RevMexAA (Serie de Conferencias), **42**, 131–131 (2013)

REMOTE OBSERVING WITH THE ING TELESCOPES

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The advent of high-bandwidth, low-latency networks allows the possibility of observing remotely from the telescope, either at an observatory's 'sea-level' base, or indeed from farther afield.

There are many factors that favour remote observing for observers and observatories alike. Significant savings in travel costs and time are gained, and hazardous travel to the telescopes, especially in periods of extreme mountain weather, are avoided. Working at altitude can pose health risks for some, and mental alertness is almost certainly greater at low altitudes for the majority of people, so that observing efficiency is better. Furthermore, remote observing allows for greater student participation and training in a cost-effective way, and likewise science team members can more easily eavesdrop and offer strategic and practical advice on the observing process. For observatories, remote observing can lead to significant savings in operating costs, staff effort is deployed more efficiently, and expert help is readily to hand for daytime troubleshooting.

Naturally there are potential disadvantages too. If visiting observers do not attend the telescope, there's a risk that observatory and community become detached due to the reduced interaction. Daytime sleeping can be interrupted by the higher noise levels in the sea-level environment. Also, latency in network communications can frustrate the observing experience, and network failures would be catastrophic if adequate redundancy is not available.

Several major observatories offer remote observing routinely; for example, CFHT and UKIRT service observations are carried out by staff from their respective bases in Waimea and Hilo, and roughly half of Keck observations are carried out by science teams from dedicated remote sites in continental U.S.

The William Herschel Telescope (WHT) and Isaac Newton Telescopes (INT), part of the Observatorio del Roque de los Muchachos (ORM), are situated on the rim of the Caldera de Taburiente National Park, La Palma, at an altitude of ∼2.4 km, and less than 50 km by road from Santa Cruz de La Palma. The relatively low amplitude means conditions are less extreme than at the Hawaiian observatories, but nonetheless winter conditions at the ORM, and on the approach road, can be severe. It is not unusual for access to the observatory to be restricted, and even for it to be unreachable by road, for short periods of bad winter weather.

Although ING does not offer remote observing for science teams, it does have a remote observing capability at its sea-level base in Santa Cruz de La Palma, which is mainly used by astronomy and technical staff. The network between the sea-level base and the WHT has a full-duplex bandwidth of 100 Mbps, with latency consistently less than 2-msec. Connectivity from the WHT to the Internet has a bandwidth greater than 0.5 Gbps. Virtual Network Computing (RealVNC), which of course is considerably more efficient than X11-forwarding, allows all observing and instrument-control desktops to be displayed and operated efficiently from the remote observing office. An H.323-protocol video-conferencing system hosts two-way audio and video communications between the remote observing office and the WHT control room. The low-latency network connection makes the overall remote observing experience in terms of GUI operations and general observing procedures only minimally different from being physically present in the control room.

The main useage of remote observing in ING is by staff for afternoon instrument preparation, remote night-time support of visiting lone observers at the INT from the WHT control room, training of staff and students, general instrumental troubleshooting by experts from sea-level, and service observing. Arguably the most complex instrumentation on the WHT is the adaptive optics suite. The remote observing capability from sea-level has played a crucial role in the development and exploitation of this system. It is used routinely for mirror flattening, instrument preparation and maintenance, and is also used for carrying out AO service observing.

We do not have plans at present to offer remote observing other than from the sea-level base for ING staff. But as the observatory evolves and engages more with large surveys, it is possible that remote and eavesdropping observing modes will assume a more prominent role than is presently the case.

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