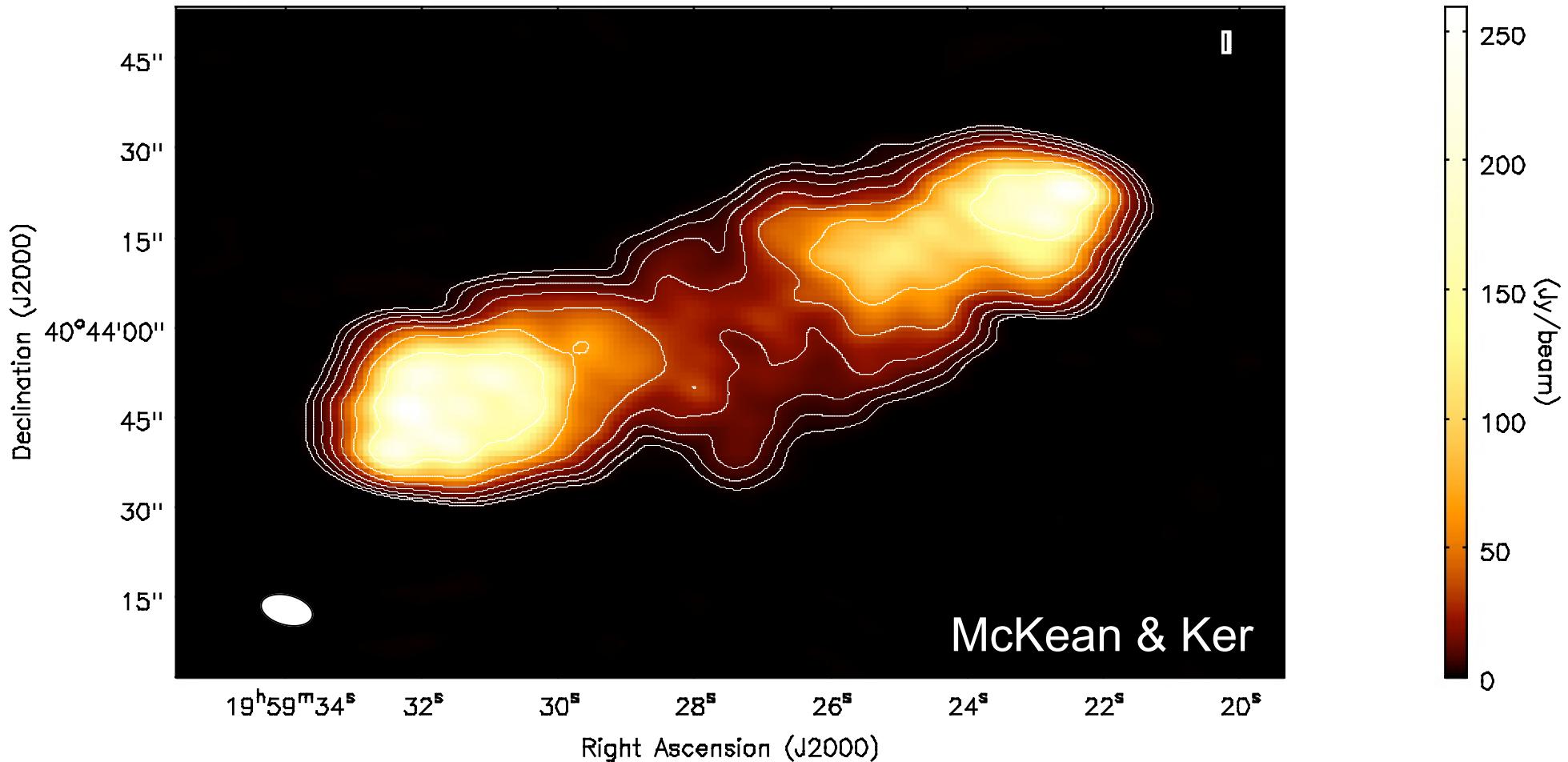
The LOFAR bandpass

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HBA at 240 MHz image Cygnus A

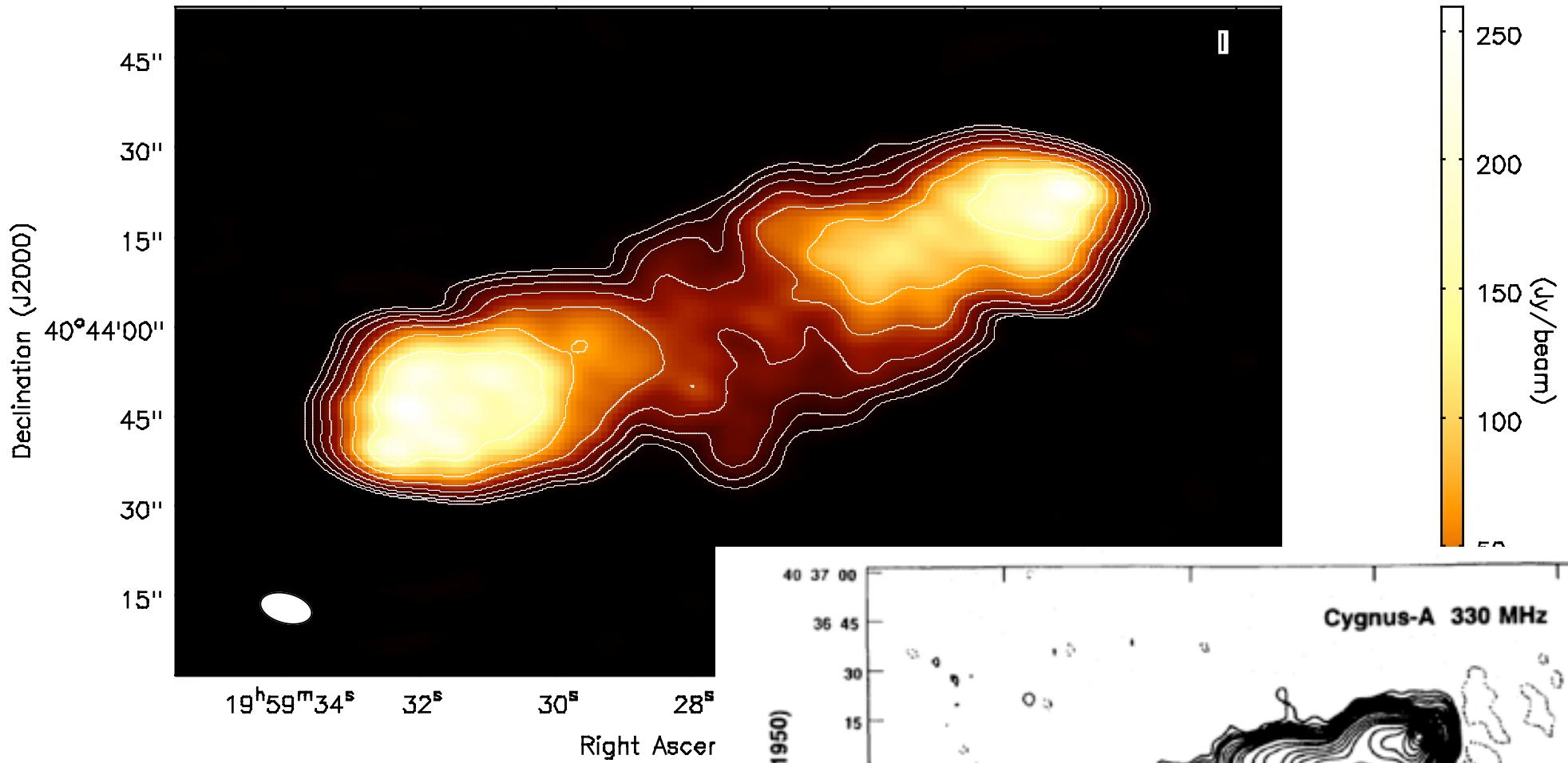
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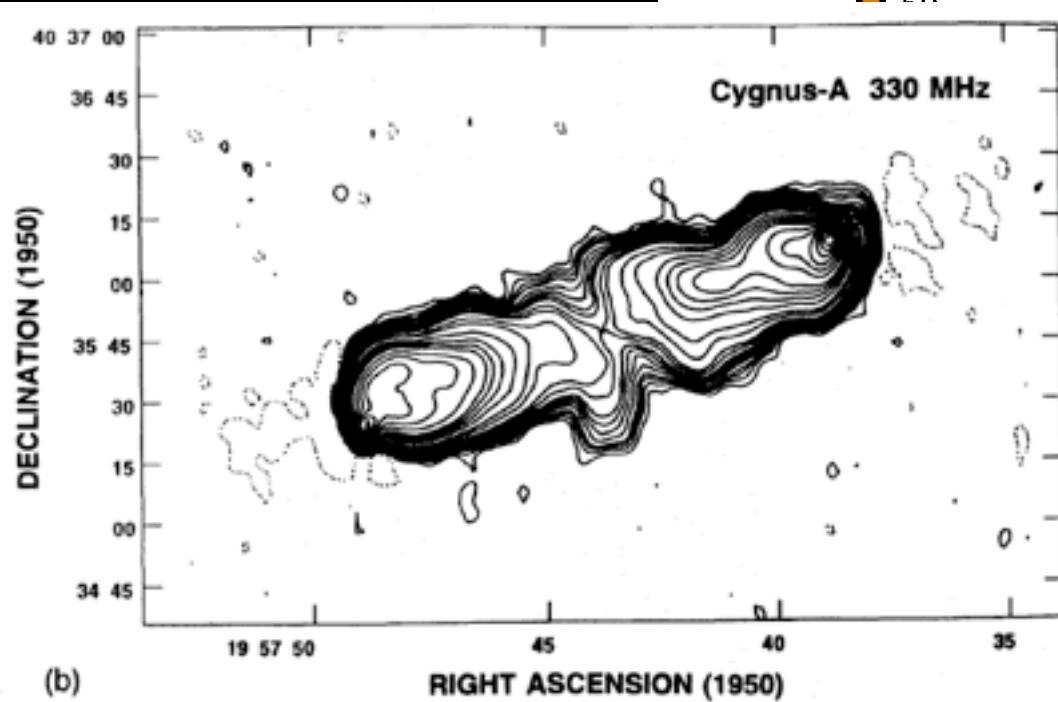
- 220-240 MHz (230 MHz)
- 16 stations (120 Gb x 240 subbands)
- 6 hr observation

HBA at 240 MHz image Cygnus A

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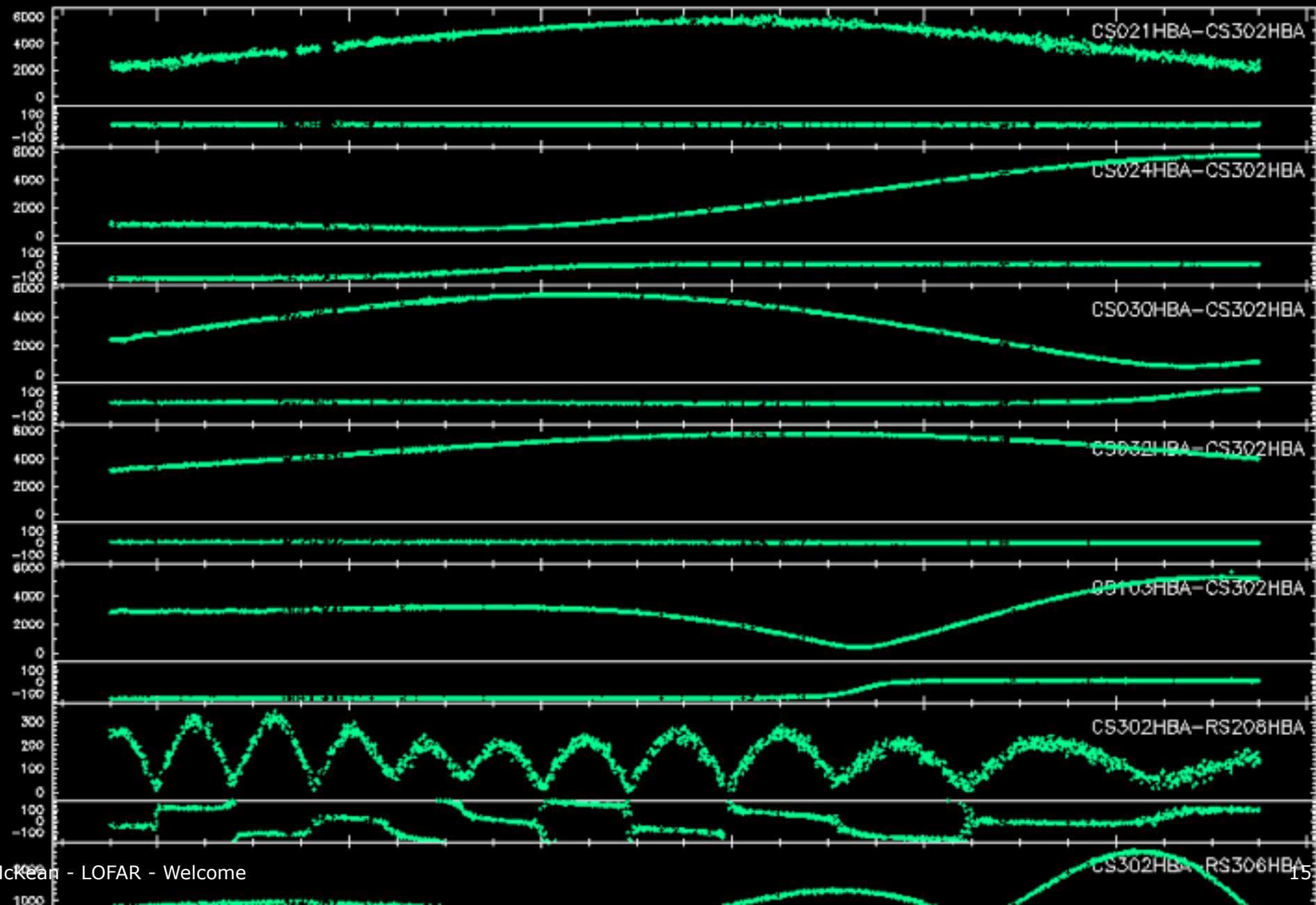


Data quality

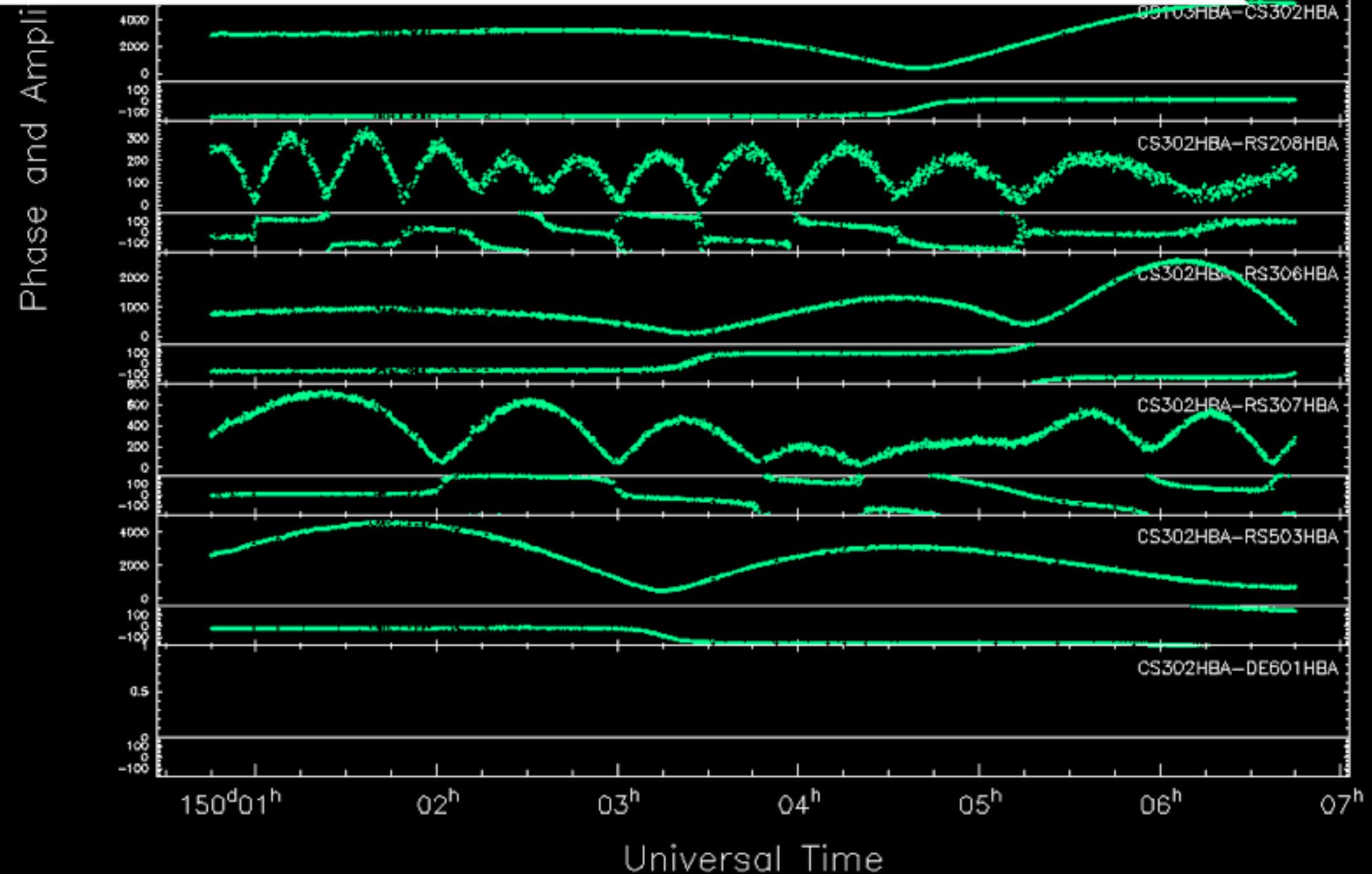


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Baselines of 1:CS302HBA in IF 1, Pol XX

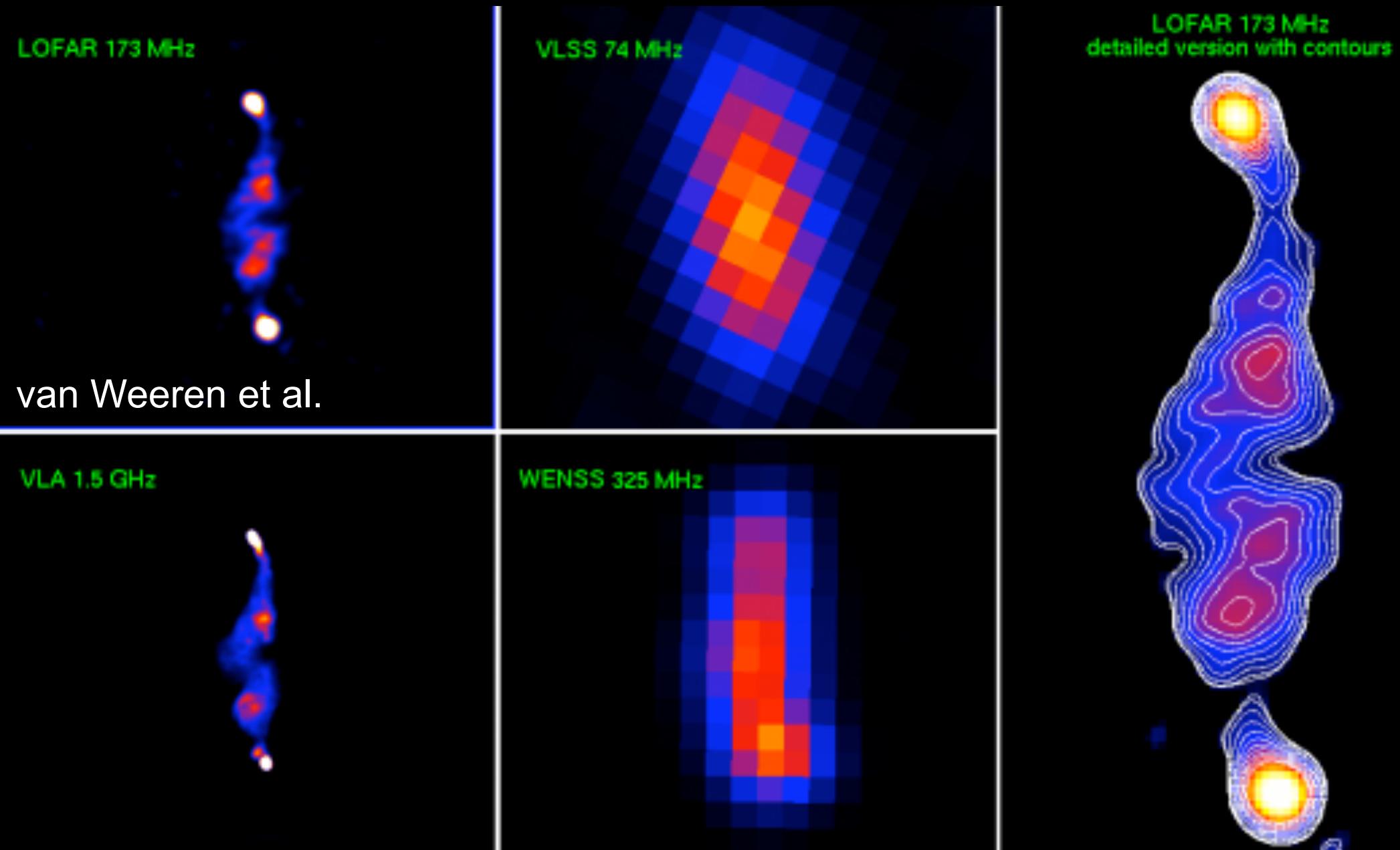


Data quality



3C61.1 at 173 MHz with LOFAR

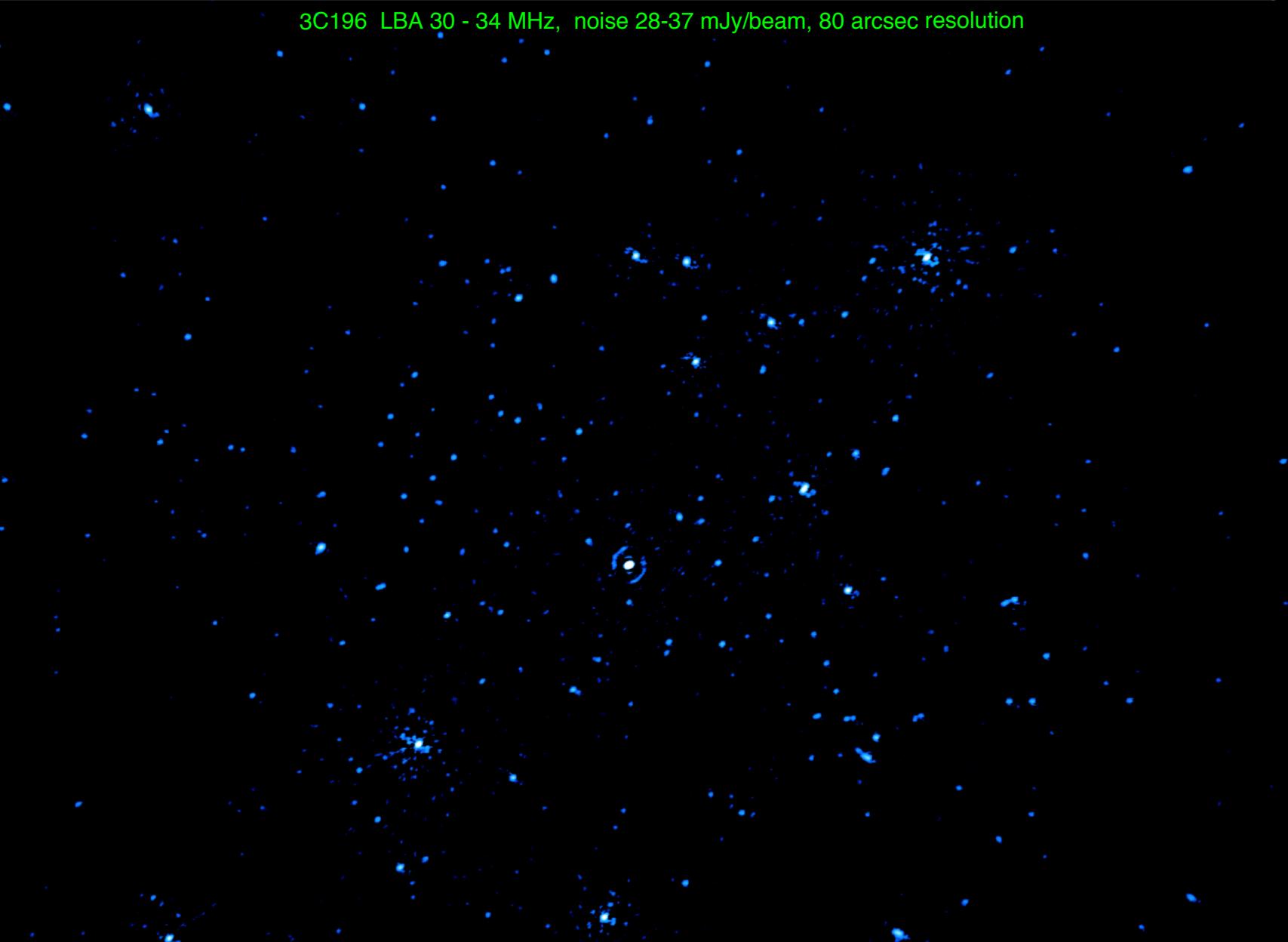
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Wide-field imaging - 3C196

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3C196 LBA 30 - 34 MHz, noise 28-37 mJy/beam, 80 arcsec resolution



van Weeren et al.

- The aim of the week is to become familiar with LOFAR data, to test the LOFAR system and make science quality images.

Monday

09:00 - 11:00 - Arrival and set-up

11:00 - 11:15 - John: Welcome and overview of LOFAR (basic intro to the system)

11:15 - 11:30 - Antonis: Review of the current status (similar to LSM reports)

11:30 - 12:00 - Stefan: The LOFAR station calibration (status, how it is calculated, problems)

12:00 - 12:30 - Reinout: Basic introduction to the data reduction process

12:30 - 13:20 - Lunch

13:30 - 14:00 - Sarod: The LOFAR beam shape (status, limitations)

14:00 - 14:30 - Laura: The ionosphere (+ movie from Cyril)

14:30 - 15:00 - Francesco - Results from Virgo A

15:00 - 15:30 - Bas - Introduction to the imager

15:30 - 16:00 - Roberto - Available data and discussion of tasks.

16:00 - 18:00 - Start working...

Tuesday--Friday: start at 9 am, with a group discussion at 15:00-16:00.

- Ask questions of the expert staff, try the various steps of the data reduction yourself and make the most of your week at ASTRON.