



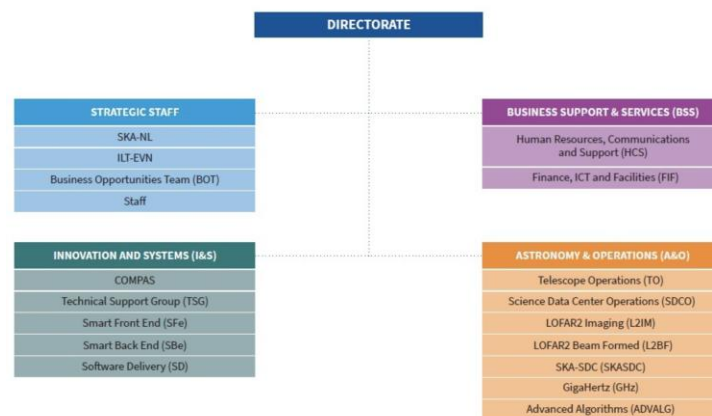
LOFAR NEWSLETTERS SEPTEMBER-OCTOBER 2020

Previous LOFAR newsletters are collected [here](#).

Announcements:

- **Cycle 15 proposal call:** 31 proposals have been received. The oversubscription factors are 1.8 and 1.1 for the observing and processing category, respectively. The PC meeting will take place on 4 and 5 November.

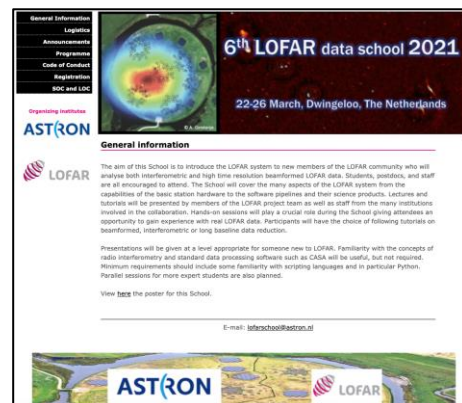
New ASTRON Structure & LOFAR operations: In order to make sure ASTRON continues to be a strong organisation that is ready for the challenges of the future (i.e. SKA, Science Data Centre, LOFAR 2.0 and a Gigahertz platform), a new departmental structure has been put in place as per 1 September 2020 (see figure below). As part of the changes, in the new structure the full set of LOFAR operational activities is run by two different units: Telescope Operations (TO) and Science Data Centre operations (SDCO), which replace the old Operations & Maintenance (O&M) and Science Operations & Support (SOS) groups, respectively. They are both located within the new 'Astronomy & Operations' department



Telescope Operations is responsible for monitoring and control of the telescope, for its maintenance, and for the generation of pre-processed data (L1 data products) on the CEP systems. SDC Operations will take over various processes from the former SOS group and will complement them with new ones aimed at the generation of science-ready

data from the instrument and management of the SDC systems, including the archives. Specifically, SDCO will be the main contact point for the users. It will offer support and will ultimately deliver high level data products (L2+) to them. Moreover, it will be the defining customer of the Science Data Center (SDC) future products. The transition to the new structure is in progress and will continue for the next several months, while the plans of the new groups will take their final shape. This will not impact daily science operations nor support to the users, which will both be run by SDCO. When needing assistance, users should continue contacting ASTRON through the [Helpdesk system](#). Users with active observing projects will still be assigned a 'friend of the project' for the necessary project handling.

- **Lofar School:** the 6th LOFAR Data will take place between 22 - 26 March 2021. Because of the current Covid-19 pandemic, the event will be virtual. The school will offer lectures and demos. Online material will also be provided for offline hands-on data processing sessions. Interaction and networking between participants and lecturers will be promoted via Q&A sessions as well as team building activities. An announcement with further details will be distributed in due course. Registration is expected to open mid-December.



Array & observing system status:

- 38 stations operational in the Netherlands: 24 core and 14 remote stations. 14 international stations in operations: DE601, DE602, DE603, DE604, DE605, FR606, SE607, UK608, DE609, PL610, PL611, PL612, IE613, LV614.
- A new international station will be built in Italy. Station deployment will start in 2022. The station will be fully functional in 2023.
- The overview of non-operational antenna elements for LBA and HBA is available [here](#). Currently, all antenna components are operating nominally, except for LV614 that has 52% non-operational LBA elements. These are being worked on.
- No major failures were experienced on CEP hardware/software over the past couple of months. A major CEP4 upgrade is being planned in the coming weeks, but system downtime will be limited to a couple of days.

Observing Programs

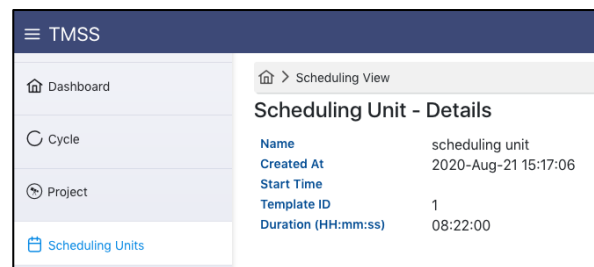
- Cycle 14 observations started on 1 June 2020, and will run till 30 November 2020. The observing schedule is available [here](#). So far, over 80% of the observing program has been completed, with an average observing efficiency of 70%.

- Observations run smoothly over the past two months with no major failures. Due to the postponed start of the commissioning activities of TMSS, part of the long-term allocations has been advanced from Cycle 15 to the current Cycle.

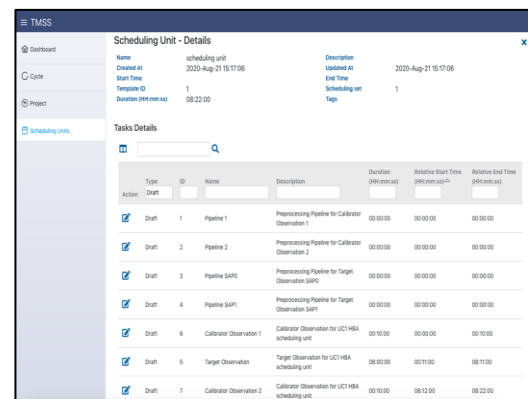
PROJECTS

Telescope Manager Specification System (TMSS; R. Pizzo)

- TMSS (Telescope Manager Specification System) will be a brand-new software application for the specification, administration, and scheduling of LOFAR observations. It will enable the required support for LOFAR2.0 use cases, while also streamlining LOFAR operations and improving the adaptability and maintainability of software for future extensions.



- The TMSS project has made progress in various areas. The web interface is now taking shape (see figures). It is already possible to view and edit cycles, projects and tasks, and it is possible already to specify a complete scheduling unit (the combination of observations, pipelines and quality assurance plots) in one go. Work is in progress to complete the observing chain by adding the specification of ingest jobs.



- Significant progress has been made with dynamic scheduling, a revolutionary system that will automatically determine the observing schedule. The proof of concept shows that simple scheduling constraints are properly handled and new, more complex ones, can now be added.
- A test version of TMSS has been installed for commissioning purposes. The first test observations have been performed successfully.
- According to the current planning, TMSS will be put in production in June 2021, at the start of cycle 16.

LOFAR2.0 (W. van Cappellen)

- The Systems Engineering Master Schedule has been made: a detailed plan on how the new LOFAR2.0 products will be integrated step by step into the LOFAR telescope.
- Although a lot of work is done in developing and accommodating LOFAR2.0 stations within LOFAR, also LOFAR1 stations will continue to be supported for a while. The solution chosen is to hide the LOFAR1 station with a wrapper, such that other systems can interact with the LOFAR1 station with "just" another configuration. By this elegant solution, the renewed Telescope Manager system for LOFAR2.0 can already be used when the wrapper is available, prior to the roll-out of LOFAR2.0 stations.
- It has been decided that the LOFAR2.0 Monitor and Control system will be built using the Tango Controls framework. The decision to implement the LOFAR2.0 Monitor and Control system software on top of the Tango Controls framework has mainly been driven by the modern object-oriented approach that the framework takes. This approach naturally leads to software component hierarchies in the Monitor and Control layers of the LOFAR2.0 telescope that respect very well the overall architecture and design. With a modern architecture based on Tango Controls the time to delivery will be shorter and the software will be much more maintainable and be ready for extension at all layers. Tango Controls provides native Python3 support which is the de-facto language used in Astronomy. This allows us to create an open and low-threshold interface for LOFAR users that is not only convenient but also straight forward to use. Target audiences are, among Operators and Maintenance engineers, also our International Station owners; it will enable these groups to also create their own tooling, perfectly tailored to their needs.
- You can find more details about the LOFAR2.0 program in the LOFAR2.0 Newsletters: <https://www.astron.nl/lofar2-0-newsletter/>

COBALT2 – PHASE 2 (C. Bassa)

- The COBALT 2.0 Phase 2 team is working on an upgrade of the software for the COBALT correlator and beamformer.
- The LOFAR Mega Mode (LMM) will allow signals from the LOFAR stations to be simultaneously correlated as well as processed by different beamforming pipelines. This enables multiple science cases to be served by a single observation. Furthermore, more simultaneous beams can be formed by applying re-digitization of the output data. This operation reduces the data rate by about a factor of 4, without affecting the data quality. Work is also underway to implement Doppler correction in the correlator. This feature will reduce decorrelation on long baselines by barycentering the observed frequencies at each station. Miscellaneous updates to the code-base (e.g. the use of C++11 constructs and new CUDA features) improve the overall code quality and make the pipelines run faster and more efficient.

LOFAR Data Valorization (R. Pizzo)

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- A new project is being defined to bring the LOFAR data hosted at the LTA to a next level: LDV (LOFAR Data Valorization)
 - Most of the data at the LTA is in the form L0-L1 (uncalibrated data) and in LDV we will generate higher level data products (L2+) and make them openly available to the community. By doing so, we will also be able to control the size of the LTA.
 - We will achieve this by processing all uncompressed interferometric (IF) data through Dysco compression, as a very first step of the project. We will also act on the beamformed (BF) data, but with different routines. Following phases of the project will see the calibration of the compressed IF data through the advanced Prefactor4 pipeline, which will be release mid 2021, and direction-dependent calibration routines. These will return science-ready data products. It is expected that this will generate a dramatic increase of science output from LOFAR.
 - The project will last for 3 years, starting from January 2021. During the first two years, we will focus on the processing at SURFsara of (i) imaging data up to and including Prefactor4 calibration and (ii) of the BF data. This is because both the processing infrastructure and pipelines delivered by already active ASTRON projects have been developed to initially run at this LTA site. It is the intention to extend this service to the other LTA sites by January 2023.
 - In 2023, the plan is to process the output of Prefactor4 through direction-dependent routines and the LOFAR-VLBI pipeline to generate science-ready data.

Calendar next LOFAR activities:

The dates of LOFAR Status Meetings, roll-outs and stop days are listed in an online calendar that is available [here](#). In particular, we emphasize:

- Next LOFAR bulletin: December 2020