ASTRON

Netherlands Institute for Radio Astronomy

update from the

LOFAR Users meeting 4 April 2016

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Stefan Fröhlich, David Rafferty, Andreas Horneffer, Tim Shimwell + others

ASTRON is part of the Netherlands Organisation for Scientific Research (NWO)

CITT project overview

CITT 1

Sept. 2013 – Sept. 2015

Work streams:

- DPPP calibration
- AWImager
- Generic pipeline framework
- Selfcal pipeline

CITT 2

Oct. 2013 – Sept. 2017

bring results of CITT 1 to the user

Work streams:

- DPPP calibration
- AWImager / GPU Gridder
- Factor / HBA calibration
- LBA calibration

\+ maintenance of DPPP / BBS / AWImager / PyBDSM

Advisory group for feedback on priorities

Time line

- October 2015: Start of project
- 9 – 11 December 2015: Factor Busy Week 23
- 25 – 29 January 2016: Surveys Workshop on Facet Calibration
- 22 – 25 February 2016: Factor Busy Week 24
- 29 Feb – 4 March 2015: LBA expert workshop at Leiden
- Before summer 2016 Factor Busy Week 25 (to be planned)

DPPP developments

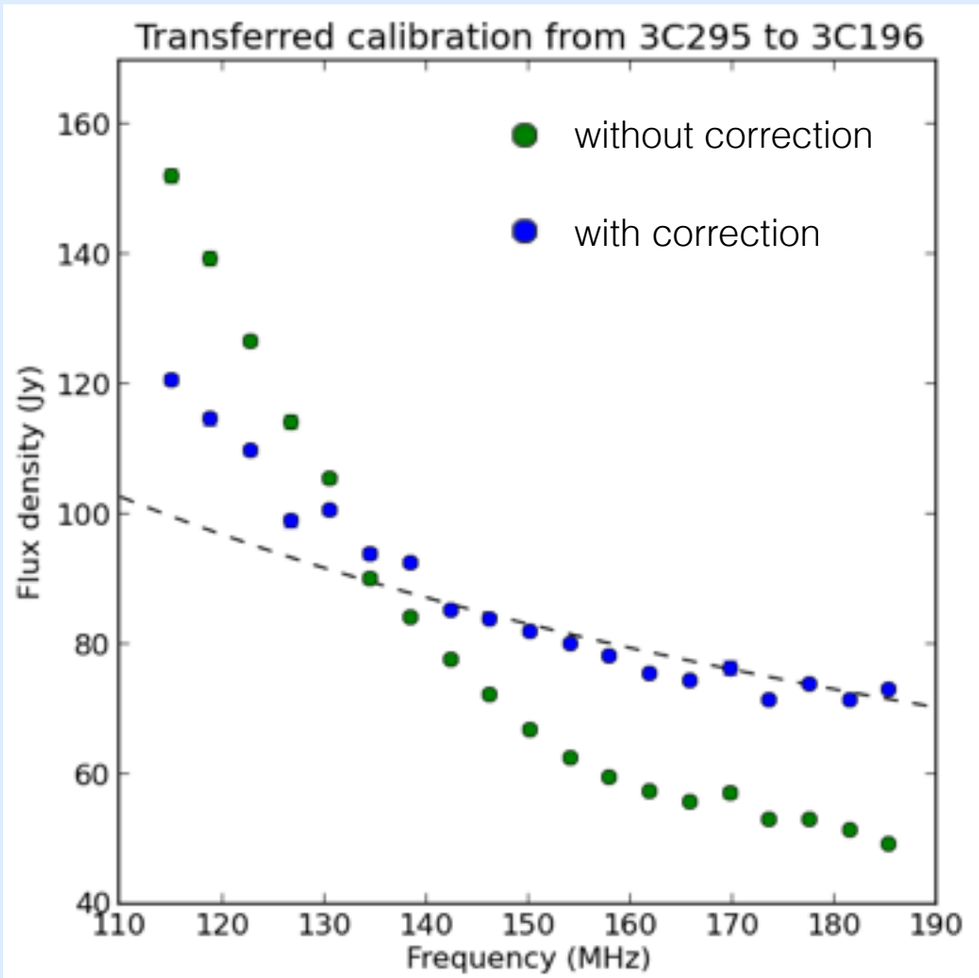
- Plan: replace BBS calibration with DPPP calibration where possible

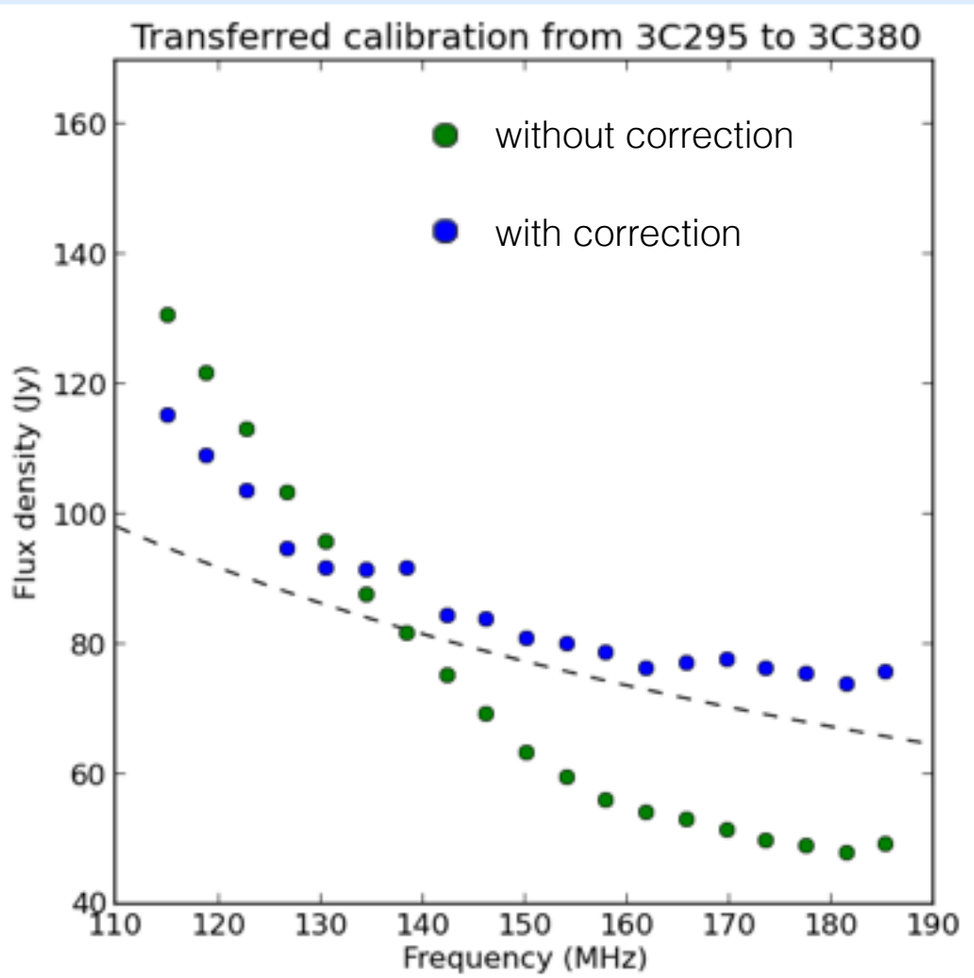
- Now in DPPP:
  - GainCal
    - Full Jones / diagonal / phase only / scalar phase
    - With or without beam model
  - ApplyCal
  - ApplyBeam (in phase center)
  - Predict / subtract / add

- Work on DPPP now:
  - Solve per group of channels
  - Fitting phase slope

Beam normalization

- Updated HBA beam model was made by George Heald & TJD
- Incorporates normalization for power over the hemisphere
- Currently (still) in testing, not implemented in the production beam model (DPPP, BBS, AWImager, WSClean, …)





AWImager and Image Domain Gridder

Development on AWImager has focused on Image Domain Gridder

- Image Domain Gridder:
  - Speedup of ~10× in gridding and degridding
  - Uses GPUs
  - Works well with A-term / phase screens

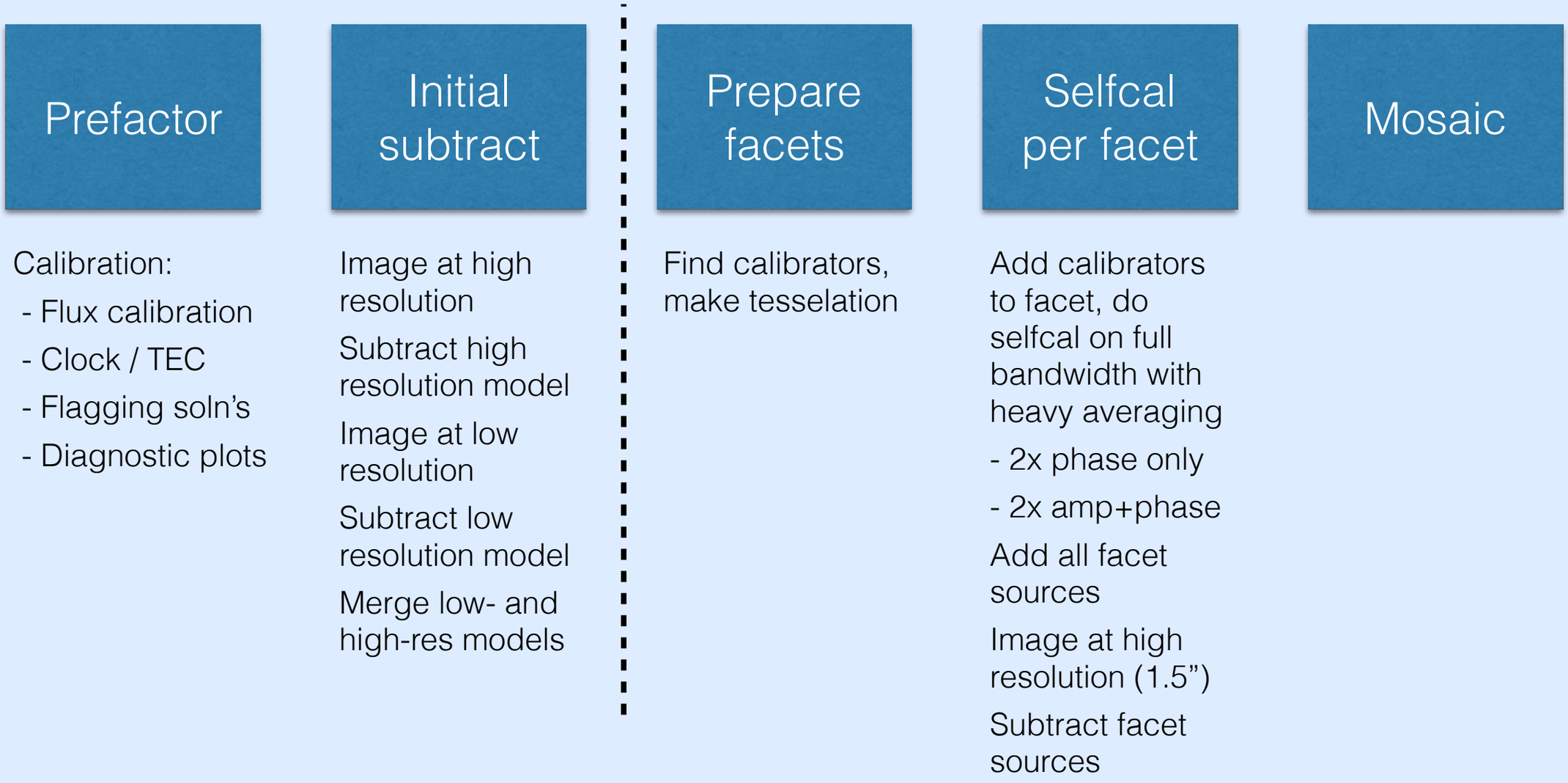
- AWImager
  - Uses Image Domain Gridder
  - Uses CASA for deconvolution
  - Building on top of CASA code is not supported, hard to maintain (but works)

- Alternative currently investigated:
  - WSClean + Image Domain Gridder

Factor

Facet Calibration paper by Van Weeren et al:
http://arxiv.org/abs/1601.05422 , accepted for publication in ApJS

See talk by Andreas Horneffer tomorrow!



Prospects HBA

- Hardest bit in Factor is the facet self-calibration.
- The direction independent calibration is more or less stable.

The CITT thinks direction independent calibration (‘pre-factor’) and imaging (‘initial subtract’) should become available on CEP4.

Requires adjustments on CEP4: “generic pipeline pilot”

LBA

Experts now all together in Leiden
(Huib + students, Franceso, Leah, …)

CITT facilitates and collaborates where possible
- e.g. by implementing DPPP features

One calibration option for LBA is Factor

Conclusion

- Factor ‘almost there’, will push to observatory / CEP4
- LBA: work in progress
- Imager: lots of good stuff, not there yet
- DPPP: done for main scenarios, working on more scenarios