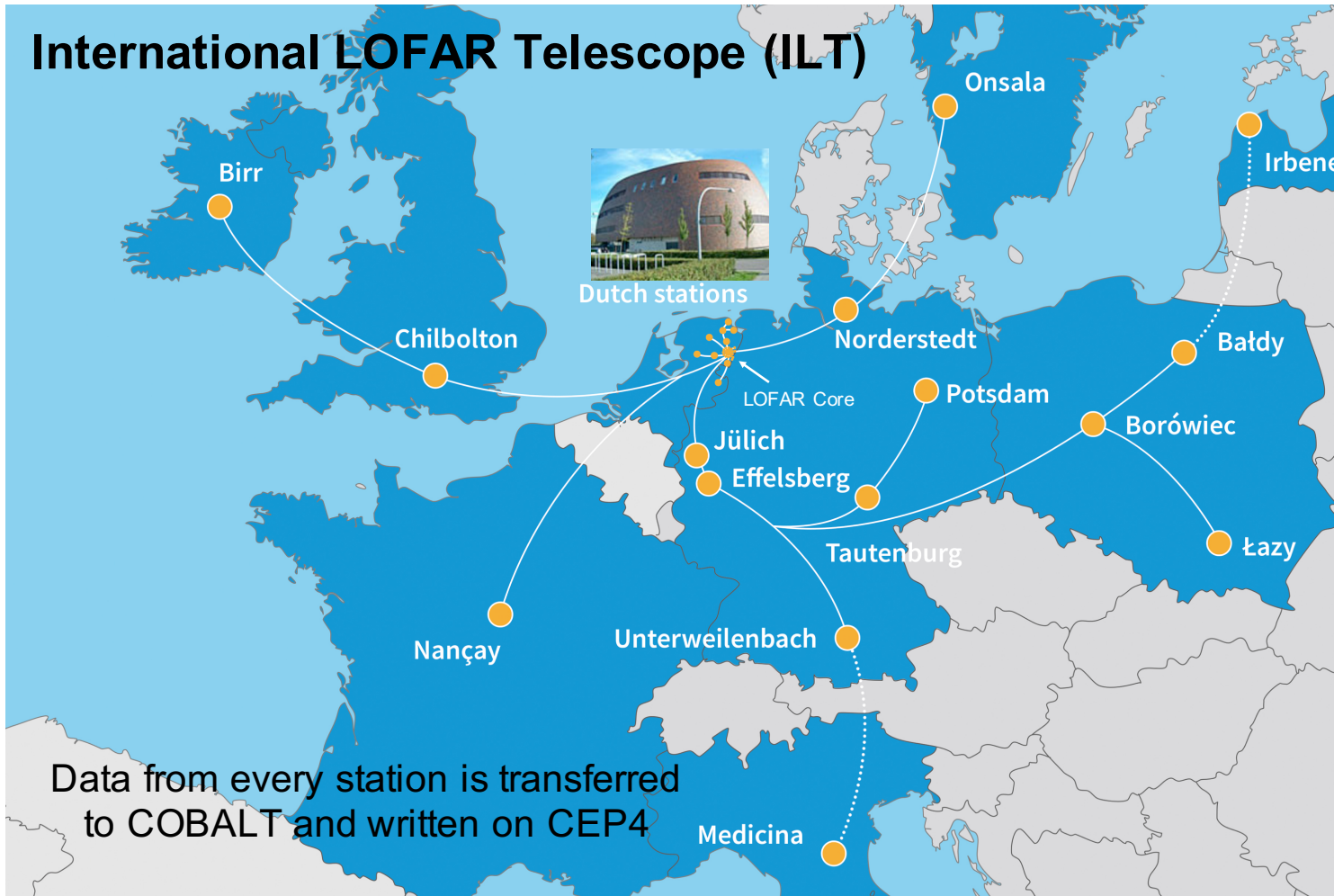


Data retrieval from the Long Term Archive

Tom Franzen | LOFAR Telescope Scientist
LOFAR Data School 2018

LOFAR Data Flow



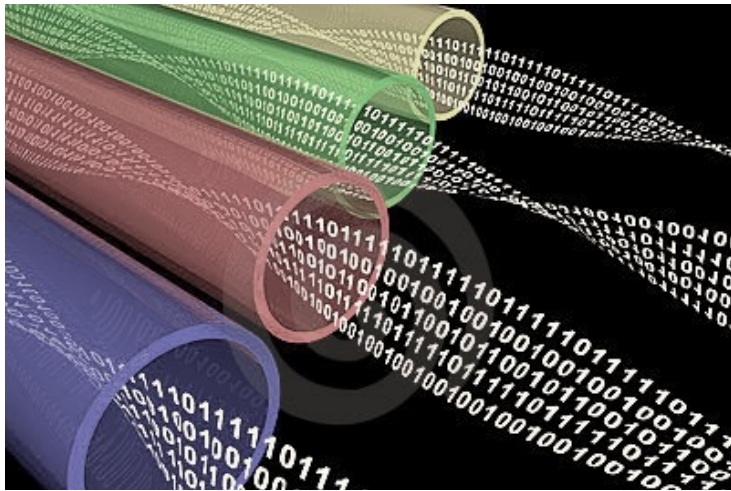
The LOFAR Long Term Archive

What is the LTA?

A collection of data centres offering computing and storage facilities to many big scientific projects, among which is LOFAR



The LOFAR Long Term Archive



INGEST

Data and metadata flow from the LOFAR cluster to the LTA sites at ~ 1.5 GB/s

Size of stored data growing at ~ 7 PB/yr

Whenever a data set needs to be archived, a series of checks is performed, e.g.

- Has the same data file already been archived?
- Does the checksum of the file in the archive match that of the file in the LOFAR cluster?

Data files missing metadata are archived as *Unspecified products*. These cannot be searched for unless the proper ID is known.

The LOFAR Long Term Archive

The data reaching the LTA is written on disks, but the final storage is on tapes. Tapes are cheap and reliable devices for data storage.

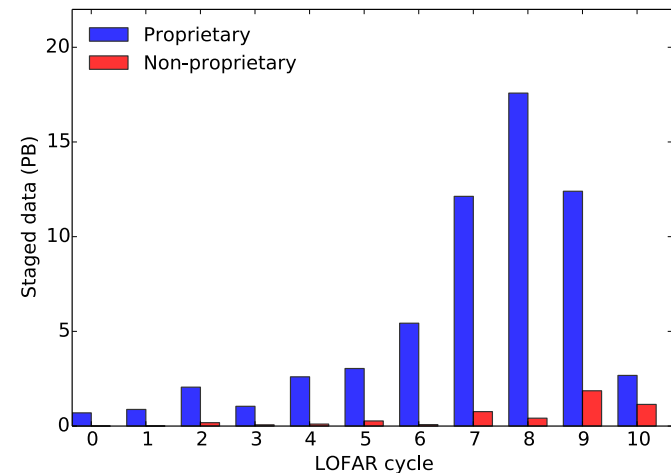
LTA tapes are not reachable through the internet.



Whenever the data are needed by a user, the files on tape must first be copied to disks reachable through the net.

Staging and its limitations

- The tape containing the data is reached by a robotic arm, then its content is read and copied to disk
- A staging request cannot contain more than a few thousand files and it cannot exceed 5 TB. *What if I need to stage 20k files? Split them into 10 consecutive requests for 2k files each.*
- Consecutive: a new request is issued after the previous one has completed (i.e. all files staged)



~65 PB of data stage since 2012

Accessing the archive

- The necessary information can be found in the *LTA How To* at https://www.astron.nl/lofarwiki/doku.php?id=public:lta_howto
- The web interface to the archive is located at <https://lta.lofar.eu/>
- The data in the archive have a *proprietary* status for 1 year: only members of the project are allowed to download them
- All the metadata are public as soon as the data are archived
- Staging is possible only if you are a registered user: you need a MoM account with *LTA user* privileges.
- You can create an account within the web interface. After creating the account, send Science Operations & Support a request for *LTA user* privileges (use JIRA ticketing system at <https://support.astron.nl/rohhelpdesk>)

The web interface

The web interface is the main location for data browsing

If you have successfully logged in, your user name will appear at the top right of the page

LOFAR Long Term Archive

FRANZEN SIGN OUT

HOME SEARCH DATA BROWSE PROJECTS HELP

Lofar Long Term Archive

11 July 2018: A new version of this web service has been released. For the list of changes please have a look at the [release notes](#). The same page also contains up to date documentation about the service. The description below is work in progress and will be changed soon.

Welcome to the Lofar Long Term Archive (LTA) web service

This service is the main access point for searching and downloading data from the LOFAR LTA. Please visit the [documentation](#) for a description on how to use this service.

From March 1 2015 onwards, cycle data which have passed the proprietary period will be publicly available. All metadata in the Archive can be queried anonymously at anytime, but downloading public data can only be done by registered users (follow the "Create account" link). Non-public data can only be downloaded by project members.

Note: for the first cycles of LOFAR operations, part of the data were ingested in the archive without metadata. These data cannot be found using the standard search parameters, except for the appropriate Observation ID. When unspecified data are present in a project, this is listed in the "Unspecified" column on the Projects page. Data can still be requested using the "Project" pulldown in the various Search options.

A list of all LOFAR observing cycles and approved projects can be found [here](#).

For more information on this web service see the [Lofar wiki](#).

This system was developed as part of the Target project. Target was [supported](#) by Samenwerkingsverband Noord-Nederland (SNN) and the Groningen Municipality. The project was financially supported by the European Fund for Regional Development and the Dutch Ministry of Economic Affairs, Agriculture and Innovation (Pieken in de Delta), the Province of Groningen and the Province of Drenthe.

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Basic search

If you click on *SEARCH DATA*, you are shown the basic query page

Important: pay attention to the classes and their meaning

Your search will be performed within the parameters of the classes that you have selected

The screenshot shows the LOFAR website's search interface. At the top, the LOFAR logo is on the left, and the user name 'FRANZEN' and a 'SIGN OUT' button are on the right. A purple navigation bar contains 'HOME', 'SEARCH DATA' (circled in red), 'BROWSE PROJECTS', and 'HELP'. Below the navigation bar, a 'Search' sidebar on the left lists 'Basic search', 'Advanced search', and 'Browse projects'. The main content area is titled 'Basic search' and contains a light blue informational box: 'The Basic Search module allows you to search for data within a specified pointing (coordinates) and to specify whether you want to perform your search on observations and/or pipelines. If you decide to select a project, the search will be confined to only that project. For more advanced search options per data type use the "Advanced search".' Below this is a form with two sections: 'Data product types' and 'Pointing'. The 'Data product types' section has a checked 'Observation' option and unchecked options for 'Averaging Pipeline', 'Calibration Pipeline', 'Imaging Pipeline', 'Long Baseline Pipeline', and 'Pulsar Pipeline'. The 'Pointing' section includes an 'Object' field with 'resolve' as a suggestion, 'Reference' options for 'J2000' (selected) and 'B1950', and 'System' options for 'SUN' and 'JUPITER'. It also has 'Units' for RA and DEC, with 'hex' selected for RA and 'deg' selected for DEC. A 'Radius' field is set to '1', and the 'Calculate angular distance (slower)' option is checked. A blue 'Search' button is at the bottom.

LOFAR

FRANZEN SIGN OUT

HOME SEARCH DATA BROWSE PROJECTS HELP

Search

Basic search

Q Basic search

Q Advanced search ▾

☰ Browse projects ▾

The Basic Search module allows you to search for data within a specified pointing (coordinates) and to specify whether you want to perform your search on observations and/or pipelines. If you decide to select a project, the search will be confined to only that project. For more advanced search options per data type use the "Advanced search".

Data product types ⓘ

Observation

Averaging Pipeline

Calibration Pipeline

Imaging Pipeline

Long Baseline Pipeline

Pulsar Pipeline

Pointing ⓘ

Object resolve

Reference J2000 B1950

System SUN JUPITER

Units rad deg hex

RA

DEC

Units rad deg min sec

Radius 1

Calculate angular distance (slower)

Search

Advanced search – raw observations

- If you click on *Advanced search*, you obtain links to a number of classes, each with its own set of parameters (although many can be shared)
- If you then click on *Raw Observations*, you reach this page
- Searching on observations almost **never** returns retrievable data. You are searching over the products of an observation, i.e. raw data. With some exceptions, **raw data are not archived**.
- You can search on observations when you don't know what processing was performed on your data

The screenshot shows the LOFAR Long Term Archive search interface. The top navigation bar includes the LOFAR logo, the text "LOFAR Long Term Archive", and a "SIGN OUT" button. Below the navigation bar, there are links for "HOME", "SEARCH DATA", "BROWSE PROJECTS", and "HELP". The main content area is titled "Search Observation for LT10_010". On the left, a sidebar menu lists search options: "Q Basic search", "Q Advanced search -", "Raw Observations", "Averaging Pipeline", "Calibration Pipeline", "Imaging Pipeline", "Long Baseline Pipeline", "Pulsar Pipeline", "Unspecified Process", "All Observations and Pipelines", and "Browse projects -". The "Advanced search -" and "Raw Observations" items are circled in red. The main search area contains a text box with the query "Q J2000" and a "resolve" button. Below this, there are sections for "Observation Output" (with checkboxes for "Any", "Interferometric Data", and "Beam Formed Data"), "Pointing" (with fields for Object, Reference System, Units, RA, and DEC), "Observing Date" (with "From" and "To" fields), "Duration" (with a "Min" field), and "Antenna Set and Instrument Filter" (with radio buttons for "any", "any HBA", "any LBA", and "custom +/-", followed by a list of filter options like "HBA Dual @ 110-190 MHz", "HBA Dual @ 170-230 MHz", etc.).

Advanced search – averaging pipeline

- Most data simply go through the averaging (pre-processing) pipeline
- Your search will take you immediately to the products of the pipeline in the archive

The screenshot shows the LOFAR Long Term Archive search interface. The top navigation bar includes the LOFAR logo, the text "LOFAR Long Term Archive", a user profile icon for "FRANZEN", and a "SIGN OUT" button. Below the navigation bar are links for "HOME", "SEARCH DATA", "BROWSE PROJECTS", and "HELP".

The main content area is titled "Search Averaging Pipeline". On the left, a sidebar menu lists search options: "Basic search", "Advanced search", "Raw Observations", "Averaging Pipeline" (highlighted with a red circle), "Calibration Pipeline", "Imaging Pipeline", "Long Baseline Pipeline", "Pulsar Pipeline", "Unspecified Process", "All Observations and Pipelines", and "Browse projects".

The main search form includes a blue informational box: "The Advanced Search modules allow you to specify coordinates and specific parameters of the observation or pipeline products that you are looking for. A search on observations will return the setup of the telescope at the time of observing, but is unlikely to return any downloadable data. Typically, only pipeline products are archived and these can be directly searched for by selecting the Pipeline modules. If you choose observations, you will anyhow have the chance to jump to the relative pipelines."

The search parameters are as follows:

- Averaging Pipeline Output**: Interferometric Data
- SAS Id**: [Empty text input]
- Pipeline Run Date**: From [0000-00-00 00:00:00] To [0000-00-00 00:00:00]
- Pointing**: Object [resolve], Reference J2000 B1950, System SUN JUPITER, Units rad deg hex, RA [], DEC [], Units rad deg min sec, Radius [1], Calculate angular distance (slower)
- Frequency Integration Step**: From [] To []
- Frequency Resolution**: From [] To [] [Hz]
- Time Integration Step**: From [] To []
- Time resolution**: From [] To [] [s]
- Project**: [any] (dropdown menu)
- Maximum Number of Rows**: []

A "Search" button is located at the bottom of the form.

Browse projects

- If you click on *Browse projects*, you can select all projects from a particular cycle or all commissioning projects
- The 1st column shows if you are a member of the project or not



Member of project



Public project

LOFAR Long Term Archive

 FRANZEN SIGN OUT

[HOME](#) [SEARCH DATA](#) [BROWSE PROJECTS](#) [HELP](#)

Search

Q Basic search

Q Advanced search ▾

Browse projects ▾

All projects

Commissioning

Cycle 0

Cycle 1

Cycle 10

Cycle 2

Cycle 3

Cycle 4

Cycle 5

Cycle 6

Cycle 7

Cycle 8

Cycle 9

Other projects

Cycle 10 projects Number of projects: 27

In the table below a project can selected to restrict all data searches to that project only. Use the 'search' button to select the project and go to the search page, use the 'show data' button to select the project and to show all data in it. Alternatively click on the project name to view the project details.

The first column shows a when you are a member of the project or a for public projects.

M	Project	Description	Release date	Actions
	DDT10_001	LOFAR observations of MAXI J1820+070 / ASASSN-18ey during a state transition	2019-11-15	<input type="button" value="set"/> <input type="button" value="search"/> <input type="button" value="show data"/>
	DDT10_003	HI absorption in the most powerful radio-loud quasar at the end of cosmic reionisation	2019-08-21	<input type="button" value="set"/> <input type="button" value="search"/> <input type="button" value="show data"/>
	DDT10_004	Time-domain follow-up of pulsar candidates from the LoTSS Survey	2019-08-15	<input type="button" value="set"/> <input type="button" value="search"/> <input type="button" value="show data"/>
	DDT10_005	Time-Domain Follow-Up of a Variable Source from LoTSS and TGSS	2019-08-15	<input type="button" value="set"/> <input type="button" value="search"/> <input type="button" value="show data"/>
	LC10_001	Probing the Effects of Aging in Scaling Relations between Jet Power and Radio Power		<input type="button" value="set"/> <input type="button" value="search"/> <input type="button" value="show data"/>
	LC10_002	Continuing 3d-VLBI of scattering-induced echoes in B1508+55		<input type="button" value="set"/> <input type="button" value="search"/> <input type="button" value="show data"/>
	LC10_005	Shaping the planetary nebula K 3-17 by magnetic fields		<input type="button" value="set"/> <input type="button" value="search"/> <input type="button" value="show data"/>
	LC10_006	Long wavelength tail of the radio spectrum of NGC 6826: evidence for a temperature gradient in the planetary nebula		<input type="button" value="set"/> <input type="button" value="search"/> <input type="button" value="show data"/>
	LC10_008	The fate of energised particles in galaxy clusters		<input type="button" value="set"/> <input type="button" value="search"/> <input type="button" value="show data"/>
	LC10_010	Are radio halos common in relaxed galaxy clusters with a cool core?		<input type="button" value="set"/> <input type="button" value="search"/> <input type="button" value="show data"/>
	LC10_011	How much mass is there inside Tycho s supernova remnant?	2019-08-29	<input type="button" value="set"/> <input type="button" value="search"/> <input type="button" value="show data"/>
	LC10_012	Rapid follow-up of Short Gamma-Ray Bursts		<input type="button" value="set"/> <input type="button" value="search"/> <input type="button" value="show data"/>
	LC10_013	Exploring the dawn of particle acceleration in pre-merging galaxy clusters		<input type="button" value="set"/> <input type="button" value="search"/> <input type="button" value="show data"/>
	LC10_015	LOFAR Localizations of Eight GBNCC Pulsar Survey Discoveries		<input type="button" value="set"/> <input type="button" value="search"/> <input type="button" value="show data"/>
	LC10_017	The low-frequency radio continuum emission in nearby galaxies: the case of M33 and M82		<input type="button" value="set"/> <input type="button" value="search"/> <input type="button" value="show data"/>
	LC10_020	LOFAR Legacy 60 MHz survey of the 3CRR catalogue - II		<input type="button" value="set"/> <input type="button" value="search"/> <input type="button" value="show data"/>
	LC10_021	Formation of extended radio emission in double-relic galaxy clusters		<input type="button" value="set"/> <input type="button" value="search"/> <input type="button" value="show data"/>
	LC10_022	Low frequency spectra of Pulsar Wind Nebulae: What is the cause of the spectral break?	2019-07-12	<input type="button" value="set"/> <input type="button" value="search"/> <input type="button" value="show data"/>
	LT10_001	Monitoring Scintillation Above LOFAR		<input type="button" value="set"/> <input type="button" value="search"/> <input type="button" value="show data"/>
	LT10_003	Lightning Imaging with LOFAR		<input type="button" value="set"/> <input type="button" value="search"/> <input type="button" value="show data"/>
	LT10_004	Pulsar Timing with LOFAR		<input type="button" value="set"/> <input type="button" value="search"/> <input type="button" value="show data"/>
	LT10_005	Completing the LOFAR Tied-Array All-Sky Survey		<input type="button" value="set"/> <input type="button" value="search"/> <input type="button" value="show data"/>
	LT10_010	The LOFAR Two-metre Sky Survey: Opening up a new window on the Universe		<input type="button" value="set"/> <input type="button" value="search"/> <input type="button" value="show data"/>
	LT10_012	Deep LOFAR observations in the best-studied extragalactic fields		<input type="button" value="set"/> <input type="button" value="search"/> <input type="button" value="show data"/>
	LT10_013	Low-frequency follow-up of gravitational wave events		<input type="button" value="set"/> <input type="button" value="search"/> <input type="button" value="show data"/>
	LT10_015	Timing of LOTAAS Pulsar Discoveries		<input type="button" value="set"/> <input type="button" value="search"/> <input type="button" value="show data"/>
	LT10_016	Characterisation of the radio eclipses of black widows and redbacks		<input type="button" value="set"/> <input type="button" value="search"/> <input type="button" value="show data"/>

View project details

Click on the project name to view the project details

The screenshot displays a web interface for project management. On the left, a sidebar lists project cycles from Cycle 2 to Cycle 9, plus 'Other projects'. The main area shows a table of projects with columns for 'Project', 'Description', 'Release date', and 'Actions'. The project 'LT10_010' is highlighted with a red circle. A modal window titled 'Project "LT10_010"' is open, showing details for this project.

Number of products:		
	Total	Public
BeamFormed	0	0
Correlated	95488	0
Pulsar	0	0
Image	0	0
Unspecified	0	0

At the bottom of the modal, there are 'Close' and 'Set Project' buttons.

Project-specific actions

- Click on *show data* to select the project and view all data available
- Click on *search* to select the project and go to search page

The screenshot shows the LOFAR Long Term Archive website. The header includes the LOFAR logo, the text "LOFAR Long Term Archive", and a "SIGN OUT" button. A navigation bar contains "HOME", "SEARCH DATA", "BROWSE PROJECTS", and "HELP".

The main content area is titled "Search" and "Cycle 10 projects Number of projects: 27". A blue informational box states: "In the table below a project can be selected to restrict all data searches to that project only. Use the 'search' button to select the project and go to the search page, use the 'show data' button to select the project and to show all data in it. Alternatively click on the project name to view the project details." Below this, a note says: "The first column shows a 👤 when you are a member of the project or a 🌐 for public projects."

A table lists 27 projects. The columns are "Project", "Description", "Release date", and "Actions". The "Actions" column contains "set", "search", and "show data" buttons. The "search" button for project "LT10_010" is circled in red.

M Project	Description	Release date	Actions
👤 DDT10_001	LOFAR observations of MAXI J1820+070 / ASASSN-18ey during a state transition	2019-11-15	set search show data
👤 DDT10_003	HI absorption in the most powerful radio-loud quasar at the end of cosmic reionisation	2019-08-21	set search show data
👤 DDT10_004	Time-domain follow-up of pulsar candidates from the LoTSS Survey	2019-08-15	set search show data
👤 DDT10_005	Time-Domain Follow-Up of a Variable Source from LoTSS and TGSS	2019-08-15	set search show data
👤 LC10_001	Probing the Effects of Aging in Scaling Relations between Jet Power and Radio Power		set search show data
👤 LC10_002	Continuing 3d-VLBI of scattering-induced echoes in B1508+55		set search show data
👤 LC10_005	Shaping the planetary nebula K 3-17 by magnetic fields		set search show data
👤 LC10_006	Long wavelength tail of the radio spectrum of NGC 6826: evidence for a temperature gradient in the planetary nebula		set search show data
👤 LC10_008	The fate of energised particles in galaxy clusters		set search show data
👤 LC10_010	Are radio halos common in relaxed galaxy clusters with a cool core?		set search show data
👤 LC10_011	How much mass is there inside Tycho's supernova remnant?	2019-08-29	set search show data
👤 LC10_012	Rapid follow-up of Short Gamma-Ray Bursts		set search show data
👤 LC10_013	Exploring the dawn of particle acceleration in pre-merging galaxy clusters		set search show data
👤 LC10_015	LOFAR Localizations of Eight GBNCC Pulsar Survey Discoveries		set search show data
👤 LC10_017	The low-frequency radio continuum emission in nearby galaxies: the case of M33 and M82		set search show data
👤 LC10_020	LOFAR Legacy 60 MHz survey of the 3CRR catalogue - II		set search show data
👤 LC10_021	Formation of extended radio emission in double-relic galaxy clusters		set search show data
👤 LC10_022	Low frequency spectra of Pulsar Wind Nebulae: What is the cause of the spectral break?	2019-07-12	set search show data
👤 LT10_001	Monitoring Scintillation Above LOFAR		set search show data
👤 LT10_003	Lightning Imaging with LOFAR		set search show data
👤 LT10_004	Pulsar Timing with LOFAR		set search show data
👤 LT10_005	Completing the LOFAR Tied-Array All-Sky Survey		set search show data
👤 LT10_010	The LOFAR Two-metre Sky Survey: Opening up a new window on the Universe		set search show data
👤 LT10_012	Deep LOFAR observations in the best-studied extragalactic fields		set search show data
👤 LT10_013	Low-frequency follow-up of gravitational wave events		set search show data
👤 LT10_015	Timing of LOTAAS Pulsar Discoveries		set search show data
👤 LT10_016	Characterisation of the radio eclipses of black widows and redbacks		set search show data

Search confined to a particular project

- Orange box at top right of page indicates that project LT10_010 is selected
- Search will be confined to that particular project

The screenshot shows the LOFAR search interface. At the top, the LOFAR logo is on the left, and the user name 'FRANZEN' and a 'SIGN OUT' button are on the right. A navigation bar contains 'HOME', 'SEARCH DATA', 'BROWSE PROJECTS', and 'HELP'. An orange box on the right of the navigation bar displays 'LT10_010' with a dropdown arrow, indicating the selected project.

The main content area is titled 'Search' and 'Basic search for LT10_010'. A light blue informational box explains: 'The Basic Search module allows you to search for data within a specified pointing (coordinates) and to specify whether you want to perform your search on observations and/or pipelines. If you decide to select a project, the search will be confined to only that project. For more advanced search options per data type use the "Advanced search".'

The search options are organized into sections:

- Data product types**:
 - Observation
 - Averaging Pipeline
 - Calibration Pipeline
 - Imaging Pipeline
 - Long Baseline Pipeline
 - Pulsar Pipeline
- Pointing**:
 - Object: [resolve](#)
 - Reference: J2000 B1950
 - System: SUN JUPITER
 - Units: rad deg hex
 - RA:
 - DEC:
 - Units: rad deg min sec
 - Radius:
 - Calculate angular distance (slower)

A 'Search' button is located at the bottom of the search form.

Search output

- Here is the output of a search for all averaging pipeline data products for LT10_010 within 1 deg from 3C48
- You can click on the *Number of correlated data products* link for further details
- *Show pipelines* will tell you which pipelines were run on the product selected. In this case, none.
- *Source data product* will take you to the raw data

HOME SEARCH DATA BROWSE PROJECTS HELP LT10_010

Averaging Pipeline (total 57) ▾

[edit columns](#) [stage selected](#) [show dataproducts](#) [show pipelines](#)

#	<input type="checkbox"/> Distance [degrees]	Project	Release Date	Pipeline Name	Pipeline Version	SAS Id	Frequency Integration Step	Time Integration Step	Strategy Name	Flag Auto Correlations	Demixing	Number Of Correlated DataProducts	Source DataProduct
1	<input checked="" type="checkbox"/>	0.0000	LT10_010	3C048/1.0/TP	n/a	662502	4	1	Preprocessing Pipeline	1	1	243	show
2	<input type="checkbox"/>	0.0000	LT10_010	3C048/1.0/TP	n/a	664212	4	1	Preprocessing Pipeline	1	1	243	show
3	<input type="checkbox"/>	0.0000	LT10_010	3C048/1.0/TP	n/a	657450	4	1	Preprocessing Pipeline	1	1	243	show
4	<input type="checkbox"/>	0.0000	LT10_010	3C048/1.0/TP	n/a	664822	4	1	Preprocessing Pipeline	1	1	243	show

Follow *Number of correlated data products* link for the 1st data set

Averaging Pipeline (total 57) ▾

[edit columns](#) [stage selected](#) [show dataproducts](#) [show pipelines](#)

#	<input type="checkbox"/>	Distance [degrees]	Project	Release Date	Pipeline Name	Pipeline Version	SAS Id	Frequency Integration Step	Time Integration Step	Strategy Name	Flag Auto Correlations	Demixing	Number Of Correlated DataProducts	Source DataProduct
1	<input type="checkbox"/>	0.0000	LT10_010		3C048/1.0/TP	n/a	662502	4	1	Preprocessing Pipeline	1	1	243	show
2	<input type="checkbox"/>	0.0000	LT10_010		3C048/1.0/TP	n/a	664212	4	1	Preprocessing Pipeline	1	1	243	show
3	<input type="checkbox"/>	0.0000	LT10_010		3C048/1.0/TP	n/a	657450	4	1	Preprocessing Pipeline	1	1	243	show
4	<input type="checkbox"/>	0.0000	LT10_010		3C048/1.0/TP	n/a	664822	4	1	Preprocessing Pipeline	1	1	243	show



List of data products
(one for each subband)

Interferometric Data (total 243) ▾

[edit columns](#) [stage selected](#) [filter dataproducts](#)

#	<input type="checkbox"/>	Project	Release Date	DataProduct Identifier	Target Name	Right Ascension [degrees]	Declination [degrees]	Central Frequency [MHz]	Channel Width [Hz]	Channels Per Subband	Integration Interval [s]	Start Time	Duration [s]	SubArray Pointing Identifier	Subband	Station Subband	Stations	Observations	Pipeline	Derived DataProducts
1	<input type="checkbox"/>	LT10_010		24920081	3C048	24.4221	33.1598	120.3125	12207.031250	16	1.00139	2018-08-05 05:00:00	599.0	889558	0	0	show	1	3C048/1.0/TP	
2	<input type="checkbox"/>	LT10_010		24920084	3C048	24.4221	33.1598	120.8984	12207.031250	16	1.00139	2018-08-05 05:00:00	599.0	889558	3	0	show	1	3C048/1.0/TP	
3	<input type="checkbox"/>	LT10_010		24920085	3C048	24.4221	33.1598	121.0938	12207.031250	16	1.00139	2018-08-05 05:00:00	599.0	889558	4	0	show	1	3C048/1.0/TP	
4	<input type="checkbox"/>	LT10_010		24920086	3C048	24.4221	33.1598	121.2891	12207.031250	16	1.00139	2018-08-05 05:00:00	599.0	889558	5	0	show	1	3C048/1.0/TP	

Customise result columns and filter results

Interferometric Data

Select which columns to show.

Select [all](#) or [none](#) or [default](#)

Select	Column
<input checked="" type="checkbox"/>	Project
<input type="checkbox"/>	Creator
<input type="checkbox"/>	Privileges
<input checked="" type="checkbox"/>	Release Date
<input checked="" type="checkbox"/>	DataProduct Identifier
<input checked="" type="checkbox"/>	Target Name
<input checked="" type="checkbox"/>	Right Ascension
<input checked="" type="checkbox"/>	Declination
<input checked="" type="checkbox"/>	Central Frequency
<input checked="" type="checkbox"/>	Channel Width
<input checked="" type="checkbox"/>	Channels Per Subband
<input checked="" type="checkbox"/>	Integration Interval
<input checked="" type="checkbox"/>	Start Time
<input checked="" type="checkbox"/>	Duration
<input type="checkbox"/>	End Time
<input checked="" type="checkbox"/>	SubArray Pointing Identifier
<input checked="" type="checkbox"/>	Subband
<input checked="" type="checkbox"/>	Station Subband
<input checked="" type="checkbox"/>	Stations
<input checked="" type="checkbox"/>	Observations
<input checked="" type="checkbox"/>	Pipeline
<input checked="" type="checkbox"/>	Derived DataProducts
<input type="checkbox"/>	DataProduct Type
<input type="checkbox"/>	Ingestion Date
<input type="checkbox"/>	File Format
<input type="checkbox"/>	Filename
<input type="checkbox"/>	Dirty Flag
<input type="checkbox"/>	Valid Flag
<input type="checkbox"/>	Storage Writer
<input type="checkbox"/>	Storage Writer Version

Submit

DataProducts which are a result from a Pipeline all have Station Subband 0, use frequency to filter on these.

Station Subband	<input type="text"/>
Beam Number	<input type="text"/>
Observing Frequency	From <input type="text"/> To <input type="text"/> [10-250 MHz]
Observing Frequencies	<input type="text"/> 0.1953125 width [MHz]
Filename	<input type="text"/>
Maximum Number of Rows	<input type="text" value="1000"/>

Interferometric Data (total 243) -

[edit columns](#) [stage selected](#) [filter dataproducts](#)

#	Prc	Right Target Name	Ascension [degrees]	Declination [degrees]	Central Frequency [MHz]	Channel Width [Hz]	Channels Per Subband	Integration Interval [s]	Start Time	Duration [s]	SubArray Pointing Identifier	Station Subband	Stations	Observations	Pipeline	Derived DataProducts		
1	<input type="checkbox"/>	LT1	1	3C048	24.4221	33.1598	120.3125	12207.031250	16	1.00139	2018-08-05 05:00:00	599.0	889558	0	0	show	1	3C048/1.0/TP
2	<input type="checkbox"/>	LT1	4	3C048	24.4221	33.1598	120.8984	12207.031250	16	1.00139	2018-08-05 05:00:00	599.0	889558	3	0	show	1	3C048/1.0/TP
3	<input type="checkbox"/>	LT1	5	3C048	24.4221	33.1598	121.0938	12207.031250	16	1.00139	2018-08-05 05:00:00	599.0	889558	4	0	show	1	3C048/1.0/TP
4	<input type="checkbox"/>	LT1	5	3C048	24.4221	33.1598	121.2891	12207.031250	16	1.00139	2018-08-05 05:00:00	599.0	889558	5	0	show	1	3C048/1.0/TP

Staging the data

Select the data products you want to retrieve and click on *stage selected*

Interferometric Data (total 243) ▾

[edit columns](#) [stage selected](#) [filter dataproducts](#)

#	Project	Release Date	DataProduct Identifier	Target Name	Right Ascension [degrees]	Declination [degrees]	Central Frequency [MHz]	Channel Width [Hz]	Channels Per Subband	Integration Interval [s]	Start Time	Duration [s]	SubArray Pointing Identifier	Subband	Subband	Station	Stations	Observations	Pipeline	Derived DataProducts
1	<input type="checkbox"/> LT10_010		24920081	3C048	24.4221	33.1598	120.3125	12207.031250	16	1.00139	2018-08-05 05:00:00	599.0	889558	0	0	show	1	3C048/1.0/TP		
2	<input type="checkbox"/> LT10_010		24920084	3C048	24.4221	33.1598	120.8984	12207.031250	16	1.00139	2018-08-05 05:00:00	599.0	889558	3	0	show	1	3C048/1.0/TP		
3	<input type="checkbox"/> LT10_010		24920085	3C048	24.4221	33.1598	121.0938	12207.031250	16	1.00139	2018-08-05 05:00:00	599.0	889558	4	0	show	1	3C048/1.0/TP		
4	<input type="checkbox"/> LT10_010		24920086	3C048	24.4221	33.1598	121.2891	12207.031250	16	1.00139	2018-08-05 05:00:00	599.0	889558	5	0	show	1	3C048/1.0/TP		

Depending on the load on the system, staging can be slow. Waiting times of a week are not unheard of.

Staging Service

The following 4 file(s) will be requested for download, with a total size of 4.4 GB.

Size	MD5 checksum	Filename
1.1 GB	89cb12adf0a462afa363f669d86e7d15	L662502_SB000_uv.MS_aa0fd66f.tar
1.1 GB	71aafe1e25023fb412442655ac592115	L662502_SB003_uv.MS_e77712fc.tar
1.1 GB	5ae114c9fa5764e3c1eab561329fec2c	L662502_SB004_uv.MS_7dd8d9fc.tar
1.1 GB	45ca920a701b8f6c761d271094b7fbf1	L662502_SB005_uv.MS_2b075d98.tar
4.4 GB	Total filesize	

Follow *source data product* link for the 1st data set

Averaging Pipeline (total 57) ▾

[edit columns](#) [stage selected](#) [show dataproducts](#) [show pipelines](#)

#	<input type="checkbox"/>	Distance [degrees]	Project	Release Date	Pipeline Name	Pipeline Version	SAS Id	Frequency Integration Step	Time Integration Step	Strategy Name	Flag Auto Correlations	Demixing	Number Of Correlated DataProducts	Source DataProduct
1	<input type="checkbox"/>	0.0000	LT10_010		3C048/1.0/TP	n/a	662502	4	1	Preprocessing Pipeline	1	1	243	show
2	<input type="checkbox"/>	0.0000	LT10_010		3C048/1.0/TP	n/a	664212	4	1	Preprocessing Pipeline	1	1	243	show
3	<input type="checkbox"/>	0.0000	LT10_010		3C048/1.0/TP	n/a	657450	4	1	Preprocessing Pipeline	1	1	243	show
4	<input type="checkbox"/>	0.0000	LT10_010		3C048/1.0/TP	n/a	664822	4	1	Preprocessing Pipeline	1	1	243	show

Raw data are not retrievable



Obtain observational setup

Interferometric Data (total 243) ▾

[edit columns](#) [filter dataproducts](#)

#	<input type="checkbox"/>	Project	Release Date	DataProduct Identifier	Target Name	Right Ascension [degrees]	Declination [degrees]	Central Frequency [MHz]	Channel Width [Hz]	Channels Per Subband	Integration Interval [s]	Start Time	Duration [s]	SubArray Pointing Identifier	Subband	Subband	Stations	Observations	Pipeline	Derived DataProducts
1	<input type="checkbox"/>	LT10_010		24919838	3C048	24.4221	33.1598	120.3125	3051.757812	64	1.00139	2018-08-05 05:00:00	599.0	889558	0	104	show	1	AveragingPipeline	
2	<input type="checkbox"/>	LT10_010		24919839	3C048	24.4221	33.1598	120.5078	3051.757812	64	1.00139	2018-08-05 05:00:00	599.0	889558	1	105	show	1	AveragingPipeline	
3	<input type="checkbox"/>	LT10_010		24919840	3C048	24.4221	33.1598	120.7031	3051.757812	64	1.00139	2018-08-05 05:00:00	599.0	889558	2	106	show	1	AveragingPipeline	
4	<input type="checkbox"/>	LT10_010		24919841	3C048	24.4221	33.1598	120.8984	3051.757812	64	1.00139	2018-08-05 05:00:00	599.0	889558	3	107	show	1	AveragingPipeline	

The download process

- When you have received an e-mail announcing that staging has finished, you can download your data
- The download speed can vary between the different LTA sites (different lines) and it depends on how you retrieve your files
- The fastest way is a globus copy (requires grid certificate and grid srm software), which should reach 100 MB/s; the slowest is http at ~10-20 MB/s
- Documentation available at:
https://www.astron.nl/lofarwiki/doku.php?id=public:lta_tricks

Alternative interfaces

https://www.astron.nl/lofarwiki/doku.php?id=public:lta_tricks

Advanced ways to find and retrieve data in the LTA

There are some useful ways to find and retrieve your data in the LTA that might not be immediately obvious. This page explains some of the more advanced options you have.

Queries

- You can use colons in numeric queries, to select ranges. This will for example give all observations and pipelines that have a SAS/Observation ID in the range from 432000 to 432190:

Observation Id	<input type="text" value="432000:432190"/>
Observing or Pipeline Run Date	From <input type="text" value="0000-00-00 00:00:00"/> To <input type="text" value="0000-00-00 00:00:00"/>
Project	<input type="text" value="any"/>
Maximum Number of Rows	<input type="text"/>

In textual entries, wildcards can be used.

Target Name	<input type="text" value="3c19*"/>
--------------------	------------------------------------

- You can put a list of SAS/Observation IDs in the query:

Observation Id	<input type="text" value="146112,147775,151778"/>
Observing Date	From <input type="text" value="0000-00-00 00:00:00"/> To <input type="text" value="0000-00-00 00:00:00"/>

Alternative interfaces

If you are (or want to become) familiar with SQL, you can run your own queries on the catalogue

DBView

[edit](#)

There is a server that gives the option to run your own queries on the database <http://lofar-dbview.target.rug.nl/> [↗](#)

A useful query might be this one, that gives you all files for a certain Obs Id (SAS VIC tree ID).

```
SELECT fo.URI, dp."dataProductType", dp."dataProductIdentifier",
       dp."processIdentifier"
FROM AWOPER."DataProduct+" dp,
     AWOPER.FileObject fo,
     AWOPER."Process+" pr
WHERE dp."processIdentifier" = pr."processIdentifier"
      AND pr."observationId" = '123456'
      AND fo.data_object = dp."object_id"
      AND dp."isValid" > 0
```

In this '123456' should be replaced with the Obs Id of an Observation/Pipeline you're looking for. Pipelines also have an "observationId" == the SAS Id, even though that's a bit confusing. To be able to run this query, you have to go to the link above, login as the right user, select the right project, and then put this query into the "Manual [SQL](#)".

Example You can also modify these queries. for example if you want to also know the MD5 checksum, you can run:

```
SELECT fo.URI, fo.hash_md5, dp."dataProductType", dp."dataProductIdentifier",
       dp."processIdentifier"
FROM AWOPER."DataProduct+" dp,
     AWOPER.FileObject fo,
     AWOPER."Process+" pr
WHERE dp."processIdentifier" = pr."processIdentifier"
      AND pr."observationId" = '123456'
      AND fo.data_object = dp."object_id"
      AND dp."isValid" > 0
```

Alternative interfaces

- AstroWise also has a Python interface that can be used to find your data & stage it
 - Useful for project with many files that cannot be staged all at once: write your scripts to stage in chunks
 - Example scripts are on the wiki
- Python module for staging
 - Monitor status of your requests (queued, in progress or finished), abort staging requests, reschedule failed requests etc.

```
# python code
from pprint import pprint
from awlofar.main.aweimports import Observation, Pointing, SubArrayPointing
from common.database.Context import context
result = {}
for project in sorted(context.get_projects()) :
    print "Project %(project)s" % vars()
    ok = context.set_project(project)
    # do your query
    obs_ids = set()
    query = (Pointing.rightAscension > 95) & \
            (Pointing.rightAscension < 105) & \
            (Pointing.declination > 20) & \
            (Pointing.declination < 30)
    print "Total Pointings %d" % len(query)
    for pointing in query :
        print "Pointing found RA %f DEC %f" % (pointing.rightAscension, pointing.declination)
        query_subarr = SubArrayPointing.pointing == pointing
        for subarr in query_subarr:
            query_obs = Observation.subArrayPointings.contains(subarr)
            for obs in query_obs :
                obs_ids.add(obs.observationId)
    result[project] = sorted(list(obs_ids))
    print result[project]

pprint(result)
```


Summary

- Data retrieval from the LTA poses technical challenges (large data size, large number of files, searchability etc.)
- AstroWise web interface is main location for data browsing <https://lta.lofar.eu/>
- Plan to develop new tool for archive browsing: ASTRON Data Portal (ADP).
- To avoid manual work, searching and staging through python scripts can be a powerful alternative, but test your scripts well. Do not try to stage the entire archive!

