LOFAR OVERVIEW AND FEEDBACK FROM 2nd LOFAR USERS MEETING

R. F. Pizzo

ASTRON

Zandvoort aan Zee, April 4th 2016

LOFAR

ARRAY STATUS

International LOFAR Telescope (ILT)

Onsala

Birr

Dutch stations

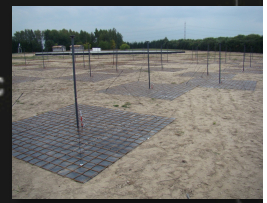
Norderstedt

Chilbolton

LOFAR Core (NL)

Potsdam

Bałdy



Borówiec

- *50 operational stations completed*
- *38 NL stations, 12 international stations*
- *1 new station funded – it will be built in Ireland*

Jülich

Effelsberg

Tautenburg

Łazy

Unterweilenbach

Nançay

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Netherlands Institute for Radio Astronomy

ANTENNA ELEMENTS STATUS

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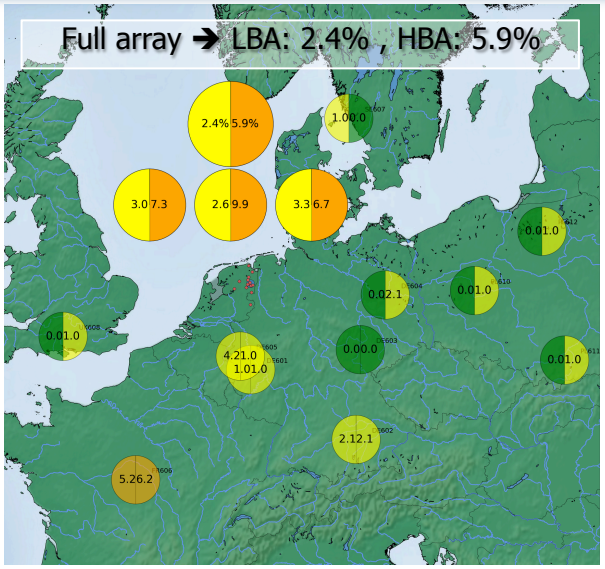

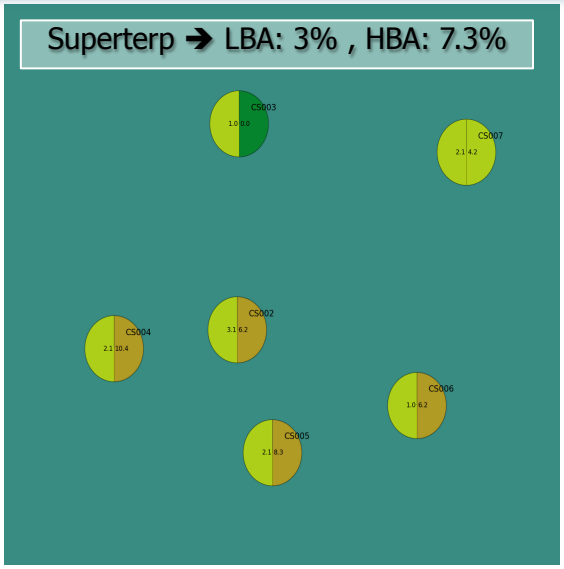

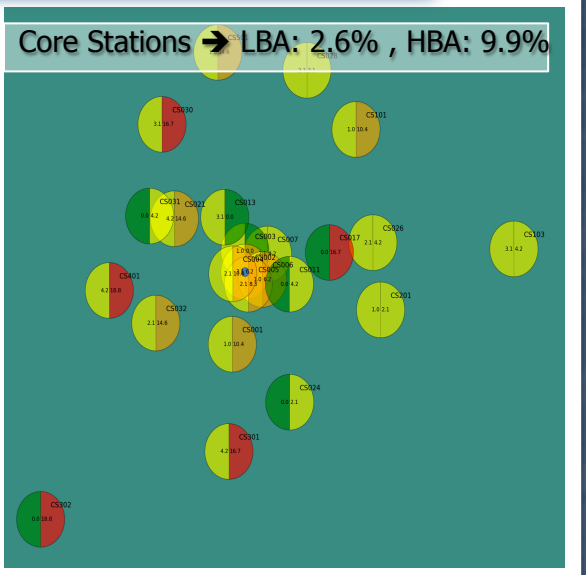

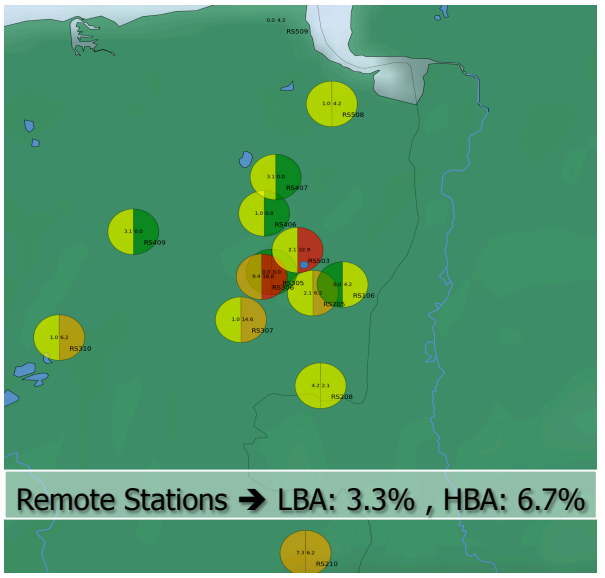

All operational
< 5% not operational
< 15% not operational
> 15% not operational

- Current status available at
  https://proxy.lofar.eu/array_status/
- Maintenance starting soon

STATION CALIBRATION

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Station	mode 1/2	mode 3/4	mode 5	mode 6	mode 7
CS001	23-06-15	21-09-15	19-02-15	23-12-15	11-02-15
CS002	23-06-15	21-09-15	11-02-14	23-12-15	24-02-15
CS003	18-06-15	21-09-15	11-02-14	23-12-15	24-02-15
CS004	18-06-15	21-09-15	11-02-14	23-12-15	19-02-15
CS005	18-06-15	21-09-15	11-02-14	23-12-15	19-02-15
CS006	18-06-15	13-07-15	11-02-14	21-01-16	19-05-14
CS007	18-06-15	21-09-15	11-02-14	23-12-15	24-02-15
CS011	18-06-15	21-09-15	19-02-15	23-12-15	24-02-15
CS013	17-09-14	05-08-14	19-02-15	23-12-15	19-02-15
CS017	18-06-15	13-07-15	19-02-15	23-12-15	24-02-15
CS021	18-06-15	05-08-14	19-02-15	13-01-16	19-02-15
CS024	18-06-15	21-09-15	19-02-15	23-12-15	19-05-14
CS026	18-06-15	21-09-15	19-02-15	23-12-15	19-02-15
CS028	18-06-15	21-09-15	19-02-15	23-12-15	24-02-15
CS030	18-06-15	21-09-15	19-02-15	23-12-15	19-02-15
CS031	20-09-12	05-08-14	19-02-15	23-12-15	24-02-15
CS032	18-06-15	13-07-15	19-02-15	23-12-15	24-02-15
CS101	18-06-15	21-09-15	19-02-15	23-12-15	24-02-15
CS103	13-07-15	21-09-15	19-02-15	23-12-15	24-02-15
CS201	18-06-15	21-09-15	19-02-15	23-12-15	19-02-15
CS301	18-06-15	21-09-15	19-02-15	23-12-15	24-02-15
CS302	18-06-15	21-09-15	19-02-15	23-12-15	19-02-15
CS401	18-06-15	15-10-12	19-02-15	23-12-15	24-02-15
CS501	18-06-15	21-09-15	19-02-15	23-12-15	24-02-15
RS106	18-06-15	21-09-15	20-04-15	23-12-15	21-01-16
RS205	18-06-15	21-09-15	04-11-15	23-12-15	04-11-15
RS208	18-06-15	12-11-13	04-11-15	23-12-15	04-11-15
RS210	18-06-15	22-07-14	04-11-15	23-12-15	21-01-16
RS305	13-07-15	21-09-15	04-11-15	23-12-15	04-11-15
RS306	18-06-15	21-09-15	04-11-15	23-12-15	04-11-15
RS307	18-06-15	21-09-15	04-11-15	23-12-15	04-11-15
RS310	18-06-15	22-07-14	04-11-15	23-12-15	21-01-16
RS406	18-06-15	21-09-15	04-11-15	23-12-15	04-11-15
RS407	18-06-15	21-09-15	21-09-15	23-12-15	04-11-15
RS409	18-06-15		04-11-15	13-01-16	04-11-15
RS503	18-06-15	21-09-15	20-04-15	23-12-15	21-01-16
RS508	18-06-15	21-09-15	04-11-15	13-01-16	04-11-15
RS509	18-06-15	21-09-15	04-11-15	23-12-15	24-02-15
DE601		04-11-15	19-10-15	23-12-15	19-10-15
DE602		13-07-15	20-04-15	23-12-15	24-08-15
DE603		04-11-15	19-10-15	23-12-15	19-10-15
DE604		03-10-13	19-10-15	23-12-15	19-10-15
DE605		13-07-15	19-10-15	23-12-15	19-10-15
FR606		04-11-15	04-11-15	23-12-15	04-11-15
SE607		04-11-15	19-10-15	23-12-15	19-10-15
UK608		04-11-15	19-10-15	23-12-15	19-10-15
DE609		03-04-15	21-09-15	23-12-15	21-09-15
PL610			29-01-16	29-01-16	29-01-16
PL611		29-01-16	03-02-16	03-02-16	03-02-16
PL612		29-01-16	29-01-16	29-01-16	29-01-16

- Current status

  http://www.astron.nl/radio-observatory/astronomers/current-status

- Significant progress made since last year meeting:
  - more regular updates
  - Tables for mode 6
- Station calibration still competing with Cycle operations
- Contact points: (L. Cerrigone + observers)
- New station calibration method to be finalized: Holography.
  - It will make both data collection, handling and reduction (much) easier!

ACHIEVEMENTS AND ISSUES

MAIN OPERATIONAL ACHIEVEMENTS 2015-2016

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- Network reconfiguration: 18-29 May 2015
- CS013 rotated to originally planned orientation – regularly adopted in production observing since December 9
- Polish Stations
- Mode 6 operational
- LBA sparse implemented and caltables in progress
- Poznan LTA now operational

MAIN OPERATIONAL ACHIEVEMENTS 2015-2016

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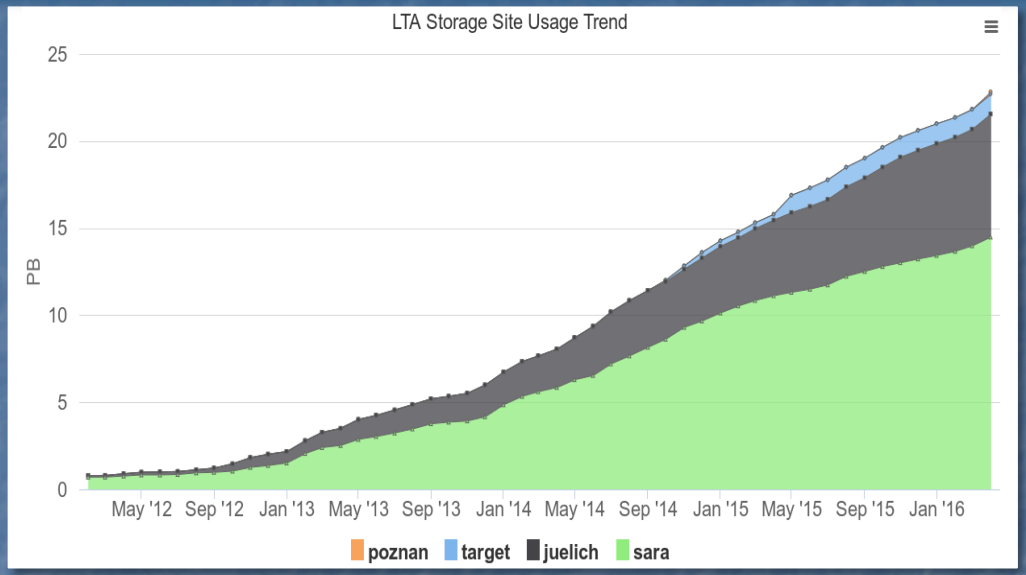
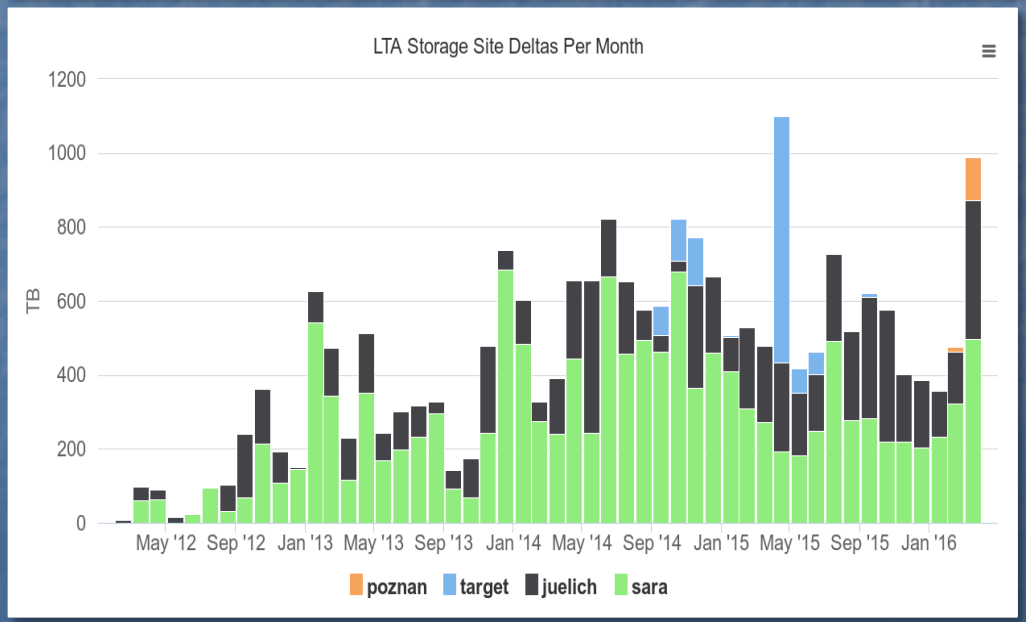
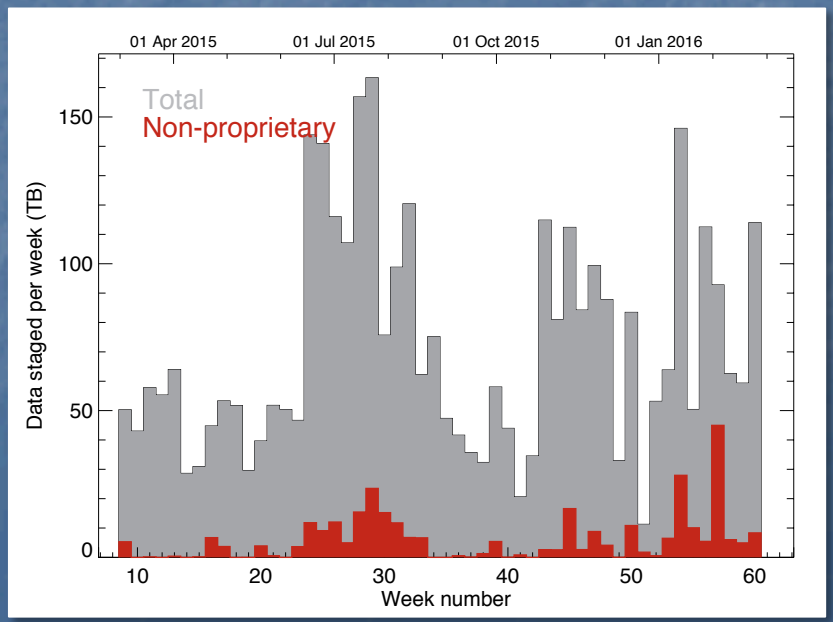


- > 22.5 PB of LOFAR data in the LTA!
- Public data being actively retrieved by non-proprietary users
- LTA survey closed on 1 April – results will be advertised





OPERATIONAL ISSUES

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I. Several Dutch stations suffered from the warm summer temperatures -> a few imaging and BF runs were postponed

   - Hardware improvements implemented at all NL stations

II. Ingest system instability-> long ingest queue -> CEP2 (production cluster) full

III. CEP2 instability -> swpping

IV. Preparing and supporting Cycle, DDT, and commissioning observations still remain *very manual procedures*, which put a *significant* burden on the Science Support group (and also inevitably lead to human errors). *These routines still await significant automation.*

IMPROVEMENTS IN THESE AREAS WILL IN TURN DELIVER HIGHER OBSERVING EFFICIENCIES

SCIENCE OPERATIONS

CYCLE 4 & 5 OBSERVING PROGRAMS

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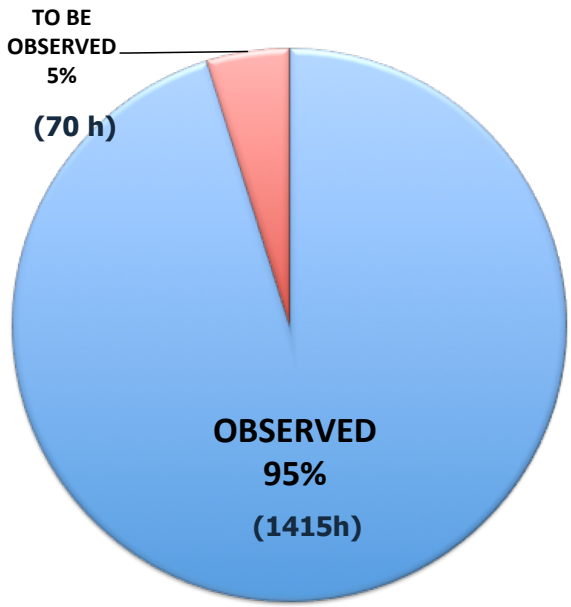
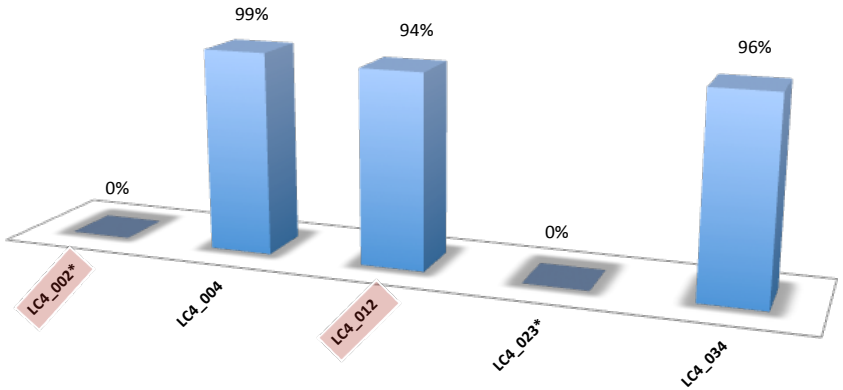
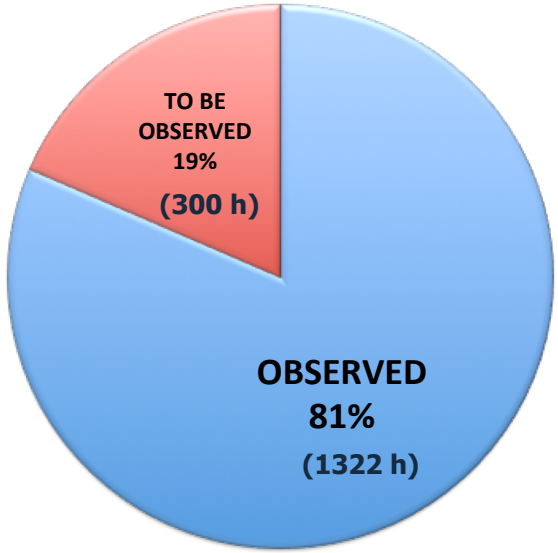
STATUS CYCLE 4



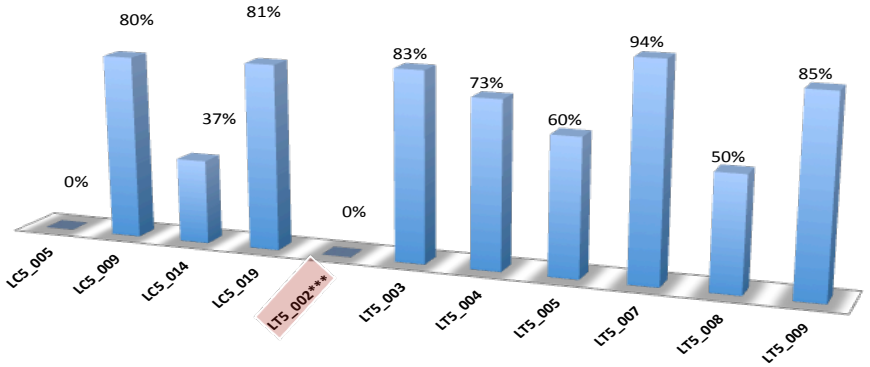
Status of active Cycle 4 projects



STATUS CYCLE 5



Status of active Cycle 5 projects



OBSERVING EFFICIENCY

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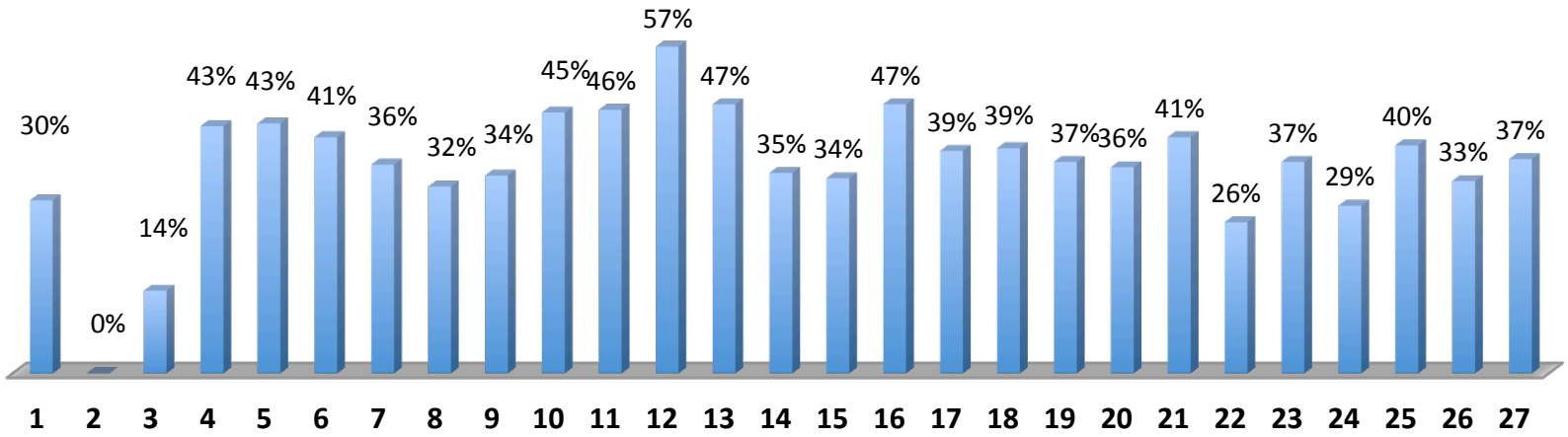

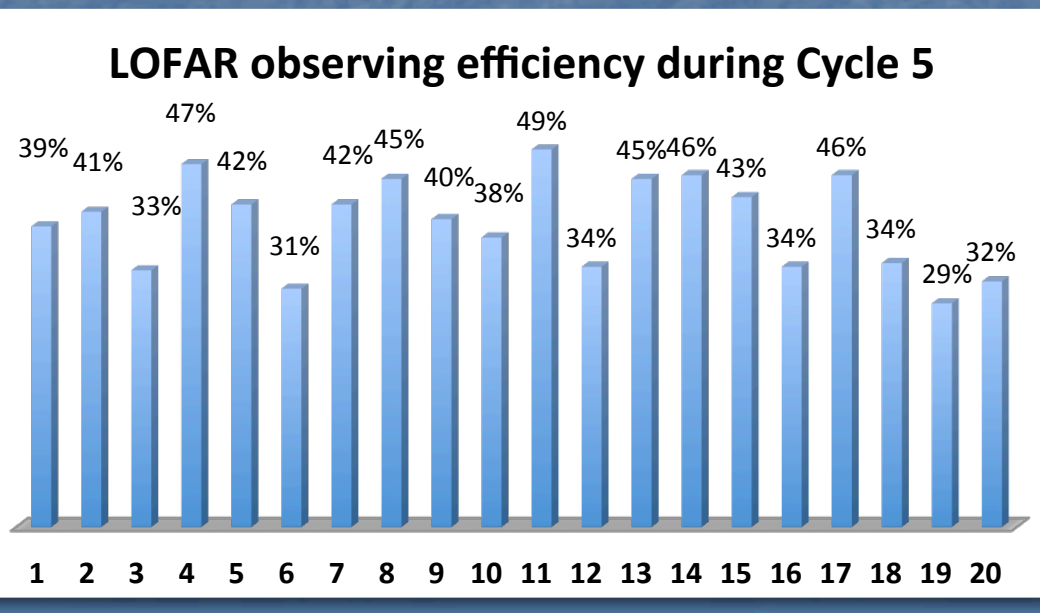

- Average ~ 39% ➔ improved by 4% w.r.t. Cycle 3
- Issues:
  - System robustness (LTA instability, CEP instability, …)
  - Manual procedures…

CYCLE 6 PROPOSALS

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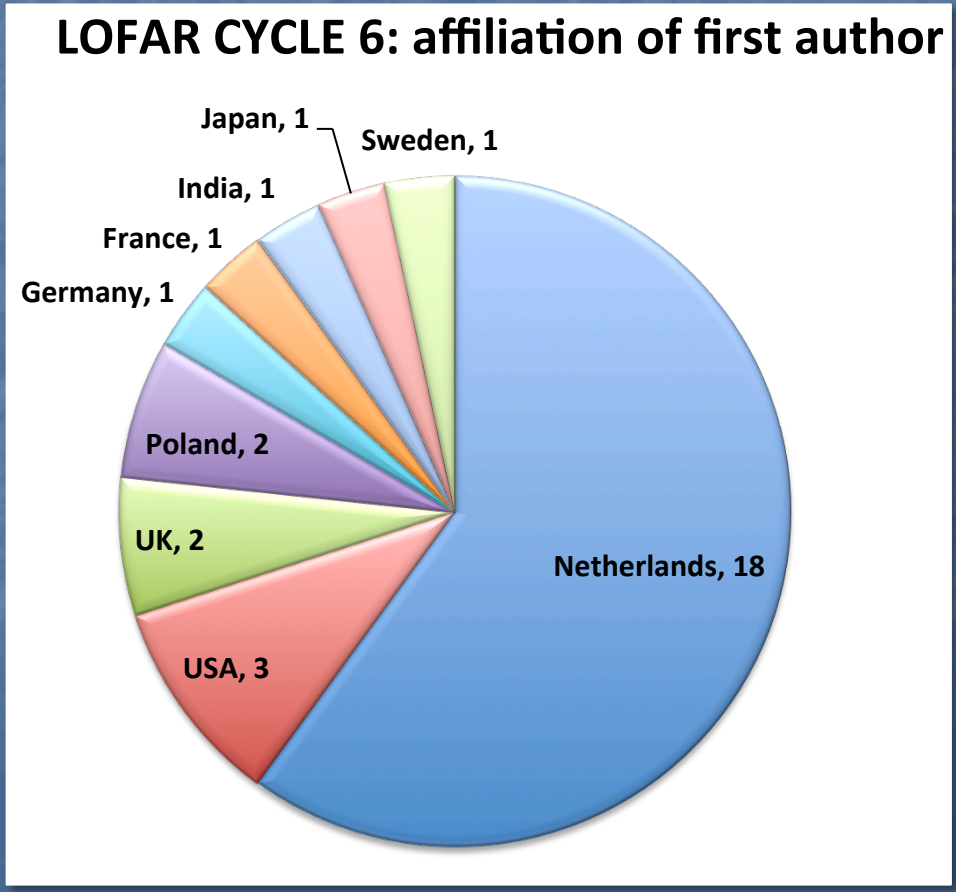
- 30 regular proposals received
- Oversubscription:
  - Observing -> 1.2
  - Processing -> 1.6



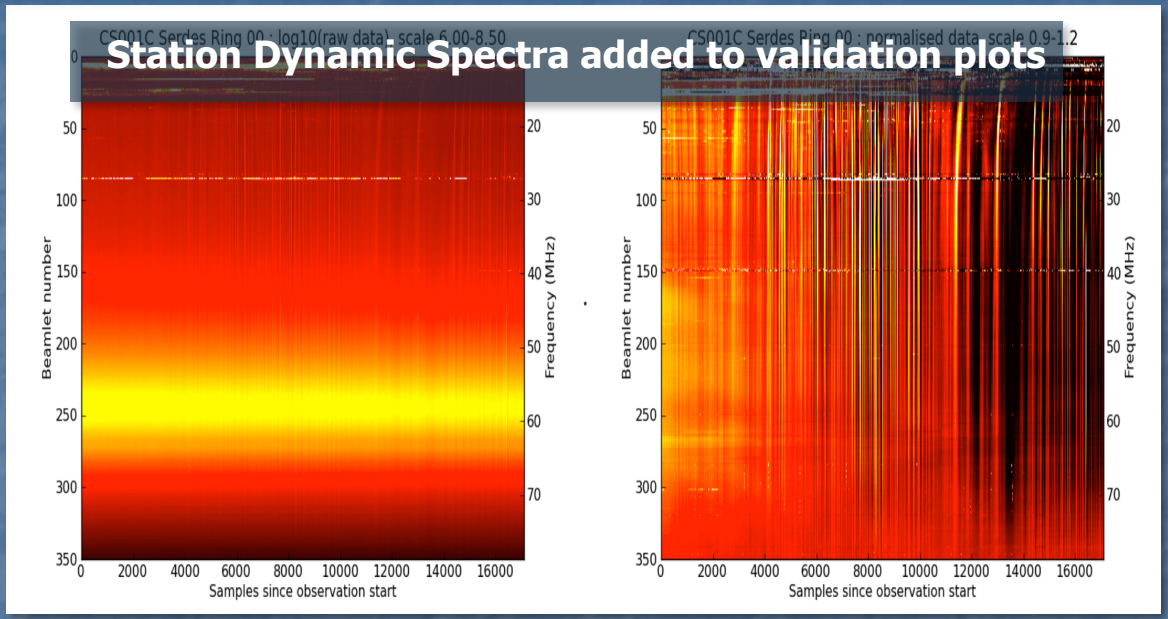
Observing mode	Fraction of proposals
IM	63%
BF	20%
BF+IM	13%
TBB	3%

Science Area	Fraction of proposals
Extragalactic	37%
Transients	27%
Planets	17%
Galaxy	7%
Ionosphere	7%
Stellar	3%
Solar	3%

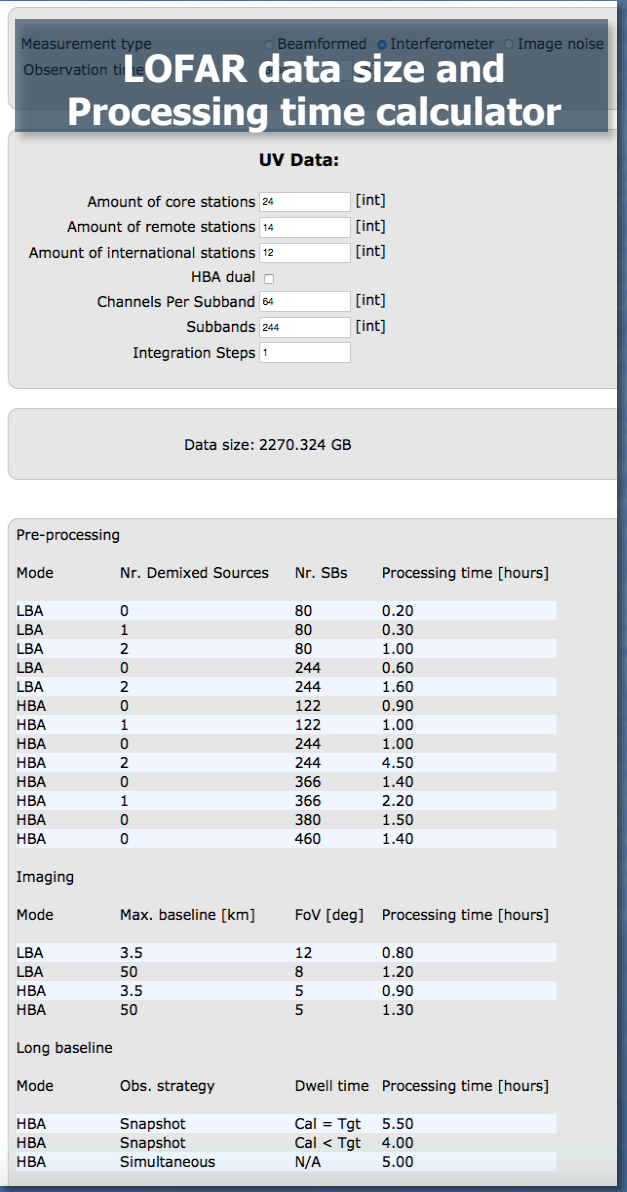
TOOLS AND DOCUMENTATION

TOOLS

Station Dynamic Spectra added to validation plots



LOFAR data size and Processing time calculator



Pre-processing

Mode	Nr. Demixed Sources	Nr. SBs	Processing time [hours]
LBA	0	80	0.20
LBA	1	80	0.30
LBA	2	80	1.00
LBA	0	244	0.60
LBA	2	244	1.60
HBA	0	122	0.90
HBA	1	122	1.00
HBA	0	244	1.00
HBA	2	244	4.50
HBA	0	366	1.40
HBA	1	366	2.20
HBA	0	380	1.50
HBA	0	460	1.40

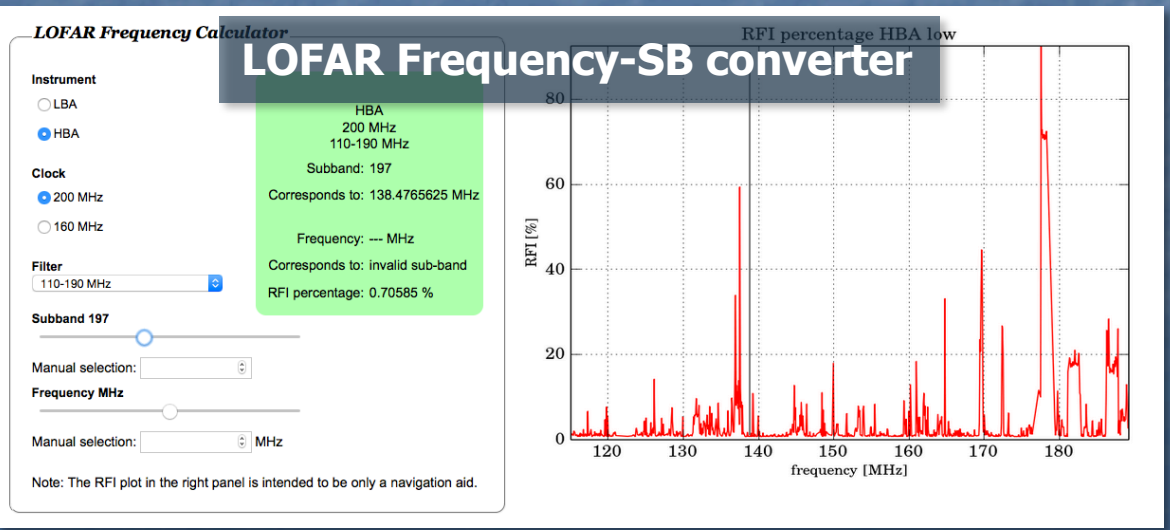
Imaging

Mode	Max. baseline [km]	FoV [deg]	Processing time [hours]
LBA	3.5	12	0.80
LBA	50	8	1.20
HBA	3.5	5	0.90
HBA	50	5	1.30

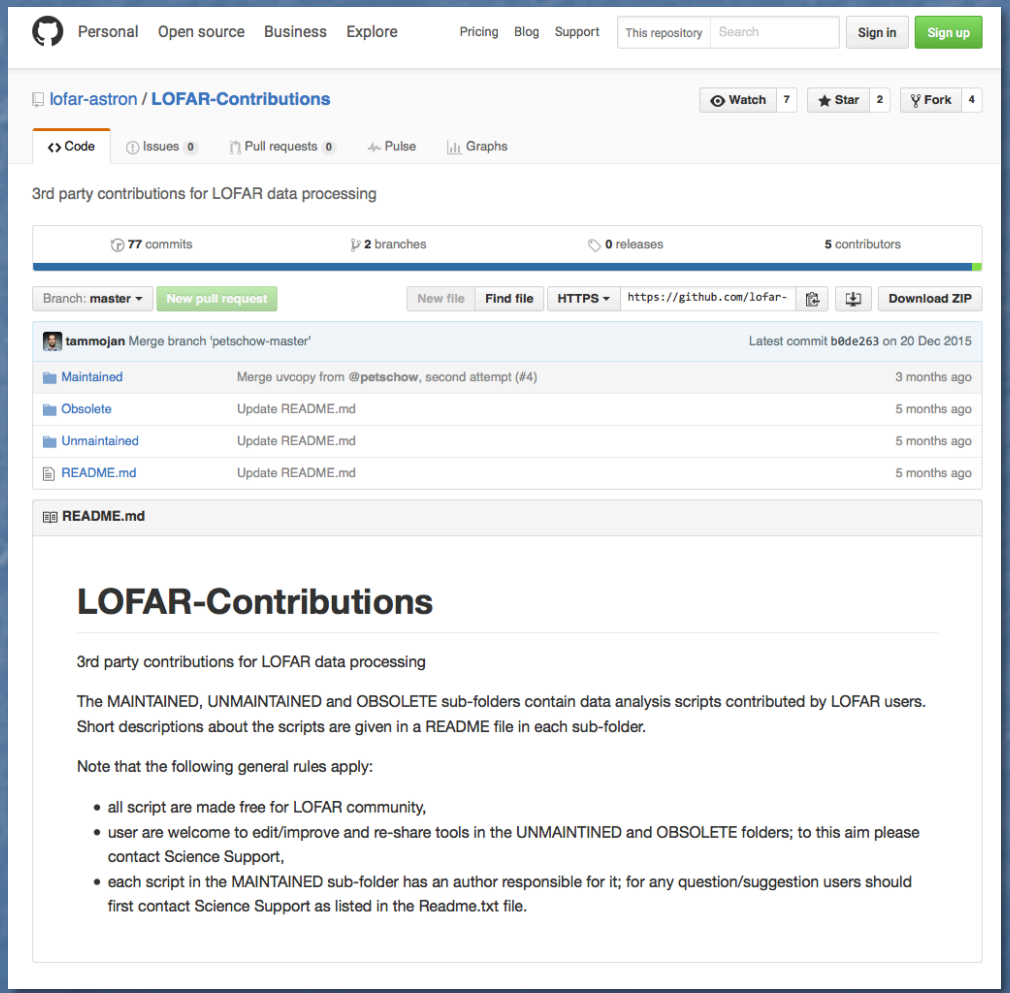
Long baseline

Mode	Obs. strategy	Dwell time	Processing time [hours]
HBA	Snapshot	Cal = Tgt	5.50
HBA	Snapshot	Cal < Tgt	4.00
HBA	Simultaneous	N/A	5.00

LOFAR Frequency-SB converter



TOOLS: GITHUB



- LOFAR user contributed scripts have been migrated to GitHub and are now available to the entire user community.
- https://github.com/lofar-astron/LOFAR-Contributions
- The repository is also documented in the latest release of the LOFAR Imaging cookbook.

DOCUMENTATION

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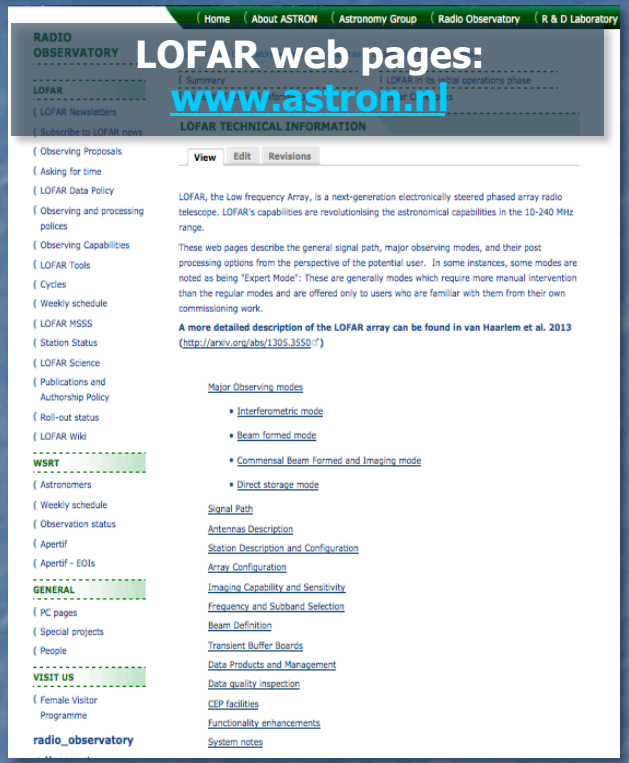

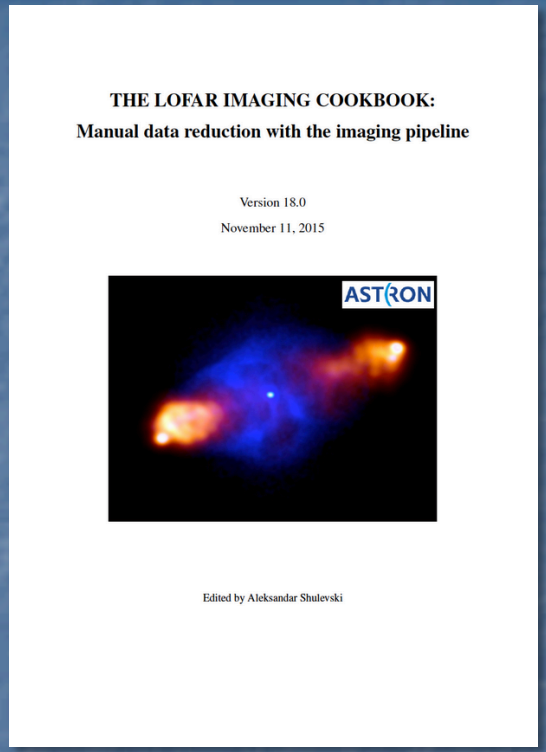

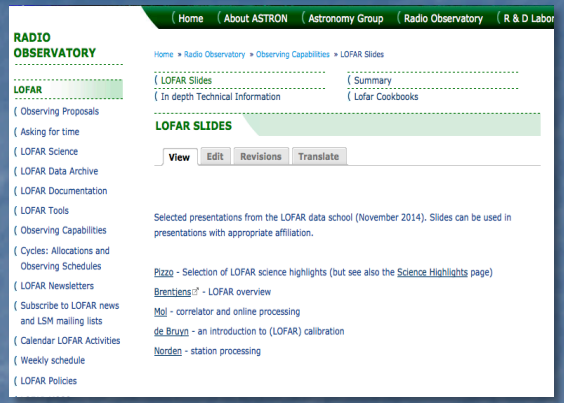

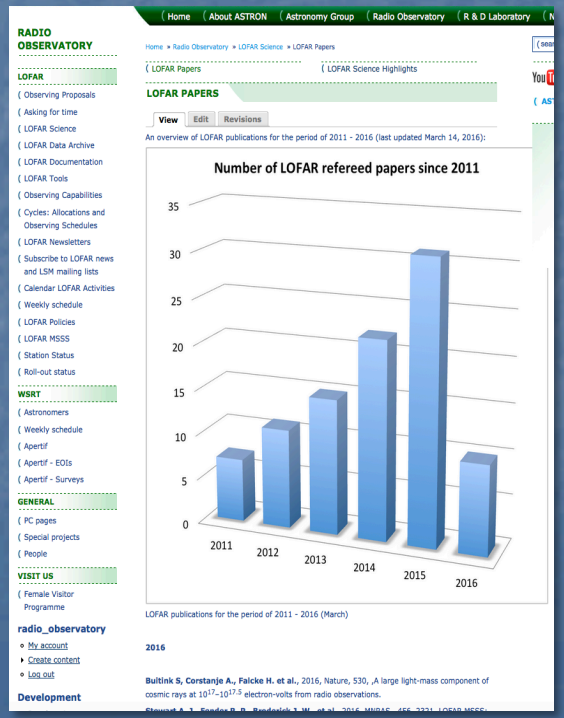

Plus:

LOFAR Wiki ➔ www.lofar.org/wiki

LOFAR Bulletins ➔ http://www.astron.nl/radio-observatory/lofar-newsletters/lofar-newsletters

LOFAR Status Meetings slides ➔ http://www.lofar.org/operations/doku.php?id=public:lsm_new:start

LOFAR CALENDAR

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Home » Radio Observatory » Calendar LOFAR Activities

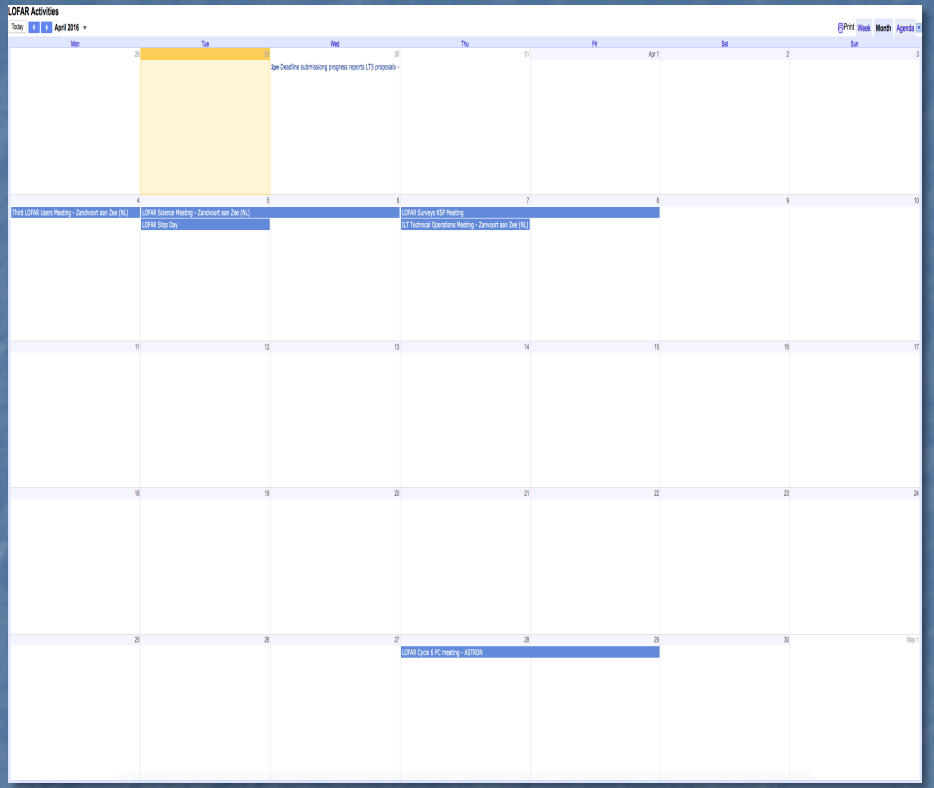
CALENDAR LOFAR ACTIVITIES

The calendar of planned LOFAR activities - such as stop stays, Weeks, Meetings - can be found at the link below:

https://calendar.google.com/calendar/embed?src=2jkmjaro6ek0kh7tmf9brpf8pk%40group.calenda/Amsterdam

LOFAR

- Observing Proposals
- Asking for time
- LOFAR Science
- LOFAR Data Archive
- LOFAR Documentation
- LOFAR Tools
- Observing Capabilities
- Cycles: Allocations and Observing Schedules
- LOFAR Newsletters
- Subscribe to LOFAR news and LSM mailing lists
- Calendar LOFAR Activities
- Weekly schedule
- LOFAR Policies
- LOFAR MSSS
- Station Status
- Roll-out status



Calendar of planned LOFAR activities - such as stop stays, roll outs, Proposal deadlines, Busy Weeks, Meetings

FEEDBACK FROM 2ND LOFAR USERS MEETING

LOFAR USERS MEETING 2015 – ENHANCED OBSERVING FUNCTIONALITY

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Rotation CS013 (various)	✓
RCU mode 6 observing (EoR)	✓
Automatically flash station boards with AARTFAAC firmware after a 48v reset (transients)	✓
Responsive Telescope functionality (transients)	
TBB operational (cosmic rays)	
Request of online RFI flagging, which would allow rejection of single stations: currently not prioritized (transients)	✗
Writing out data as 8, 4, 2, 1-bit samples: currently not prioritized (transients)	✗

LOFAR USERS MEETING 2015 – PROPOSALS AND DATA MANAGEMENT

NorthStar improvements (various)	
MoM – difficult to check observation/pipeline settings (transients)	

LOFAR USERS MEETING 2015 – PROCESSING & LTA

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Running multiple pre-processing pipelines on the same raw data (surveys)	✓
Updated beam model – see M. Brentjens' talk (various)	
More metadata (e.g. flagged tiles written to BF headers, BF calibration table) (transients)	
Automation interfaces to the Catalog and the staging service: see http://www.lofar.org/wiki/doku.php?id=public:lta_tricks (surveys)	✓

LOFAR USERS MEETING 2015 – DOCUMENTATION

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Software development updates at LSM (various)	✓
Collection of LOFAR slides, list of LOFAR papers, science highlights (various)	✓
Repository for scripts and tools developed and shared by user - GitHub (surveys)	✓
Better documentation on installation LOFAR software at external computing facilities http://www.lofar.org/operations/doku.php?id=public:user_software:start (various)	

THANKS !