

Report of the 19th GTC User's Committee Meeting

February 20-21, 2019

Held at IAC, La Laguna, Tenerife

GUC attendees: Daniel Rosa González (**chair**, INAOE) , Ascensión del Olmo (IAA), Miriam García García (CAB), Jorge García Rojas (IAC), Jian Ge (UF), Nuria Huélamo (CAB), Ignacio Negueruela (UA), and Cristina Ramos Almeida (IAC).

1. General Remarks

The GTC user's committee (GUC) 19th meeting was held at the Instituto de Astrofísica de Canarias. The GTC director and representatives of the science, engineering and development divisions informed the GUC on the performance and maintenance of the telescope, as well as development of new instrumentation since the last meeting in September 2018. This report summarizes the most important issues discussed during the meeting, and the recommendations from the GUC.

Funding situation

The GTC Director expressed his concern about the continuous lack of resources. Some progress has been met on personnel recruitment, including a new Head of Administration, and two electrical and one software technicians. At the moment GTC is operating with 8 support astronomers. Apart from taking care of the observations and conducting their own research, they take care of the data quality control, use and improve the different instrument pipelines, advise the users on the use of the different instruments and data reduction packages and discuss with the engineers new ways to improve the use of the different instruments. It is clear to this GUC that more support astronomers are needed.

Finally, the GTC strategic plan 2017-2020 was approved by *Ministerio de Ciencia, Innovación y Universidades* ([MICIU](#)) but the total amount of money to be received has not been decided yet.

In short, GTC expressed its concern that the prolonged budget deficits that will continue affecting the development and completion of internal GTC projects. All this makes very difficult to attract and retain highly qualified personnel and it is putting **the future of GTC at serious risk**.

Remote control room

The remote control room at CALP is already working. GTC invites other Spanish institutions and the international partners to create their own remote control rooms. It has been regularly used for daily coordination meetings, remote calibrations, software/operational tests and night time troubleshooting analysis.

Agreement with China

As mentioned in previous meetings, China will provide a high-resolution spectrograph covering the range from 380 to 780 nm to look for exoplanets and to study stellar abundances. The GUC was informed that the original design has changed to a dual instrument. The blue part of the instrument will have a spectrograph with $R \sim 30,000$ and the green-and-red ultra-stable arm will have $R \sim 100,000$.

Outreach and better environment

The *Fundación Española para la Ciencia y la Tecnología* has funded a new outreach program which will include 18 nights during which the general public can connect to the GTC. A professional communicator (*youtuber*) will be at the GTC coordinating and interviewing a professional astronomer. Moreover, a dedicated web-page will show every night where the telescope is pointing at every moment. A short description of the scientific project that is being observed at any moment will be also shown. GTC is promoting the use of green vehicles to access the observatory, and developing solar infrastructure.

New GTC instrumentation plan

The process to define new instruments started in March 2018, and during the *Science with GTC* meeting held in Valencia (December 2018) six different instruments were presented. The overall details of these instruments can be found at <http://www.gtc.iac.es/instruments/nextgeneration.php>. The GTC director informed us that the possibility **to send more ideas for new instruments is still open**. GTC is waiting for the central government to confirm the amount of money that will be used to develop the new instrumentation. GTC is planning to have a one day meeting to continue with the discussion of the future GTC instrumentation.

2.- Response from the GTC director to the GUC recommendations from the previous meeting

In October 2018, the IAC adaptive optics team, the FRIDA PI and associated scientists organized a RIA meeting to discuss the status of the project and stimulate scientific cases with FRIDA and AO (<http://riastronomia.es/frida-gtcao-ciencia-con-la-primera-instrumentacion-de-optica-adaptativa-en-gtc/>). Several scientific topics were discussed and a document with a brief description of scientific cases was sent to the GUC.

EMIR information has been updated in the GTC pages. Several pages include now the calculated sensitivities in different observing modes. The noise present in the preprocessed data frames delivered to the users during semester 2018A and earlier (those taken in RAMP readout mode) can be significantly reduced using the python script developed by the EMIR team and available at <http://www.iac.es/proyecto/emir/pages/observing-with-emir/note-for-emir-users-27sep18.php>. Users need to request the raw observations to GTC and run the script. This noise was particularly important in the case of faint sources observed in spectroscopic mode. From 2018B onwards the preprocessed data are delivered to the users without this noise.

GTC is still looking for better blue lamps to perform trace (continuum lamp) and wavelength calibration (emission line lamp). The cost of the continuum lamp being currently considered is of around 15000 euros.

Post-observation support: GTC has developed a help desk (GTC phase 3), accessible at <http://gtc-phase2.gtc.iac.es/science/F3/phase3start.php>. GTC users could ask about:

- Data quality control
- Calibration files
- Reopen the access to data

Data reduction help

A dedicated page will contain the links to the different reduction packages.

3. Update on science operations

The GUC members were informed about the performance of the telescope. The presentation can be consulted in the GTC Users Committee pages. 2018 has been one of the best years in terms of weather conditions. Together with the fact that the lost of observation time has been reduced to a small percentage, this resulted in around 900 hours of observations delivered in 2018A. The night time available for scientific operations is approximately 1642 hours per semester. In semester 2018A, Spain received 92.1% of the time, and Mexico and UF 5% and 1.2% respectively. By February 2019, the number of published papers using GTC observations was 429, including 189 from Spain, 22 from Mexico and 16 from the UF. GTC showed that the number of published papers increased in the last year, and now we are at the same level as the Keck telescopes at the time of their ninth year of operations. Director Discretionary Time (DDT) is producing 1 paper after 6 hours of GTC time, ESO-GTC after 14 hours and observations obtained through regular TAC 1 paper after 25 hours. **GTC encourages users to make use of the DDT that at the moment is used well below the assigned time of 10 nights per semester.**

GTC is operating in a queue mode almost all the time, with up to five different instruments, thus covering a wide range of observing conditions, but without an automatic system for the queue management (100% manual). Therefore completion rates can decrease in the coming semesters with the arrival of new instruments.

GTC stressed the problem of completing programs requiring observations in overpopulated ranges of coordinates (specially r.a. from 10 to 12 hours and 2 hours; see <http://www.gtc.iac.es/observing/observing.php>). This is affecting even A-band programs. At the moment there is only one Large Program (LP) to be finalized and due to several issues (e.g. several hours to be deliver to Guaranteed Time projects), **GTC suggests not to offer LPs next semester.**

4. Time Allocation Committee (TAC) summary for semester 19A

The Spanish TAC received 168 proposals, 65% of them requesting GTC observing time. No Large programs were offered. The over subscription factor is ~3.5 for the Spanish community, just below 3 for the University of Florida and around 6 for the Mexican community.

By far, OSIRIS is the most requested instrument, and **the long slit mode the most solicited.** The science time allocated in semester 2019A for EMIR and MEGARA were of ~25% and ~20% respectively. HiPERCAM reached about 10% of the time **and CanariCam only 4%.**

A call for Spain-Mexico collaborative proposals was not issued in 2019A. This topic was discussed during the Science with GTC meeting in Valencia, but an agreement between the IAC and GTM directors has been not reached yet.

Maria Rosa Zapatero (president of the Spanish TAC) **comments that the TAC evaluations already include the technical reports from the support astronomers if there are any issues.** She also comments on the DDT process to obtain observations. In general, it is a process that takes only a few days – in some cases only two days – but she recognized that due to **delays in the response from some referees during holidays the evaluation of some of DDT proposal were delayed in the past.**

5. Updates on instrumentation

OSIRIS: the detector replacement by a monolithic 4kx4k is still in process, and funds from MiCIU have been approved. The plan is to move OSIRIS from the Nasmyth-B focus to the Cassegrain focus in March 2020. At that time OSIRIS will still operate with the old CCD. Notice that once OSIRIS is dismantled, it **will not be offered to the Community (probably during 2020A)**. The change of focus is **motivated by the arrival of the adaptive optics system to the GTC**.

NEFER : the scanning Fabry-Perot mode in OSIRIS is available for normal use from semester 2019A, however, there were few applications to use this instrument mode, **and no time was allocated via TACs in 2019A**.

EMIR: the NIR imager and multi-object spectrograph is offering now all the possible modes. The images have been improved after the tilt correction. Now the sensitivities of image and multi-object spectroscopy modes have been revised (see the corresponding GTC pages) and are compatible with the results given by the exposure time calculator (ETC). The firsts refereed papers obtained with EMIR data have been published (Lodieu et al. 2018, Madonna et al. 2018) and several teams are successfully testing the different modes. Examples includes the observation of star forming galaxies at $z \sim 1.473$ where the [OIII]5007 line was detected in a JAB=22.33 mag. object after an exposure time of 2.8 hours.

MEGARA: the optical integral-field Unit (IFU) and multi-object spectrograph (MOS) for GTC also produced its first refereed paper (Dullo et al. 2019). The instrument had a high time allocation success obtaining 21% of the total requested time with 70% of the proposal located in the highest priority band. Different examples of the IFU mode were presented. Until February 2019 more than 260 hours have been provided to the different teams including 80 hours of guaranteed time. GTC confirms that correcting by illumination gradients is no longer necessary. The MEGARA halogen lamp for tracing/flat fielding in the extreme blue, at wavelengths below 4000Å, does not provide sufficiently strong intensity. **That is a problem discussed in the previous meeting that has not been resolved yet.**

HiPERCAM: this high speed, multiband imager visitor instrument has been well received by the Community. It was used in 3 reserved observing slots with extremely valuable support from the instrument team. The raw data are reduced by the instrument team, and delivered to the PIs. The instrument team is considering to change the use of the instrument to common user, by using one of the Folded Cass focal stations reserved to technical instruments. The GTC Steering Committee will decide the new status of the instrument.

CanariCam: the mid-infrared camera is expected to be at the GTC in March 2019 after several improvements performed at UF. Now the camera is provided with a new data acquisition system, new mechanical interfaces to the focal station and thermal/mechanical interfaces between cold-head and dewar. **Notice that this camera is going to be mounted on the telescope only until the arrival of MIRADAS at the end of 2019. Therefore GTC advises the community to request CanariCam observations in 2019B, as it might be the last opportunity to obtain mid-infrared data with the GTC.**

HORuS: the commissioning of the high optical resolution spectrograph was finalized in December 2018 and the instrument will be offered to the Community in semester 2019B for observations to be taken from July 2019 onwards.

MIRADAS: the new near-infrared multi-object echelle spectrograph operating in the 1-2.5 μ m bandpass will be at the GTC in late-2019.

FRIDA: the diffraction-limited NIR imager and integral field spectrograph is expected to be sent to GTC by the 2021A semester.

6. Efficiency of the meetings of the GUC:

The GUC acknowledges the time and effort that the GTC staff and instrument PIs dedicate to brief the GUC on various subjects. To improve the efficiency of the meetings the GUC recommends **to increase the length of the meetings taking place in La Palma by an extra half day.**

7. Summary of recommendations from the GUC

1. The GUC acknowledged the effort and hard work of both the FRIDA and GTC AO teams. The AO team showed a solid progress with the goal of having the system at GTC in March 2020. However, the GUC is concerned about the delay in the FRIDA fabrication process. One of the main problems comes from the camera, which cannot be safely cooled and needs a replacement. Preparing the GTC to receive the AO system requires a lot of work from the GTC personnel (e.g. rms telescope surface must be improved from the current 150nm to around 30 nm, reduce the telescope vibration and work on an interface to communicate the AO system with FRIDA). Nobody is currently working on these issues, and there are no plans to implement these changes in the near future. Moreover, OSIRIS and HiPERCAM must be changed from the current focal point. These changes imply that these two instruments will not be used during semester 2020A. Given that both instruments are taking most of the observing time on GTC – specially OSIRIS -- the GUC recommends not to install the OA system until a consistent plan of completion of the FRIDA camera will be presented to GTC. A GTC plan to receive the AO system is also mandatory.
2. GTC users complain about the unfinished pipelines for both EMIR and MEGARA. In the case of EMIR/MOS, the GUC recommends that the pipeline provided delivers flux calibrated spectra. In the case of MEGARA, the IFU pipeline should deliver the wavelength and flux-calibrated **reconstructed** data cube.
3. Now that the GTC has gathered a lot of observations of both EMIR and MEGARA, the GUC would like to see a direct comparison of the signal to noise ratios obtained with the values estimated by the corresponding ETCs. These figures will help the community to prepare in a safer and confident manner the next GTC proposals.
4. The GUC agrees with GTC that an effort is needed from the user community to reflect on the role of the GTC to be competitive in the era of extremely large telescopes. The capabilities of new instrumentation should adapt to the future needs of the community foreseen as the outcome of this debate. In this framework the GUC fully supports GTC's initiative to organize a meeting to discuss these points, and to keep the call for new instrumentation open.
5. At this moment the GTC Science Operations Group resources are severely limited to support the current workload caused by a very ambitious instrumentation plan. Moreover, queue management is fully manual and many different variables have to be taken into account in a very complex scenario. The GUC recommends to find financial support to provide extra personnel to the Science Operations Group and develop an specific software to automatize the telescope queue and prevent future inefficiencies.

6. As pointed out in previous meetings, the MEGARA halogen lamp for tracing/flat fielding in the extreme blue, at wavelengths below 4000 Å, does not provide sufficiently strong intensity. The GUC advises GTC to give high priority to this issue and to work with the MEGARA team to replace the existing lamp as soon as possible.
7. The GUC recognizes the effort to have an active GTC archive. However, the GUC is worried about the quality of the automatic reduced data that will be archived. GUC members started a discussion about this issue and plan to do a poll to extract more information from the whole GTC community.
8. The process to assign DDT seems to rely on a single person, and in some cases the assignment process has taken more than 2 weeks. Some scientific cases (e.g. AGN flares, GRBs) require very quick action to be useful. Therefore we encourage the people involved in the DDT assignment to revise the procedure to grant access to the telescope as quickly as the scientific case requires.
9. Given the recent time and funding investment in CanariCam and its unique capabilities, the GUC supports a special and final call for this instrument.
10. The GUC recommends that support astronomers use detailed protocols to check the quality of the observations during the night.
11. Considering GTC's present commitments on Guaranteed Time programs of both EMIR and MEGARA, and the commissioning efforts in the near future, the GUC recommends not to offer large programs in the next semester.
12. The GUC recommends that in the case of both EMIR and OSIRIS observations, the phase 2 should include another field to constrain the airmass, as happens in the case of CanariCam phase 2.
13. The GUC recommends modifying MEGARA's phase-2 templates to include the possibility of small offsets. At the moment, offsets require a new OB with the ensuing overheads.

April 22, 2019

The GTC user's committee