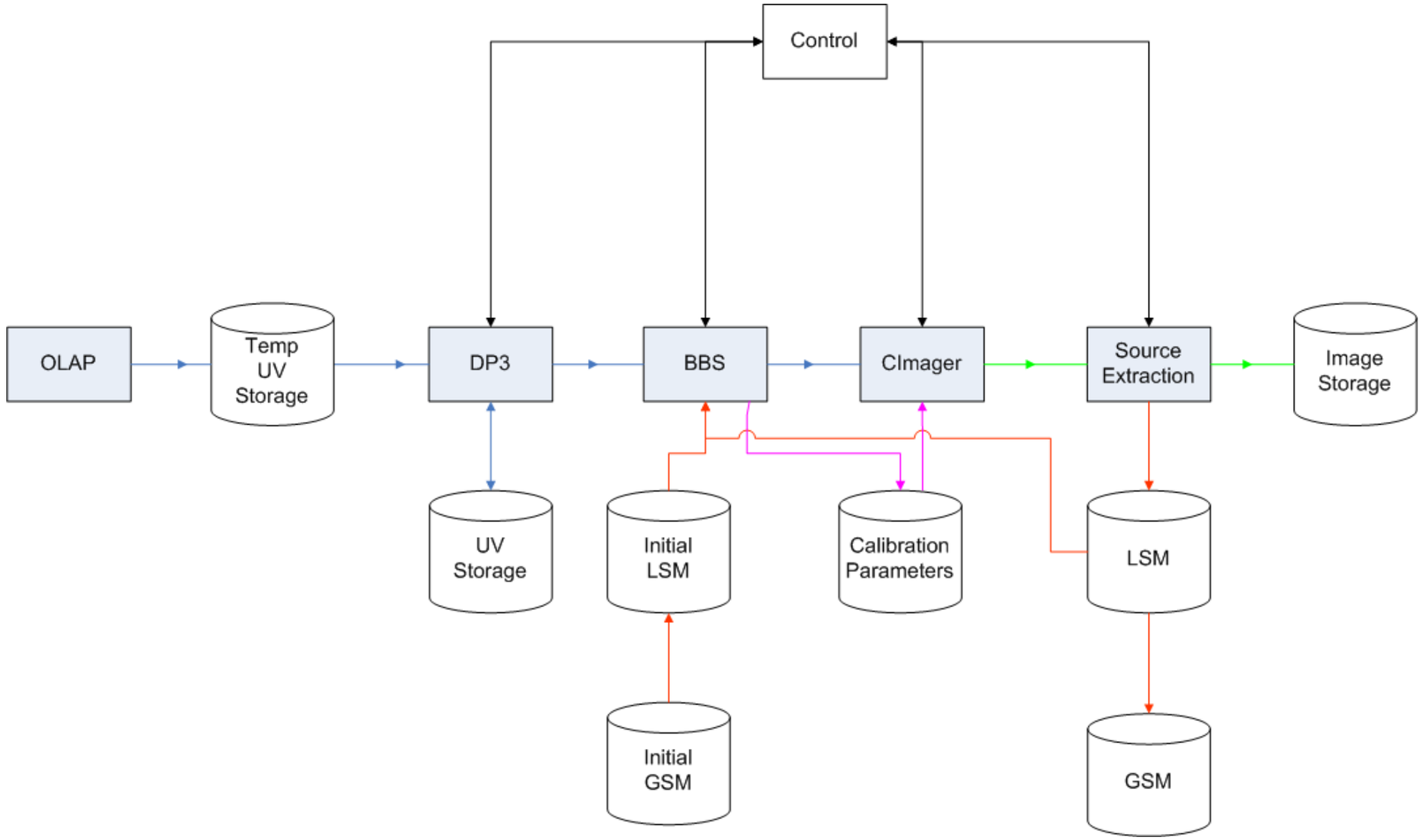
# LOFAR Pipeline Update

*LOFAR Status Meeting*
*18 November 2009*

**Michael Wise**

# Imaging Pipeline

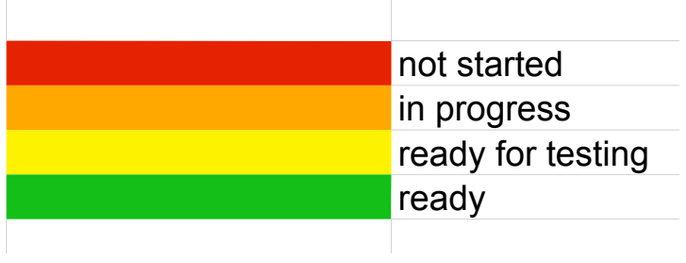


# Imaging Pipeline

| | tasks | Developer | Commissioner | Status |
|---|---|---|---|---|
| **Preparation** | | | | |
| | MSSS Observation proposal | Nijboer, de Bruyn, Survey KSP | | draft |
| | MSSS scheduling | Survey KSP, Observatory | | needed |
| | Flux scale | Brentjens, Bout | | in progress |
| | Finalized station beam models | Beam Team | | in progress |
| | | | | |
| **Stations** | | | | |
| | 20 validated stations | roll out team | | in progress |
| | HBA ring splitter | | | implemented |
| | multi beam observations | | | ready |
| | HBA station taper | | | needed |
| | Station Calibration LBA | Wijnholds | | working |
| | Station Calibration HBA | Parisa Noorishad | | in progress |
| | | | | |
| **SAS / MAC** | | | | |
| | single beam observations | Overeem | Brentjens | implemented |
| | multi beam observations | Overeem | Brentjens | implemented |
| | | | | |
| **OLAP** | | | | |
| | writing to new storage facilities | Broekema / Mol | | ready |
| | multi beam observations | Mol | | in progress |
| | queue scheduling | de Jong | | in progress |
| | rapid switching | Romein | | in progress |
| | parallel incoherent beam mode | Pulsar group | | in progress |
| | | | | |
| **SIP** | | | | |
| SIP - DPPP | | | | |
| | Table based corrections? | | | possibly needed |
| | Flagger | Renting / Van Diepen / Offringa | Rafferty | in progress |
| | Clock phase correction | De Gasperin / Van der Tol | de Bruyn | under investigation |
| | Bandpass correction | Pandey | Mohan | under investigation |
| | A-team subtraction | | Mohan / Van Weeren? | needed |
| | Data compression | Renting | | ready |
| SIP - BBS | | | | |
| | Beam model | Van Zwieten | Brentjens / Yatawatta | in progress |
| | Ionospheric model | Van der Tol | Birzan | implemented |
| | Solution based flagging | Van Zwieten | Heald / McKean / Pandey | implemented |
| | Spectral index | Van Zwieten | Heald / McKean / Pandey | implemented |
| | Extended sources | Van Zwieten | Heald / McKean / Pandey | implemented |
| | phase shifting and averaging | Van Zwieten | Birzan | in progress |
| | | | | |
| SIP - Imager | | | | |
| | Application of DD effects | Van Diepen / Van Zwieten / Van der Tol | Rol / Rafferty | in progress |
| | Facetting | ASKAP / CASA | Rol | implemented |
| | determination uv-plane taper | | | needed |
| | | | | |
| SIP - Source Finding | | | | implemented |
| | | | | |
| SIP - Sky Models | | | | |
| | Implementation of LSM | Swinbank / Scheers | Mohan | in progress |
| | Quality check before GSM update | | | needed |
| | | | | |
| SIP - General | | | | |
| | Data quality checks | | | needed |
| | Pipeline control | Swinbank | | in progress |
| | Mosaicing software | ? | | in progress |
| | data formats | USG | | in progress |
| | Header meta data updates | | | needed |
| | visualization | various | | in progress |
| | | | | |
| **CEP processing** | | | | |
| | profiling | Swinbank | | in progress |
| | phase 2 cluster hardware | Broekema? | | needed |
| | | | | |
| **Archive** | | | | |
| | data ingest procedure | Renting | | in progress |
| | observation database | Renting | | in progress |
| | search functionality | Astrowise | | in progress |
| | hardware procurement | Holties | | needed |
| | storage and retrieval | Holties | | needed |
| | reprocessing functionality | Holties | | needed |
| | | | | |
| **Support** | | | | |
| | test suites | Surveys / Rol | | needed |
| | documentation | Surveys / Busy Weeks | | in progress |

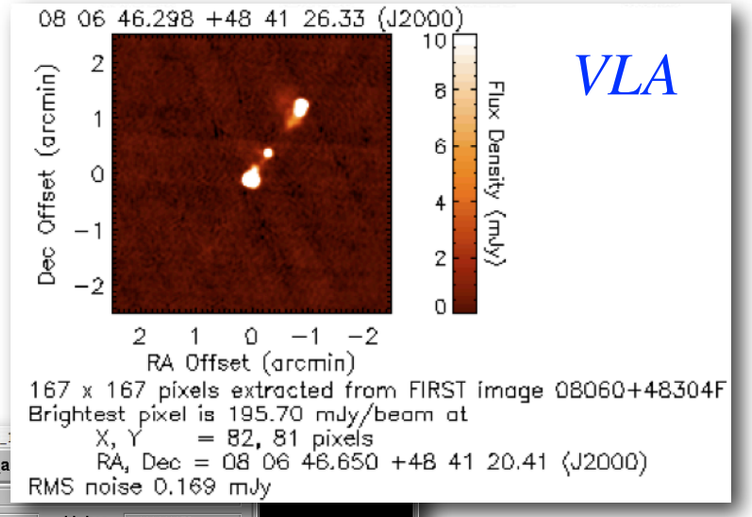
## *Highlights*

- LBA calibration in good shape (ITRF coordinates underway )
- HBA calibration is on hold
- DPPP stable; needs more testing
- BBS ready for testing
- DDE in imager by Dec. 4
- Focus of Dec. 14 busy week
- *Flux scale*
- *Scheduling (RO/Surveys)*



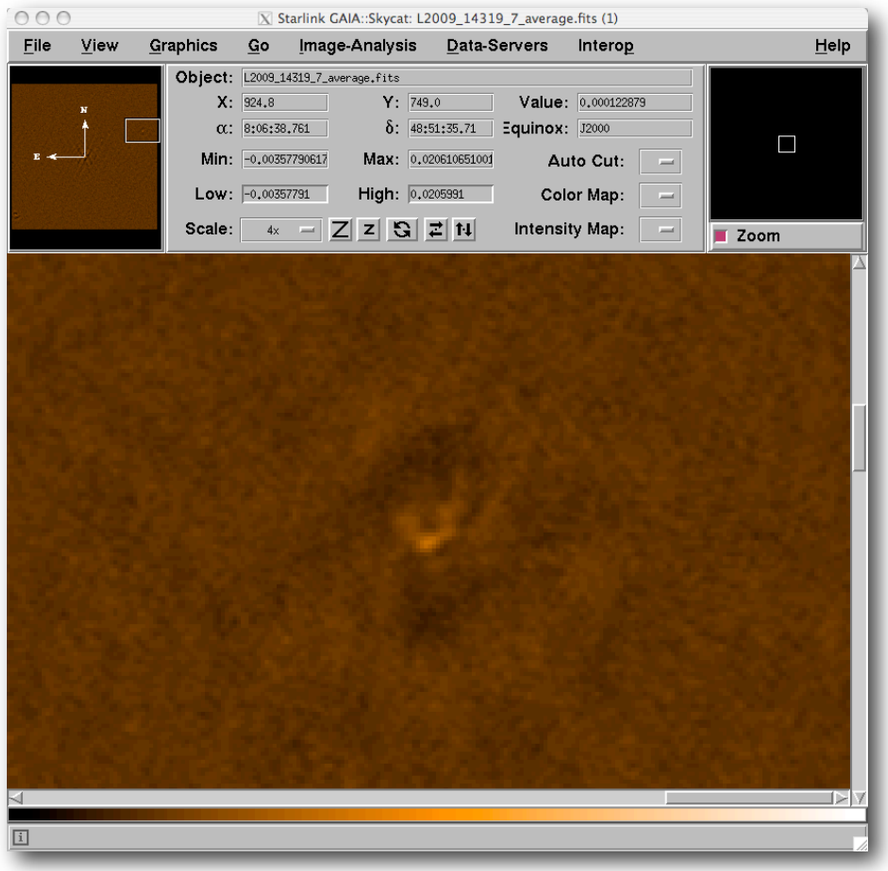
# Imaging Pipeline

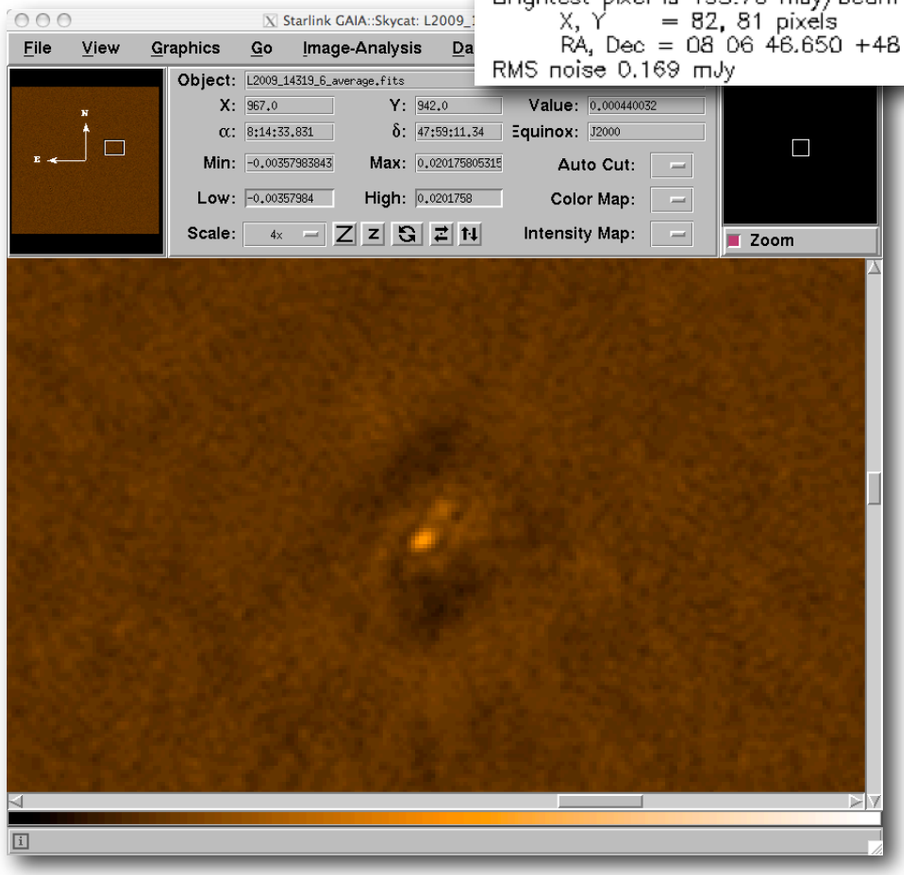
## *Pipeline configuration testing and performance profiling*




*VLA*

*(courtesy: J. Swinback, J. McKean, E. Rol)*

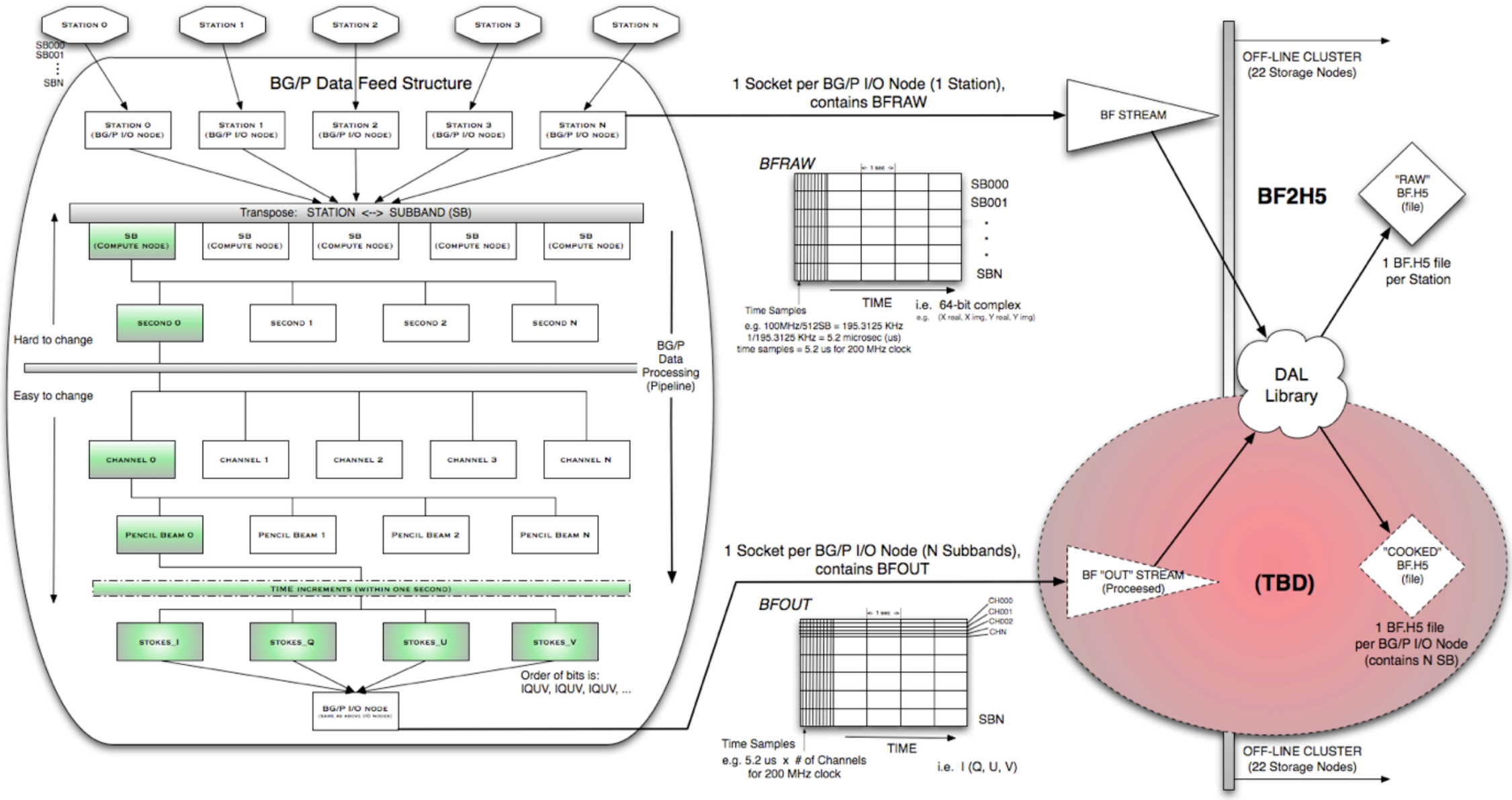



*51 w-planes, 7 mins*

*257 w-planes, 220 mins*

# Beam-formed Data Pipeline



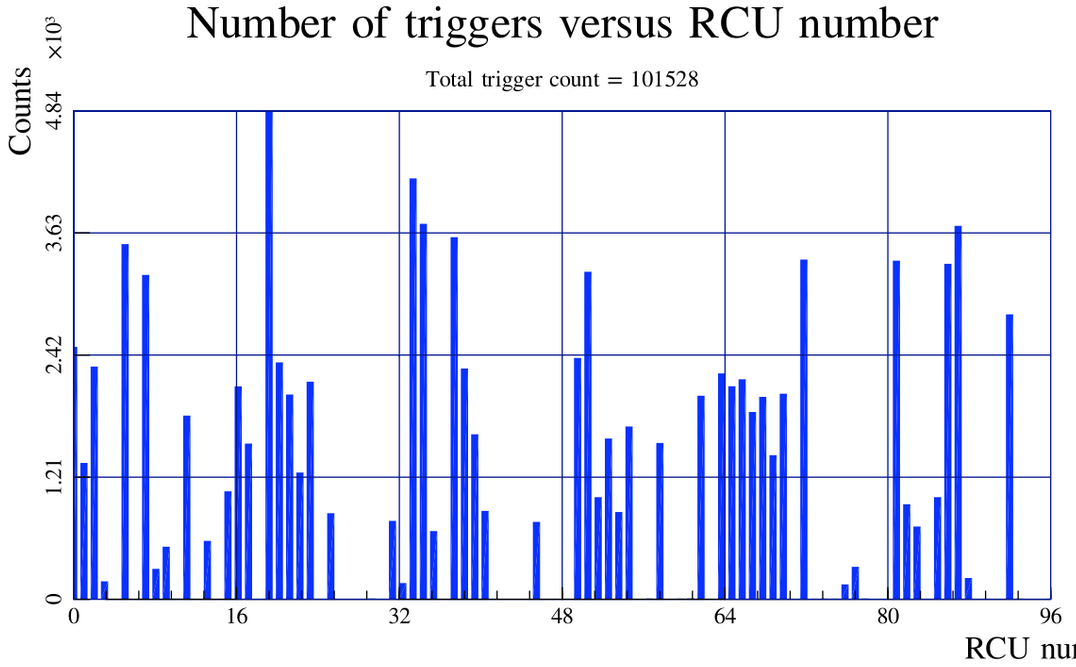

*(courtesy A. Alexov)*

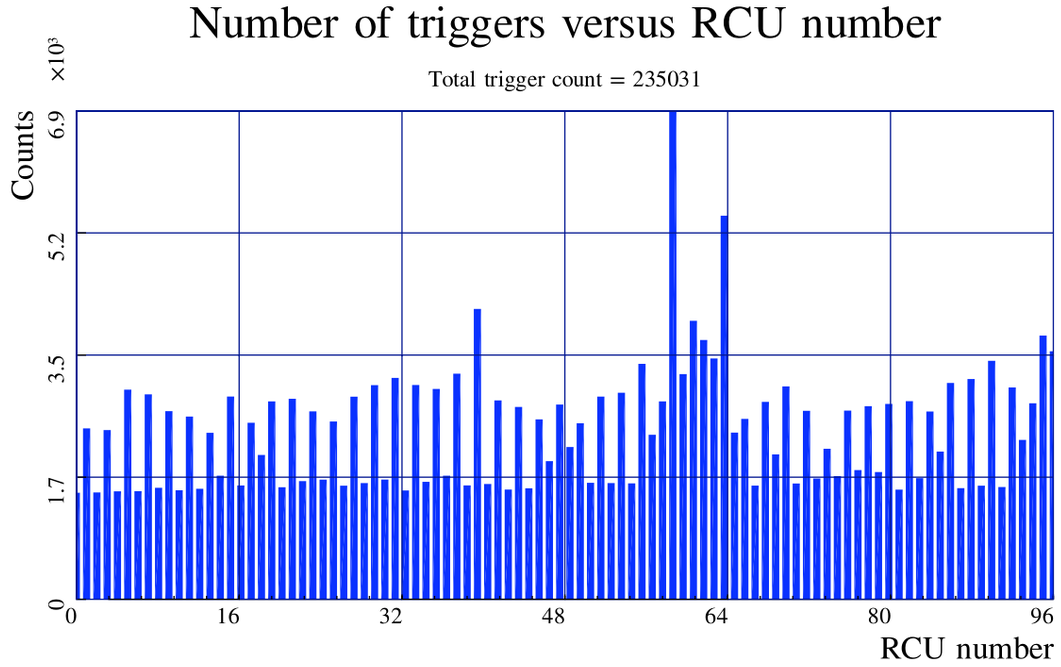
***LOFAR beam-formed data flow***

# Beam-formed Data Pipeline

| Pulsar Pipeline Checklist | | | |
|---|---|---|---|
| | **tasks** | **Developer** | **Commissioner** |
| **BG/P** | | | |
| | Design/preparatory work for BG/P 2nd transpose | John Romain, Jan David Mol | |
| | Implement BG/P 2nd data transpose | Rob van Nieuwpoort | Rob van Nieuwpoort, John Romain, Jan David Mol |
| | Document "new" BFout stream (post 2nd transpose) | Jan David Mol | Jan David Mol, Alwin |
| | Test and bug fix 2nd transpose | Rob van Nieuwpoort, Jan David Mol, John Romain | Rob van Nieuwpoort, Jan David Mol, Alwin de Jong, Jason Hessels |
| | | | |
| **SAS / MAC** | | | |
| | Integrate of OLAP into SAS/MAC | Alwin de Jong, Ruud Overeem | Alwin de Jong, Ruud Overeem |
| | Integrate of TAB module into SAS/MAC | Jan David Mol, Ruud Overeem | Jan David Mol, Ruud Overeem |
| | | | |
| **BF2H5** | | | |
| | Merge USG repository as svn external package into LOFARSOFT | Alwin de Jong, Lars Baehren, Marcel Loose | Alwin de Jong |
| | Integrate DAL "BF" and "Common" classes into BF2H5 | Alwin de Jong | Alwin de Jong |
| | Integrate parset reader into BF writer w/in LOFARSOFT | Alwin de Jong, Jan David Mol | Alwin de Jong |
| | Integrate new BF H5 data format (ICD) into BF2H5 (raw data) | Alwin de Jong | Alwin de Jong, A2, J. Hessels |
| | Integrate new BF H5 data format (ICD) into BF2H5 (BG/P out data) | Alwin de Jong, Jan David Mol | Alwin de Jong, A2, J. Hessels, Jan David Mol |
| | Extract UDPcopy and IonProc out of LOFARSOFT | Alwin de Jong, Jan David Mol | Alwin de Jong |
| | Extract parameterDB out of LOFARSOFT | Alwin de Jong, Jan David Mol | Alwin de Jong |
| | Create standalone BF2H5 tool | Alwin de Jong, Masaya | Masaya, James Anderson |
| | | | |
| **BF ICD** | | | |
| | Create mock BF H5 files with 4 types of data storage containers | A2 | A2 |
| | Benchmark (DAL C++) 4 storage types to choose optimum BF container | A2 | A2, Jason Hessels |
| | Finalize BF ICD | A2, L. Baehren, J. Romain, JD Mol, J. Hessels, K. Anderson | A2, Lars Baehren, J. Romain, JD Mol, J. Hessels, M. Wise |
| | (Perform benchmarking on H5 chunking) | K. Anderson, A2, L. Baehren | |
| | Identify source of metadata values (& calculations) | Alwin de Jong, R. Overeem, J. Hessels | |
| | Profile BF Observations (& Pipeline) for typical stats on sizes | J. Hessels, B. Stappers, M. Wise | |
| | | | |
| **USG Software Repository** | | | |
| Integrate Pulsar SW into USG | Integrate FFTW-3.1.2 into cmake | A2 | |
| | Integrate PPGPLOT into cmake | A2 | |
| | Interate TEMPO into cmake | A2 | |
| | Integrate PRESTO into cmakA2 e | A2 | A2 fixing seg fault & other issues on new cluster build |
| | Integrate SIGPROC into cmake | A2 | |
| | Test software installation/components on new cluster | A2, J. Hessels, B. Stappers | The Pulsar Group |
| | Test software installation/components on user machines | Pulsar Group | |
| | | | |
| DAL | Create DAL classes for BF metadata and structure (abide by ICD) | Lars Baehren, A2 | |
| | Create DAL methods to access data from BF structure (abide by ICD) | Lars Baehren, A2 | |
| | Wrap BF DAL classes and methods with Python for PyDAL | A2, Lars Baehren, K. Anderson | The Pulsar Group |
| | Ongoing PyDAL updates and bugfixes | A2, Lars Baehren, Frank B. | |
| | Integrate HDF5 into file I/O for Presto/TEMPO/etc | A2 | The Pulsar Group |
| | | | |
| Related Tools | Update/maintain/expand "convert" program for ongoing BF observations | Tom Hassal, A2, Jan David Mol | A2, Tom Hassal, Jan David Mol, J. Hessels |
| | Integate "convert" into cmake | A2 | A2, Tom Hassal |
| | | | |
| **Pulsar Pipeline** | | | |
| | Design Pulsar Pipeline for basic onserving modes | J. Hessels, B. Stappers, J. van Leeuwen, A2, M. Wise | The Pulsar Group |
| | Decide how to distribute the Pulsar Pipeline | M. Wise, L. Baehren, J. Hessels, A2, J. Swinbank | |
| | Implement Pulsar Pipeline Design within the iPython Framework | A2, K. Anderson, J. Swinbank | A2, K. Anderson, J. Swinbank |
| | Pipeline Testing | A2, K. Anderson, J. Swinbank, J. Hessels, B. Stappers, J. Van Leeuwen | A2, J. Hessels, B. Stappers, J. Van Leeuwen |
| | Release Pulsar Pipeline | M. Wise | |
| | Design Pulsar Pipeline(s) for other observing modes including survey | J. Hessels, B. Stappers, J. van Leeuwen, A2, M. Wise | |
| | | | |
| **Archive** | | | |
| | Sync Archive schema with BF ICD | A. Renting, A2, L. Baehren, M. Wise, R. Overeem | A. Renting, A2, J. Hessels |
| | Archive Pulsar raw data | A. Renting | A. Renting, A2, J. Hessels, M. Wise |
| | Archive Pulsar Pipeline Processed data | A. Renting, A2 | A. Renting, A2, J. Hessels, M. Wise |
| | | | |
| **Misc.** | | | |
| | (Remove PGPLOT from PRESTO) | Lars Baehren, A2 | The Pulsar Group |
| | (Work with the VO on format/protocol issues for LOFAR HDF5 data) | J. Swinbank, A2, M. Wise, K. Anderson | ? |

# VHECR Pipeline




*(courtesy: A. Corstanje)*

*Before update* *After update*

- TBB busy week last week (9-13 Nov)
- Diagnosed RCU triggering bug; software patched
- Source of odd/even RCU trigger pattern still being investigated
- Bug preventing large TBB dumps was fixed
- First tests of the MAC/SAS TBB control layer

# Commissioning Proposals

July 09 Announcement of Opportunity

Sept 09 Commissioning proposals due

Nov 09 Technical Review Panel meets

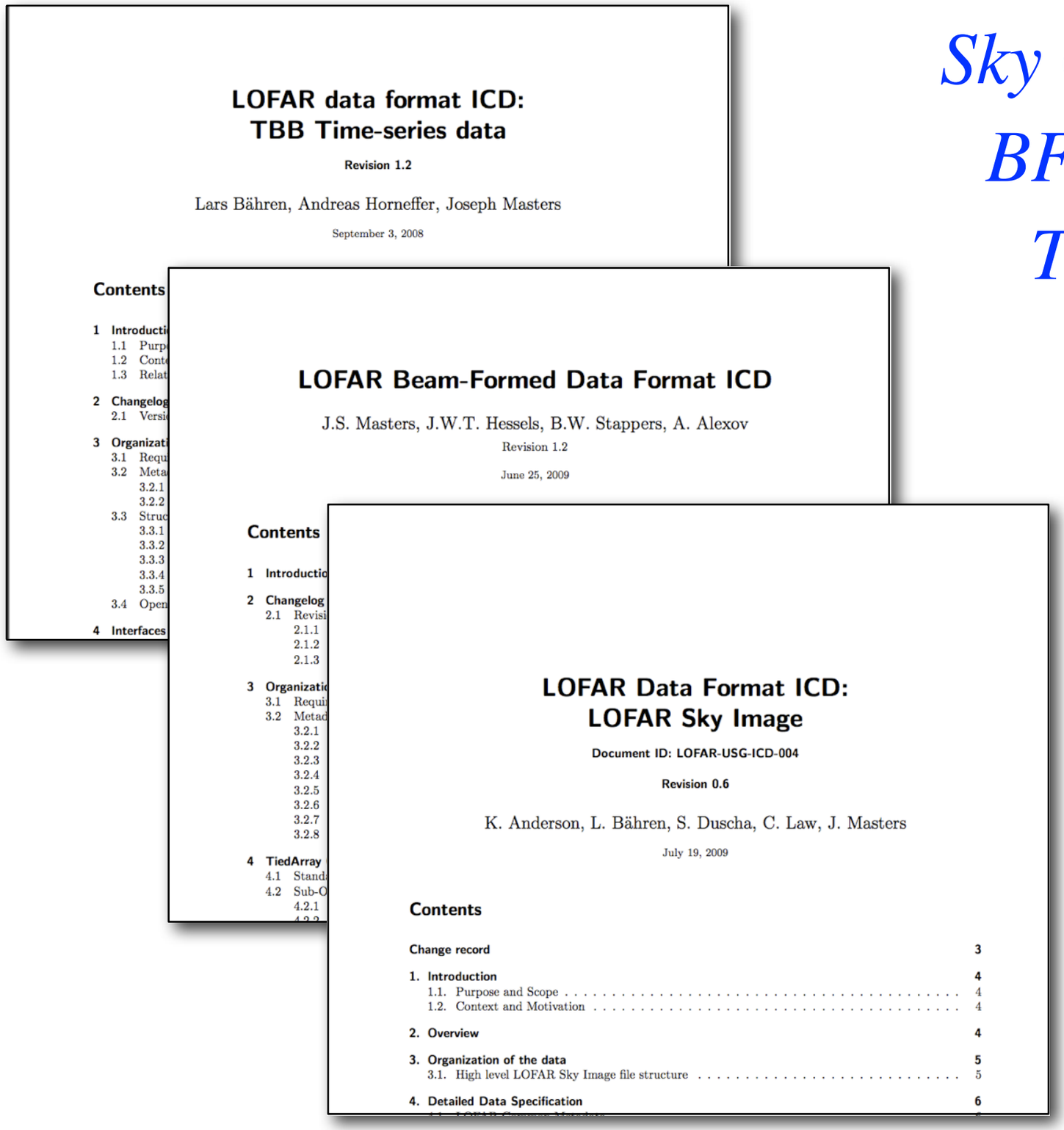
Dec 09 LOFAR Program Committee meets

Dec 09 First proposals executed

Jan 10 Final results announced

⇒ *Execute a few highly ranked projects in 2009*
*Iterate with proposers on details*
*Discuss deliverables*
*Commitment of resources*

# LOFAR Data Formats




*Sky Cubes*

*BF Data Products*

*TBB Time Series*

*Near-field Cubes*

*Dynamic Spectra*

*RM Cubes*

# The End