

A fast link with Paranal: new operational opportunities



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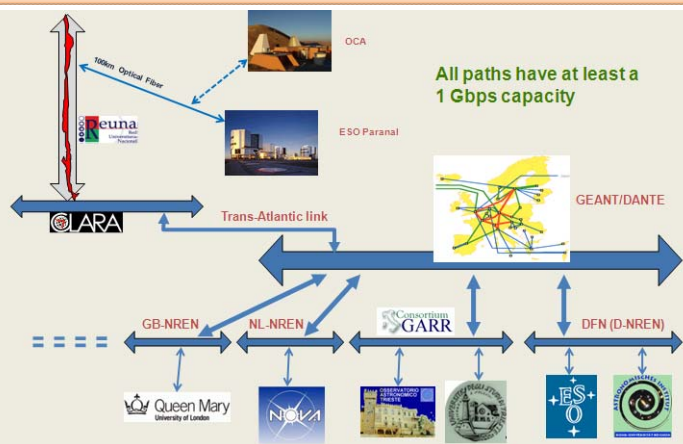


EVALSO ('Enabling Virtual Access to Latin-american Southern Observatories') is a project funded by the Framework Programme 7 of the European Union. Its goal is to enable fast access to two European optical astronomical facilities in the Atacama Desert in northern Chile, the world-class ESO Paranal Observatory and the one run by the Ruhr Universität Bochum at the neighbouring Cerro Armazones. EVALSO plans to make available the physical infrastructure to efficiently connect these facilities to Europe via the international infrastructures created in the last years with the European Commission support (ALICE, trans-Atlantic link, GEANT2). ESO, as member of the EVALSO Consortium, is involved in the implementation of the link and is exploring the analysis of the operational opportunities that this new capability will give the European astronomical community, not only in terms of faster access to the collected data, but also opening the door to new and more efficient ways of operating remote facilities.

EVALSO in a nutshell:

- Installing a 100 km optic fibre from the astronomical facilities to Antofagasta, the closest city where there is an already available communication infrastructure.
- Close cooperation with REUNA, the Chilean National Research and Education Network (NREN), to connect from Antofagasta to Santiago and access there the International Research Network through RedCLARA, the Latin America Research network operated by CLARA
- Via the trans-Atlantic link between Brazil and Spain, to the European GEANT2 infrastructure
- Via DFN, the German NREN, to ESO.

EVALSO will provide to the observatories a path at Gbps capacity between their sites and the



Data rates, now and soon:

- Current data rate at VLT + VLTI: 14.9 GByte/day (average), 80 GByte/day (peak)
- Future expected data rate of VISTA: 105 GByte/day (average), 450 GByte/day (peak)

Transferring the whole data stream over 24h will require 50 Mbit/s
Much higher transmission rates (100's of Mbit/s) needed for near-real-time applications (e.g. remote observing)

Closing the operations loop

The operations model of the VLT and other ESO facilities is a complex network of interactions among groups based at widely separated geographical locations, which exchange large volumes of information.

At the core of this network is the ESO Science Archive Facility, located at ESO Headquarters in Germany, used for the storage of all data obtained at the VLT and all other ESO telescopes, and also as a tool for the preparation of data packages for users, retrieval of sets of observations by the community, data quality control, instrument health monitoring, distribution of science-ready data products, etc.

The extremely low percentage of technical downtime at the VLT (<3%) relies on the early identification of instrument under-performance and the need for preventive maintenance carried out through careful monitoring. Detailed follow-up, trending and diagnostic is carried out off-line at ESO headquarters in Germany.

One of the main motivations for EVALSO is to close the operations loop on a timescale dramatically shorter than possible today, thus bringing about important benefits in terms of reliability and robustness.

New operational possibilities

The VLT is largely operated in *Service Mode*, ensuring that the best conditions go to the best programmes that need them. However, the lack of real-time interaction in that mode prevents the reaction to unexpected findings in observations just executed, or the fine-tuning of the following observations based on results just obtained.

A Gbps-class transfer rate makes possible remote observing by making science data available at the computer of a remotely located scientist just a few seconds after they have been obtained. Remote observing combines both *flexibility* and *two-ways interaction* in real time. It has been implemented at some observatories and is being considered for the operation of Extremely Large Telescopes. Observers will be in their offices or even at home, receiving data as they are obtained, and deciding based on the results of observations just performed. Ideally, the researchers will be contacted at short notice whenever the conditions are suitable for the execution of their programmes.

EVALSO opens up the possibility of considering the implementation of new observing modes that expand the capabilities of the observatory towards the operational requirements set by prominent science cases of current astrophysics.



<http://www.evalso.eu>