Herschel Users' Group

MINUTES OF THIRD MEETING

3 - 4 May 2011

Members Attending: E. Falgarone, P. Hartogh, L. Hunt, R. Kennicutt (Chair), L. Kristensen, J-F. Lestrade, G. Meeus , A. Noriega-Crespo, , G. Stacey, A. Weiss

HSC Staff Attending: G. Pilbratt, P. Garcia-Lario, A. Marston, B. Merin, L. Metcalfe, S. Ott

Apologies: M. Meixner, D. Rigopoulou

1. SUMMARY

The third meeting of the Herschel Users' Group (HUG) was held less than three months after its second meeting in February 2011. As such the discussions focussed on issues relevant to the upcoming OT2 Call for Proposals and updates on the issues raised in the previous HUG reports.

The HUG once again notes with satisfaction the high level of performance of Herschel, the ability of the team to recover from spacecraft anomalies, the efficient scheduling of observing time, and continuing improvements to the instrument calibrations and data processing software.

The main recommendations from this meeting are as follows:

1.1 With regard to allocation of observing time in the (last) OT2 round, the Committee endorses the consensus view of the Herschel Science Team that Priority 2 time (whether assigned in Cycle 1 or 2) should only be used to fill gaps in the main programme of Priority 1 observations, or to be available in case the lifetime of Herschel exceeds current estimates. As for the treatment of OT1 Priority 2 programmes in the upcoming OT2 proposal round, the HUG favoured one in which Priority 2 targets be maintained in the observing queue but released for new proposals in Cycle 2, with the understanding that any observations approved in Priority 1 be shared between the OT1 and OT2 proposers (Section 3.1).

1.2 The Committee recommends that the application form for OT2 time include questions which ask proposers to justify explicitly the uniqueness of Herschel observing capability for the proposed observations, and describe the robustness (or not) of the proposed observations in the event that only part of the programme is completed before the end of helium. Information on which regions of the sky are unavailable/available for scheduling future observations should also be included in the Call (Section 3.3).

1.3 The Committee notes with satisfaction that steps will be taken to reduce the number of duplications in OT2, via a combination of duplication checking of proposals in advance, clearer rules for awarding time to the highest-ranked proposal, and clearer guidelines for trimming of proposals by the HOTAC and its panels (Section 3.2).

1.4 The HUG notes the substantial ongoing improvements to the calibration, documentation, and data processing capabilities for the various Herschel observing modes. In particular:

1.4.1. PACS Spectroscopy: The HUG notes the ongoing improvements that have been made to the calibrations and pipelines for PACS spectroscopy, including prototype software for the processing of unchopped line scan maps. Important areas still needing attention include flatfielding for short-range spectroscopy, the unknown distortion of the spectral signal for extended sources, and the flux loss for point sources outside of the central spaxel (Section 4.1).

1.4.2. Spectral Mapping with SPIRE and PACS: The recent establishment of a SPIRE FTS User Support Group within the SPIRE ICC and HSC, and the upcoming Spectral Mapping Meeting at ESAC are excellent examples of focussed effort and teaming of ICC staff, HSC staff, and key observers, and the HUG hopes that these become models for similar initiatives in other areas (Section 4.2).

1.4.3. HIFI: The HUG notes the continuing improvements across the board on the calibration of HIFI observations, including the specific issues with sideband calibration, fringing, and baseline stability raised in its previous report. Recently an issue has arisen with the signal/noise of spectra of very bright continuum sources, which is serious for observations of planets and needs to be addressed (Section 4.3).

1.4.4. PACS/SPIRE Extended Emission: Considerable progress has been made in quantifying the calibrations of PACS and SPIRE for extended emission, and this information should be disseminated to observers. Some confusion remains among observers about whether the improvements in point source calibration translate directly into a better calibration of the surface brightness for extended sources. This may or may not be the case, and clearer information on the subject would be helpful (Section 4.4).

1.4.5. Documentation of Calibrations: Improvements to the documentation of instrument calibrations continue to be made in the instrument manuals, web pages, and software documentation and these are much appreciated by observers. The HUG reiterates its recommendation that the calibrations incorporate as practically as possible applicable bands, flux ranges, etc.

1.5 In order to obtain further feedback and more focussed feedback from observers the Committee recommends that the DPUG expand its Data Processing Users' Survey by contacting the 42 Key Programme PIs for the names of the key people on their teams with data handling and processing experience. The DPUG can then poll those individuals directly, using either a variant on the current survey or questionnaires which are customised to their particular interests (Section 5.1). The HUG also welcomes the initiation of calibration and data processing workshops (Section 5.2).

1.6 The Committee notes with great concern the cancellation by ESA of two of the three HSC staff hires approved earlier in the year. The HSC has delivered impressive performance on a lean staff, but the thin coverage of critical staff leaves it vulnerable during the most important and demanding phase of the mission (Section 2).

1.7 Over the coming months the balance of Herschel observing will shift from Key Programmes to OT1 and OT2 observers. The HUG needs to establish better means for communicating with observers who are not parts of large experienced teams. A first step will be a request for feedback from users, which will be circulated prior to the next HUG meeting, scheduled for late this year.

2. GENERAL

The meeting began as usual with a presentation on Herschel status by the Project Scientist (Göran Pilbratt) and the Science Operations Manager (Leo Metcalfe), and a copy of the presentation is posted on the HUG website. The spacecraft and instruments remain healthy. Anomalies (usually induced by Single Event Upsets or SEUs) continue to cause short periods of downtime and schedule rebuilding but the Herschel team has become adept at reacting to them. Observing efficiency remains high (typically 18-20 observing hours per day). The project has entered the phase where Key Programmes are beginning to be completed in significant numbers, and this trend should continue over the next 6 months.

At its meeting in February the Committee learned that three new staff positions at the HSC had been approved by ESA. At this meeting the HUG learned that these authorizations had been rescinded by ESA as part of a general cost-cutting action, and only one of these has been restored. The HUG has noted in the past how thinly stretched the HSC staff is, and the loss of the two positions cannot help but negatively impact observer support.

3. CYCLE 2 OPEN TIME CALL FOR PROPOSALS

The upcoming Cycle 2 Call for Proposals will be Herschel's last, and issues relating to the upcoming OT2 call were the highest priority topics for this HUG meeting. Within this area three important subtopics were discussed:

- How to treat the large pool of Priority 2 observations from Cycle 1 in the upcoming Cycle 2 call?

- How to minimize duplications between OT2 approved programmes (a major problem in OT1)?

- Whether to modify the proposal form to require more explicit information on important questions?

Ultimate responsibility for the guidelines and policies for Herschel time allocation rest with the Herschel Science Team (HST) and the Time Allocation Committee (HOTAC). However the HUG was asked for its opinions on a number of issues and questions which have been raised by the HST.

3.1. Handling of Cycle 1 Priority 2 Observations

G. Pilbratt presented a summary of the remaining time available for new projects and the time assignment options considered recently by the HST. The operational lifetime of Herschel remains uncertain by at least +-3 months, but current best estimates show that the currently approved Priority 1 (P1) observations (plus a small amount of GT2 time) consume most of the nominal spacecraft lifetime. This is comparable to the total time contained in unexecuted OT1 P2 observations. Thus the first important decision is whether to commit to completing the OT1 P2 observations, in which case no P1 time would be allocated in Cycle 2, or to award approximately 3 months (~1600-2000 hours) of Priority 1 observations in Cycle 2, with a much lower likelihood of completing most of the Priority 2 observations (from either Cycle 1 or 2). The strong consensus of the HST is for the second option, and the HUG endorses this choice.

A second difficult decision is whether to protect the OT1 P2 observations against duplication in Cycle 2. Opinions on this issue differed in the HST (we were told) and they differed within the HUG as well. Since the probability of completion for a P2 observation is small, protecting these observations may conceivably prevent potentially

important observations from being carried out. However opening approval OT1 P2 programmes to re-competition (after the proposal abstracts have been published) raises questions of fairness. After considerable discussion the HUG agreed that their favoured option would be one in which Priority 2 targets be released for OT2, but retained as filler and backup observations for the duration of the Herschel mission. In the rare event that the HOTAC approves Priority 1 time in Cycle 2 for duplicate observations, the overlapping data would be shared by the two OT1 and OT2 teams. Whilst this is hardly a clean or optimal solution the Committee believes that it offers the best compromise between allocating Herschel time for the highest-priority science, and respecting the interests of the OT1 proposers. Note that this option would offer OT1 proposers the opportunity to re-propose their observations and "upgrade" them to Priority 1, without the risk of losing their current Priority 2 status should the proposal not be successful.

3.2. Reducing Duplications in Cycle

The minutes from the HUG#2 meeting contain an extensive discussion of the problems caused by the large number of duplicated observations approved in Cycle 1. Resolving these duplications imposed an enormous workload on the Community Support Group at the HSC, and ultimately led to a considerable allocation of time to unproposed targets as compensation to teams who lost duplicated observations. In its report the HUG recommended several minor modifications to the time allocation process in Cycle 2, which would eliminate many if not most of these duplications.

In its presentation at this meeting the Community Support Group indicated that it planned to implement most of the HUG recommendations in Cycle 2. Details can be found in the HUG#2 minutes, but the key elements are to:

a. Perform cross-checking of AORs in proposals prior to the HOTAC meeting, to identify duplications in advance;

b. Discourage panels and the HOTAC from trimming proposals, and when they do to specify which AORs are to be dropped;

c. Award duplicated observations to the highest-ranked proposal (may require mechanism for ranking proposals across panels);

d. Update the duplications policy appropriately and call to the attention of proposers.

The HUG reiterates its support for these changes, and believes it will improve the fairness of the time allocation process as well as reduce the workload on the HSC and proposers in Phase 2.

3.3. Proposal Form and Supporting Documentation

During the presentation of the Community Support group a number of other minor modifications to the proposal form, instructions, and documentation were proposed. Some of these arise from previous HUG recommendations, and in any case the Committee strongly supports the following changes.

a. Add a question asking that proposers justify the uniqueness of Herschel for the proposed observations. Currently proposers are asked to address this question as part of their main scientific case, but listing this question separately will force proposers to address it, and will alert the HOTAC panels to consider it explicitly.

b. Add a question asking proposers to describe the robustness of the proposed observations against partial completion. Such robustness should not be a requirement for approving a proposal, but the panels need to clearly understand the impacts of partial completion when ranking the proposals.

c. Provide information to proposers on which regions of the sky are heavily subscribed already in terms of Herschel visibility (and hence are less likely to be scheduled), and which are relatively open.

4. INSTRUMENT-SPECIFIC ISSUES

Given the short time since the last HUG meeting the Committee did not engage in an end-to-end review of the status of instrument calibrations, documentation, and data processing. Nevertheless the HSC presented comprehensive updates in all of these areas, and it is clear that ongoing improvements are being made on nearly all of the topics raised in the last HUG report. This is not entirely surprising because it is clear that most of the priorities identified by this Committee are also shared by the ICCs and the HSC scientists.

In this section we briefly summarise topics which were discussed at the meeting. Most of these were follow-up on the highest priorities identified earlier, along with a new questions or issues.

4.1. PACS Spectroscopy

The HUG notes the ongoing improvements which have been made to the PACS spectroscopic calibrations and pipelines, including prototype software for the processing for the processing of unchopped line scan maps. A few issues remain which require continuing attention.

a. The flat fielding task implemented in HIPE 7 does not work properly for short-range spectroscopy. We are aware that this problem is being addressed, but would like to give this a high priority.

b. Another common problem is the unknown distortion of the spectral signal for extended sources, so that the following questions remain: how does the spectral profile change when observed in a different spaxel? How can the spectrum outside the central spaxel be properly flux calibrated? A good characterisation of distortion and calibration issues should also be a primary task.

c. Similarly, for point sources that are not well centred, it would be good to characterise the effect in change of spectral shape and flux loss, so that a correction can be applied when this happens to a certain observation.

4.2. Spectral Mapping with SPIRE and PACS

As discussed in previous HUG reports spectral mapping of extended sources poses perhaps the most challenging remaining tasks for SPIRE and PACS. This need has been recognised by the ICCs and the HSC, and a number of steps to address them. The SPIRE ICC and the HSC have set up a FTS User Support Group, which will work within the current ICC and HSC groups to provide focussed effort and support for proposal preparation, AORs, calibration, and data analysis with SPIRE FTS data. The HUG welcomes this development.

On a somewhat broader level the HSC, Data Processing Users' Group (DPUG), and PACS and ICCs have organised a Spectral Mapping Meeting for 26-27 May at ESAC, to bring together ICC and HSC staff, with holders of large Herschel observing programmes, to discuss the current status and plans for each instrument and discuss ongoing work on the data processing.

Both of these activities are much in the spirit of the initiatives ("tiger teams", interest groups, etc) that the HUG has strongly recommended be initiated, and we hope that they serve as successful models which can be extended to other areas. As described later in the report such extensions indeed are planned by the DPUG.

4.3. HIFI:

The HUG notes the continuing improvements across the board on the calibration of HIFI observations, including the specific issues with sideband calibration, fringing, and baseline stability raised in its previous report.

Recently it was discovered that processed spectra of bright continuum sources (e.g., bright planets) contain features which are considerably larger than would be expected from the signal/noise estimates given in HSPOT. This raises questions about the origin of the "noise" and can lead to serious errors in the estimation of exposure times.

4.4. Mapping of Extended Emission with PACS and SPIRE:

Considerable progress has been made in quantifying the calibrations of PACS and SPIRE for extended emission, and this should be disseminated to observers. There is some confusion among observers, who believe that the improvements in point source calibration translate directly into a better calibration of surface brightness for extended sources. This may or may not be the case, and therefore clearer information on the subject would be helpful. On the PACS team, for instance, there is a consensus on techniques, in the sense that if the correct procedures and point-spread-functions (PSFs) are applied to the data, when comparing the calibration of the integrated fluxes and surface brightness (over some range) with other instruments (e.g. MIPS), the results are outstanding. What is not yet clear, however, if whether this consistency applies over a wide range of surface brightness [from a few MJy/sr to thousands] and environments [from the diffuse ISM to compact but extended sources], and whether the maps over this range are sensitive to the reduction pipelines applied. This is especially important for applications involving fitting of dust SEDs, where even modest uncertainties at the 10-20% level can have enormous effects on derived parameters.

4.5. Documentation of Calibrations

Documentation of Calibrations: Improvements to the documentation of instrument calibrations continue to be made in the instrument manuals, web pages, and software documentation and these are much appreciated by observers. The HUG reiterates its recommendation that the calibrations incorporate as practically as possible applicable bands, flux ranges, etc.

5. DATA PROCESSING AND DPUG

The Committee received detailed presentations from S. Ott and the DPUG Chair (B. Merin) on the status of HIPE, data processing for individual observing modes, and the coordination of activities within the Herschel team and with the DPUG. The Committee was gratified to see evidence for continued progress in nearly all areas, and in particular for an increased engagement with observers, both via the HUG itself and within individual working groups.

Most of the discussion following these presentations addressed how to improve feedback from observers to the HSC further yet.

5.1. DPUG Survey

At the February HUG meeting the Committee received an interesting presentation on the early results from the DPUG Users' Survey. The on-line questionnaire was sent to lead authors of the Herschel SDP papers, and provided very useful feedback on the implementation and use of HIPE and provided limited feedback on the more specific experiments of observers. Since that meeting only a few other responses to the survey have been received, raising the question of what to do next. Despite the valuable information gained the responses were limited both in numbers and in the detail regarding specific packages and problems encountered. Questions also remain about whether survey reached the key people involved with data processing on the teams.

To address these problems the HUG suggests a slightly different approach. In order to reach the key HIPE users we suggest that the DPUG chair contact each PI of a Key Programme and ask them to email back the names, email addresses, and responsibilities of those people in their project which they believe are best placed to provide in-depth feedback. The DPUG can then contact those individuals, using either a modified version of the current DPUG survey or a questionnaire customised to their use of Herschel instruments and software. This should put the DPUG in touch with key people, and over time may identify particularly knowledgeable and articulate members of the observer communities who can be co-opted for other activities such as workshops, interest groups, etc. The HUG would be happy to lend its name and support to these initial contacts, but obviously the follow-up is a matter for the DPUG.

5.2. Working Groups

In addition to the surveys mentioned above the DPUG is organising a series of activities and working groups in an effort to improve communications with observers and networking between groups with common interests. Upcoming meetings and activities (May - June) include astronomer testing of HIPE 7, the spectral mapping workshop mentioned earlier, and a HIPE forum. Most of these types of events will be webcast, allowing for participation by observers who cannot be physically present at the meetings. The DPUG Chair also discussed expanding the activities of working groups by organising web-based discussion meetings. Suggested topics include PACS spectroscopy calibration, HIFI calibration, PACS extended emission, and processing of large-area maps. These priorities are well aligned with those communicated to the HUG by observers, and we hope that they will move forward.

As part of the planning of the agendas for these discussions the organiser might check Helpdesk traffic to identify frequently asked questions and problems, so the solutions to these issues can be circulated to a larger group of observers. In some cases it might even be useful to disseminate this information in writing, either via email or by posting on the relevant web pages.

6. FUTURE HUG MEETINGS AND ACTIVITIES

During its first year the HUG adopted a relatively high meeting frequency, so that its meetings were well-timed with respect to observing time calls and other project milestones. With the completion of the last observing time call this summer the Committee will revert to its originally planned meeting frequency of twice per year. The next meeting will be held at ESAC during the period October - December 2011.

Over the next several months another important transition in the project will take place, with the balance of observing time shifting from the Key Programmes to the OT1 and OT2 observers. The Committee is concerned that it establishes better mechanisms for maintaining contact with the experiences and concerns of the general observers. Prior to its next meeting it will invite input from all observers (probably announced via a Herschel e-News item), and further means of communication will be discussed at that meeting.

7. ACKNOWLEDGEMENTS AND THANKS

The HUG wishes to express its thanks to Göran Pilbratt and the HSC staff for hosting a productive and smooth running meeting.