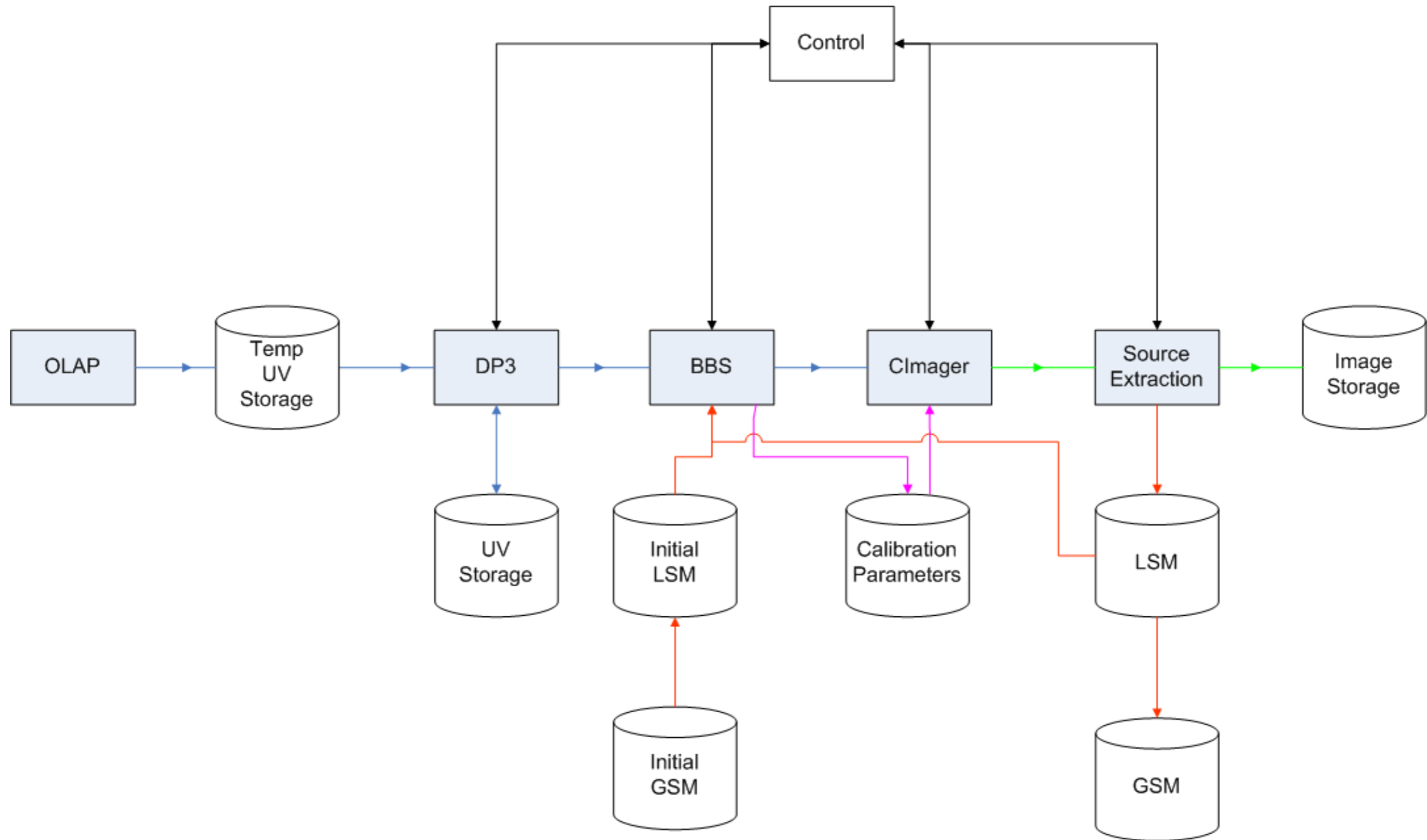


LOFAR Pipeline Update

*LOFAR Status Meeting
April 14, 2010*

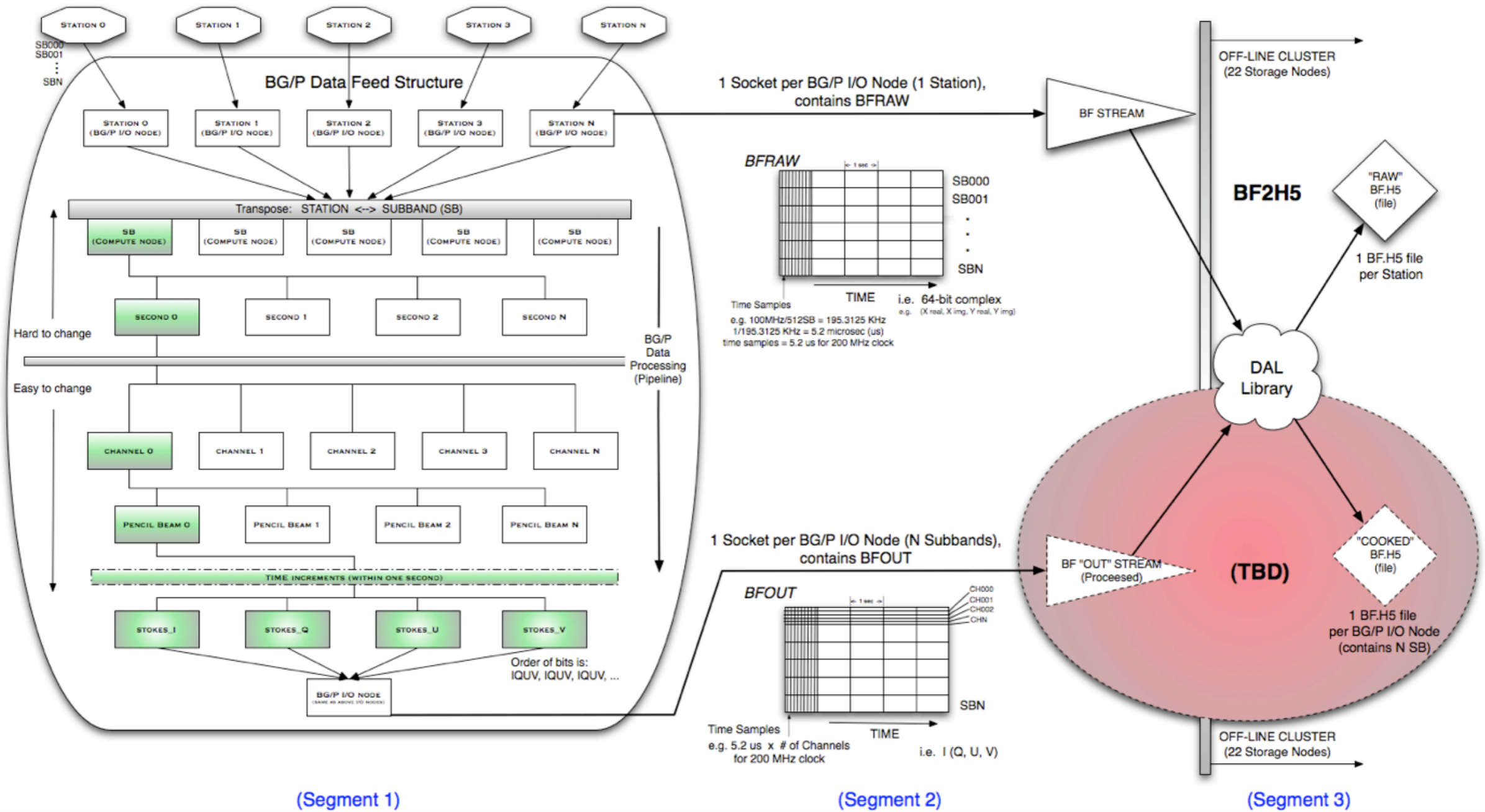
Michael Wise*

**On behalf of the LOFAR collaboration*

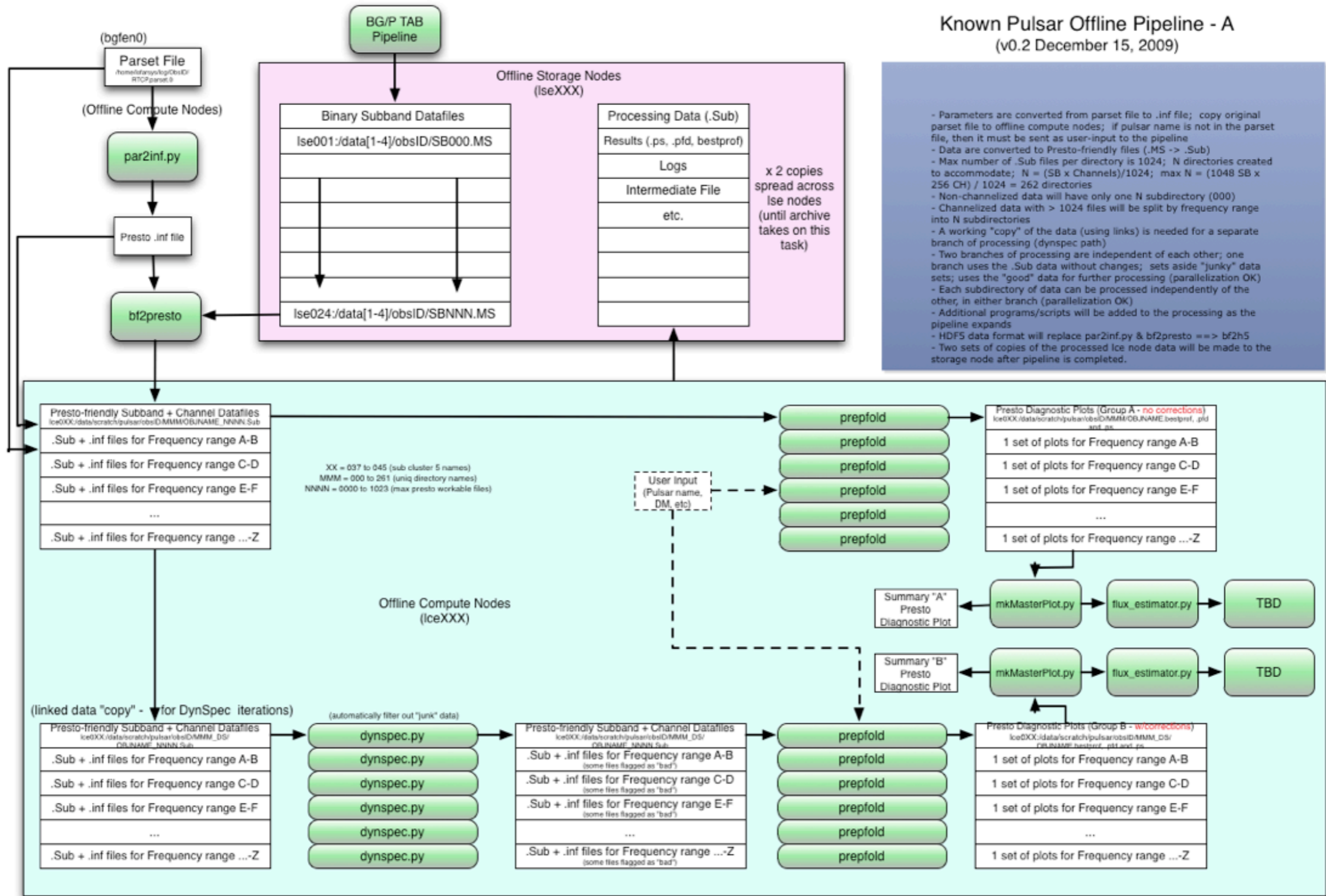


- General
 - Integration of Pipeline with MAC nearly done.
 - Assessment of pipeline performance in progress.
 - UVW coordinate flip is fixed.
 - Investigations for running pipeline on the Grid started.
 - Exporting data to the Grid tested, but needs improvement for large files.
 - MS 3.0 definition under way.
 - Makesourcedb performance improved.
- DPPP
 - New NDPPP robust and part of pipeline.
 - It includes “pre-flagging”.
- BBS
 - HBA station beams ready for testing. Who?
 - Faraday rotation implemented and being tested.
 - BBS and CASA have qualitatively the same solutions.

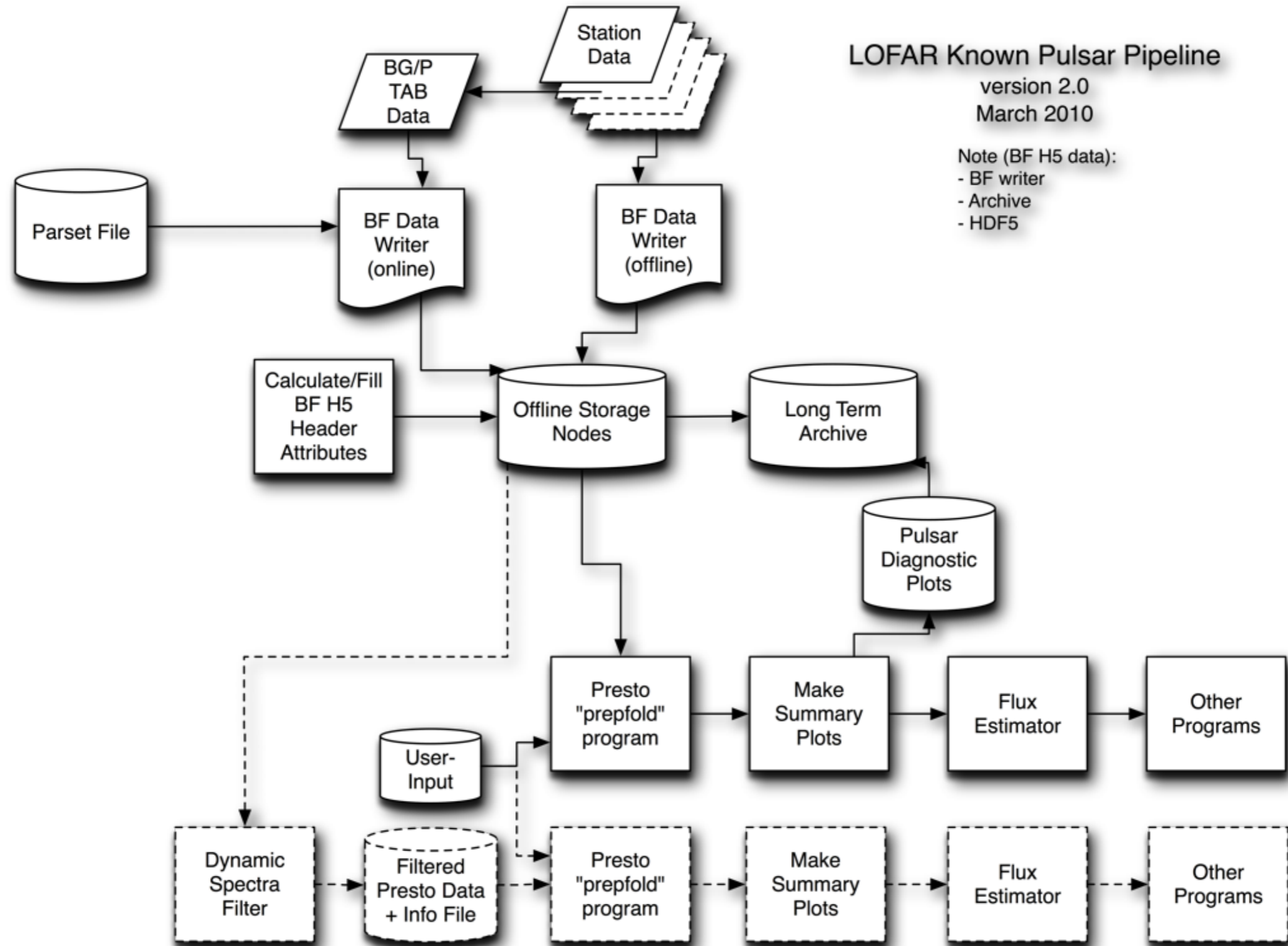
- BBS Ionosphere
 - EXP_ION modules checked into LOFAR tree.
 - Separate clock and TEC phase.
 - Next: DD Calibration, phase screen construction and interpolation.
- Imager
 - Initial implementation for Direction Dependent Corrections available for 4 months now! Who will test this?
 - Next implementation step started.
 - CImager performs as fast as CASA when using the correct parameters.
 - More documentation under way.
- Source Finding
 - No news.
- Some remarks
 - MSSS dress rehearsal: no useful data was taken.



(courtesy A. Alexov)



(courtesy A. Alexov)



(courtesy A. Alexov)

Pulsar Pipeline Checklist

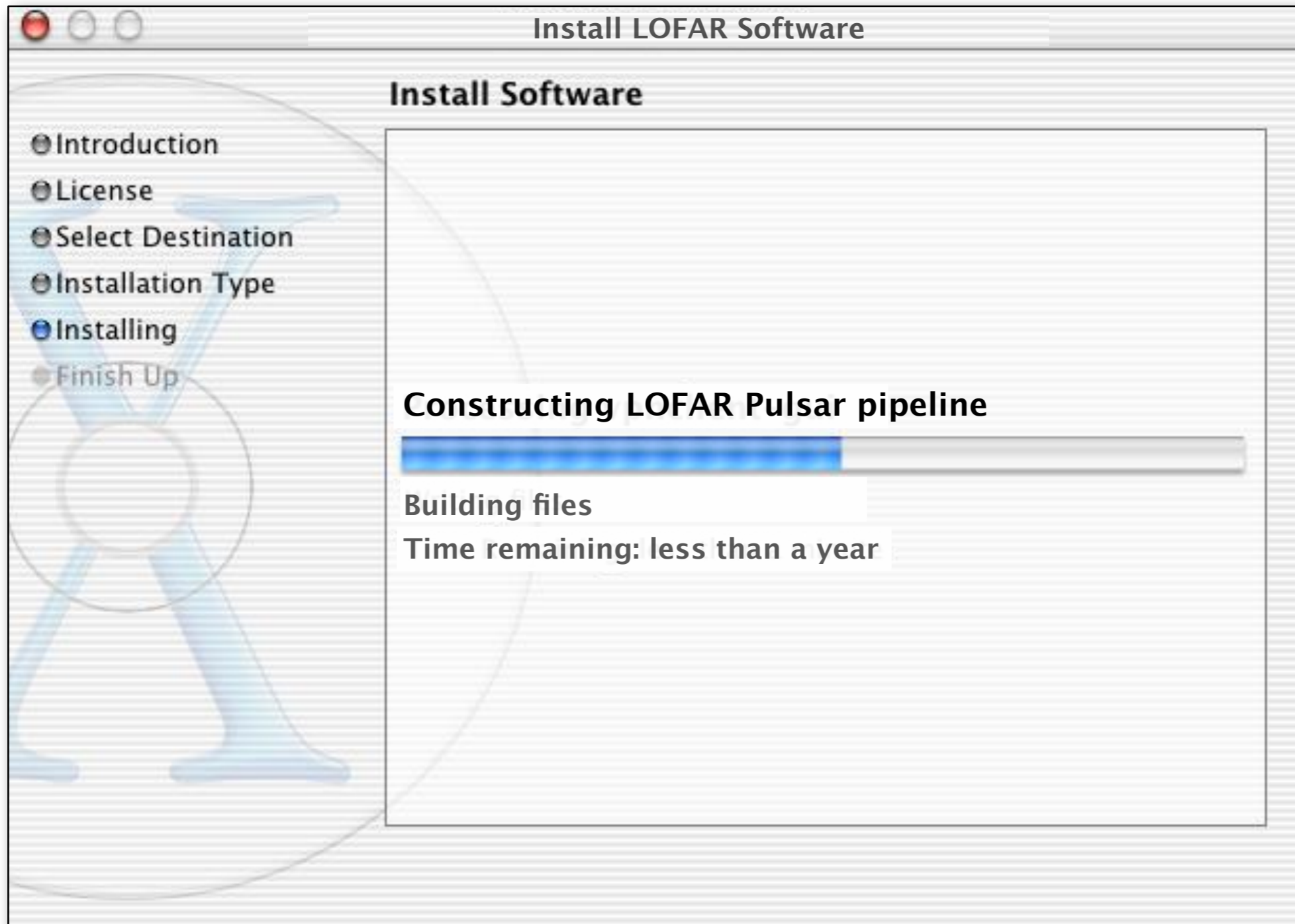
	tasks	Developer	Commissioner
BG/P	TAB Pipeline	John Romain, Jan David Mol, Rob van Nieuwpoort	Jan David Mol, Jason Hessels
	Design/preparatory work for BG/P 2nd transpose	John Romain, Jan David Mol, Rob van Nieuwpoort	
	Implement BG/P 2nd data transpose	Jan David Mol	John Romain, Jan David Mol
	Document "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	Jan David Mol, Alwin de Jong, Jason Hessels
	Integrate phase correction into TAB module	Jan David Mol, John	JD, Jason
SAS / MAC/MoM	Integrate of TAB module into SAS/MAC	Jan David Mol, Ruud Overeem	Jan David Mol, Ruud Overeem
	Offline Pipeline connection to SAS/MAC	John Swinbank, Ken Anderson, A2, Ruud Overeem	John Swinbank, Ken Anderson, A2, Ruud Overeem
	MoM connection to SAS/MAC	Jason, Hanno, Antonio	
BF2H5 online version	BeamFormed Writer (1st version to OLD ICD spec)	Alwin de Jong	Alwin de Jong, J. Hessels
	Test svn externals when building LOFARSOFT with the DAL	Lars Baehren, Marcel Loose, Alwin de Jong	Alwin de Jong
	Integrate DAL 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, Jason Hessels, Jan David Mol
	Integrate new BF H5 data format (ICD) into BF2H5 (BG/P out data)	Alwin de Jong, Jan David Mol	Alwin de Jong, Jason Hessels, Jan David Mol
	Test writing 248 subbands at once to check efficiency	Alwin de Jong	Alwin de Jong, Jason
BF ICD	Create mock BF H5 files with 4 types of data storage containers	A2	A2, Jason Hessels
	Benchmark (DAL C++) 4 storage types to choose optimum BF container	A2, L. Baehren	A2, Lars Baehren, J. Romain, JD Mol, J. Hessels, M. Wise
	Finalize BF ICD	A2, L. Baehren, J. Romain, JD Mol, J. Hessels, M. Wise	A2, Lars Baehren, J. Romain, JD Mol, J. Hessels, M. Wise
	Identify source of metadata values (& calculations)	Hanno, R. Overeem	
	Profile BF Observations (& Pipeline) for typical stats on sizes	J. Hessels, B. Stappers, M. Wise	
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, Ken Anderson	The Pulsar Group
	Ongoing PyDAL updates and bugfixes	A2, Lars Baehren, Frank B.	The Pulsar Group
	Integrate HDF5 into file I/O for Presto/TEMPO/etc	A2	The Pulsar Group
Pulsar Tools	Daily build of USG repository on offline cluster	Arno, Mike Wise, Lars	
	Integrate FFTW-3.1.2 into cmake	A2	A2 fixing seg fault & other issues on new cluster build
	Integrate PPGPLOT into cmake	A2	Ben Stappers, Joeri
	Integrate TEMPO into cmake	A2	Ben Stappers, Joeri
	Integrate PRESTO into cmake	A2; Lars	
	Integrate SIGPROC into cmake	A2	
	Integrate PSRCHIV into cmake	A2	
	Test software installation/components on new cluster	A2, J. Hessels, B. Stappers	
	Test software installation/components on user machines	Pulsar Group	
	Integrate "convert" (bf2presto) into cmake	A2	A2, Tom Hassall
	Update/maintain/expand "convert" (bf2presto) program for BF observations	Tom Hassall, A2, Jan David Mol	A2, Tom Hassall, Jan David Mol, Jason Hessels
	Assist Pulsar Group with integration of tools/scripts into cmake & USG	A2; Lars	
	Maintain/upgrade Pulsar shell script pipeline	A2, Pulsar Group	A2, Tom Hassall
Pulsar Pipeline Integration	Design Pulsar Pipeline for basic observing modes	J. Hessels, B. Stappers, J. van Leeuwen, A2, M. Wise	
	Decide how to distribute the Pulsar Pipeline	M. Wise, L. Baehren, J. Hessels, M. Wise	
	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	A2, K. Anderson, J. Swinbank
	Design Pulsar Pipeline for "Quicklook" results in realtime (LOFAR opening)	J. Hessels, B. Stappers, J. van Leeuwen, A2, M. Wise	A2, K. Anderson, J. Swinbank
	Test Known Pulsar Quicklook Pipeline	J. Hessels, B. Stappers, A2, K. Anderson	
BF2H5 offline version	Extract UDPcopy and IonProc out of LOFARSOFT	Alwin de Jong, Jan David Mol	Alwin de Jong
	Extraction process of parameterDB out of LOFARSOFT & distribute offline	Mike to assign this issue to different group	
	Create standalone BF2H5 tool	Alwin de Jong	Masaya, James Anderson
	UDP reader/interpreter library (UK)	Alessio, Aris, Chris	Alessio, Aris, Chris, Alwin
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

Current Status

- Prototype of 2nd transpose done
- Offline pipelines tools complete
- Initial pipeline integration working
- Station UDP library prototype (Oxford)
- Offline BF data writer ongoing

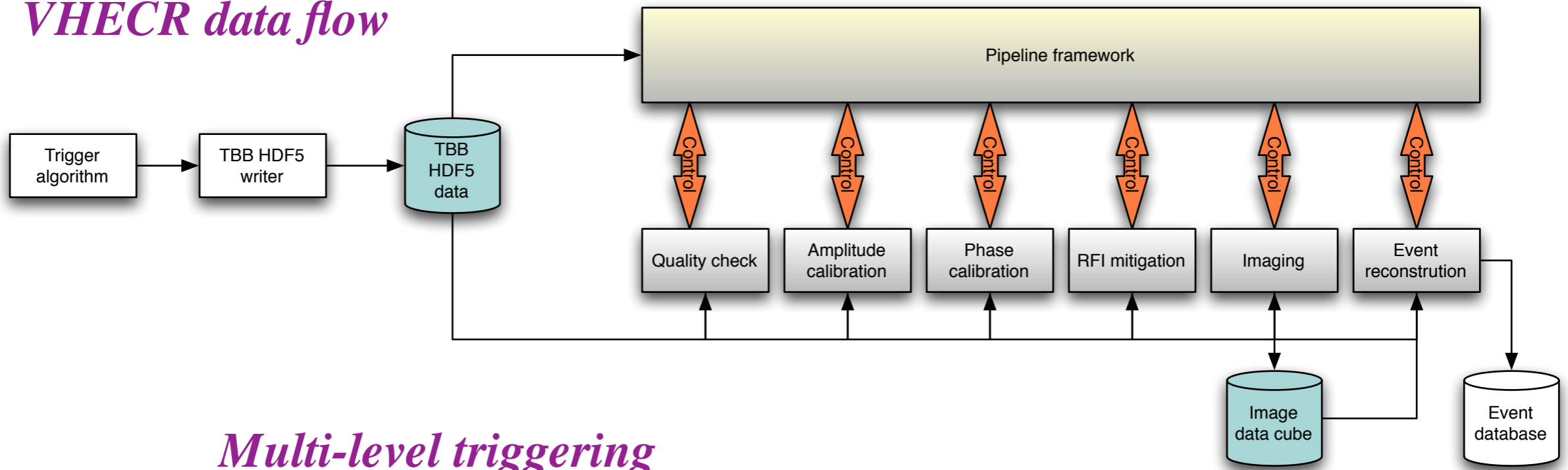
Next Steps

- Finish and test 2nd transpose module
- Finish DAL interface updates
- Finish online BF data writer
- Integrate BF data writers with MAC
- Continue offline pipeline integration

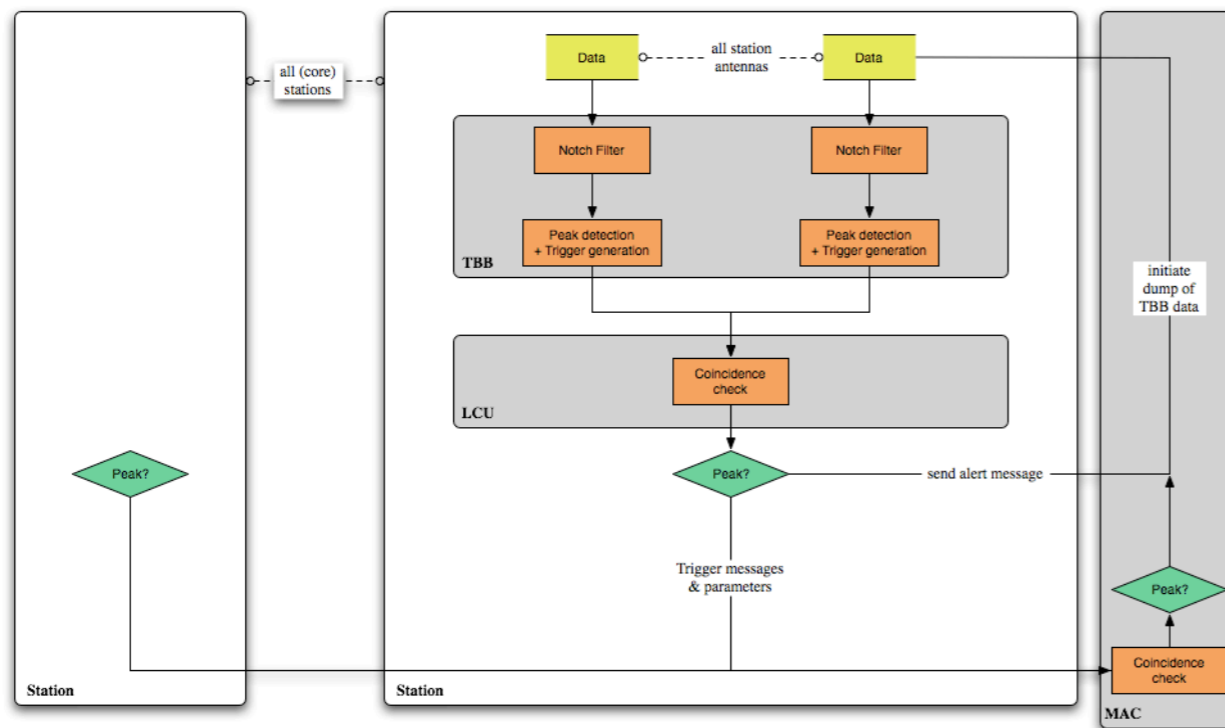


(courtesy L. Bähren)

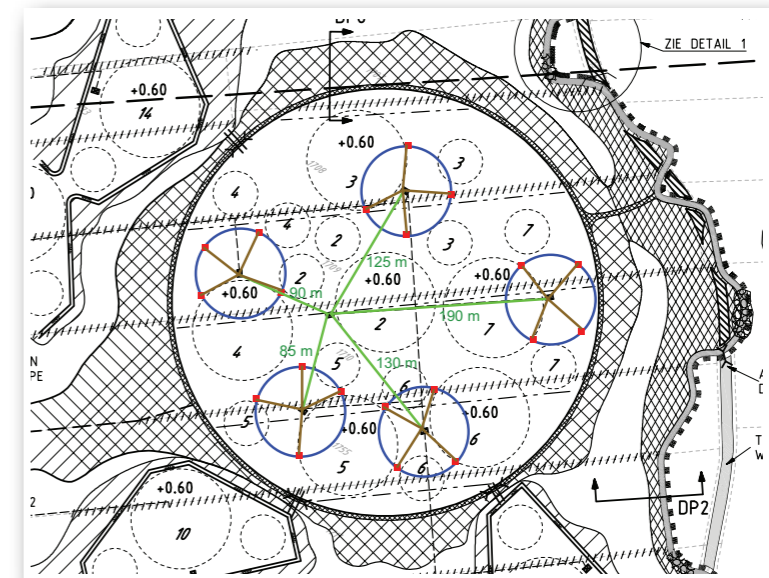
VHECR data flow



Multi-level triggering



Particle Detector Array



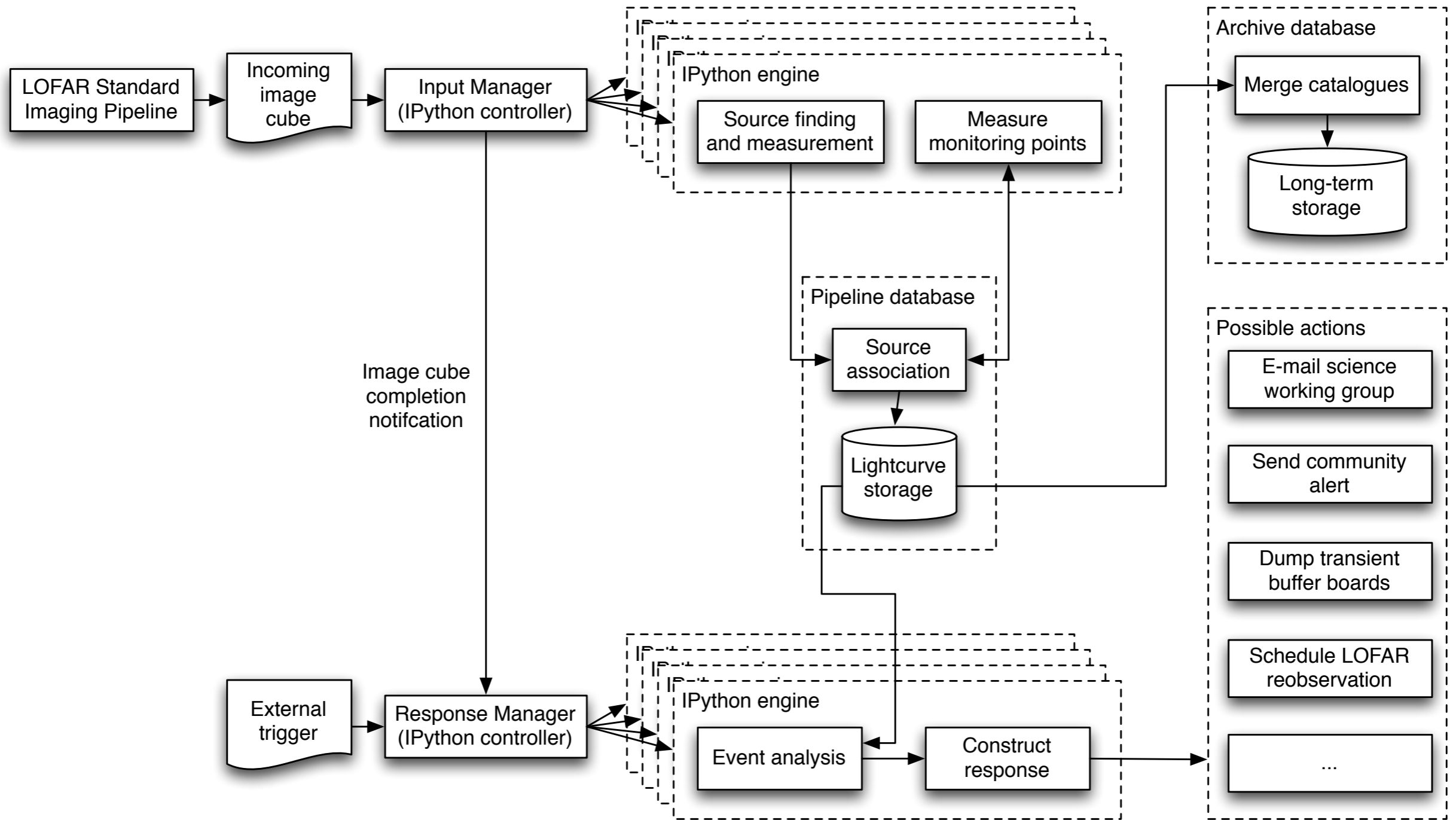
MAC/SAS	Task	Developer	Commissioner	Due date	Status/Remarks
Ruud	Get tbbcontrol running under control of MAC	Ruud, Pieter	Arthur, Andreas		mostly done
	Implementation of filter coefficients	Pieter	Pieter, Andreas		implementation done, testing needed
	Dynamic assignment of MAC address to which TBB data are sent	Pieter	Pieter, Andreas, Arthur		implementation done, testing needed
	Integrate tbbcontrol with MAC/SAS	Ruud, Pieter	Ruud, Andreas		done to start single TBB dump
	Design VHECRtrigger interface to MAC/SAS	Arthur			parameters now included into trigger doc
	Implement MAC control of VHECRtrigger	Ruud, Pieter			inspection of resulting data ongoing
	Ingest trigger metadata into MAC/SAS database	Ruud, Pieter			inspection of resulting data ongoing
	Interface to accept external trigger	Ruud, Pieter	Ruud, Andreas		
	Specification of 3 rd level (cross-station) trigger	Arthur, Andreas			
	Implementation of 3 rd level trigger	Ruud, Pieter			
	Receive/Accept external trigger (e.g. LASA, 3 rd level trigger) in VHECRtask	Andreas, Arthur			
	Integrate LASA control with MAC/SAS	Ruud, Pieter, Satyendra			
Triggering					
Andreas, Arthur	Test and validate 1 st level trigger running on FPGA	Arthur, Andreas	Arthur, Andreas		
	Run preliminary version of 2 nd level trigger (VHECRtrigger) online on station	Andreas, Arthur	Andreas, Arthur		
	Automated dumping of data from VHECRtrigger	Andreas, Arthur			
	Develop and fine-tune VHECRtrigger coincidence algorithm	Arthur, Andreas			
Particle detector array					
Joerg, Satyendra	Ingest LASA software into USG repository	Lars, Satyendra			
	Documentation for LASA software	Satyendra			
	Update LASA description document	Joerg			
	Document data products and inputs	Satyendra			
	Put LASA detectors into the field	Joerg, Andre			
TBB data: ICD & writer					
Lars	Are Station and Dipole metadata lists complete?	Andreas, Lars			
	Which trigger information needs to be stored and where/how is it stored?	Andreas, Arthur, Lars			
	What calibration information needs to be stored – where/how?	Andreas, Lars			
	Integrate TBB data-writer with MAC/SAS	Ruud, Lars, Andreas			
	Tie TBB classes to CommonInterface	Lars			
	Implement recent format definition in data_hi	Lars			
	tbb2h5 creates/writes data through library routines	Lars, Andreas			
	Safeguard against invalid HDF5 data access in TBB_DipoleDataset	Lars			
	Ingest trigger metadata from MAC/SAS database and write them to output dataset	Lars			
Pipeline framework					
Ken, John, Martin	Combine HDF5 files from multiple TBBs into single file structure	Ken, Martin, Lars			
CR-Tools					
Lars, Andreas, Martin	Clean up CR-Tools code tree	Lars, Andreas			ongoing
	Build and install CR-Tools under Mac OS X "Snow Leopard"	Martin, Lars			"wrong architecture" errors @ Fortran code
	Automatic build of CR-Tools on cluster	Lars, Tuin, Arno			awk error fixed; errors building hftools
	Data I/O – Connect DataReader to DAL (LOFAR_TBB)	Lars			functionality available in DAL classes
	Data I/O – Enable selection of antennas	Lars	Sander		not done; test error catching off
	Data I/O – Python bindings	Martin, Lars			
	Quality check of raw data – algorithm description	Andreas			
	Quality check of raw data – C++ implementation				
	Quality check of raw data – Python bindings	Martin			
	Amplitude calibration – algorithm description	Andreas			
	Amplitude calibration – C++ implementation				
	Amplitude calibration – Python bindings	Martin			
	Phase calibration – algorithm description	Andreas			
	Phase calibration – C++ implementation				
	Phase calibration – Python bindings	Martin			
	Flagging / RFI mitigation – algorithm description	Andreas			
	Flagging / RFI mitigation – C++ implementation				
	Flagging / RFI mitigation – Python bindings	Martin			
	Imaging – Algorithm description	Lars	Lars, ??	??	what is the status of code?
	Imaging – Basic C++ implementation	Lars			extraction of core algorithm ongoing
	Imaging – handling of general WCS parameters for the images	Lars			functionality complete?
	Imaging – handling of multi-station data	Lars			needs updating to LOFAR
	Imaging – Python bindings	Lars, Martin			needs updating to LOFAR
	Source finding – algorithm description	Andreas, Heino			
	Source finding – C++ implementation				
	Source finding – Python bindings	Martin			
	Extraction of event parameters – algorithm description	Andreas			
	Extraction of event parameters – C++ implementation	Andreas			
	Export of event parameters to database				
	Extraction of event parameters – Python bindings	Martin			
Inspection tools					
	List of required external packages (and their respective versions)	Heino, Arthur			
	Porting of command line scripts to Cmake instructions	Lars			
Archive / Database					
	Sync archive schema with TBB time-series ICD				
	Archive TBB time-series data				
Misc.					
	Use Redmine for issue tracking	John, Lars			
	Set up Dashboard for the various USG packages	Marcel	Lars		Harro want Bugzilla; discussion Michael/Antonis
	Set up regular meetings to monitor/discuss development	Lars, Michael, Andre			submitting tickets from within the VHECR working
	Make schedule for execution of accepted proposals	Andreas, Michael, Heino			first meeting done
	Is the ICD flexible enough to accommodate channelized data?	Mathijs, Lars, Andreas			
	Demonstration to be shown at the official LOFAR opening	Andreas, Heino			Arthur's plots / LASA / Crab pulsar (Sander)

Current Status

- MAC control of TBB mostly done
- FPGA trigger implemented and tested
- LCU trigger code being tested
- Minor ICD and DAL updates done
- Trigger metadata packet defined
- Wrapping offline tools underway

Next Steps

- Integrate TBB data writer with MAC
- Define particle detector interface
- Ingest trigger metadata into SAS
- Define required calibration data
- Continue preparation of offline tools



(courtesy J. Swinbank)

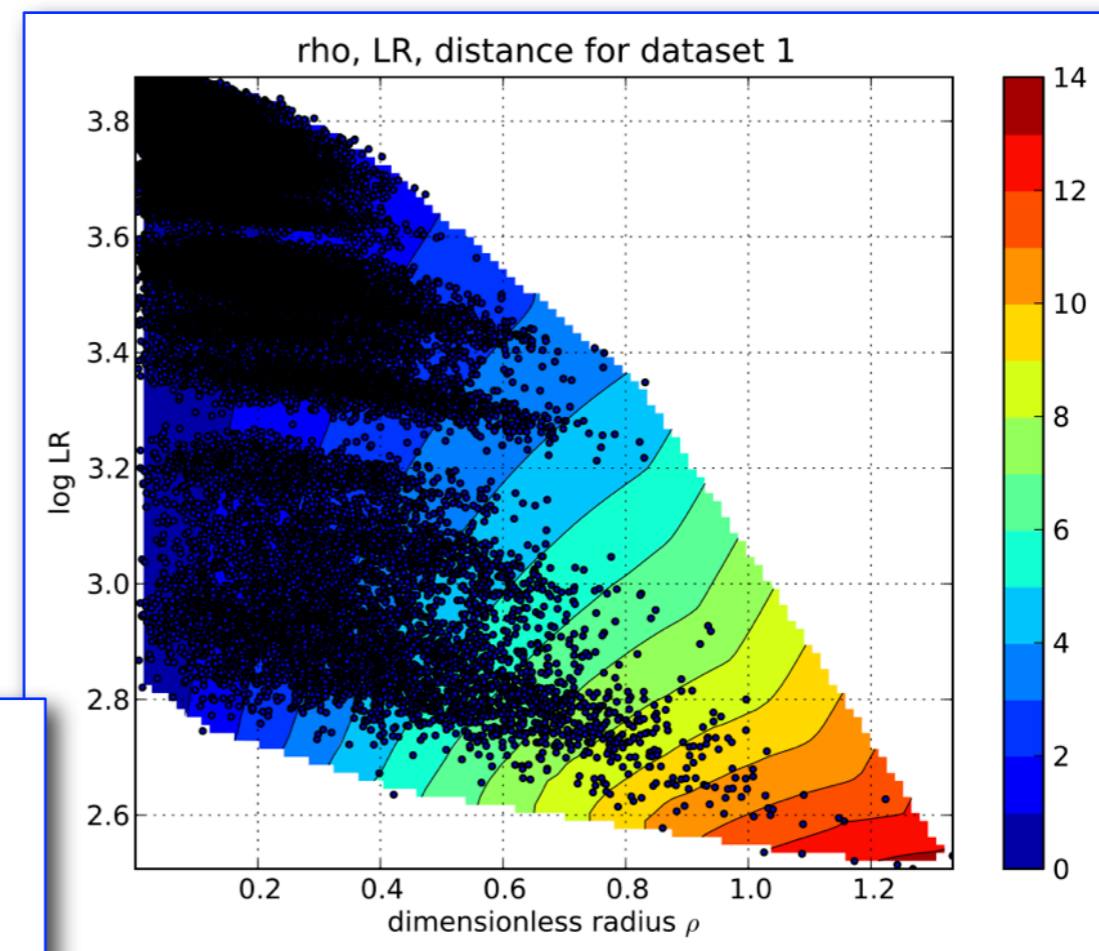
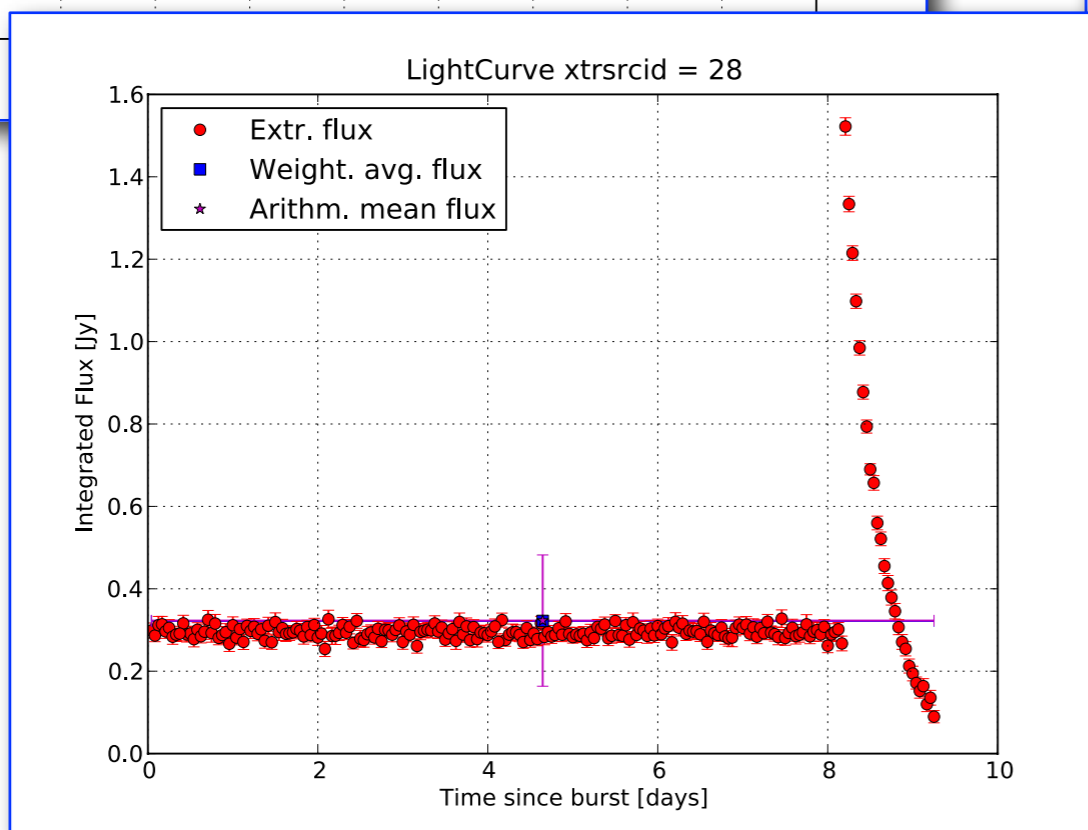
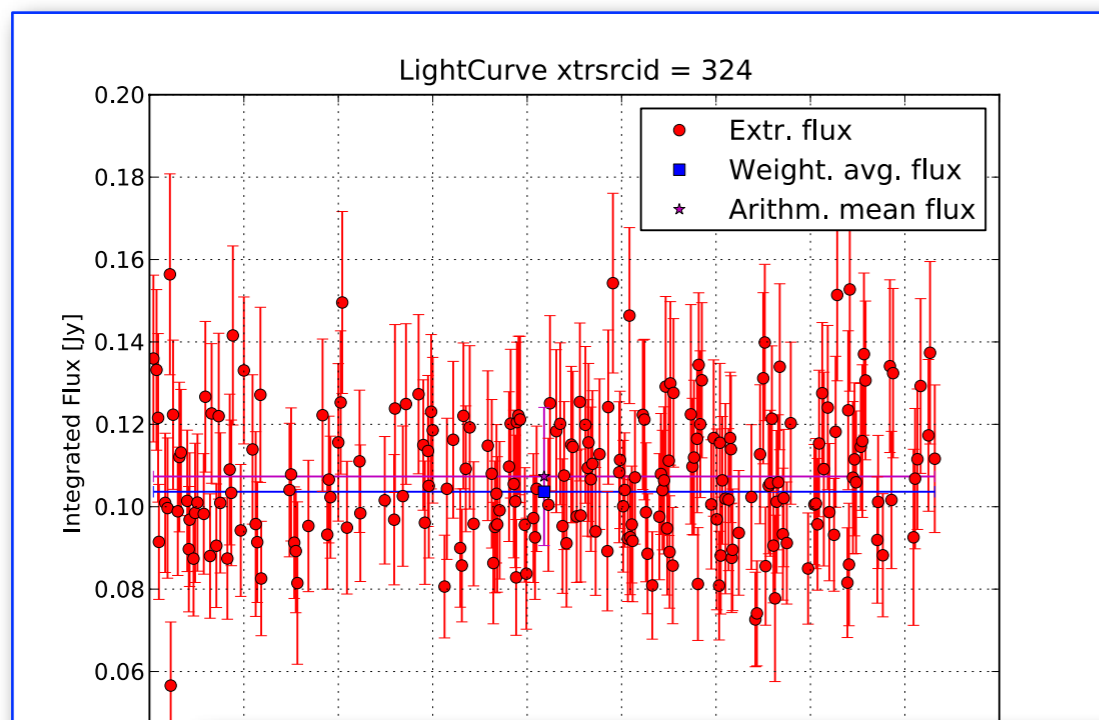
Transients Pipeline Checklist				
	Complete	Ongoing	Stalled (why?)	Not started
	Tasks	Developer	Commissioner	Expected date of readiness
Standard Imaging Pipeline	Imaging pipeline in place & operational; image cubes available on cluster	ASTRON imaging pipeline group		
	Appropriate imaging pipeline settings for transient work			
	Flagging (DPPP) algorithms tested			
	Adequate image cubes (ie, with full headers) available as HDF5	Anderson		
Policy Decisions	Selection of standard bands	Science working groups		
Pipeline Infrastructure	Implementation via "pipeline framework" developed for imaging	Swinbank		
	Code available via USG repository; built on LOFAR cluster	Swinbank & Bahren		
	Input handler written for HDF5 image cube	Swinbank & Anderson		
	Integration with MAC/SAS control layer	Swinbank & Overeem		
Source Extraction	Algorithm development	Spreeuw		
	Python packaging with distutils	Swinbank		
	Test automation			
	Beam shape information	Anderson		
	Deconvolve fitted parameters from restoring beam			
	Performance development			
Pipeline Database	Definitive selection of database system	Scheers & Software WG		
	Lightcurve construction	Scheers		
	Performance and concurrency	Scheers		
	Deployment on LOFAR cluster	Scheers		
Transient Identification	Image differencing			
	Dispersion			
Lightcurve Classification	Infrastructure	Rol		
	Initial lightcurve classification plugins	Rol		
	Machine learning integration	Rol (& Coenen?)		
	Cross-matching with WENSS etc databases	Scheers		
	VO integration			
	Science-driven classification data:			
	Jets	Jets WG (Markoff et al.)		
	Planets	Planets WG (Zarka et al.)		
Flare Stars	Flare Stars WG (Osten et al.)			
Pulsars	Pulsars WG (Stappers et al.)			
Serendipity	Serendipity WG (Wise et al.)			
Response System	Definition of required responses			
	Communication with rest of LOFAR system			
	Schedule of follow-up observations	Swinbank		
	Dump TBBs	ter Veen		
	others?			
	Broker/priority system for distribution of scarce resources	Swinbank		
Sending triggers to outside facilities	Follow-up WG (Wijnands, Jonker et al.), Swinbank			
Archive	Population of lightcurve archive database from pipeline database	Scheers		
	Hosting of lightcurve archive database	Software WG? LOFAR Archive Group?		
	Storage of uv and/or image data	Software WG? LOFAR Archive Group?		
	Interface catalogues with Virtual Observatory	Software WG? LOFAR Archive Group?		

Current Status

- Prototype with major components
- Performance tests underway
- VOEvent packets being defined
- Lightcurve scoring module design
- New database variability metrics
- Creation of BBS source models

Next Steps

- Source-specific scoring algorithms
- Performance profiling
- Default observation configurations
- Tests of alert generation/reception
- Continue offline testing



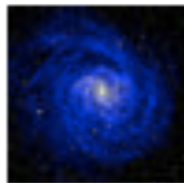
Sample extracted lightcurves

⇒ *Offline tests are ongoing*
TKP busy week April 6-9

(courtesy B. Scheers)

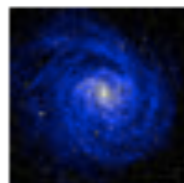


twitter



ASTRON_LOFAR @whiskybreak @ASTRON_LOFAR the transients are definitely the most civilised of the Lofar KSPs.
about 17 hours ago via UberTwitter in reply to whiskybreak

- RSM testing: 2 x 22 x 1 hr LBA zenith pointings, 30-80 MHz
- Simultaneous pulsar/imaging on B0329+54: 12 hrs
- Pulsar mode only on B0809+74: ~50 hrs
- Jupiter bursts: 20 mins (1.5 TB)
- Saturn lightning: 3 hrs (2 TB)
- SETI prep work: 1 Hz spectral capability demonstrated
- Various and many pipeline tests



ASTRON_LOFAR @whiskybreak @ASTRON_LOFAR the transients are definitely the most civilised of the Lofar KSPs.
about 17 hours ago via UberTwitter in reply to whiskybreak

An astronomical map showing a field of galaxy clusters. The map features a grid of blue lines representing celestial coordinates. Numerous galaxy clusters are marked with red crosses and labeled with names such as NGC 4850, NGC 4857, NGC 4858, NGC 4859, NGC 4860, NGC 4861, NGC 4862, NGC 4863, NGC 4864, NGC 4865, NGC 4866, NGC 4867, NGC 4868, NGC 4869, NGC 4870, NGC 4871, NGC 4872, NGC 4873, NGC 4874, NGC 4875, NGC 4876, NGC 4877, NGC 4878, NGC 4879, NGC 4880, NGC 4881, NGC 4882, NGC 4883, NGC 4884, NGC 4885, NGC 4886, NGC 4887, NGC 4888, NGC 4889, NGC 4890, NGC 4891, NGC 4892, NGC 4893, NGC 4894, NGC 4895, NGC 4896, NGC 4897, NGC 4898, NGC 4899, NGC 4900, NGC 4901, NGC 4902, NGC 4903, NGC 4904, NGC 4905, NGC 4906, NGC 4907, NGC 4908, NGC 4909, NGC 4910, NGC 4911, NGC 4912, NGC 4913, NGC 4914, NGC 4915, NGC 4916, NGC 4917, NGC 4918, NGC 4919, NGC 4920, NGC 4921, NGC 4922, NGC 4923, NGC 4924, NGC 4925, NGC 4926, NGC 4927, NGC 4928, NGC 4929, NGC 4930, NGC 4931, NGC 4932, NGC 4933, NGC 4934, NGC 4935, NGC 4936, NGC 4937, NGC 4938, NGC 4939, NGC 4940, NGC 4941, NGC 4942, NGC 4943, NGC 4944, NGC 4945, NGC 4946, NGC 4947, NGC 4948, NGC 4949, NGC 4950, NGC 4951, NGC 4952, NGC 4953, NGC 4954, NGC 4955, NGC 4956, NGC 4957, NGC 4958, NGC 4959, NGC 4960, NGC 4961, NGC 4962, NGC 4963, NGC 4964, NGC 4965, NGC 4966, NGC 4967, NGC 4968, NGC 4969, NGC 4970, NGC 4971, NGC 4972, NGC 4973, NGC 4974, NGC 4975, NGC 4976, NGC 4977, NGC 4978, NGC 4979, NGC 4980, NGC 4981, NGC 4982, NGC 4983, NGC 4984, NGC 4985, NGC 4986, NGC 4987, NGC 4988, NGC 4989, NGC 4990, NGC 4991, NGC 4992, NGC 4993, NGC 4994, NGC 4995, NGC 4996, NGC 4997, NGC 4998, NGC 4999, NGC 5000. Other clusters are marked with green diamonds and labeled with names such as Abell 1470, Abell 1471, Abell 1472, Abell 1473, Abell 1474, Abell 1475, Abell 1476, Abell 1477, Abell 1478, Abell 1479, Abell 1480, Abell 1481, Abell 1482, Abell 1483, Abell 1484, Abell 1485, Abell 1486, Abell 1487, Abell 1488, Abell 1489, Abell 1490, Abell 1491, Abell 1492, Abell 1493, Abell 1494, Abell 1495, Abell 1496, Abell 1497, Abell 1498, Abell 1499, Abell 1500, Abell 1501, Abell 1502, Abell 1503, Abell 1504, Abell 1505, Abell 1506, Abell 1507, Abell 1508, Abell 1509, Abell 1510, Abell 1511, Abell 1512, Abell 1513, Abell 1514, Abell 1515, Abell 1516, Abell 1517, Abell 1518, Abell 1519, Abell 1520, Abell 1521, Abell 1522, Abell 1523, Abell 1524, Abell 1525, Abell 1526, Abell 1527, Abell 1528, Abell 1529, Abell 1530, Abell 1531, Abell 1532, Abell 1533, Abell 1534, Abell 1535, Abell 1536, Abell 1537, Abell 1538, Abell 1539, Abell 1540, Abell 1541, Abell 1542, Abell 1543, Abell 1544, Abell 1545, Abell 1546, Abell 1547, Abell 1548, Abell 1549, Abell 1550, Abell 1551, Abell 1552, Abell 1553, Abell 1554, Abell 1555, Abell 1556, Abell 1557, Abell 1558, Abell 1559, Abell 1560, Abell 1561, Abell 1562, Abell 1563, Abell 1564, Abell 1565, Abell 1566, Abell 1567, Abell 1568, Abell 1569, Abell 1570, Abell 1571, Abell 1572, Abell 1573, Abell 1574, Abell 1575, Abell 1576, Abell 1577, Abell 1578, Abell 1579, Abell 1580, Abell 1581, Abell 1582, Abell 1583, Abell 1584, Abell 1585, Abell 1586, Abell 1587, Abell 1588, Abell 1589, Abell 1590, Abell 1591, Abell 1592, Abell 1593, Abell 1594, Abell 1595, Abell 1596, Abell 1597, Abell 1598, Abell 1599, Abell 1600. The text "The End" is centered in the image in a white serif font.

The End