



# EUROPEAN ORGANISATION FOR ASTRONOMICAL RESEARCH IN THE SOUTHERN HEMISPHERE

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Users Committee 45 <sup>th</sup> Meeting April 27+28, 2021	For Review
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## **ESO Responses to Recommendations from 44<sup>th</sup> Users Committee Meeting**

This document is for **ESO INTERNAL USE**

After the 2021 UC meeting: **PUBLIC**

Distribution to Users Committee, their colleagues with a need-to-know, and their supervisors is authorised.

**Users Committee is invited to review this document**

## UC44 RECOMMENDATIONS

The UC, on behalf of the community, thanks ESO for enabling the 44th UC Meeting in a remote connection format. The UC also thanks ESO for following up on last year's recommendations. The new list of recommendations is based on feedback from users and the discussions during the online meeting (UC only and jointly with ESO).

The recommendations are grouped into topics within which they are listed in order of priority.

### **General**

**UC44.R01:** The primary role of the UC is to communicate the Users' opinions to ESO. However, the UC's role is also to assist ESO in informing the community about ESO operations. We recommend that ESO reinforces this role by keeping the UC informed about major and/or sudden operation disruptions/changes (e.g. the time of deployment of the distributed peer-review (DPR), changes to the carry-over policy, observatory closures, etc) affecting ESO users when this is not immediately communicated via ESO newsletters or news updates on ESO web-pages. This will allow the UC members to communicate up-to-date information to the whole community and respond adequately to individual users.

We appreciate the UC's role as the focal point for the community related to ESO operations status. Through regular communications via email or short video calls, the UC was kept informed about all major changes as well as consulted when taking decisions related to suspension of Call for Proposals for P107, plans for the operations ramp-up, and available time at the telescopes including Special Call for P107. The community at large has also been kept informed about all upcoming changes and updates during the past difficult year through the ESO web pages and the Science Newsletter. In case there are outstanding questions we invite the UC to get in contact with ESO via the ucomm account which will ensure prompt feedback from ESO. The individual questions from users are best directed via [usd-help@eso.org](mailto:usd-help@eso.org) to User Support Department or to ALMA helpdesk (<https://help.almascience.org/>).

**UC44.R02:** The UC recommends that ESO makes every effort to find alternative arrangements, such as increased use of designated visitor mode, for visiting astronomers affected by travel restrictions also beyond the COVID-19 crisis. In general, we recommend that ESO offers dVM observations also for runs longer than one night as an option for users who wish to minimise travel times and carbon footprint.

The ESO p1 proposal form allows users to request dVM mode already at the time of preparing a proposal and there is no restriction on the requested length of the observing run.

On Paranal, the dVM is regularly used. Indeed during the Covid pandemic all Visitor Mode runs have been converted to dVM. We thank the dVM observers for continuously providing constructive feedback, via end-of-mission reports, on how to improve the user experience.

On La Silla, the dVM was first used in November 2019 after the social unrest in Chile. These were relatively simple HARPS observations. The real implementation started after the ramp-up of the observatory in September and October 2020. End of mission reports demonstrate that users are generally satisfied with the system, and that a few adjustments (such as direct access to data) would make the experience even better. While the future VM/dVM balance is yet to be discussed, with the arrival of SOXS and NIRPS, it is expected that dVM will continue having a prominent role.

Over the past 6 months, due to a large number of dVM runs, a streamlined support with automatic reminders and help with verification of few OBs prior to the start of the run has been implemented in coordination with the User Support Department.

**UC44.R03:** The UC recommends to continue remotely connecting with the broader ESO user community and expand online activities to include schools, meetings, conferences, workshops and seminars.

Over the past year, ESO has moved its scientific activities online and has opened the possibility of attending seminars to wider astronomic community. The Joint Astronomy Colloquia as well as a new series of Cosmic Duologues, and the new Hypathia Colloquium, specifically designed to help early-career researchers, have been widely advertised and have attracted very high attendance. As the science workshops moved fully online, they had increased attendance by more than factor of 2-3 compared to usual in-person meetings. The conferences and workshops have also been recorded such that attendees from other time-zones can see the presentations at more convenient times. A virtual tour of ESO has been streamed on YouTube to give the opportunity to young researchers interested in the Fellowship programme not only to see the premises and activities at ESO, but also interact with the current Fellows.

Following the decision to suspend the Call for Proposals for P107, a workshop for users focused on exploration of archival data and data reduction, including hands-on sessions, has been organised in September 2020. It had ~70 participants. The second part, focusing on preparation of Phase 1 proposals, was organised in March 2021.

Furthermore, ESO has invited the European ALMA user community to participate in the exercise of re-designing the ALMA user experience and held three community assemblies to inform about the ramp-up plans for ALMA.

### **Distributed Peer Review**

**UC44.R04:** The vast majority of Users who completed the poll have a favourable opinion on DPR, while expressing two main concerns: On the confidentiality and on the level of reviewer expertise. We recommend that ESO explores mitigating strategies to prevent potential backlash from the community concerning these two concerns. This may include making public the guidelines for reviewers, clarifying to proposers which criteria will/will not be taken into consideration, and communicating the process by which reviewers are selected.

An extensive paper on the DPR concepts and the results of the DPR experiment has been published in the Messenger. This article addresses the concerns expressed by the UC. 1) if one accounts for the numbers in the game, DPR actually presents a comparable (if not smaller) risk of confidentiality loss (because it is true that there are many more reviewers, but each of them also sees many less proposals). 2) We take that concern is that proposals are possibly reviewed by not sufficiently expert applicants, typically students. Since each proposal is going to be seen by 8-10 reviewers, this set will be strongly dominated by senior scientists (just because of the small fraction of junior applicants, of the order of 10% of total). In addition, the availability of a much larger pool of reviewers (about 700 if one includes only the PIs), makes the proposal-referee match much more accurate than it can possibly be in a rigid, classical panel. The point is taken, and these aspects will be properly explained and clarified, making the review guidelines available to everybody. Here it may suffice to say that this is implicit, since everybody submitting a proposal as PI will be reviewing proposals.

### **Operations, Data, Pipelines:**

**UC44.R05:** In connection with the COVID-19 impact, the UC recommends monitoring and reporting via newsletters on the impact and losses (e.g. estimated time losses and delays) of the P105 proposals due to the shut-down of facilities. We recommend ESO to consider carrying over both visitor- and service mode A-ranked P105 programmes as for several periods, with priorities based on the scientific merit of the affected programmes.

This recommendation was formulated before the end of P105. Updates were published regularly. Basically, all the science time of P105 was lost due to the pandemic. And so were all technical activities planned for that semester. P106 started with a ramp-up plan. The non-availability of a number of instruments and the cancellation of all planned technical activities until Dec 31<sup>st</sup>, 2020 had a significant impact on the amount of science carried out during P106. It is clear that there will be a significant amount of carry-over, adding to that coming from P105. The schedule of P107 has been prepared with the following criteria: a) all P105 A-rank and VM/dVM runs of P105 are carried over into P107 (whenever possible and barring special exceptions); b) P105 B-rank programmes are carried over unto P107 on a best effort basis; c) P105 C-rank programmes are carried over and kept in stand-by, ready to be used in case of need for poor-conditions material. Given the uncertain situation it is hard to make a commitment for further carry-over of P105 observations. This, the newly approved Large Programmes in P106 and the postponement of technical activities (some of which are very important) is already creating significant commitments for the future. Depending on the situation, ESO may have to consider a reset of the programmes (as opposed to another cancellation of the Call for Proposals).

**UC44.R06:** Continue exploring virtualisation options for the pipelines (Anaconda/Conda, Docker, cloud), to support a range of operating systems and facilitate installation.

Progress was made on the option discussed at the meeting to develop a Conda environment with the python dependencies needed by ESO Reflex. Limiting it to include the python dependencies and not the pipelines themselves seems to be a good compromise between curbing development effort needed to a manageable level and still solving the vast majority of the installation issues as reported to us by users and at the same time providing new ways to work with pipelines on virtual environments.

**UC44.R07:** Prioritise the implementation of ETC in p1 and achieve better migration of information between p1 and p2. We note that ESO released the new p1 tool without ETC implementation as recommended by the UC in previous meetings. Feedback from the community from the 2020 UC poll sends a clear signal that users would greatly appreciate the ETC implementation as ESO originally envisioned.

The integration of ETC with P1 and P2 is still foreseen as originally planned. The migration of information between ETC-P1-P2 (and also to QC, archive, pipelines) is foreseen through the implementation of a definition of the target (and all its astrometric and physical parameters) unified across all tools. Once that is in place, the P1 and P2 are ready for integration with ETC.

**UC44.R08:** to prioritise the following recurrent user suggestions for improvements of the pipelines. *i)* Telluric correction, *ii)* Documentation of pipeline parameters, *iii)* Optimal spectral extraction, *iv)* Coadding 1D and 2D (echelle) spectra, *v)* Absolute flux calibration.

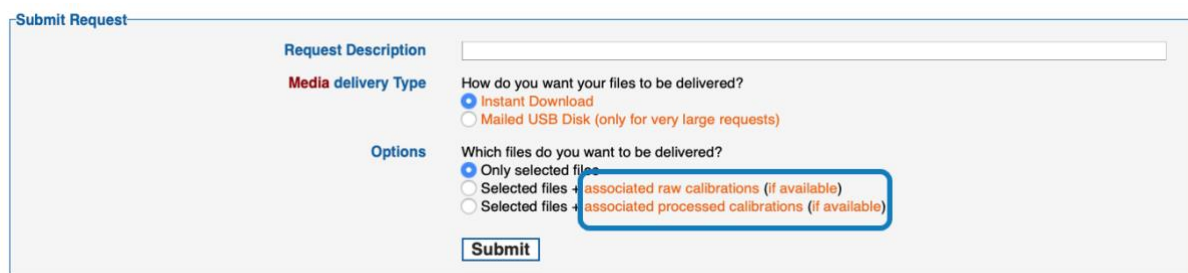
i. Telluric correction

- a. The KMOS processed data collection was recently released ([announcement](#), [data](#), [description](#)). It covers the whole data history and all individual data cubes were corrected for tellurics. A Reflex workflow incorporating the same algorithms was publicly released.
- b. Molecfit Reflex workflow was released, supporting X-Shooter and UVES. More instruments are on the way. Further improvements on X-Shooter will take longer than anticipated because it turned out that the instrument wavelength calibration is not accurate enough to reliably apply Molecfit. Work is in progress to fix it, most likely by including sky emission lines.
- c. A new version 4.0.0 of Molecfit has been released in early March. The algorithms in Molecfit itself are actively undergoing further improvement.

- ii. Documentation of pipeline parameters
  - a. Pipeline parameters are documented in great detail in the corresponding User Manuals. Furthermore, to make the documentation more accessible for science users, the most important parameters are described in the Reflex Tutorials, together with practical examples of their effects on the final products. The Tutorials themselves are constantly maintained and updated according to software changes or improvement suggestions. Specific suggestions on areas for improvement are greatly appreciated and should be communicated directly to the User Support Department via [usd-help@eso.org](mailto:usd-help@eso.org).
- iii. Optimal spectral extraction
  - a. Some pipelines, most notably UVES, already offer optimal extraction. The CRIFES+ pipeline will be released with optimal extraction. Work is in progress to adapt X-Shooter pipeline to use the same algorithm. Realistically, the release may be in late 2022.
- iv. Coadding 1D and 2D (echelle) spectra
  - a. A recipe to co-add 1D extracted spectra was publicly released as part of the ESO Tool Kit software (ESOTK: <http://eso.org/sci/software/pipelines/esotk/esotk-pipe-recipes.html>). The recipe was used to generate the OB-level stacks recently released ([data](#), [documentation](#)).
- v. Absolute flux calibration
  - a. Relative flux calibration. The list of flux calibrators was expanded to improve coverage in right ascension (high-resolution reference data based on stellar model spectra were created for the white dwarf standard star EG21). This brings the number of flux standard stars for X-Shooter and UVES to 6.  
Based on these, flux standard star spectra from 17 years of observations were reprocessed to create new master response curves for UVES, which now provide a much better correction of instrumental features.
  - b. Absolute spectral flux calibration. We have identified slit losses as the main limitation for it. We are currently characterizing the problem, e.g. dependency on seeing and object geometry, in order to identify a way forward.

**UC44.R09:** Improve the ESO archive data calibration selection to make it more evident which calibration files types are available for download and which files and types are missing in the selection.

The archive service that associates the calibration files to raw data resulting from a user query is documented at different levels of granularity. Firstly, the tool itself is documented at: <http://archive.eso.org/cms/faq.html#data>. Secondly, relevant links are also provided at the time of requesting data for download, as highlighted below:







The screenshot shows a 'Submit Request' form with the following sections:

- Request Description:** A text input field.
- Media delivery Type:** A section titled 'How do you want your files to be delivered?' with two radio button options:
  - Instant Download
  - Mailed USB Disk (only for very large requests)
- Options:** A section titled 'Which files do you want to be delivered?' with three radio button options:
  - Only selected files
  - Selected files + associated raw calibrations (if available)
  - Selected files + associated processed calibrations (if available)
- Submit:** A button at the bottom.

Then, the completeness of each dataset is presented to users with a standard traffic light color scheme (there is also a red code for system failures, not included here), e.g.:

**Data entities 1-2 of 2**

Select	Dataset	File (Category)
<input type="checkbox"/>	  SAF+UVES.1999-09-27T23:43:32.503	
<input type="checkbox"/>	  SAF+UVES.2019-09-02T06:27:46.924 (data_with_raw_calibs)	

Finally, at the finest level of granularity, the full association tree for each dataset is included in the dataset itself. It is a hierarchical representation of the dataset, in which the relationships among files are represented (in xml format). Missing data types are marked as such.

Any feedback on how to improve the documentation would be very much appreciated. Many thanks!

### Time Domain:

**UC44.R10:** Improve the response time and communication and provide timely updates on the status of ALMA triggers to the Users. Provide quick access for users to the raw uncalibrated data, and QA0 and QA0+ results as soon as they become available.

Several changes are under-way with the aim to improve communication about Target of Opportunity (ToO) observations scheduling and status for the users. *(i)* In the Proposers Guide – more verbose information regarding restrictions for ToO observations under different conditions (e.g., during long-baseline campaign); *(ii)* In the Science Portal – current status of ALMA (weather, antenna moves, in campaign mode, etc.); *(iii)* Astronomers on duty – evaluate the feasibility of execution and contact the PI when execution starts; *(iv)* Astronomers on duty – send the results of QA0/QA0+ to PI by default; *(v)* ARC – stage raw data immediately and automatically.

**UC44.R11:** to update the options included in the ETC to *i)* include more of the frequently used stellar template spectra in the ETC (e.g. cooler stars below 4000K). *ii)* Enable short exposures for the ETC estimates. *iii)* Include windowing mode for finding charts in p2.

- i) This will become available in ETCs v2.0. It is not a trivial task given the need to re-calculate the spectra for high resolution (up to 200,000 to be useful for ESPRESSO and CRIRES) and covering very wide wavelength range (from UVES to CRIRES). If there is an existing database (also for BDs or hotter stars), with the correct wavelength coverage and spectral resolution ESO would be glad to receive such help via [usd-help@eso.org](mailto:usd-help@eso.org)
- ii) Short exposures are implemented for all ETCs. This recommendation is linked to the time domain presentation by user representative and thus refers most likely to burst mode that is offered only on HAWK-I and VISIR. Some special modes are indeed not offered in the ETC, and in the context of the ETCs v2.0 development this will be reviewed and offered if possible. Alternatively, it will be properly documented.
- iii) Windowing is implemented for HAWK-I and can be extended to other instruments upon request.

**UC44.R12:** Explore the implementation of a high time-resolution optical imaging mode particularly for ToO + RRM observations, for example, as part of the ongoing FORS upgrade.

FORS observing modes shall be upgraded respecting new and faster readout schemes and windowing of the CCD. By combining the faster readout schemes with windowing, the read-out times can be drastically reduced. For example, in long-slit spectroscopy when 10 instead of the 4000 pixels are read in the spatial direction the reduction in read-out time is about a factor 10-40. The FORS upgrade shall allow for the shortest exposure times that these are smaller or equal to 0.25sec (and with a goal of 0.1sec).

**UC44.R13:** Add flexibility for balancing allocated time for ToO and RRM programs across two or more periods. Explore the option to carry over a fraction of ToOs for very rare events for already allocated time.

It has been possible for several semesters to apply for ToO/RRM time within Large Programmes (for large requests) and within Monitoring programmes (for total requests below 100h). This is a very significant change with respect to the past, when these programmes had to be submitted and reviewed every semester, exposing them to possible alternate outcomes. This allows the users to have, in principle, two years of coverage. We believe this is sufficient to guarantee continuity for an approved programme and also to cover rare events. Longer extensions should be re-evaluated by the OPC via a new submission.