HERSCHEL SPACE OBSERVATORY

Announcement of Opportunity for Open Time (OT2)

Policies and Procedures

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Policies and Procedures

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Chapter 1. Introduction

1.1. Overview

The Herschel Space Observatory (aka Herschel) was successfully launched on 14 May 2009. It has been designed to provide the astronomical community with a facility to carry out routine astronomical observations for a period of at least three years. General information about the Herschel mission, the observatory, its instruments, and the ground segment is provided in the Herschel Observers' Manual, and more general additional information is provided on the HSC website .

The majority of Herschel's observing time is made available to the astronomical community by the traditional route of calls for observing proposals, followed by peer review, in response to Announcements of Opportunity (AO), issued by the Herschel Science Centre (HSC). The observing time consists of Guaranteed Time (GT) and Open Time (OT). The GT (32% of the available time) is owned by contributors to the Herschel mission, mainly the science payload consortia. The remainder time is OT, that is awarded in a standard competitive manner to investigators worldwide. All observing proposals are reviewed by the Herschel Observing Time Allocation Committee (HOTAC).

This is the second (and final) in-flight Herschel AO, and currently open time (OT2) observing proposals are solicited for. The guaranteed time part (GT2) has already been conducted. The allocation of OT2 observing time is the subject matter of the present 'Policies and Procedures' document.

There is only one 'size' of proposal (as opposed to in OT1 where there were two: 'large' proposals for programmes requiring observing time in excess of 100 hours, and 'normal' proposals, for observing programmes requiring up to 100 hours). All proposals will be subjected to scientific and technical evaluation of the proposed observations, and checking with respect to the 'Reserved Observations List' (ROL) which together with the duplications policy is considered part of the AO package.

There is the possibility - under certain conditions - to apply also for XMM-Newton observing time in the current OT2 AO process (as was the case in OT1).

Responding to the AO is a two-phase process. Responses to this call consist of so-called Phase 1 proposals including Astronomical Observation Requests (AORs). After peer review by the HOTAC, successful proposers will have the opportunity and/or obligation to update their AORs under the technical advise of the HSC according to the recommendations made by the HOTAC entering them into the Herschel database in their final version (Phase 2).

Information about data products and proprietary time is provided as well as special information for investigators based in the USA only.

For an overview of the contents of this document Chapter by Chapter see below in 'Scope'.

1.2. Scope

The present version of this document provides the rules applicable to the OT2 AO and the procedures to be followed to apply for observing time with Herschel as a response to the call. All OT2 proposers are required to follow the policies and procedures described in this document.

A summary description of the contents of this document section by section is as follows:

- The full AO package is described in Chapter 2.
- The detailed AO schedule is provided in Chapter 3.
- An overview of the total observing time available, and information about time already allocated is provided in Chapter 4.
- Information about OT2 programmes and the possibility to apply for XMM-Newton observing

time is further explained in Chapter 5.

- Details of the Phase 1 proposal submission procedure are given in Chapter 6.
- Details of the evaluation and selection processes are given in Chapter 7.
- The entry of the final observation details, i.e. the Phase 2 process, and the reserved observations list are described in Chapter 8.
- Post-call modifications to approved proposals are addressed in Chapter 9.
- Information regarding further calls is provided in Chapter 10.
- Information on data products, programme deliverables, and proprietary rights can be found in Chapter 11.
- Finally, special information which is applicable only to investigators based in the USA can be found in Chapter 12.

1.3. Acronyms

The following acronyms are used in this document:

- AO : Announcement of Opportunity
- AOR : Astronomical Observation Request
- AOT : Astronomical Observation Template
- DA : (NASA) Data Analysis
- DDT : Director's Discretionary Time
- D/SRE : (ESA) Director of Science and Robotic Exploration
- ESA : European Space Agency
- ESO : European Southern Observatory
- FAQs : Frequently Asked Questions
- GT : Guaranteed Time
- HCNE : Herschel Confusion Noise Estimator
- HCSS : Herschel Common Science System
- HDC : Herschel Duplication Checker
- HIFI : Heterodyne Instrument for the Far Infrared
- HIPE : Herschel Interactive (data) Processing Environment
- HOSS : Herschel Optical System Scientist
- HOTAC : Herschel Observing Time Allocation Committee
- HROST : Herschel Reserved Observations Search Tool
- HSA : Herschel Science Archive

- HSC : Herschel Science Centre
- HSpot : Herschel observation planning tool
- ISO : Infrared Space Observatory
- KP : Key Programme
- LP : 'Large' Programme (in OT1)
- MS : Mission Scientist
- NASA : National Aeronautics and Space Administration
- NHSC : NASA Herschel Science Center
- NP : 'Normal' Programme (in OT1)
- OT : Open Time
- PACS : Photodetector Array Camera & Spectrometer
- PDF : Portable Document Format
- PI : Principal Investigator
- ROL : Reserved Observations List
- RSP : Routine Science Phase
- SDP : Science Demonstration Phase
- SMP : Science Management Plan
- SPIRE : Spectral and Photometric Imaging Receiver

Chapter 2. OT2 AO package

The AO OT2 package consists of 'administrative' documentation, manuals, the necessary tools, and supporting documentation and information.

2.1. AO documentation

The OT2 AO package consists of the following Documentation:

- Herschel OT2 Announcement of Opportunity: This is the formal letter from the ESA Director of Science and Robotic Exploration inviting the scientific community to apply for the Herschel OT2 observing time.
- Executive Summary: Summarises the document package, providing the reader with an overview and help on where to find the relevant information.
- 'Policies and Procedures' (this document): The 'administrative' part of the call documentation, providing all necessary information about the policies adopted and the procedures to be followed.
- Herschel Observers' Manual: Describes Herschel as an observatory facility, providing the background information that every proposer needs.
- HIFI Observers' Manual: Provides instrument specific information and describes how to use HIFI to perform observations.
- PACS Observers' Manual: Provides instrument specific information and describes how to use PACS to perform observations.
- SPIRE Observers' Manual: Provides instrument specific information and describes how to use SPIRE to perform observations.
- SPIRE/PACS Parallel Mode Observers' Manual: Provides specific information and describes how to use SPIRE and PACS simultaneously to perform so-called 'parallel mode' observations.
- HSpot Users' Guide: Provides information about the Herschel observation planning tool HSpot and how to use it for the preparation of observing proposals.
- The 'Reserved Observations List' (ROL) which is searchable using the 'Herschel Reserved Observations Search Tool' (HROST, see below in 'AO tools'). Information on the accepted observations contained in the GT and OT Key Programmes, the GT1 and OT1 programmes, as well as the GT2 programmes (proposal id, title, PI name and institution, and links to the abstracts) is provided in the AO web pages, together with instructions on how to access their associated AORs through HSpot as well as on how to search the database of Reserved Observations to avoid potential duplications.

Furthermore, there will be a special online only AO document called AO Latest News, available through the HSC website. It will provide late additions or corrections to the documentation package after the issue of the call for proposals. Proposers should consult this web page regularly.

2.2. AO tools

The AO OT2 package also includes the following Tools:

- HerschelFORM PDFLaTeX package: This is the LaTeX package that must be used for OT2 pro-

posal generation, this is mandatory. It consists of a template proposal form and associated LaTeX class and style files to ensure that all proposals will share a standard format and follow the page limit rules defined in this document. It is based on the ESOFORM LaTeX package, originally developed by the ESO User Support System (USS) Department, adapted to Herschel needs. The OT2 version 4.0 must be used.

- HSpot: This is the software tool for planning Herschel observations and submitting proposals, which has been built starting from the tool originally developed for the Spitzer Space Telescope called 'Spot', thus 'Herschel-Spot' or simply 'HSpot'. HSpot allows you to design, plan, and optimise an observation, and to determine how much time will be required to execute it. In addition, it also includes visualisation tools to permit the general observer to see how proposed Herschel observations will be laid out on the sky. The look and feel of this tool is that of the Spitzer tool, but it has been fully adapted for Herschel. It also performs background and confusion noise estimation. HSpot can be downloaded from the HSC web pages.The OT2 version 6.0.0 must be used.

- Herschel Reserved Observations Search Tool (HROST): This is a java-based web tool developed at the HSC to search the so-called 'Reserved Observations List'. This is a list consisting of those observations already accepted, which cannot be duplicated by OT2 proposals to be submitted (except for OT1p2 observations, see Section 5.5).

- Herschel Duplication Checker (HDC): A standalone web-based tool that identifies all AORs in your proposal that potentially duplicate other approved science observations which are part of the ROL.

2.3. Associated documentation and tools

In addition to the main AO documentation and tools listed above, other complementary information and tools are also available through the HSC web pages. Among them:

- 'Herschel Background Estimator': This is the infrared background estimator provided in HSpot, which is an extended version of the tool developed for the Spitzer Space Observatory. The background estimator provides the total brightness at a given sky position, as well as the breakdown into its components over the entire Herschel wavelength range.

- 'Herschel Confusion Noise Estimator' (HCNE): The HCNE provides estimates for the confusion noise (i.e. uncertainty of flux determination due to the sky background) for the photometric bands of the Herschel PACS and SPIRE instruments. The confusion noise is specific for the selected observing mode and is derived considering the two main astrophysical components in the far-infrared: the Galactic cirrus and the cosmic infrared background.

- Presentations given at the Herschel First Results Symposium (aka ESLAB 2010) held on 4-7 May 2010 and several other workshops and symposia can be found under Conferences/Workshops on the HSC website.

- A Herschel publications list and direct links to the Astronomy and Astrophysics Herschel Special Issues can be found under Scientific Publications on the HSC website.

Chapter 3. OT2 AO schedule

The sequence of dates for the current second (and final) in-flight Announcement of Opportunity (AO) for Herschel Open Time (OT2) is as follows:

- 9 June 2011: The Herschel OT2 Announcement of Opportunity is issued. Phase 1 OT2 proposals can be submitted.
- 20-21 June 2011: A Herschel Observation Planning Workshop will be organised by the HSC in ESAC, Madrid, and simultaneously by the NHSC in IPAC, Pasadena, CA.
- 15 September 2011 12:00 UT: Submission deadline for Phase 1 OT2 proposals. Start of technical and HOTAC evaluation process for these proposals.
- 23 September 2011: Submission deadline for NASA Data Analysis (DA) funding for investigators based in the USA only, see Chapter 12.
- 8-11 November 2011: HOTAC meeting, after which the recommendation regarding OT2 proposal time allocation will be provided to ESA's Director of Science and Robotic Exploration (D/SRE) for final decision.
- 24 November 2011: Announcement of approved OT2 proposals and start of Phase 2 data entry.

Note that 12:00 UT refers to 12:00 hours (noon) Universal Time (UT=GMT). Central European Summer Time (CEST) is UT+2 hours on 15 September 2011.

The current AO process is the final call for Herschel observing programmes.

Chapter 4. Observing time

4.1. Total amount of observing time

Herschel is designed to provide at least three years of Routine Science Phase (RSP) observations after the initial mission phases including the Science Demonstration Phase (SDP, see the Herschel Observers' Manual). The current best estimate of the mission lifetime still has a significant uncertainty, being in the range 3.5-4 years, but providing confidence in achieving this (see further Chapter 5).

The total available observing time to be allocated to GT and OT observers in the nominal three year RSP is 19,776 hours. This figure is obtained from 21 hours schedulable observing time per day for 3x365 days, minus 14% which has been reserved for observatory calibration and engineering observations; i.e. (21 x 3 x 365) x 0.86 = 19,776 hours.

Although there are many conceivable reasons for why the actual amount of available observing time could differ from this number, in both positive and negative sense, the nominally available observing time is considered realistic based on actual in-flight performance and has been adopted for the conduction of the AO process.

4.2. Guaranteed and Open Time

As it has already been mentioned, the Herschel observing time is divided into Guaranteed Time (GT) and Open Time (OT). Of the total available observing time 32% is GT, i.e. 6328 hours for the 3 year mission. The remaining 68% of the time is awarded as OT, i.e. 13448 hours for the 3 year mission. A maximum of 4% of the Open Time can be allocated in programmes as Director's Discretionary Time (DDT).

The GT holders and their allocated times are as follows:

- Instrument Principal Investigators (PIs) each own 30% of the GT, thus each instrument PI owns 1898 hours of GT.
- The Herschel Science Centre (HSC) owns 7% of the GT, thus the HSC owns 443 hours of GT.
- Mission Scientists (MSs) each own 0.6% of the GT, thus each MS owns 38 hours of GT.
- The Herschel Optical System Scientist (HOSS) owns the same amount of time as an MS, i.e. the HOSS owns 38 hours of GT.

4.3. Allocation of observing time

The available Herschel observing time will be allocated in three AO cycles. In each cycle there will be GT and OT, GT is awarded first, followed by OT. The first cycle was the pre-flight Key Programmes (KP) cycle, which was conducted in 2007. The second cycle, which was the first in-flight cycle and designated AO-1, was conducted in 2010. The current cycle is the second and final in-flight cycle, designated AO-2.

4.3.1. Key Programme observing time

The concept of Key Programmes (KPs), is an important element of the Herschel science mission, and was introduced in a dedicated pre-launch AO. The KP concept is a mechanism to ensure that large programmes, requiring a great deal of observing time (in practice in the range 100-900 hours), could be proposed, selected, and executed. These programmes are intended to exploit the unique

Herschel capabilities, addressing important scientific issues in a comprehensive manner, generating well characterised data sets of high archival value and the need for follow-up observations.

The three major GT owners, the instrument PIs, were required to spend a minimum of 50% of their GT on Key Programmes, with no specified maximum, while there was no such requirement on the remaining minor GT holders. The outcome of the GT KP process is that in excess of 90% of the total available GT time has been spent in the form of Key Programmes.

Regarding the OT, the HOTAC was free to approve proposals requiring up to a maximum of 40% of the total nominally available OT in the form of Key Programmes and this was actually the amount of time eventually allocated.

In the end by coincidence 21 GT as well as 21 OT Key Programmes were awarded observing time. Altogether in the KP AO cycle approximately 11,000 hours of observing time were allocated.

4.3.2. AO-1 observing time

In the AO-1 cycle, about 550 hours were allocated in GT1, and a further just under 6600 hours in OT1.

The GT1 time is shared between 33 observing programmes, as described in GT1 Programmes web page.

The OT1 time is shared between 241 observing programmes, as described in OT1 Programmes web page. The OT1 time was divided between OT1 priority 1 (OT1p1) time, constituting almost 5000 hours, and the remaining time designated OT1 priority 2 (OT1p2).

4.3.3. AO-2 observing time

In the current AO-2 cycle, about 350 hours have been allocated in GT2, and the remainder of the available observing time will be offered as OT2.

The GT2 time is shared between 32 observing programmes, as described in GT2 Programmes web page.

The OT2 time allocation is addressed in Chapter 5.

4.4. AOTs and AORs

Proposers may apply to use any of the pre-defined instrument observing modes described in the Observers' manuals. These pre-defined observing modes or 'Astronomical Observation Templates' (AOTs) are made available through HSpot. Once an AOT has been chosen, the detailed observing parameters for that particular observing mode need to be entered using HSpot resulting in an 'Astronomical Observation Request' (AOR). AORs are the primary units of Herschel observing time.

4.5. Observing constraints

4.5.1. Scheduling strategy

Herschel observing will be conducted autonomously without real-time interaction. This means that observers are not expected to be present at the HSC while their observations are carried out.

All observations have to be specified in full detail by the proposers using HSpot well in advance to the time when the observations will actually be executed. For a variety of reasons including efficiency, sky coverage and instrument operation constraints, Herschel mission planning will distribute

the available observing time among accepted proposals on a 'per observation' (AOR) basis. This is the way other space-based facilities like the Spitzer Space Telescope and the Hubble Space Telescope operate, and it was also the case of Herschel's precursor, the Infrared Space Observatory (ISO).

Similarly, it must be emphasised here that - for operational reasons - no guarantees can be given that any particular observation (AOR in the case of Herschel) within an accepted proposal will, in fact, be executed, although every attempt will be made to achieve this objective. Note that no grades are assigned to individual AORs accepted for execution. This means that the final scheduling sequence will be based solely on maximising the telescope observing efficiency.

In addition to the top priority of producing efficient schedules, observations belonging to an earlier AO have also a higher priority over observations from a later AO (except in the case of fixed time observations and of priority 2 observations, see below). This is true also within an AO, the GT observations have priority over OT observations in the same AO (but not over OT from an earlier AO). Thus, as examples, the KPs have priority over GT1/OT1, GT1 over OT1, and OT1p1 has priority over GT2 as well as over the (yet to come) OT2p1 proposals, while the already approved OT1p2 proposals and the new OT2p2 proposals that will be approved in this AO will have the lowest priority, and as such, they will be considered only as schedule fillers at any moment.

4.5.2. Spacecraft 'slewing' overhead charges and time constrained observations

Slew times between observations are charged over all AORs as a flat 3 minutes overhead. This overhead time is automatically applied to all non-time constrained observations entered through HSpot.

However, time constrained observations can also be defined using HSpot. These are:

- All observations entered in HSpot using the timing constraints window.
- All observations entered in HSpot using the Group/Follow-on constraints, with the exception of concatenations
- Observations requesting an orientation constraint or a chopper avoidance angle.

Time constrained AORs reduce the flexibility of scheduling and the overall observing efficiency. For this reason they are further penalised, in terms of overhead charges, with a 10 minutes slew overhead in HSpot, instead of the 3 minutes applicable to non-constrained AORs. Programmes with heavily constrained AORs will need to be accompanied by a compelling justification.

Concatenated observations are charged 3 minutes overhead per AOR, unless observing the same target (no slew, see also below), then only 3 minutes overhead for the entire chain is charged.

If a concatenated chain is time constrained, then the overhead charge is 10 minutes for the first AOR, and 3 minutes for each following AOR, unless observing the same target, then only 10 minutes for the entire chain is charged.

Concatenation between 2 AORs is permitted:

- For scientific reasons as motivated in the proposal.
- For nearby targets. Two targets are nearby if they are separated in the sky by less than 1 degree. A target can be celestial (fixed position) or a solar system object (moving position).
- Using the same sub-instrument only: the applicable 'sub-instrument' definitions are:
    - The PACS photometer and spectrometer are separate 'sub-instruments';

- The SPIRE photometer and spectrometer are separate 'sub-instruments';
- The SPIRE PACS parallel mode is a separate 'sub-instrument';
- The seven HIFI LO bands are separate 'sub-instruments';

4.5.3. Duplicate observations

In order to preserve the overall science efficiency of the observatory, duplicate observations will in general not be permitted. Checks for potential duplications (see the Herschel Duplication Policies document) between your planned observations and already approved AORs contained in the so-called 'Reserved Observation List' will be made by the HSC during the technical review of submitted proposals.

The 'Reserved Observation List', available in the HSC web page, contains all observations of the GT and OT Key Programmes and of the GT1, OT1, and GT2 proposals previously approved by the HOTAC that cannot be duplicated by any OT2 programme (except for OT1p2 observations, see Section 5.5). The list can be inspected by OT2 proposers using the Herschel Reserved Observations Search Tool (HROST).

HROST enables you to search all the AORs included in the current Reserved Observations List in a simple fashion through a java-based web interface (requires Java 1.6 or higher). Once you start the application you can make queries by entering a position in the sky and a search radius as input and the tool will return as output a summary description of all AORs in the database overlapping your search area. Potential duplications found using this tool can be further investigated in detail using HSpot. You can access and download those AORs of your interest by using the option 'View accepted proposals' under the 'File' menu in HSpot.

Additionally, for the OT2 call the Herschel Duplication Checker (HDC) is provided. It is a standalone web-based tool that identifies all AORs in your proposal that potentially duplicate other approved science observations which are part of the ROL.

The HOTAC will be informed of the existing duplications in each round of submissions. Duplicating AORs found in the newly submitted proposals will be removed if the duplication is with observations already approved in previous calls as they always take priority (with the exception of OT1p2 observations, see Section 5.5). In the case of duplications among the newly submitted proposals, priority will be given to those observations in the proposal which received the highest grade in the review process. The higher ranked proposal will be allowed to keep the observations while the other(s) will have to remove the duplicated AOR(s). The results of this duplication analysis will be communicated to the users by the HSC and the time allocation reduced accordingly.

The AORs belonging to OT1p2 proposals will not be blocked for OT2 proposers. Conceivably, they could be part of a proposal submitted in AO-2. If such a proposal is awarded priority 1 time, the successful proposer will have to share the data with the original OT1p2 proposer (see more details in Section 5.5. and in the Herschel Duplication Policies document).

4.6. Targets of Opportunity

A Herschel target is considered a 'Target of Opportunity' (ToO) if the observations are linked to the occurrence of an event whose exact timing and/or location in the sky are unknown at the time of the proposal submission deadline. ToO targets include objects which can be identified in advance but which undergo unpredictable changes (e.g. some recurrent novae) as well as objects that can only be identified in advance as a class (comets, novae, supernovae, gamma ray bursts, etc). Herschel proposals consisting of ToO targets in full or in part must present a detailed observing plan for the observations to be performed if the triggering event occurs. A generic name and dummy coordinates (if necessary) will be entered through HSpot for this purpose. Integration times will be estimated as a function of the brightness assumed for the event. Backup strategies can also be proposed (e.g. for not-so-bright comets). The triggering conditions and the reaction times necessary to accomplish the

scientific goals proposed must be clearly described and justified in the proposal.

The HOTAC may recommend the tentative allocation of observing time provided these conditions are met and the reaction times required are compatible with Herschel operational constraints (typically a minimum of 5-7 days, although under exceptionally favourable circumstances reaction times of 3-4 days can be achieved, and this will be tried only for critical ToOs). It will be the responsibility of the proposer to urgently submit a ToO activation request to Helpdesk in case the conditions approved by HOTAC are satisfied. He/she will provide as well all the necessary information to initiate the preparation of the observations updating the details of the observations originally included in HSpot, if needed, so that the observations can be programmed at the earliest possible time, considering the reaction times solicited in the proposal.

In the event of a sudden phenomenon of a nature that could not have been anticipated, Herschel observations can also be requested through Director's Discretionary Time (DDT).

Chapter 5. OT2 Time Allocation

5.1. OT2 overview

In the OT2 process all remaining Herschel observing time will be awarded. At the present time there is some uncertainty as to exactly how much this is. By now Herschel has a known track record with respect to observing efficiency, thus the remaining main contribution to this uncertainty is the overall mission lifetime uncertainty.

At all times during the mission it is necessary to have a 'buffer' of at least 6 months of observations available for scheduling in the mission planning process. Initially this was an estimate, but it has been validated as a good number by actual in-flight experience. What 'at all times' means is that also at the end of the mission there will be no less than 6 months-worth of observations remaining. These observations will thus never be executed, but they do need to be allocated observing time.

Both of these aspects, the uncertainty in the amount of available observing time and the fact that an 'over-allocation' of at least 6 months of observations is required, must be taken into account in the OT2 process.

5.2. Mission lifetime

Since the OT1 process the lifetime expectation has varied considerably. For the purpose of the OT2 process, an indication will be provided in this document. In order to use the most accurate number at hand the final decision about how much observing time to actually allocate in the HOTAC process will only be taken close to the HOTAC meeting (to be held 8-11 November 2011) using all information and analysis then available.

At the moment all available information is being consolidated, and information as appropriate regarding mission lifetime will be prepared and posted on the AO Latest News web page on the HSC website. This page will provide late additions or corrections to the documentation package in general, and should be regularly consulted. The intention is that a note will be posted before the summer holiday season.

5.3. OT2 observing programmes

OT2 observing time will be allocated by the HOTAC in two different categories: priority 1 and priority 2, designated OT2p1 and OT2p2, respectively. The difference between the two can be described as follows:

- OT2p1: These are observing programmes that under nominal conditions are expected to be executed fully, or close to fully.

  This thus means that the OT2p1 observing programmes can be of a large variety with limited constraints, including programmes needing (near) completion of their observations in order to be viable scientifically.

- OT2p2: These are observing programmes that will be used to ensure efficient scheduling. This means that on average the completion percentage will be low, but can be expected to be strongly varying between programmes depending on a large number of unpredictable parameters.

  This thus means that the OT2p2 observing programmes will be much more constrained:

  - In particular they need to be very robust with respect to partial completion. In effect the observations individually need to be viable scientifically.

  - They must not be fixed-time observations, or have a dependency on the time of execution of

another observation.

- They must not be observations to be 'triggered' by an event of some sort, e.g. they cannot be 'ToO-like' observations.

Although it was failed to be communicated in the 'Policies and Procedures' document at the time, a similar scheme was also used in OT1 where observing time was awarded by the HOTAC as priority 1 and priority 2, designated OT1p1 and OT1p2, respectively.

5.4. OT2 available observing time

The amount of available OT2p1 time is the amount of time between when we expect the currently available observations to have been executed and the nominal lifetime, minus a 'scheduling allowance' estimated to be about 2 months. In the amount of currently available observations all observations except the OT1p2 observations will be taken into account (see also Section 5.5).

The current best estimate as to when all existing Herschel observations (thus not counting OT1p2 observations) will be executed is end of June 2012. In order to put numbers in for illustration end of February 2013 will be used as the assumed end of mission, plus the fact that Herschel executes approximately 550 hours of HOTAC-approved science observations per month. (It should be noted that the actual mission lifetime could be both shorter and longer.)

It should also be remembered that as stated earlier it is required to 'over-allocate' by no less than 6 months beyond the end of the mission, and here the uncertainty in the predicted mission lifetime needs to be taken into account.

5.4.1. OT2p1 observing time

With the above assumptions the amount of OT2p1 observing time available for allocation becomes:

- Science operations from end June 2012 to end February 2013, this is 8 months.
- The 'scheduling allowance' of 2 months (to make (near) completion viable) needs to be deducted, thus 6 months remaining.
- Since 550 hours can be allocated per month, a total of 3300 hours can thus be offered as OT2p1 observing time.

It should be noted that the amount of OT2p1 time, 3300 hours on the assumption of end of life by the end of February 2013, increases or decreases by 550 hours for every month of longer or shorter lifetime.

5.4.2. OT2p2 observing time

As opposed to the OT2p1 observing time, the amount of OT2p2 observing time is independent of mission lifetime. However, it is affected by the magnitude of the mission lifetime uncertainty.

With the above assumptions the amount of OT2p2 observing time available for allocation becomes:

- The 'over-allocation' of no less than 6 months beyond the predicted mission lifetime need to be covered. Allocate 6-7 months.
- The uncertainty in the predicted mission liftime needs to be covered (need 6 months of 'over-allocation' also in the case of the mission turning out to be longer than nominal). Allocate 1-2

months, cumulative 8 months.

- The 'scheduling allowance' of 2 months (to make (near) completion viable) not allocated to OT2p1 needs to be added. Allocate 2 months, cumulative 10 months.
- Almost 3 months of OT1p2 time has already been allocated, this needs to be subtracted. Thus a negative allocation of 3 months, cumulative 7 months.
- Since 550 hours can be allocated per month, a total of 3850 hours can, and must, thus be offered as OT2p2 observing time. The already allocated OT1p2 observing time thus remains as part of the required 'over-allocation'.

5.4.3. OT2p1 and OT2p2 observing time summary

As described in the above two subsections, with an assumed mission lifetime by the end of February 2013, with an uncertainty of plus/minus 1-2 months, the following amounts of observing time will be available for allocation by the HOTAC in the OT2 call:

- 3300 hours of OT2p1 time (increases or decreases by 550 hours for every month of longer or shorter lifetime), plus
- 3850 hours of OT2p2 time (independent of lifetime),

Although there is no maximum or minimum on the amount of observing time than can be proposed for, it is clear that the scientific motivation for an observing programme needing a large amount of observing time has to be correspondingly high and well justified.

Since more than half of the total nominally available observing time for Herschel has already been allocated to large programmes in the form of GT and OT KPs and OT1 LPs, this requirement is strongly emphasized in the current AO.

5.5. OT1p2 programmes

As is clear from the above the already allocated OT1p2 observing programmes are part of the pool of 'over-allocation' programmes, which comprises a total of 10 months-worth of observing. In the case where everything is nominal approximately 2 months would be observed, thus approximately 20%. Should the mission lifetime be longer/shorter than the nominal, then this figure would become higher/lower.

However, since only a minor fraction of the OT1p2 observations can reasonably be expected to be executed, the fact that the associated AORs 'block' potential observations from being proposed in OT2 is potentially disadvantageous (and against the adopted policy for Herschel) to the overall science return of the Herschel mission. It has therefore been decided to introduce special provisions for the OT1p2 observing programmes and associated observations as follows:

- The AORs associated with the approved OT1p2 observations will not be blocked for OT2 proposals. They will be visible in HROST, but indicated as priority 2.
- The original proposer can, but is not under obligation, repropose the OT1p2 observations in OT2. If the OT2 proposal is awarded OT2p1 time the OT1p2 time is lost. In the case some of the observations have already been executed, they will be counted as part of the new proposal time allocation. If the OT2 proposal is not awarded OT2p1 time, the AORs remain as OT1p2 observations. However, see next bullet.
- Since the AORs are not blocked it is conceivable that they could be part of a proposal submitted by someone else. If such a proposal is awarded OT2p1 time, the successful proposer will have to

share the data with the original OT1p2 proposer. They both get the data equally, and with the same proprietary rights.

- It is acknowledged that there may be remaining questions on this matter, and as questions appear in Helpdesk if/when appropriate a supplementary note will be posted on AO Latest News.

5.6. OT2 joint Herschel/XMM-Newton observing time

With the aim of taking full advantage of the complementarity of ESA's observing facilities, it has been agreed to establish an environment for scientific programmes that require observations with both to achieve the desired scientific results. By joint agreement in the current OT2 AO process there is up to 500 ks of XMM-Newton observing time available for allocation by the HOTAC. There is no mechanism whereby the XMM-Newton TAC can allocate observing time on Herschel.

XMM-Newton observing time can be requested for those programmes where the science objectives require:

- Simultaneous or quasi-simultaneous Herschel and XMM-Newton observations, or
- short (max. 10 ks) snapshot-type XMM-Newton observations of newly detected and likely variable sources which require scheduling within a year after the Herschel observation.

Proposers wishing to make use of this opportunity have to submit a single proposal in response to the Herschel OT2 AO indicating the request for XMM-Newton observing time in the appropriate section of the proposal submission form. Although time is requested on both observatories, it will be unnecessary to submit proposals to two separate TACs. The science case for all proposals submitted to Herschel will be reviewed exclusively by the HOTAC.

The primary criterion for awarding observing time to joint Herschel/XMM-Newton programmes is that both Herschel and XMM-Newton data are required to meet the scientific objectives of the proposal. It must be noted that the minimum XMM-Newton observing time is 5 ks. In addition, each observation requires 3 ks for instrument setup. In the case of Herschel observation times exceeding the minimum XMM-Newton observation time, the allocated XMM-Newton observing time cannot exceed the allocated Herschel observing time. Neither target of opportunity nor any other type of observations with a reaction time of less than 8 weeks from an unknown triggering date will be considered for this cooperative programme.

It is the proposers' responsibility to provide a full and comprehensive scientific and technical justification for the requested observing time on both facilities. Both the XMM-Newton and the Herschel observatories, will perform feasibility checks of the proposals. They each reserve the right to reject any observation determined to be unfeasible for any reason. For more information on XMM-Newton consult their website at http://xmm.esac.esa.int.

Apart from the above, for both the XMM-Newton and the Herschel observatories, the general policies and procedures currently in force for the final selection of the proposals, the allocation of observing time, the execution of the observations, and the data rights remain unchanged.

Chapter 6. Phase 1 proposal submission

The response to this call for proposals is a two-phase process. Phase 1 is needed for every proposal while Phase 2 is only applicable to accepted proposals. In Phase 1, all proposals will go through peer review by the HOTAC, which will make a recommendation regarding time allocation to ESA's Director of Science and Robotic Exploration who will take the formal decision.

During Phase 2, the final version of these observations will be entered by 'successful' proposers into the Herschel database following the recommendations made by the HOTAC under the technical advise of the HSC. In both cases (Phase 1 and Phase 2), Herschel proposals must be prepared using HSpot, the software tool provided by ESA. For OT2 proposals, it is mandatory that the PDF file uploaded through HSpot must be generated using the current (OT2 AO version) HerschelFORM PDFLaTeX package distributed by the HSC. Proposals not generated using this version of the HerschelFORM PDFLaTeX package will automatically be rejected.

The following subsections describe the procedures to be followed and forms to be used for Phase 1 proposal submission, as applicable for OT2 proposers.

6.1. Submission procedures

As described in the schedule in Chapter 3 the OT2 proposals are due in the period between 9 June and 15 September 2011. In order to be able to submit a proposal using HSpot, the Principal Investigator (PI) must be registered first in the HSC as a Herschel services user. This can be done by clicking the User Registration button in the HSC web page and following the instructions there. By registering, users will also be joining Herschel e-mail distribution list(s) enabling us in the HSC to provide them with information as needed.

The HSC will provide support and answers to questions that may arise during the preparation of observing programmes through the Helpdesk web interface. Note that only registered Herschel services users are enabled to get support via the Helpdesk. To aid quick and accurate processing of queries, questions must be classified by the users according to pre-defined topics when they are submitted. Upon submission, they will receive an auto-generated e-mail with a ticket id (do not reply to this e-mail message!) which can be used to monitor the status of the query at any moment via the web interface. The expected timescale for reply is a few working days at most. A list of Frequently Asked Questions (FAQs) and answers, updated regularly, is also available from the Herschel Helpdesk web pages.

All proposals must be submitted using HSpot, Remember that you need to be a registered Herschel services user to be able to do this. For the OT2 AO the most recent HSpot version 6.0.0 must be used. It can be downloaded from the HSpot download web page .

Registered users submitting proposals can verify that their proposals have successfully been received at the HSC using the Proposal Handling link under the Herschel User Services menu available from the HSC web pages. The user submitting the proposal is the proposal PI as seen by the system. The Proposal Handling System can be used by the proposal PI to define 'co-users' who can also view and update the proposal as many times as needed until the deadline. Only the proposal PI can define these 'co-users'. The actual updating and re-submitting of the proposal is done always using HSpot.

The submission of OT2 proposals must be completed before 12:00 UT on 15 September 2011. Proposals (or updates of proposals) received after the deadline will not be considered.

6.2. Proposal contents

A Phase 1 proposal contains three parts which are all submitted simultaneously from HSpot, but can be updated separately. These are:

- The proposal 'cover sheet'
- The scientific justification file
- The observations (AORs) prepared with HSpot

The AORs and the cover sheet information are entered directly into HSpot while the scientific justification is a single PDF file which is generated with the HerschelFORM PDFLaTeX package and submitted as an attachment to the proposal, as explained in Section 6.3 below.

The AORs and the cover sheet information created in HSpot can be saved to your local disk as text files and then reloaded in HSpot for further modifications as many times as needed prior to submission.

6.2.1. Cover sheet

The proposal cover sheet contains header-type information which is entered directly into HSpot by filling in the appropriate fields within the 'Proposal Submission Tool' window (under the 'Tools' menu in HSpot main window's toolbar).

- Select a concise title for your proposal
- Select the right programme from the pull-down menu ('OT2' for this AO).
- Enter the total amount of time requested (in decimal hours) in the proposal as calculated by HSpot.
- Enter, one by one, the names, affiliations and e-mail addresses of your co-I's.
- Write a short abstract (no more than 2040 characters including blank spaces) describing the main features of your proposal.
- Choose one (and only one) among the science categories offered as a choice in HSpot into which you feel your proposal fits better from the broad Extragalactic, Galactic, or Solar System headings. This information will be used to distribute proposals to the panels for the review.
- Add any other text which you may consider convenient to be placed in the cover sheet (otherwise leave it blank).

Note that the PDF file containing the scientific justification of the proposal is not part of the cover sheet. It only needs to be uploaded at the precise moment when the proposal is being submitted.

6.2.2. Scientific justification

The 'scientific justification' part of the proposal must be contained in a separate PDF file which is ingested in HSpot as an additional input to the 'Proposal Submission Tool' window described above.

The PDF file must be generated using the HerschelFORM PDFLaTeX style macro following a predefined template provided by the HSC. The class and style files, the template file itself and a Users' Manual containing all the information required to fill the template and generate the corresponding PDF file are all made available as part of the HerschelFORM PDFLaTeX package at the HSC web pages.

There is a strict limit in the number of pages allocated for each individual section of the proposal. Proposals requesting joint Herschel/XMM-Newton observations will need to add the scientific case which explains the need for coordinated observations. Please note that the text entered under a given section exceeding these page limits will not be visible in the output PDF file. Note as well that the maximum size of the resulting pdf file is 5 Mb (including figures). Any colour figure in the proposal

should be interpretable even if printed with a black and white printer. The proposal contents and page limits (including figures and tables) are as follows:

Proposal Submission Checklist

- A new feature introduced in the OT2 call is the proposal submission checklist that you should complete before submitting your proposal. This comprises of six questions that give HOTAC information that is needed to understand your proposal's requirements and, if accepted, for the HSC to schedule your observations efficiently. You must answer the six questions. Compilation will fail if any of the check boxes is left empty.

Description of the proposed programme (max 3 pages)

- Scientific goals. Proposals must indicate here the main science goals to be addressed and provide an explanation for how they are proposed to be met using the proposed observations. A description of the relevance of the proposed science to astronomy should be given indicating how the proposed Herschel observations will advance knowledge in the proposed area of research.

- Need for Herschel. Proposals must explain why the main science goals require observations to be performed by Herschel, rather than by another facility, or by other observations altogether. A clear description should be given indicating why the Herschel capabilities are unique in advancing knowledge in the proposed area of research.

- Science exploitation plan. This section should contain a brief description of the plans to exploit the data from the scientific point of view in the first year after the observations have been made. The science plan should be readily comprehensible to broad-based scientists.

- Relation to other observations. If applicable, it should be outlined here how the proposed Herschel observations will be complemented by other data (past, present or future - Herschel or other facility), whether such other data are essential for the analysis and interpretation and how the Herschel observations may be followed up. Also details of any linked proposals with other observatories should be mentioned. In particular, the need for coordinated observations with XMM-Newton should be justified here. Joint Herschel/XMM-Newton proposals must include here a detailed description of the observations to be performed with XMM-Newton, indicating clearly the observing strategy and number of seconds requested.

Technical implementation (max 1 page)

- Observing strategy. A detailed justification should be given here of the specific observing modes proposed and of the choice of observing parameters made. Arguments should be given here to support the overall observing strategy proposed. Information should be provided about criteria used for target selection, including quantitative descriptions of the expected target flux densities or surface brightness at the relevant wavelengths, required sensitivity, wavelength and coverage strategy (including redundancies).

- Observing time requirements. The total amount of time requested in the proposal should be justified here. The numbers provided should be based on the resource estimates calculated by HSpot. For Herschel OT2 proposals the full set of AORs must be submitted in Phase 1. The calculations presented should also demonstrate, if applicable, that the proposers have checked the background and confusion noise expected as derived from the available estimators, as well as the maximum expected flux densities or surface brightness in the fields of view or spectral apertures to be used.

- Other special requirements or constraints. Time constraints, concatenations, avoidance angles for chopper orientation, specific position angles for maps, or any other special requirement or constraint entered through HSpot should be justified here. In general, constraints are detrimental to overall mission planning efficiency. The lower efficiency is hidden in the longer average

slewing times between observations. As already mentioned in Section 4.5.2, time constrained observations are charged for 10 minutes slew overhead instead of the 3 minutes applicable to non-constrained observations. The overheads applicable to every constrained observation entered through HSpot are automatically charged following the rules defined in Section 4.5.2).

- Duplication analysis. Indicate clearly here the result of your duplication checks using HROST and the Herschel Duplication Checker (HDC). If there are potential duplicate observations in the Reserved Observations List please justify here why your proposed observations should not be considered a duplication, or, alternatively, why duplicated observations are requested (e.g. to search for variability).

- Robustness against incompletion. Here you should demonstrate that your programme is robust against a potential early end of the mission that could lead to it not having been completed. For non-robust proposals, proposers should demonstrate that their programme is of sufficient interest to justify being awarded high priority time. For non-robust proposals, proposers should demonstrate the capability of their programme to produce valid science even if they are just partially executed.

Data processing plans (max 1 page)

- Data processing and analysis plans: Give a concise explanation of the strategy for data reduction and analysis with a description of available hardware, software and manpower. For small projects this may be a very short statement. Larger projects with more complex data processing needs will be expected to show in adeqaute detail that they can use and process the data that they will receive efficiently and effectively.

- Product generation methods. Provide here a careful description of any special software that you plan to use in analysing your data other than HIPE. Use of HIPE, the Herschel specific data processing and interactive analysis software is encouraged in order to make distribution and usage simple to other astronomers.

Management and Outreach plan (max 1 page)

- Team resources and management plan. This section should include an explanation of the strengths and track records of the team that make it appropriate for the project. It should contain a summary of staff and other resources that will be committed to the programme. For proposals with a large number of applicants, describe briefly the team management plan and organisational structure.

- Outreach activities. This section should outline your plans on the publication and dissemination of the science results obtained with Herschel to a wider audience than the Herschel community itself. In particular, any systematic efforts planned on the area of sharing the new scientific knowledge provided by Herschel with the general public through outreach activities will be considered as a bonus in the evaluation process.

The 'List of team members with associated roles' containing names, affiliation, and relevant qualifications of all investigators collaborating in the proposal is no longer required (but the cover page still is).

An 'Observations summary' will be created from the AORs by the HSC staff. It will be appended to the proposal and made available to the HOTAC and HSC staff performing technical checking. This 'Observations summary' can also be retrieved from HSpot at any moment by the PI and co-users of a given proposal, together with the rest of the proposal documentation, using the option "Retrieve proposal documentation" under the 'Submit' menu of the Proposal Submission Tool window.

6.2.3. Astronomical Observation Requests

These are the Astronomical Observation Requests (AORs) as prepared with HSpot, containing full details about the observing parameters which completely defines the way in which a given observation will be executed.

The submitted AORs should be the final ones you expect to have scheduled if the proposal is successful. For OT2 proposals the entire set of AORs must be submitted in Phase 1. No additional AORs, nor changes of targets or observing modes will be allowed in Phase 2, with the exception of those explicitly mentioned as backup targets/strategies in the original proposal. Otherwise, only the observation parameters of AORs already submitted in Phase 1 can be edited in Phase 2, if this is considered necessary by the proposer. Other changes will only be allowed if they have been recommended by the HOTAC, or by the HSC for technical reasons.

6.3. Proposal submission

Proposals must be submitted to the HSC electronically through HSpot, and shall be consistent with the page and format guidelines given in Section 6.2. Note that this is enforced by the usage of the HerschelFORM PDFLaTeX package, which is mandatory.

When your proposal is ready to be submitted to the HSC you need to open a HSpot session and ensure that:

- your computer is connected to the Internet;
- the set of AORs loaded into the AOR window of HSpot are the ones associated to the proposal that you want to submit;
- the cover sheet information that you see in the 'Proposal Submission Tool' window is correct, including the total requested time consistent with the associated AORs;
- the PDF file to be uploaded containing the scientific justification file has correctly been chosen and corresponds to the proposal that you want to submit.

It is recommended to compute all time estimates before proceeding with proposal submission. In case there is any AOR for which time estimation has not been run or shows an out of date value, the system will force you to run time estimation and bring it up-to-date at the time of proposal submission. This will serve as an additional validation to ensure that the time requested on the cover sheet is consistent with the latest time estimation made by HSpot. If everything is OK, click on 'Submit proposal to the HSC' under the 'Submit' menu of the 'Proposal Submission Tool' window's toolbar. A new window will appear in your screen where you will be prompted to enter the username/password combination which is your identification as a Herschel services user (you have to be a registered user to be able to submit proposals!). Once this information is filled in, click 'OK' on this window and the submission process will start.

If the submission is successful an acknowledge window will appear with the message 'Your proposal was successfully submitted'. The proposal information (username and id assigned by the HSC to your proposal) will appear on the bottom of the Proposal Submission Tool window. However, this is not the final step in the process. Some time later, an e-mail message sent by the HSC to the submitter's e-mail address will confirm the successful reception and processing of the proposal at the HSC. Please check your e-mails to make sure that the submission process finalised without any problems. In case a problem is encountered during the processing of your proposal, the notification e-mail message will ask you to get in contact with the HSC Helpdesk.

Proposals must be submitted prior to the deadline. Please plan your submission early in advance to avoid any unexpected problem in the last minute.

If you have submitted an observing proposal, but have noticed that there are errors or parts of it which need to be revised or updated, there is no need to submit a 'new' proposal, and you should not. You (or your co-users) can update the proposal by using the options 'Retrieve proposal from HSC' and 'Update proposal at HSC' under the 'Submit' menu of the 'Proposal Submission Tool' window's toolbar. After entering your username and password you can retrieve, update and re-submit your

proposals (or those from your co-users) as many times as needed before the deadline.

Chapter 7. Proposal evaluation and selection

The proposals received by the submission deadline at the Herschel Science Centre (HSC) will be organised into four broad science topical areas based on the choice of 'science category' made by the proposer on the proposal coversheet. These Phase 1 proposals will then be made available to the Herschel Observing Time Allocation Committee (HOTAC) for evaluation.

The HOTAC will consist of eight Panels plus the HOTAC Chair, two Panels each representing the four science topical areas as follows:

- Cosmology
- Galaxies/AGNs
- Interstellar Medium/Star Formation & Solar System
- Stars & Stellar Evolution

By having broad science topics and parallel Panels per topic the HOTAC will be able to minimise potential institutional, professional and personal conflicts of interest. All members of the HOTAC Panels will have access to all the proposals electronically using the Herschel Proposal Handling System (PHS) tool.

The HOTAC will evaluate and recommend proposals for execution based on the following criteria:

- Science excellence and relevance of the proposed observations
- Uniqueness/need of Herschel observations to achieve the scientific goals proposed
- Technical merit/feasibility and robustness of the proposed observations
- Convincing plans for the data reduction and analysis
- Management and Outreach plan

During this process the HSC will assist HOTAC in the technical evaluation of the proposals, in particular regarding feasibility and duplication issues. After a period of individual study and grading of the proposals, the HOTAC members will hold a formal meeting (to be held on 8-11 November 2011), where they will formulate a consolidated recommendation regarding which proposals be awarded observing time and how much. The ESA Director of Science and Robotic Exploration will receive the HOTAC recommendations and take the final decision.

The PI's of all proposals will be informed by electronic mail of the results of the proposal evaluation process. These results, as well as the comments made by the HOTAC during the meeting, will also be made available to the users through the Herschel PHS web pages where they (and their co-users) will be able to see the status of their proposals and AORs at any moment during the mission (submitted/accepted/rejected/scheduled/ executed/etc). Acceptance of a proposal may be conditional to e.g. modification/reduction of targets and/or observing modes in Phase 2. It has to be noted here that -for operational reasons- no guarantees can be given that any particular AOR will, in fact, be executed, although every attempt will be made to complete all observations requests in accepted proposals.

The list of accepted proposals will be announced by the HSC through the web together with the overall statistics on the response and the results of the call. The information to be made public will contain only the following items:

- Principal Investigator
- Proposal title
- Abstract
- List of Reserved Observations associated to the proposal (as explained in the next section)

The remainder of the approved proposals, and the entirety of the proposals not selected, shall remain confidential to the extent allowed by the review process.

Chapter 8. Phase 2 data entry and reserved observations

The principal investigators of accepted proposals will be invited to Phase 2 of proposal preparation. This activity is planned to commence in the last week of November 2011 for OT2 proposers.

The purpose of Phase 2 is to finalise the proposed observations to committed observations. As already mentioned, change of targets or observing modes will in principle not be allowed, unless they were included in the original proposal as backups. Otherwise, only changes to the observation parameters of AORs already submitted in Phase 1 will be accepted.

The above rules are not applicable to those proposals where the acceptance by HOTAC was conditional to changes to the observations as they were submitted in Phase 1 or when technical problems were identified by the HSC which require observing mode changes to solve them. In this case, the required changes must be implemented in this Phase 2 and the HSC will ensure that they are consistent with the recommendations made.

The end result of Phase 2 is the list of committed observations which will also form the basis of the Reserved Observations list, which may not be repeated by proposers in further calls. Each call for proposals will be accompanied by a major update of the Reserved Observations List, where the new AORs will be added. While the OT2 call is open, no major changes will be permitted in the Reserved Observations List.

Chapter 9. Post-call modifications

Procedures have been established and are in place to allow for post-call modifications if proposers consider there is a need to modify and refine approved observations after the call has been closed. They are intended to allow some flexibility with respect to changes that are oriented to maximise the scientific return of the mission. However, they will be restricted to the minimum, the have to be requested through Helpdesk, they will be reviewed by the HSC Community Support Group and may have to be finally approved by the Project Scientist.

The modifications made shall not alter the scientific content or intent of the original AOR and must be such that the programme stays within the originally allocated observing time. Major modifications will need to be reviewed and approved by the Project Scientist, in consultation with the HOTAC Chair if necessary.

Chapter 10. Further calls for proposals

This is the second and final in-flight AO. Like all previous AOs, it has two parts: GT and OT. The GT2 part has already been conducted, the current call is for OT2. No further future calls are foreseen.

Chapter 11. Data products and proprietary rights

Generic Herschel data product levels are defined as following:

- Level-0 data products: Raw telemetry data as measured by the instrument, minimally manipulated and ingested into the mission data base/archive. Typically, readings are in binary units versus detector pixel number.
- Level-1 data products: Detector readouts calibrated and converted to physical units, in principle instrument and observatory independent. It is expected that level-1 data processing can be performed without human intervention.
- Level-2 data products: Further processed level-1 data to such a level that scientific analysis can be performed. For optimal results many of the processing steps involved to generate level-2 data may require human intervention, based both on instrument understanding as well as understanding of the scientific aims of the observation. These data products are at a publishable quality level and should be suitable for virtual observatory access.
- Level-3 data products: These are the publishable science products where level-2 data products are used as input. These are products not only from the specific instrument, but are usually combined with theoretical models, other observations, laboratory data, catalogues, etc. Their formats should be virtual observatory compatible and these data products should be suitable for virtual observatory access.

Herschel data products (from Level 0 to Level 2) are systematically generated by the Herschel Data Processing pipeline and made available to users through the Herschel Science Archive immediately after the pipeline processing is completed, typically 1-2 days after an observation has been executed. Following the completion of some basic quality checks, something which may take from a few additional days to weeks, depending on the circumstances, notification e-mails are sent to the data owners that can then be informed about any quality issue affecting their observations.

All observations made after the first year of the routine phase will have a proprietary period of 6 months, after which the observations will become public. This is applicable for all (GT2 and) OT2 observations.

The proprietary time applies to each observation individually, counted from the day when the data are made available to the initial data owner. Note that data resulting from routine calibration observations will generally enter the public domain immediately after they are processed unless duplicating a science observation.

Chapter 12. Special information for US-based investigators

Investigators based at U.S. institutions that are a principal or co-investigator on a proposal submitted to ESA in response to the Herschel OT2 AO are eligible to submit a proposal for NASA Data Analysis (DA) funding to the NASA Herschel Science Center (NHSC). Eligible OT2 investigators must respond to the NHSC call for proposals if they expect NASA funding for their investigation.

The NASA Data Analysis Call for Proposals is available online only, through the NHSC website at https://nhscsci.ipac.caltech.edu/sc/index.php/Proposals. All DA proposals must be submitted electronically to the NHSC by September 23, 2011, 5:00 pm PDT (Pacific Daylight Time).