LOFAR OBSERVING: INTERACTION USER – RADIO OBSERVATORY

R. F. Pizzo



ASTRON, November 17th 2014



RO PEOPLE





A large number of software and hardware engineers, astronomers and others who \succ designed, constructed and keep LOFAR operational

ASTRON's Radio Observatory Science Support Group



Roberto Pizzo







Carmen Toribio







sciencesupport@astron.nl

Radio Observatory Operators

Wilfred Frieswijk



observer@astron.nl

Telescope Astronomers \succ

Michiel Brentjens



+ Operations and maintenance + Software Support

THE LOFAR SYSTEM: DATA FLOW



AST(RON



Station signals collected in the station cabinets

Signal sent to COBALT for correlation



CEP2

Groningen LTA site

Products sent to the longterm archive

Data sent to CEP2 for initial RO processing – products might get copied to CEP3

> Entire process is overseen by Operators, Science Support and Software Support groups

CALL FOR PROPOSALS



AST(RON

- > Two observing Cycles every year:
 - May 15 November 14
 - November 15 May 14
- Proposal call: 4 months before start of the Cycle (January, July)
- http://www.astron.nl/radioobservatory/observingproposals/regular-proposal-callinstructions/regular-proposal-callinstr
- Proposal deadline: 2 months before the start of the Cycle (March, September)
- Advertisement of new functionality for the coming Cycle
- Available observing and processing hours

International LOFAR Telescope

Proposal Call to the Worldwide Community

Cycle 3: 15 November 2014 - 14 May 2015

Submission deadline Wednesday 10 September 2014, at 12 UT

This file in PDF form

Submission only via the online tool NorthStar

** Proposers must ensure that their justification files adhere to the instructions given below and in Northstar, repeated online <u>here</u>. **

The International LOFAR Telescope (ILT) is a powerful next-generation radio telescope for frequencies below 240 MHz that offers revolutionary new observing capabilities thanks to its phased-array technology with digital beam-forming.

Time on the ILT is available to scientists from the worldwide community, partly through Open Skies, and partly through allocations in tandem between national consortia and the independent Programme Committee.



AST(RON

Radio Observatory

(R&DL

- Use the LOFAR web pages as a reference during the proposal preparation
- LOFAR pages: http://www.astron.nl/radioobservatory/radio-observatory
- Note: extensive description of LOFAR system available in van Haarlem et al. 2013



RADIO OBSERVATORY

(Subscribe to LOFAR news

(Observing and processing

(Observing Capabilities

(Commissioning Period &

(Observing Proposals

(Asking for time

polices

(Cycles

(LOFAR Tools

the LCCG

(LOFAR MSSS

(Station Status

(LOFAR Science

(Publications and Authorship Policy

(Roll-out status (LOFAR Wiki WSRT (Astronomers (Weekly schedule (Observation status (Apertif (Apertif - EOIs

(Weekly schedule

(LOFAR Data Policy

LOFAR

Home » Radio Observatory

(Home

RADIO OBSERVATORY

View Edit Revisions

(About ASTRON

The Radio Observatory is responsible for the astronomical exploitation of the Westerbork Synthesi Radio Telescope (WSRT) and the LOw Frequency ARray (LOFAR).

(Astronomy Group

The Westerbork Synthesis Radio Telescope, one of the most powerful radio observatories in the world, enables astronomers to study a wide range of astrophysical problems in frequencies between 115 MHz to 8650 MHz.

The WSRT is an open user facility available for scientists from any country. It is also part of the European VLBI network ($\underline{EVN} \cong^{t}$) of radio telescopes.

LOFAR is a radio interferometric array consisting of many low-cost antennae, organised in stations arranged in an area of 100km diameter as well as several international stations and operating between 10 and 250 MHz.

Astronomers can request observing time with WSRT using the <u>NorthStar for WSRT</u> \square ^{*} Web-based proposal tool and for LOFAR, using the <u>NorthStar for LOFAR</u> \square ^{*} following the instructions given in the "Announcement for Opportunity" issued periodically.

These web pages provide further information for the WSRT and the LOFAR operations.

Technical inquiries and requests for support can be requested by e-mail to sciencesupport AT astron.nl at, where they will be answered or forwarded as needed.

Contact e-mail addresses

Radio Observatory	R. Vermeulen
director 2	
Secretariat 2	M. Tibbe, L. Elpenhof
Science Support	R. Fallows, W. Frieswijk, G. Józsa, E. Orru ¹ , R. Pizzo, R. Smits, C. Toribio
Telescope Astronomers	M. Brentjens, A. Polatidis, C. Bassa
VLBI with WSRT	A. Polatidis, G. Kuper



AST(RON

LOFAR pages: http://www.astron.nl/radio-observatory/radio-observatory \succ

ASTRON	N Netherlands Institute for Radio Astronomy	LOFAR TECHNIC
RADIO OBSERVATORY	(Home (About ASTRON (Astronomy Group (Radio Observatory (R & D Lab Home > Radio Observatory > Observing Capabilities	View Edit LOFAR, the Low frequ telescope. LOFAR's ca range. These web pages des processing options fro noted as being "Exper
LOFAR (Subscribe to LOFAR news	(Summary (LOFAR in its initial operations phase (In depth Technical Information (LoFar Cookbooks	than the regular mode commissioning work. A more detailed descr
(Observing Proposals (Asking for time	LOFAR OBSERVING CAPABILITIES FOR ASTRONOMERS	(http://arxiv.org/abs/
(LOFAR Data Policy (Observing and processing	LOFAR	Major Observir
Observing Capabilities LOFAR Tools Cycles Weekly schedule Commissioning Period & the LCCG LOFAR MSSS Station Status LOFAR Science Publications and Authorship Policy Roll-out status LOFAR Wiki	LOFAR, the LOw-Frequency ARray, is a new-generation radio interferometer constructed in the north of the Netherlands and across europe. Utilizing a novel phased-array design, LOFAR covers the largely unexplored low-frequency range from 10–240MHz and provides a number of unique observing capabilities. Spreading out from a core located near the village of Exloo in the northeast of the Netherlands, a total of 40 LOFAR stations are nearing completion. A further five stations have been deployed throughout Germany, and one station has been built in each of France, Sweden, and the UK. Digital beam-forming techniques make the LOFAR system agile and allow for rapid repointing of the telescope as well as the potential for multiple simultaneous observations. With its dense core array and long interferometric baselines, LOFAR achieves unparalleled sensitivity and angular resolution in the low-frequency radio regime. The LOFAR facilities are jointly operated by the International LOFAR I relescope (ILT) foundation, as an observatory open to the global astronomical community. LOFAR is one of the first radio observatories to feature automated processing pipelines to deliver fully calibrated science products to its user community. LOFAR's new capabilities, techniques and modus operandi make it an important pathfinder for the Square Kliometre Array (SKA).	Interfer Beam f Direct s Signal Path Antennas Desc Station Descrip Array Configur Imaging Capate Frequency and Beam Definitio Transient Buffer
WSRT (Astronomers (Weekly schedule (Observation status (Apertif (Apertif - EOIs	The following web pages describe the LOFAR's observing capabilities, major observing modes and analysis pipelines: Summary LOFAR in its initial operational phase In-depth technical information Cookbooks	Data Products Data quality in CEP facilities LOFAR Time S System notes

CAL INFORMATION

Revisions

Jency Array, is a next-generation electronically steered phased array radio apabilities are revolutionising the astronomical capabilities in the 10-240 MHz

cribe the general signal path, major observing modes, and their post om the perspective of the potential user. In some instances, some modes are rt Mode": These are generally modes which require more manual intervention es and are offered only to users who are familiar with them from their own

ription of the LOFAR array can be found in van Haarlem et al. 2013 /1305.3550 2)

ng modes

- rometric mode
- formed mode
- storage mode

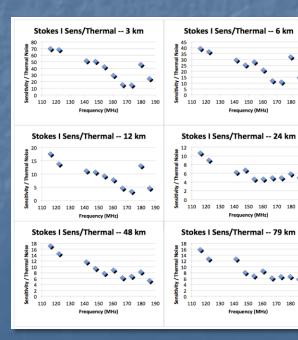
cription ption and Configuration ration bility and Sensitivity d Subband Selection on er Boards and Management nspection standard

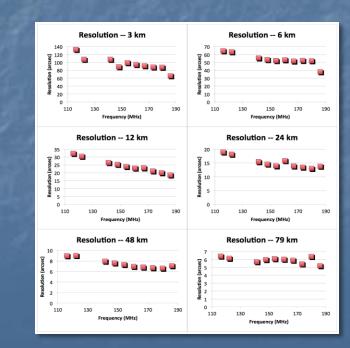


Interferometric mode web page (mode fully supported):

http://www.astron.nl/radio-observatory/astronomers/array-configurations/3-telescope-parameters-and-array-configurations

- Observing strategies (LBA, HBA) + Calibrators
- Imaging Pipeline -> see G. Heald's lecture
- Characterization: achievable noise, resolution and required processing time for various pipeline processing strategies





Туре	Nr Demixed Sources	Nr SB	P/O ratio
LBA	0	244	0.6
LBA	2	244	1.6
LBA	0	80	0.2
LBA	1	80	0.3
LBA	2	80	1.0
HBA	0	244	1.0
HBA	2	244	4.5
HBA	0	122	0.9
HBA	1	122	1.0
HBA	0	366	1.4
HBA	1	366	2.2
HBA	0	380	1.5
HBA	0	480	1.4

AST(RON

WORKING ON PROPOSAL: OBSERVING STRATEGIES LOFAR

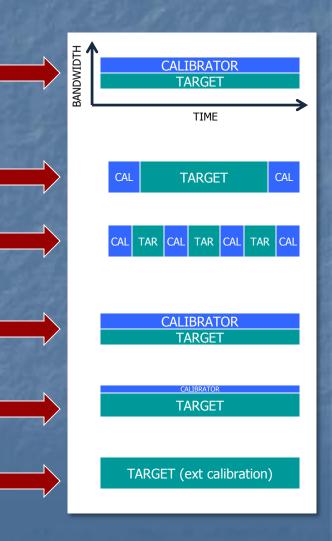
Interferometric mode web page:

http://www.astron.nl/radio-observatory/astronomers/arrayconfigurations/3-telescope-parameters-and-array-configurations

- LBA: half of the available bandwidth on the target field and half on the calibrator
- ≻ HBA:

JU.

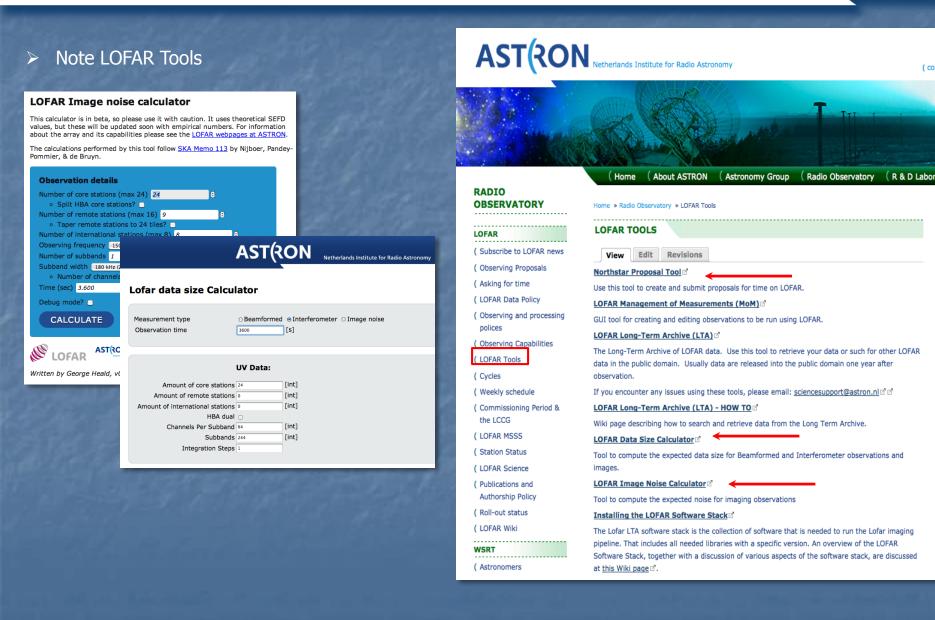
- Continuous in time/Hour Angle observation of the target bracketed by short calibrator runs
- Interleaved calibrator observations (eg. 2 min) with target field (eg. ~ 30 min), quasi-continuous in HA
- Two beams, one on the target and a second on a "phase calibrator" if present within the analog beam of the HBA tiles (experimental strategy for advanced users). The "phase calibrator" should be a bright point like source selected by the user form other catalogues.
- Three quarters of the bandwidth dedicated to the target and one quarter on the "phase calibrator"
- If the user has a good initial model of the target field at his/her disposal, observations could be performed using the full bandwidth on the target





AST(RON

(co



PROPOSAL REVIEW PROCESS AND ALLOCATIONS LOFAR

 Proposal review process lasts for ~ 6 weeks

alle alle

- Technical review panel assesses the technical feasibility of the projects
- National consortia distribute their reserved access hours in the for of must- and maysponsor hours
- LOFAR Programme Committee complete allocations by detailing allocations to the may-sponsor list of proposals and by distributing open skies fraction of time
- Allocations known after the PC meeting at

http://www.astron.nl/radioobservatory/cycles/cycles

				Total processing
Proposal Code	PI	Proposal title	-	
			hours	hours
LC2_001	R. Fallows	Investigating Refraction Through the Solar Wind using Intensity and Phase Scintillation		0
LC2_002	R. Fallows	Probing a Coronal Mass Ejection with Scintillation Arcs	12	0
LC2_003	R. Fallows	Monitoring Ionospheric Scintillation above LOFAR	0	0
LC2_004	JM. Griessmeier	Measuring the energy of Saturn's lightning	24	18
LC2_005	F. Govoni	Large-scale magnetic field connecting A399-A401	10	18
LC2_006	A. Ginsburg	A search for p-H2CO, a potential EoR contaminant, toward the Galactic Center, W43, W44, W49, and M82	8	4
LC2_007	R. Lynch	Continued LOFAR Timing of Discoveries from the GBNCC Pulsar Survey	29	3
LC2_008	G. Giovannini	The mysterious giant radio source 0917+75	8	21.6
LC2_009	K. Sendlinger	Cosmic ray propagation in NGC5033	8	14
LC2_010	J. Verbiest	Pulsar Timing with LOFAR	105	30
LC2_011	M. Serylak	Studying Pulsars and the Interstellar Medium using International LOFAR Stations	0	0
LC2_012	R. Osten	Probing the stellar flare-CME relationship	12	18
LC2_013	A. Miskolczi	Extended radio continuum halo in the edge-on galaxy NGC5907	12	17
LC2_014	M. Brienza	Exploring radio-loud AGB recurrent activity with LOFAR	64	112
LC2_015	R. Fender	Wide-field searches for image-plane radio transients	82	132.3
LC2_016	G. Ramsey	The first MHz observations of an ultra cool dwarf star	3.5	10
LC2_017	D. Mulcahy	LBA observations of M51 and NGC891	18	25
LC2_018	P. Zarka	Search of radio emission from the 55 Cnc exoplanetary system	32	0
LC2_019	A. G. de Bruyn	The LOFAR EoR project	204	0
LC2_020	J. E. Enriquez	First detection of brown dwarfs with LOFAR	12	16.5
LC2_021	S. ter Veen	FRATs:Commencal Real-Time Searches and localization of Fast Radio Bursts	0	37
LC2_022	A. Karastergiou	ARTEMIS on LOFAR: real-time searches for Fast Radio Bursts with international LOFAR stations	0	0
LC2_023	S. Buitink	Radio detection of cosmic ray air showers	0	0
LC2_024	P. Best	A joint LOFAR deep field: Elais-N1	100	0
LC2_025	A. Bilious	A Full Census of the Known Pulsar Population: Extension to the Lowest Radio Frequencies	38	10
LC2_026	D. Stinebring	Millisecond Pulsar Scintillation: a Pilot Study	37.5	9.2
LC2_027	G. Mann	Energetic electron propagation in solar flares	24.2	75.6
LC2_028	G. Mann	Solar coronal mass ejections	35	36.5
LC2_029	G. Miley	Long Baseline Studies of High-Redshift Radio Sources: Constraining particle acceleration and cold gas	17	50
LC2_030	I. Mitsuishi	Exploring Merger-Induced Diffuse Radio Emissions in Groups of Galaxies	10	14.1
LC2_031	C. Marque	Solar noise storms in the decametric and metric range: a study with LOFAR and the Nancay Radioheliograph	22	22.9
LC2_032	S. Turriziani	Blazar monitoring with LOFAR	5	9.2
LC2_033	J. Magdalenic	Observations of solar type II radio bursts by LOFAR	16	48.7
LC2_034	J. Miller-Jones	Low-frequency radio emission from x-ray binaries	14	56.7
LC2_035	H. Reid	The LOFAR quiescent sun	12	15
LC2_036	R. Oonk	Probing the Galactic Interstellar Medium on Unprecedented Scales	70	110
LC2_037	B. Burningham	A low-frequeny survey for extrasolar auroral emission	25.5	76.7
LC2_038	H. Rottgering	LOFAR surveys: Opening up a new window on the Universe	275	468
LC2_039	R. Breton	LOFAR Observation of Eclipsing Binary Pulsars	50.6	102
LC2_040	J. E. Enriquez	A panchromatic search for advanced intelligence around nearby stars	15	5
LC2_041	I. Hoffman	Search for OH Maser Emission at 54 MHz in Galactic Star-forming Regions and Supernova	8	10
LC2_042	E. Varenius	Spectral turnovers in Arp220	7	10
LT2_001	L. Gurvits	Study of atomic hydrogen at z>5	12	6
LT2_002	R. Oonk	Extragalactic Radio Recombination Lines: An LTA resource project	0	0
LT2_003	J. Hessels	LOTAAS: The Lofar Tied-Array All-Sky Survey for Pulsars and Fast Transients	170	90.4

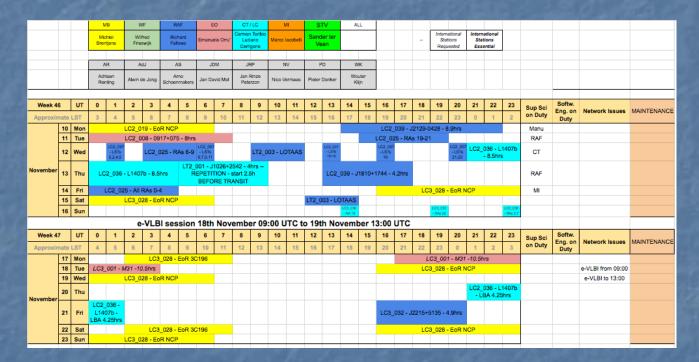
FIRST CONTACT WITH PI's



AST(RON

Science Support works out the observing schedule for the upcoming Cycle. This is advertised on ASTRON website:

http://www.astron.nl/radio-observatory/cycles/cycle-3-schedule/cycle-3-schedule



Contact e-mail to PI's -> preparation of observing templates in MoM

MoM: MANAGEMENT OF MEASURAMENTS AST(RON

https://lofar.astron.nl/mom3/

LOFAR

alle alle

> Description available at

https://lofar.astron.nl/mom3/he lp/mom2.jsp

- Reference tool for preparation and inspection of the observing/processing templates and status of observations and pipelines
- To have access, register as a new user
- After login, you will be able to see only the projects you are involved in



MoM PROJECTS

LOFAR

AST(RON

			100	and the second	والمستخدم المهيد ال		1	
	My Accou	Int					2 Help Inde	ex 😒 Logout
Pro	ject List	Query List Proje	ect Exploi	er Preferences Tools Admin				
ľг								
	ame :		ription :					
		opened 🗹 active 🗌) suspende	d _ finished ₩				
	Filter E	Explore selected						
Vie	ving Projec	ects (1 - 50 / 63)					First Prev	1 2 Next Last
	Name	e 🗸	Status	Description	PI	Friend	R	ole
E			active	2014L0FAR0BS	Pizzo, Dr. Roberto Francesco	Orru, Dr Emanuela		, Contact author
E			active	Calibration and Imaging Tiger Team	Heald, Dr. George	Toribio, Dr Carmen		extern)
E	СОВА	ALT	active	COBALT	Brentjens, Dr. Michiel	Pizzo, Dr. Roberto Francesco	Fi	riend
C	Comn	missioning2014	active	Commissioning2014	Pizzo, Dr. Roberto Francesco	Toribio, Dr Carmen	P	i, Contact author
E	DDTO	002	active	Directors Discretionary time - Radio Recombination Lines Cas A	Oonk, Dr Raymond	van der Horst, Dr. Alexander Jo	nathan (e	extern)
E	DDT2	2_001	active	Search for possible pulsar located at SNR CTA-1	Mulcahy, David	Fallows, Dr Richard	((extern)
E	DDT2	2_003	active	PS86X1-Interplanetary CubeSat and Thin-Film Spacecraft/Lander/Rover Communications and Navigation Pathfinder Experiment with LOFAR and the LuxSpace 4M Lunar Flyby Mission	Johnson, Michael	Iacobelli, Dr Marco	(4	extern)
E	IPS		active	Interplanetary Scintillation	Fallows, Dr Richard	Frieswijk, Dr Wilfred	(6	extern)
E	LC0_0	035	active	Targeted searches for pulsars and fast transients	van Leeuwen, Dr Joeri	Fallows, Dr Richard	(0	extern)
E	LC1_0	008	active	LOFAR blank-field surveys: AGN, star-formation and cosmology	Best, Professor Philip	Frieswijk, Dr Wilfred	(6	extern)
C			active	The flux density scale between 30 and 500 MHz	Scaife, Dr Anna	Fallows, Dr Richard	((extern)
E			active	Monitoring of the Crab pulsar	Wucknitz, Olaf	Frieswijk, Dr Wilfred		extern)
C			active	Testing the IC/CMB Model for X-ray Emission from Quasar Jets with LOFAR	Harris, Daniel	Toribio, Dr Carmen		extern)
E			active	LOTAAS: The LOFAR Tied-Array All-Sky Survey for Pulsars and Fast Transients	Hessels, Dr. Jason	Fallows, Dr Richard		extern)
0			active	Observing the Interplanetary Magnetic Field with LOFAR	Fallows, Dr Richard	Fallows, Dr Richard		extern)
0			active	Probing a Coronal Mass Ejection with Scintillation Arcs	Fallows, Dr Richard	Fallows, Dr Richard		extern)
6			active	Monitoring Ionospheric Scintillation above LOFAR Measuring the energy of Saturn's lightning	Fallows, Dr Richard	Fallows, Dr Richard		extern)
			active active	Large-scale magnetic field connecting A399-A401	Griessmeier, Dr Jean-Mathias Govoni, Dr. Federica	Fallows, Dr Richard Iacobelli, Dr Marco		extern) o-I
E			active	A search for p-H2CO, a potential EoR contaminant, toward the Galactic Center, W43, W44, W49, and M82	Ginsburg, Dr Adam	Toribio, Dr Carmen		extern)
6			active	Continued LOFAR Timing of Discoveries from the GBNCC Pulsar Survey	Lynch, Dr. Ryan	Fallows, Dr Richard		extern)
6			active	The mysterious giant radio source 0917+75	Giovannini, Prof. Gabriele	Iacobelli, Dr Marco		0-I
E			active	Cosmic ray propagation in NGC 5033	Sendlinger, Katharina	Frieswijk, Dr Wilfred		extern)
			active	Pulsar Timing with LOFAR	Verbiest, Dr. Joris	Fallows, Dr Richard		extern)
E			active	Probing the Stellar Flare-Coronal Mass Ejection Relationship	Osten, Dr. Rachel	Frieswijk, Dr Wilfred		extern)
E			active	Extended radio continuum halo in the edge-on galaxy NGC5907	Miskolczi, Arpad	Toribio, Dr Carmen		0-I
			active	Exploring radio-loud AGN recurrent activity with LOFAR	Brienza, Marisa	Iacobelli, Dr Marco		extern)
C	LC2_0	015	active	Wide-field searches for image-plane radio transients	Fender, Professor Rob	Toribio, Dr Carmen	(6	extern)
C	LC2_0	016	active	The first MHz observations of an ultra cool dwarf star	Ramsay, Dr Gavin	Iacobelli, Dr Marco	((extern)
E	LC2_0	017	active	LBA observations of M51 and NGC891	Mulcahy, David	Iacobelli, Dr Marco	(0	extern)

> Organized in folders

> Full inspection of observing observing setups might require some clicking – things will improve in the future

MoM: OBSERVATION FOLDERS

AST(RON



> Statuses:

- > Project: open, active, finished, suspended
- > Observations / pipelines: open, approved, scheduled, running, finished, aborted
- Ingests: approved, scheduled, running, finished, aborted

<u> My Account</u>		
Project List Query List Project Explorer Prefere	ences Tools Admin	
E Copy selected T Move selected Delete se	elected 🖸 Change status	port XML
Project Explorer	OK Status	
□ □ () LC2_014	Add Details 🥥 active	Exploring radio-loud AGN recurrent activity with LOFAR
	Add Details	3C338 HBA 16:28:38.50 +39:33:06.0
⊞ □ □ 3C338-20140805 ☐	Add Details	3C338 LBA 16:28:38.50 +39:33:06.0
	Add Details	4C12.50 HBA 13:47:33.30 +12:17:23.9
⊕ □ 4C12.50-20140808 ■	Add Details	4C12.50 LBA 13:47:33.30 +12:17:23.9
	Add Details	4C12.50 HBA 13:47:33.30 +12:17:23.9
⊞ □ □ 3C317-20140814 ☐	Add Details	3C317 HBA 15:16:44.50 +07:01:18.0
⊞	Add Details	3C317 LBA 15:16:44.50 +07:01:18.0
⊞ □ □ 3C338-20140816 REP	Add Details	3C338 HBA 16:28:38.50 +39:33:06.0
⊞ □ □ 3C317-20140821 REPET ☐	Add Details	3C317 LBA 15:16:44.50 +07:01:18.0
⊞ B20258+35-20140913 B20258+35-2014091 B20258+35-2014091 B20258 B20258 B20258 B20258 B2025 B2025 B2025 B2025 B2025 B2025 B2025 B20 B2025 B20 B2025 B20 B20	Add Details	B20258+35 HBA 03:01:42.40 +35:12:21.0
⊞ □ □ B20258+35-20140916	Add Details	B20258+35 LBA 03:01:42.40 +35:12:21.0

MoM: MULTI BEAM OBSERVING SETUPS & DETAILS LOFAR

BANDWIDTH

TIME

CALIBRATOR

TARGET

AST(RON

Details

<u>My Account</u>				LC2_014 > 3C338-20140805 > 3C338 20140805 > 3C338/1/TO	> 3C338 ? <u>Help</u> Sciose Window
				General Info Dataproducts Reports and Remarks St	atus History
Project List Query List Project Explorer Preferences	s Tools Admin			Name:	3C338
				Description:	3C338
🖲 Copy selected 📑 Move selected 💕 Delete selected	ed 🗗 Change status 📑 E	xport XML		Current status:	finished(2014/08/05 23:01 UTC)
		APOIL MILE		Туре:	BF Measurement
Project Explorer	OK S	tatus		Project name:	LC2_014
	Add Details 🥥 a		Exploring radio-loud AGN recurrent activity with LOFAR	Child of:	3C338/1/TO
□ □ () LC2_014				MoMID Measurement Type	418133 BF Measurement
Image:	Add Details		3C338 HBA 16:28:38.50 +39:33:06.0	Туре	Target
🗆 🖂 3C338-20140805	Add Details		3C338 LBA 16:28:38.50 +39:33:06.0	(System) Ra	16:28:38.50
	Add Details			(System) Dec	+39:33:06.0
🗉 📄 🔂 3C338 20140805	Add Details		LBA Outer, 10-90MHz, 8bits, 48MHz@46MHz, 1s, 64ch/sb(Imaging):	(System) Equinox	32000
⊞ ☐ 3C338/1/TO ☐	Add Details 🕢 fi	nished	[239990] 3C338/1/TO (Target Observation)	(System) Start time	2014/08/05 15:00:13
□ ∰ 2C205/1/CPT	Restart Details 🛱 🦉 🕢 fi	nished	[240808] 3C295/1/CPT (Cal Pipe Target)	(System) End time	2014/08/05 23:00:57
			· · · · · ·	(System) Duration (System) Central Frequency	46.09375 MHz
🗆 🔂 3C338/1.0/TP	Restart Details 📷 🕢 fi	nished	[240054] 3C338/1.0/TP (Target Pipeline)	(System) Bandwidth	47.65625 MHz
🗌 📩 3C338 20140805	Details 🥳 ⊘ fi	nished	Data archived in Long Time Archive (Download)	(System) Subbands	114357
		monou		(System) Online Coherent De-Dispersion (OCD)	false
	15 A A			(System) Tied Array Beam Flyseye	false
My Account				(System) Number of Tied Array Rings	0
				(System) Tied Array Ring Size	0.0
				(System) Coherent Array Beams (System) Incoherent Array Beams	
Project List Query List Project Explorer Preferences	Tools Admin			(Specification) Target name	3C338
🗈 Conversional 🗟 Mana selected 🍊 Delete selected	Change status	A VIII		(Specification) Ra	16:28:38.50
Copy selected 📲 Move selected 🛃 Delete selected	Change status Expo			(Specification) Dec	+39:33:06.0
Project Explorer	ŎK	Status		(Specification) Equinox	32000
□ □ (j) LC2_014	Add Details	active	Exploring radio-loud AGN recurrent activity with LOFAR	(Specification) Start time	N/A
	Add Details			(Specification) End time	N/A
			3C338 HBA 16:28:38.50 +39:33:06.0	(Specification) Duration (Specification) Duration Equals Observation	false
🗆 🖂 3C338-20140805	Add Details		3C338 LBA 16:28:38.50 +39:33:06.0	(Specification) Central Frequency	N/A
🗉 🔲 🖾 3C338 20140805	Add Details		LBA Outer, 10-90MHz, 8bits, 48MHz@46MHz, 1s, 64ch/sb(Imaging):	(Specification) Bandwidth	N/A
🗆 🖂 3C338/1/TO	Add Details			(Specification) Contiguous	false
		finished	20220	(Specification) Subbands	114357
🗆 📑 3C338	Details 📴 🥥	finished	3C338	(Specification) Online Coherent De-Dispersion	false
	Detaile 28			(Specification) Tied Array Beam Flyseye	false
□ 1 3C295	Details 📬 🔮	finished	3C295	(Specification) Number of Tied Array Rings (Specification) Tied Array Ring Size	N/A
				(Specification) Coherent Array Beams	
🗆 🥵 3C295/1/CPT	Restart Details 🛱 🎬 🚫	finished	[240808] 3C295/1/CPT (Cal Pipe Target)	(Specification) Incoherent Array Beams	
G 3C338/1.0/TP	Restart Details 🗃 🥥	finished	[240054] 3C338/1.0/TP (Target Pipeline)	Topology	mom_msss_418131.80.1.T.SAP000

4 > 3C338-20140805 > 3C338 20140805 > 3C338/1/TO	> 30338	? <u>Help</u>	Close Window
al Info Dataproducts Reports and Remarks Sta	atus Histor	У	
Name:	3C338		
Description:	3C338		
Current status:	finished	1(2014/08	/05 23:01 UTC)
Туре:	BF Meas	urement	
Project name:	LC2_014	ţ.	
Child of:	3C338/1	/то	
MoMID	418133		
Measurement Type		urement	
Туре	Target		
(System) Ra	16:28:3		
(System) Dec	+39:33:	06.0	
(System) Equinox	32000		
(System) Start time		/05 15:00:	
(System) End time	2014/08	/05 23:00:	57
(System) Duration			
(System) Central Frequency	46.0937		
(System) Bandwidth	47.6562		
(System) Subbands	11435	7	
(System) Online Coherent De-Dispersion (OCD)	false		
(System) Tied Array Beam Flyseye	false		
(System) Number of Tied Array Rings	0		
(System) Tied Array Ring Size	0.0		
(System) Coherent Array Beams			
(System) Incoherent Array Beams (Specification) Target name	3C338		
(Specification) Target name	16:28:3		
(Specification) Ra	+39:33:		
(Specification) Dec	12000	06.0	
(Specification) Start time	N/A		
(Specification) End time	N/A		
(Specification) Duration	1975		
(Specification) Duration Equals Observation	false		
(Specification) Central Frequency	N/A		
(Specification) Bandwidth	N/A		
(Specification) Contiguous	false		
(Specification) Subbands	11435	7	
(Specification) Online Coherent De-Dispersion	false		
(Specification) Tied Array Beam Flyseye	false		
(Specification) Number of Tied Array Rings	0		
(Specification) Tied Array Ring Size	N/A		
(Specification) Coherent Array Beams			
(Specification) Incoherent Array Beams			
Topology	mom, m	sss_418131	.B0.1.T.SAP000

MoM: MULTI BEAM OBSERVING SETUPS & DETAILS

BANDWIDTH

alle .

LOFAR

3C295/1/CPT

🔲 🚯 3C338/1.0/TP

A 3C338 20140805

TARGET

TIME

CALIBRATOR

AST(RON

Details

My Account		
Project List Query List Project Explorer Prefer	rences Tools Admin	
Copy selected	selected 🗗 Change status	Export XML
Project Explorer	ОК	Status
⊟ __ LC2_014	Add Details	active Exploring radio-loud AGN recurrent activity with LOFAR
🗉 📄 3C338-20140804	Add Details	3C338 HBA 16:28:38.50 +39:33:06.0
🗆 🗖 🔂 3C338-20140805	Add Details	3C338 LBA 16:28:38.50 +39:33:06.0
🗉 📋 🔁 3C338 20140805	Add Details	LBA Outer, 10-90MHz, 8bits, 48MHz@46MHz, 1s, 64ch/sb(Imaging
⊞ □ 3C338/1/TO ■	Add Details	finished [239990] 3C338/1/TO (Target Observation)
🗆 🙀 3C295/1/CPT	Restart Details 6	
□ 🚯 3C338/1.0/TP	Restart Details 📑 🕢	finished [240054] 3C338/1.0/TP (Target Pipeline)
3C338 20140805	Details 🙀 🥥	finished Data archived in Long Time Archive (Download)
And the second se		
<u>My Account</u> Project List Query List Project Explorer Preferen Copy selected Copy selected Copy selected		port XML
Project Explorer	ОК	< Status
□ □ () LC2_014	Add Details	active Exploring radio-loud AGN recurrent activity with LOFAR
	Add Details	3C338 HBA 16:28:38.50 +39:33:06.0
🗆 📄 🖼 3C338-20140805	Add Details	3C338 LBA 16:28:38.50 +39:33:06.0
🖻 🔲 🔂 3C338 20140805	Add Details	
🗆 📄 😋 3C338/1/TO	Add Details	
😑 📄 3C338	Details 籠 🥥	finished 3C338
3C295	Details 寶 📀	finished 3C295

Restart

Restart

Details 6h **H** 📿

Details

Details

6

finished

finished	[240808] 3C295/1/CPT (Cal Pipe Target)
finished	[240054] 3C338/1.0/TP (Target Pipeline)

[240004] 00000/10/11 (Talger 1 penne)	
Data archived in Long Time Archive (Download)	

LC2_014 >	3C338-20140	1805 > 3C338 2014	40805 > 3	3C295/1/CPT	? <u>Help</u>	🔞 <u>Ck</u>	ose Window
General I	nfo Parset	Dataproducts	Report	s and Remark	s Status I	History	
	Name:			3C295/1/CP1	Г		
	Description	ii ii		3C295/1/CP1	r (Cal Pipe T	arget)	
	Current sta	tus:		finished(20	14/08/08	01:51 l	ITC)
	Type:			Calibration P	ipeline		
	Project nar	ne:		LC2_014			
	Child of:			3C338 20140	0805		
	mom2Id			418135			
	SAS_ID			240808			
	Start time			2014/08/07	11:48:49		
	End time			2014/08/08	01:51:15		
	Duration			50546.0			
	SAS Defaul	t Template		Calibrator Pi	peline (no e	kport)	
	(Frequency	Integration Ste	ep)	N/A			
	(Time Inte	gration Step)		N/A			
	Calibration	Skymodel		3C295			
	Flagging St	rategy		LBAdefault			
	ZeroPhase			true			
	Demixing F	req Step (demix	(ing)	64			
	Demixing T	ime Step (demb	king)	10			
	Averaging	Freq Step (demb	xing)	16			
	Averaging	Time Step (demi	ixing)	5			
	Ignore Tar	get (demixing)		false			
	Demix Alwa	ays (demixing)		[CasA,CygA]			
	Demix If N	eeded (demixing))	0			
	Baselines (BBS)		*8.			
	Correlation	s (BBS)		0			
	Beam Mode	el enabled (BBS)		true			
	Solve Parm	s (BBS)		["Gain:0:0:*	", "Gain:1:1	:*"]	
	Solve UV R	ange (BBS)		0			
	Strategy Ba	aselines (BBS)		*8.			
	Strategy Ti	merange (BBS)		0			
	Topology			mom_msss_	418131.BO.	1.CPT	
	Predecesso	r		M418132			

MoM: INTERLEAVED OBSERVING SETUPS AST(RON

CAL TAR CAL TAR CAL TAR CAL

LOFAR

			Tan bir	t a				671		10.00	
🌲 <u>My Acc</u>	count										
Project Lis	at Query	List	Project Explo	orer	Preference	s Tool	s Adn	nin			
🖲 Сору	selected	Mo	ve selected	ı 🎽	Delete select	ed 🗇	Change	status		Export XML	
Project Ex	kplorer								ок	Status	
()	LC2_014					Add	Details		\bigcirc	active	Exploring radio-loud AGN recurrent activity with LOFAR
± 📃 (3C338-	201408	104			Add	Details				3C338 HBA 16:28:38.50 +39:33:06.0
± 📃 (🗋 3C338-	201408	105			Add	Details		0		3C338 LBA 16:28:38.50 +39:33:06.0
± 📃	4C12.5	0-2014	0807			Add	Details		\wedge		4C12.50 HBA 13:47:33.30 +12:17:23.9
± 🖂 (🗎 4C12.5	0-2014	8080			Add	Details		0		4C12.50 LBA 13:47:33.30 +12:17:23.9
± 🖂 (🗎 4C12.5	0-2014	0809-2.5			Add	Details		0		4C12.50 HBA 13:47:33.30 +12:17:23.9
± 🖂	🗋 3C317-	-201408	14			Add	Details		0		3C317 HBA 15:16:44.50 +07:01:18.0
± 🖂	💼 3C317-	201408	15			Add	Details		\wedge		3C317 LBA 15:16:44.50 +07:01:18.0
± 📃 (🛅 3C338-	201408	B16 REP			Add	Details		0		3C338 HBA 16:28:38.50 +39:33:06.0
± 📃 (🗋 3C317-	201408	321 REPET			Add	Details		0		3C317 LBA 15:16:44.50 +07:01:18.0
	B20258	3+35-20	140913			Add	Details		0		B20258+35 HBA 03:01:42.40 +35:12:21.0
	🗆 🔂 B2	0258+3	5 201 40905			Add	Details		0		HBA Dual Inner, 110-190MHz, 8bits, 96MHz@144MHz, 1s, 64ch/sb(Imagir
	± 🗆 🗋	B2025	58H/3C48/1/CC	0		Add	Details		0	finished	[243405] B20258H/3C48/1/CO (Calibration Observation)
	🗆 🙀	B2025	58H/3C48/1/CF	PC		Restart	Details	P	0	finished	[243465] B20258H/3C48/1/CPC (Cal Pipe Calibrator)
	• 🗆 🗅	B2025	58H/B20258+3	85/1/		Add	Details		0	finished	[243407] B20258H/B20258+35/1/TO (Target Observation)
	🗆 🔹	B2025	58H/B20258+3	85/1.		Restart	Details	6	0	finished	[243467] B20258H/B20258+35/1.0/TP (Target Pipeline)
	± 🗆 🗋	B2025	58H/3C48/2/CC	0		Add	Details		0	finished	[243409] B20258H/3C48/2/CO (Calibration Observation)
	D 🚯	B2025	58H/3C48/2/CF	PC		Restart	Details	94 94	0	finished	[243469] B20258H/3C48/2/CPC (Cal Pipe Calibrator)
	± 🗆 🗋	B2025	58H/B20258+3	85/2/		Add	Details		0	finished	[243411] B20258H/B20258+35/2/TO (Target Observation)
	🗆 🙀	B2025	58H/B20258+3	85/2.		Restart	Details	6	0	finished	[243471] B20258H/B20258+35/2.0/TP (Target Pipeline)
	•	B2025	58H/3C48/3/CC	0		Add	Details		0	finished	[243413] B20258H/3C48/3/CO (Calibration Observation)
	0 🗓	B2025	58H/3C48/3/CF	PC		Restart	Details	¶ ¶	0	finished	[243473] B20258H/3C48/3/CPC (Cal Pipe Calibrator)
	± 🗌 🗋	B2025	58H/B20258+3	85/3/		Add	Details		0	finished	[243415] B20258H/B20258+35/3/TO (Target Observation)
	🗆 📫	B2025	58H/B20258+3	85/3.		Restart	Details	@	0	finished	[243475] B20258H/B20258+35/3.0/TP (Target Pipeline)
	•	B2025	58H/3C48/4/CC	0		Add	Details		0	finished	[243417] B20258H/3C48/4/CO (Calibration Observation)
	🗆 📫	B2025	58H/3C48/4/CF	PC		Restart	Details	¶ ¶	0	finished	[243477] B20258H/3C48/4/CPC (Cal Pipe Calibrator)
	• 🗆 🗋	B2025	58H/B20258+3	85/4/		Add	Details		0	finished	[243419] B20258H/B20258+35/4/TO (Target Observation)
	🗆 🔹	B2025	58H/B20258+3	85/4.		Restart	Details	6	0	finished	[243479] B20258H/B20258+35/4.0/TP (Target Pipeline)

MoM: INTERLEAVED OBSERVING SETUPS AST(RON

CAL TAR CAL TAR CAL TAR CAL

LOFAR

<u> My Account</u>										
Project List Query List Project Explorer Preferences	Tools Admin									
E Copy selected Move selected	Change status	ort XML								
Project Explorer OK Status										
□ □ () LC2_014	Add Details	active Exploring radio-loud AGN recurrent activity with LOFAR								
	Add Details	3C338 HBA 16:28:38.50 +39:33:06.0								
⊞ □ □ 3C338-20140805	Add Details	3C338 LBA 16:28:38.50 +39:33:06.0								
	Add Details	4C12.50 HBA 13:47:33.30 +12:17:23.9								
⊞ □ □ 4C12.50-20140808	Add Details	4C12.50 LBA 13:47:33.30 +12:17:23.9								
⊞ □ □ 4C12.50-20140809-2.5	Add Details	4C12.50 HBA 13:47:33.30 +12:17:23.9								
⊞ □ □ 3C317-20140814	Add Details	3C317 HBA 15:16:44.50 +07:01:18.0								
🗉 📄 3C317-20140815	Add Details	3C317 LBA 15:16:44.50 +07:01:18.0								
⊞ □ □ 3C338-20140816 REP	Add Details	3C338 HBA 16:28:38.50 +39:33:06.0								
⊞ □ □ 3C317-20140821 REPET	Add Details	3C317 LBA 15:16:44.50 +07:01:18.0								
□ □ □ B20258+35-20140913	Add Details	B20258+35 HBA 03:01:42.40 +35:12:21.0								
🖃 🔲 🔂 B20258+35 20140905	Add Details	HBA Dual Inner, 110-190MHz, 8bits, 96MHz@144MHz, 1s, 64ch/sb(Imaging):								
□ □	Add Details	finished [243405] B20258H/3C48/1/CO (Calibration Observation)								
🗆 📑 3C48	Details 📬 📿	finished 3C48								
B20258H/3C48/1/CPC	Restart Details 6 6 6	finished [243465] B20258H/3C48/1/CPC (Cal Pipe Calibrator)								
B20258H/B20258+35/1/	Add Details	finished [243407] B20258H/B20258+35/1/TO (Target Observation)								
□ ■ B20258+35	Details 🛍 🥥	finished B20258+35								
□ 📆 B20258H/B20258+35/1.	Restart Details 🚌 🔇	finished [243467] B20258H/B20258+35/1.0/TP (Target Pipeline)								
□ B20258H/B20258+35/1. □ □ B20258H/3C48/2/CO	Add Details	finished [243409] B20258H/3C48/2/CO (Calibration Observation)								
	Restart Details 1 1	finished [243469] B20258H/3C48/2/CPC (Calibration Observation)								
□ 🔂 B20258H/3C48/2/CPC		Inished [243469] D202001/3046/2/0F0 (Cal Pipe Calibrator)								

OBSERVATION PERFORMED: RO REPORT TO PI

Dear Colleague,

the following message contains information regarding a LOFAR Cycle 3 project for which you are listed as the contact author. Please, forward this information to the suitable individuals

We would like to inform you that an observation related to your LOFAR Cycle 3 project has been performed. Please find detailed information below

General notes: -> any fundamental remarks Observations: -> details of performed observations Performance of the system: -> any issues to report with stations or CEP cluster? Data recording: -> any data missing? Data processing: -> status of processed data Archiving: -> started or in the queue

Remarks: please analyze the validation plots at https://proxy.lofar.eu/inspect/HTML/ within 24 hours after this notification and get in contact with sciencesupport@astron.nl in case you need to report problems about their quality. After this time window has passed, we will assume that your judgment is that the observation was successful and we will complete the actions described above to support your run. From the moment the data are made available to you at the LTA or, if requested, on CEP3, you will have two weeks available to check their quality and to report problems to the Observatory. After this time window has passed, no requests for re-observation will be considered

Actions: If you need any further clarification, please do not hesitate to contact us

RADIO OBSERVATORY OBSERVING POLICIES LOFAR

- http://www.astron.nl/radio-observatory/observing-capabilities/depth-technical-information/cycle-1observing-and-processin
- Most relevant ones are:

- I. In the case of malfunctioning stations or locus nodes, an observation will be considered failed if more than 5% of the data are missing on disk. Processing will be considered failed if more than 5% of the resulting processed data are missing with respect to the raw visibilities. In other cases, observations may be considered failed on a case-by-case basis, according to the science goals of the relevant proposal
- II. The only raw data inspection available to users prior to data reduction is via the <u>inspection plots</u> which are created automatically immediately after the associated observation has finished
- III. From the moment the data are made available to the users at the LTA or, if requested in the original proposal, on CEP1/CEP3, they will have two weeks available to check the quality of their data and report problems to the Observatory. After this time window has passed, no requests for re-observation will be considered
- I. In the case that an observation is considered failed, it may be repeated only once if the observing schedule allows it.
- II. All Cycle projects that cannot be completed by the end of the Cycle they refer to will remain active only during the following semester and they will be observed then with second priority with respect to the new Cycle projects.

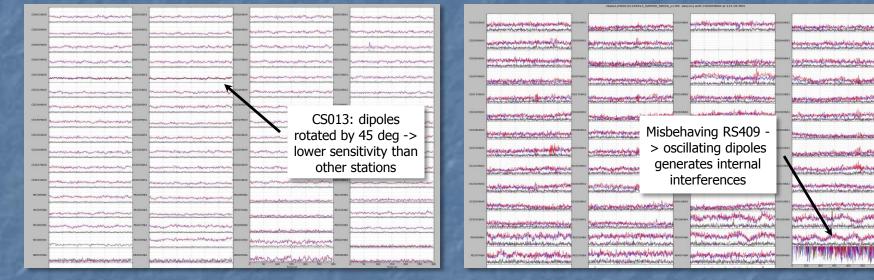
INSPECTION PLOTS: TIME SERIES



AST(RON

AS-WO MARCHARE FULL

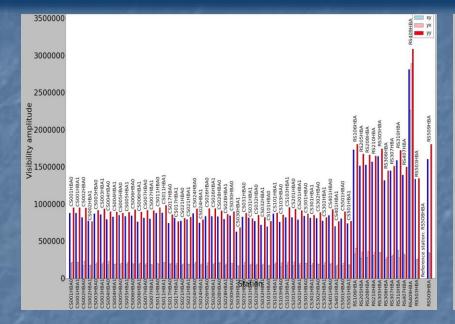
See tutorial at http://www.astron.nl/radio-observatory/observing-capabilities/depth-technical-information/data-quality- \triangleright inspection/data-gu



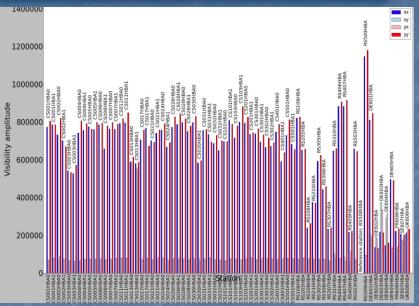
СБОЗНВАС	pathotomorphisment and the pathotom	Manager March March	C5006H8A0		CSODEHBAL	
CS007H8A0	Many Manager Manager Manager	Lancon and and and	CSOLIHBAO	printing and a second procession	CSULLHBAL	Lan parameter
C5013HB40	Manual Antonia and Antonia and Antonia and Antonia and Antonia	Annone Manager State Angel De Comp	CSOL7HBAD	possil a company and the sources	C5017HBA1	La manana
C5023HB40	Martin and a start of the start	Contranscention and	COORHBAD	ponthonograceAcordinary	CSOD4HBA1	Lampenan and the service
(5024H840	parature and a second and and	puttosatos	CSOOBHBAD	parameter and	CS028HBA3	here and the second second
(5030HBA0	providessancementariana costan	Variationality	(3031+840	Kommen and a service and a	CONTHRAT	1 marcanan
CS032HBAD	portyration concord and and assesses	La participation and the second	C5101H840	proversions	C1101HBA1	have been and the second
CS103HBA0	PERSONAL PROPERTY AND	La pooten materia	C\$201HBA0	al Marganathan	CS201HBA1	1 porter man
C5301HB40	portade approximation and and associate	La parametrica	C5302H840	protection and and the contract	C5302HBA1	porchanceron
C5401HB40	portedan and the ported to a second	L parsanananana	C5303HB40	portingenting	CISOIHBA1	providence
#510648A	para de concepción de la conse	participation	P5208HBA	propertaneous and provide	15210484	partitionencontraction
вэконва	Anerowskie and a second and a s	province province and	PESOTHEA		15510HBA	motorionistanten
IS406HBA	And the second second second second	mannentyrau	READSHEA	ponto ano antico ano	R5503HBA	Produce mark harding
RS108HBA	Martin and Soomer	providence and an an	DESOLHER	Activityhan an and	CERC2HBA	
DEBOSHBA	Process Contraction Contraction	Martin Martin	DEBOSHEA	how and have been and the series	тасонал	pontren to the stand
18.007HBA	port Republic Book Manager and	Kochalessian advantage		0 90 100 150 200 290 1 Term (s)	00	0 50 200 350 200 250 Trrve (a)

Connection problems at the beginning of the observation for all stations

INSPECTION PLOTS: VISIBILITY AMPLITUDE OFAR



- Stations with the same characteristics, e.g. all CS should have more or less the same amplitudes; when their values differ too much the sensitivity of the station is not good (in this case RS409)
- It is good to check on a long baseline a frequency with high S/N which is relatively clean of interferences (e.g. correlator SB 77 in HBA and 301-302 in LBA)
- A way to identify the presence of Solar bursts is to check if the amplitude visibilities scales of CS have much higher values than the remote station or CS in quiet conditions.



- Visibility amplitude 3C196 (resolved at long baselines)
- Different amplitudes values among RS and IS are due to the fact that some baselines detect and resolve source structure and some other do not.
- Knowing the layout of the telescope and the characteristics of the source are the key to interpret these plots.

See tutorial at http://www.astron.nl/radioobservatory/observing-capabilities/depth-technicalinformation/data-quality-inspection/data-qu

LTA: LONG-TERM ARCHIVE



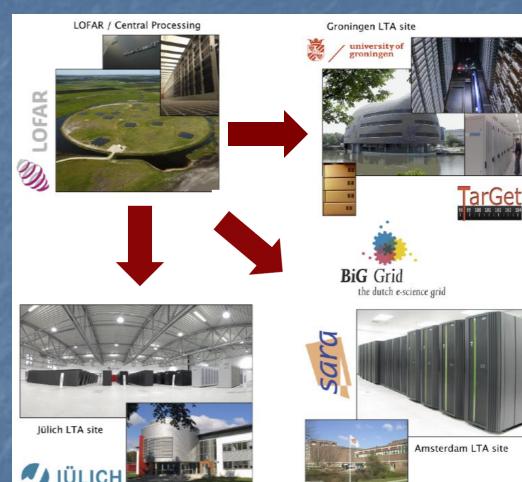
AST(RON

- Ingests are initiated by Science Support / operators in MoM. Currently, the PI should actively check the status of the ingest in MoM
- LOFAR Tools: http://www.astron.nl/radioobservatory/lofar/lofar-tools/lofar-tools

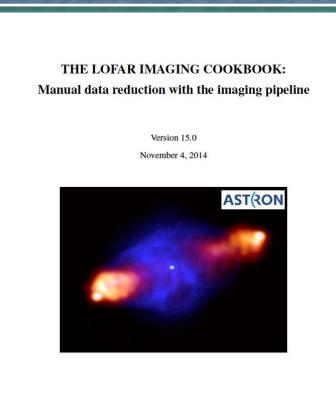
ASTROWISE -> http://lofar.target.rug.nl/

HowTo -> http://www.lofar.org/wiki/doku.php?id=p ublic:lta_howto

See H. Holties' tutorial

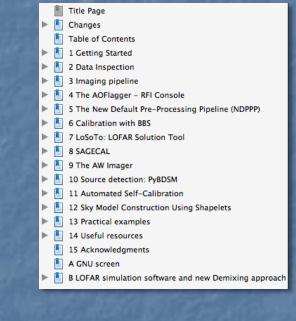


INSPECT PROCESSED DATA: LOFAR IMAGING COOKBOOK



Edited by Roberto F. Pizzo

- http://www.astron.nl/radio-observatory/lofar/lofarimaging-cookbook
- Important overview and description of tools to inspect, reduce, and analyze imaging data



- Editor R. F. Pizzo
- Authors: experienced LOFAR commissioners

CEP3: TIMELINE & POLICIES



AST(RON

- CEP3 will be used to run the commissioning processing routines, testing production software and, in selected cases, to perform advanced Cycle processing by the Cycle users
- Observing, CEP2 processing time and the use of CEP3 are allocated by the LOFAR Programme Committee and the ILT director during the regular proposal evaluation stages, or under Director's Discretionary Time
- Access privileges limited in time (4 weeks by default). Automatic notification will be sent to users one week before the expiration of access privileges. Users can request extension of their access, in case this is justified. The user's data products generated on the CEP3 nodes will be removed regularly after the expiration of the access privileges
- SLURM (cluster management and job scheduling system) will be used in 2015. Till then, things will have to be managed in a semi-manual fashion
- Beta testers are currently commissioning the new cluster
- > You will be using CEP3 for the School tutorials

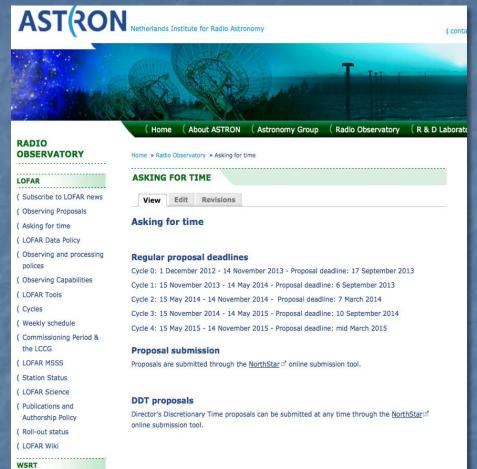
APPLYING FOR COMMISSIONING TIME



AST(RON

- LOFAR users who want to suggest observing experiments aimed at commissioning specific aspects of the instrument can apply for 'commissioning time' at any moment
- Requests should be sent to R. Pizzo (pizzo@astron.nl) and M. Brentjens (brentjens@astron.nl), who jointly will decide whether there is room in the schedule for such experiment and it is useful enough to take some specified amount of Science Support and Software Support
- \triangleright In case of rejection, the proposers can appeal to the Director of the Radio Observatory
- People who achieve scientific results from commissioning time obviously have to go through the Builders List
- For more details see

http://www.astron.nl/radio-observatory/askingtime/asking-time



Commissioning proposals

LOFAR users who want to suggest observing experiments aimed at commissioning a specific aspect of the instrument can apply for 'commissioning time'.

Astronomers (Weekly schedule

(Apertif (Apertif - EOIs

GENERAL

(PC pages

(Observation status

The requests should be sent in pdf form to R. Pizzo (pizzo@astron.nl 2) and M. Brentjens (brentjens@astron.nl), who jointly will decide whether there is room in the schedule for such experiment and it is useful enough to take some specified amount of Science Support and Software Support

