

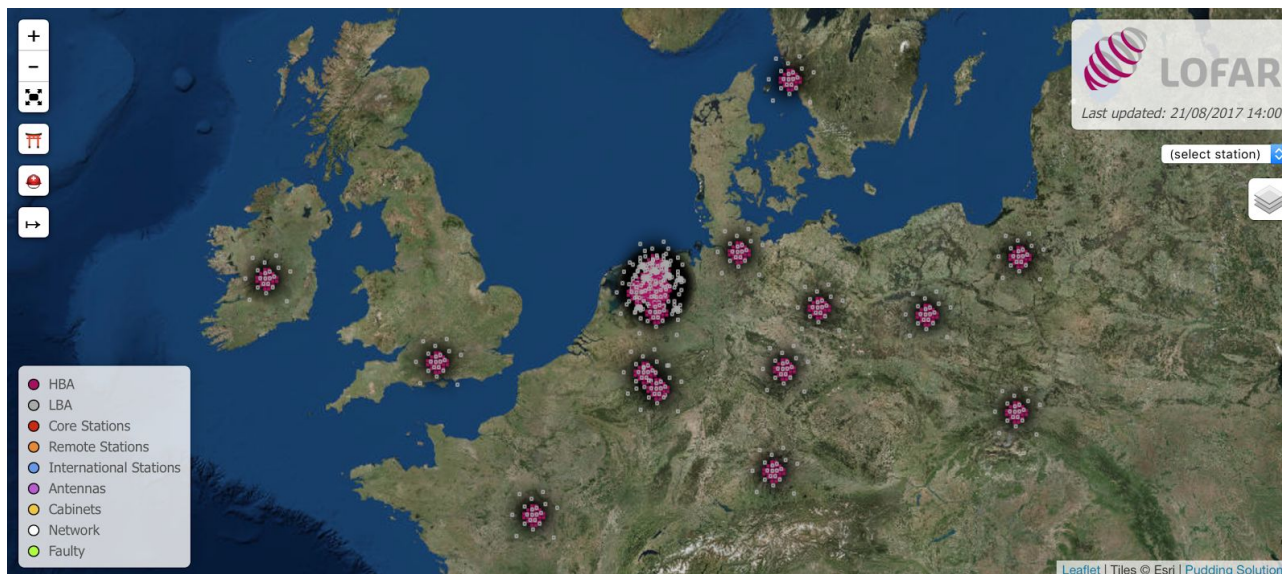
## LOFAR: Quick Start Guide

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*This document aims to provide a succinct overview of various aspects of LOFAR, supplemented by links to external, more detailed information. It is specifically aimed at new users, but contains information relevant for all users of LOFAR. Any suggestions, improvements or comments can be sent to [sos@astron.nl](mailto:sos@astron.nl).*

### What is LOFAR?

[LOFAR \(LOw Frequency ARray\)](#) is an international telescope operated by ASTRON spanning several countries, including the Netherlands, France, Germany, Ireland, Poland, Sweden and the UK, currently comprising 51 individual stations. There are [two types](#) of antennas at each station: the High Band Antennas (HBA, 110-240 MHz) and Low Band Antennas (LBA, 10-90 MHz). In total there are around 8,000 antennas spread across the continent.



See [here](#) for an interactive version of this map

### How is LOFAR operated?

The [Radio Observatory](#) at ASTRON manages and operates LOFAR, in conjunction with collaborators at the international stations. The Science Operations and Support (SOS) team is responsible for user assistance, technical assessment, observation preparation, oversight of pipelines/ingest/data processing and system tests. SOS liaises with the Operators (who carry out observing from ASTRON) and Maintenance team, as well as Software Development and Operational Support (SDOS) who manage and develop all software associated with the operation of LOFAR. If you have questions about anything LOFAR-related, your first point of call should be the SOS team ([sos@astron.nl](mailto:sos@astron.nl)).

### What kind of science does LOFAR produce?

LOFAR is used to carry out a wide range of scientific investigations, including six [Key Science Projects](#). LOFAR scientific results are presented to the community through conferences, status meetings and schools, with a list of LOFAR papers archived [here](#). A wealth of informative presentation slides can be found in the [LOFAR Slide Repository](#).

### Where can I find info about the current status of LOFAR?

Detailed system information about LOFAR (including stations, antennas and other technical information can be found [here](#). For information and insight into the current status, see [here](#). A series of [LOFAR newsletters](#), released every few months, also provide up to date information about LOFAR. It is also recommended to subscribe to the [LOFAR news mailing list](#) to be emailed updates about LOFAR. LOFAR Status Meetings for regular updates are held monthly, with presentations and recordings archived on [LOFAR Slide Repository](#). Stop days, roll-outs and proposal deadlines, as well as other events, can be found listed on the [LOFAR Google Calendar](#). Current known system issues are listed [here](#).

### What different observing modes are there for LOFAR?

Observations can take place using all stations, or a subset of the available stations (e.g. Core, Remote, International), with the HBA or LBA components of each station. The major observing modes include interferometric, beam-formed, commensal and direct storage, which are described in more detailed [here](#). There are experts in each of these different types of observing modes within the SOS team, so you are advised to contact [SOS](#) for more details if necessary. Of consideration also should be the [angular resolution](#) and [sensitivity](#) capabilities, in alignment with a given science case.

### How do I propose observations with LOFAR?

There are observing cycles each spanning 6 months, starting in mid-November and mid-May each year. You can find out more about how to submit a proposal [here](#). Proposals are submitted through the [NorthStar tool](#). You will need to create a user account to access this web tool. All Cycle allocations, including the current cycle, are archived [here](#).

### **How do I plan for proposed observations?**

The Radio Observatory offers a set of [LOFAR tools](#) which can be used to help plan for observations during a given Cycle. These include [LOFAR calculators](#) for estimating sensitivity, frequencies and source visibility, as well as [links](#) to the proposal, scheduling and inspection systems. It is also recommended to check the [current issues](#) page.

### **My data has been observed, what do I need to do as a PI before it is archived?**

An email will be sent to you by SOS upon the completion of your observations, with details about any issues you may expect with the data. Upon receipt of the email, you are given a 24-hr period to assess the [inspection plots](#) of the observations and decide whether the data quality is sufficient to proceed with ingesting into the archive.

### **Where can I store and process my data?**

Your [submitted proposal](#) should contain details of your storage/processing requirements from the RO. All RO processing pipelines are carried out on the [CEP4 supercomputing cluster](#) after observations. User processing (e.g. more advanced data reduction routines) takes place on the [CEP3 supercomputing cluster](#), which is hosted in Groningen. Default storage and/or processing time is 8 weeks, but this can be extended in exceptional circumstances via [contact](#) with the SOS team. The [Long Term Archive](#) (with sites in Amsterdam, Juelich and Poznan) provides indefinite tape storage for LOFAR data products produced by the CEP4 processing pipelines, which are accessible publicly after a 1 year proprietary period.

### **I am having trouble with some LOFAR-related software, what should I do?**

If the tool listed is one of those [listed here](#), it is recommended that you first try to contact the owner/manager of the software tool, or open an issue on the related Github page. If it is software that is managed by the RO (e.g. the standard processing pipeline), then you may contact the Radio Observatory by sending an email to [SOS](#). Note: SOS can provide limited support on a best-effort basis for third-party software and user scripts.

### **What kind of pipelines are run on the data before I receive it?**

The SOS team in combination with the Operators will pre-process observations at a basic level. This currently includes the official LOFAR calibration pipeline and flagging routines, but may expand in future to include advanced processing pipelines such as imaging. You can read more about the pipelines currently supported by the RO [here](#).

### **Are there any cookbooks or tutorials I can use for reducing my data?**

There is an official [LOFAR Imaging Cookbook](#), including tutorials, which is the best place to start for imaging a LOFAR observation. A beam-formed cookbook is currently in development. Beam-formed data can be analysed with standard pulsar packages like [psrchive](#) and [dpspr](#), or using the [LOFAR dynspec tools](#). You can find all available cookbooks on the [LOFAR wiki](#). We also recommend for new users to attend a LOFAR School for a detailed introduction into observing with LOFAR and using LOFAR data. The next LOFAR Data Processing School will take place in autumn 2018. Information about the event will be posted on the [ASTRON Events](#) page.

### **I have an awesome result using LOFAR data - who should I contact?**

If you have a press release coming out which incorporates LOFAR data, please contact the [ASTRON Communication team](#). Support may also be available for constructing a news article or press release through ASTRON, depending on the nature of the result. Any published article using LOFAR data should appear soon after on the [LOFAR Science Paper](#) list, but if you do not see your paper there after a few months, please contact the [SOS team](#). Authors are also requested to add the [official LOFAR acknowledgment](#) to their publications. You may also consider submitting an [ASTRON/JIVE Daily Image](#). You are also welcome to publicise relevant daily activities and photos on Twitter, tagging [ASTRON](#) and [LOFAR](#).

### **Is there one single place to find a detailed overview of LOFAR?**

The best place to get a detailed insight is the paper by [van Haarlem et al. \(2013\)](#). Some information may be outdated since the publication of this paper, so for the latest status you are referred to the [Radio Observatory pages](#).

### **Where can I find information about the LOFAR policies regarding data quality/storage/authorship?**

Information about LOFAR policies can be found on the [relevant section](#) of the RO webpages. These include information about what quality is deemed sufficient by the RO for observing projects, usage of CEP3/CEP4, proprietary periods, the LTA, and authorship, among other policy issues. Please also add the [official LOFAR acknowledgement](#) to your papers.

### **How do I access archival LOFAR data?**

This is done via the [Long Term Archive](#). Data observed as part of LOFAR projects becomes public after a proprietary period of 1 year. You can read more details about the LTA and how to use it [here](#).

### **I have a question that is not covered here!**

Please send an email to [sos@astron.nl](mailto:sos@astron.nl) with your question, and we will do our best to answer it. If deemed of sufficient general relevance, then it may also be incorporated into this guide in future.

**Subscribe to the LOFAR mailing list!**

[astron.nl/radio-observatory/news/subscribe-lofar-news-mailing-list/subscribe-lofar-news-mailing-list](http://astron.nl/radio-observatory/news/subscribe-lofar-news-mailing-list/subscribe-lofar-news-mailing-list)

**Useful Links**

LOFAR overview: [astron.nl/general/lofar/lofar](http://astron.nl/general/lofar/lofar)

Radio Observatory: [astron.nl/radio-observatory/radio-observatory](http://astron.nl/radio-observatory/radio-observatory)

LOFAR policies: [astron.nl/radio-observatory/lofar-policies/lofar-policies-0](http://astron.nl/radio-observatory/lofar-policies/lofar-policies-0)

LOFAR Calendar: [goo.gl/3H4rAB](http://goo.gl/3H4rAB)

LOFAR wiki: [astron.nl/lofarwiki](http://astron.nl/lofarwiki)

NorthStar proposal system: [lofar.astron.nl/proposal/setUpProposalList.do](http://lofar.astron.nl/proposal/setUpProposalList.do)

LOFAR MoM: [lofar.astron.nl/mom3](http://lofar.astron.nl/mom3)

CEP3: [astron.nl/lofarwiki/doku.php?id=cep3:start](http://astron.nl/lofarwiki/doku.php?id=cep3:start)

CEP4: [astron.nl/lofarwiki/doku.php?id=cep4:start](http://astron.nl/lofarwiki/doku.php?id=cep4:start)

LOFAR cookbooks: [astron.nl/lofarwiki/doku.php?id=public:cookbooks](http://astron.nl/lofarwiki/doku.php?id=public:cookbooks)

Long Term Archive: [lta.lofar.eu](http://lta.lofar.eu)

Long Term Archive manual: [astron.nl/lofarwiki/doku.php?id=public:lta\\_howto](http://astron.nl/lofarwiki/doku.php?id=public:lta_howto)

Observing info: [astron.nl/radio-observatory/observing-lofar/observing](http://astron.nl/radio-observatory/observing-lofar/observing)

Solved issues: [astron.nl/radio-observatory/observing-capabilities/depth-technical-information/system-notes/system-notes](http://astron.nl/radio-observatory/observing-capabilities/depth-technical-information/system-notes/system-notes)

LOFAR overview paper: [arxiv.org/abs/1305.3550](http://arxiv.org/abs/1305.3550)

LOFAR science papers: [astron.nl/radio-observatory/lofar-science/lofar-papers/lofar-papers](http://astron.nl/radio-observatory/lofar-science/lofar-papers/lofar-papers)

LOFAR slide repository: [astron.nl/LofarSlides/index.php](http://astron.nl/LofarSlides/index.php)

LOFAR tools: [astron.nl/radio-observatory/lofar/lofar-tools/lofar-tools](http://astron.nl/radio-observatory/lofar/lofar-tools/lofar-tools)

RO contact page: [astron.nl/radio-observatory/people/radio-observatory-personnel](http://astron.nl/radio-observatory/people/radio-observatory-personnel)

Interactive LOFAR map: [astron.nl/lofartools/lofarmap.html](http://astron.nl/lofartools/lofarmap.html)

**Any questions about this guide?**

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