

To: George Helou, Director of the NASA Herschel Science Center (NHSC)  
From: Margaret Meixner, Chair of the NHSC Users Panel (NUP), on behalf of the NUP

Report from NUP meeting on Feb. 27, 2009:

In attendance:

John Biegging  
Moshe Elitzur  
Andy Harris  
Paul Harvey  
Joe Hora  
Margaret Meixner

Guest member: Al Wootten, panel member for the LRR

Offline contribution from Paul Goldsmith, and Dean Hines.

-Next meeting: August: either telecon or face-to-face

Summary Statement: We think the NHSC has gained significant experience with the Herschel instrument teams and will be able to provide sound advice for the US Herschel users. At the moment, the user community does not feel well prepared for the Herschel mission data that will be coming in the next year. The NUP likes the discussion forum format of the meeting. Our recommendations below are meant to be guiding. We wish them well this year, it will be a big year for them.

Top "Ten" Priorities:

- It is important to improve the HCSS/HIPE environment. There have been many attempts in the past by others to write data processing packages that are appropriate for all wavelengths and they all have failed. The HCSS development should stay focused on Herschel. Need to work very hard at making HCSS accessible to the users. They have made a big commitment in resources.
- We would like a progress report on which elements of the pipeline are fully completed and verified, which are still undergoing development and their current status, and which elements are in the works.
- Some people will stay with HCSS and some will not. Make sure that the level 1 products are portable in FITS formats which will allow users to immediately import them into popular existing software that users will want to use.
- Need to make cheat sheets and cookbooks and get a top down structure of the data processing environment, HIPE.

- Data Processing workshops are important and more than currently planned will be needed early in the mission. Include some listening mode time for feedback on HIPE at these forums. Other forms of outreach to the US community are good, keep these going.
- HSPOT is good overall, but: We recommend Cookbooks that starts with a scientific question and show the flow through the AOT. We suggest these type of documents be delivered by the end of this calendar year.
- New NUP members would be good. Inclusion of others from the submm/millimeter community would be useful. Young astronomers who will be using the HIPE on the front line would also be useful additions.
- Funding support concern: Although theory support was part of Herschel's Cycle 0 funding, it was removed from subsequent calls because of NASA's decision to consolidate all theory and data analysis grants. The current ROSES (2009) offers two programs: Astrophysics Data Analysis and Astrophysics Theory. However, the first program supports only analysis of archival data, so the Herschel mission is excluded, and it is not clear that the second program would support Herschel-related theory proposals. The Herschel mission is thus left with a gap in theory support until after the data will be coming in. The same applies to any second call in Laboratory Astrophysics focused on Herschel.

Not a high priority:

A general problem for NHSC is that the community wants the science, technology, and software to be familiar; as with most progress in science, evolutionary rather than revolutionary. Some scientists will approach new wavelengths and technologies either inefficiently or with trepidation. Basic education is not an area where NHSC should put a great deal of effort: scientists who are uncomfortable with the waveband or technology are unlikely to be able to do the science at a level that Herschel opportunities demand. NHSC should provide entry points to help scientists understand the potential for observations and introduce interested parties to the relevant communities, but cannot provide a total education. NHSC staff should be (and are) members of the relevant communities. They can then facilitate contact and help steer data processing requirements to best support the community science goals as determined by the community through the TAC. This is in line with all other NASA mission science support center activities.

Boundary conditions:

1) We realize that the NHSC is not in the driver's seat for the tools that Herschel is using. They did supply the HSPOT tool which has been used successfully for the Guaranteed and Open Time Key Programme call and this interface is based on the Spitzer SPOT program. However, for the software for data calibration is in a draftier form and will have consequences for the Herschel users that NHSC will have to support.

2) The NHSC is cost constrained and has to prioritize its efforts. The NUP was asked for feedback on which software program to emphasize in supporting. It may be premature to give advice on the high level functions because low level problems are being worked out. We had difficulty responding because we did not have a complete understanding of the whole effort and thus the context for the decision. We suggest the following actions could be useful:

- Ask the Herschel Science Center (HSC) in Europe what the proposal pressure is for all the science observing modes and use that to help prioritize the work.
- The NUP would find it useful to see a chart on the different software packages, the status these packages (level 1, 2 or 3) and what choices the NHSC are trying to make.

Some summary notes on the data processing software environment:

-Herschel Interactive Processing Environment HIPE: Each pipeline is implemented as a Python Script that passes data between tasks

HIPE is an interactive environment , which collects tools from the developers who are distributed from China to various European countries,

- Configuration control management has been developing as it grew, communication problems, some crisis times causing some face to face meeting,

-Status: All the pipelines are “complete” to level 1, but some elements may need refinement, parameters for the data calibration, There will be errors, and its not 100% complete ; Level 2 mostly there, Level 3 may not really exist  
Controlled release of HIPE in time for the March DP workshop

Good points of the package:

-Its open source code, so the user can see what is going on, if the user invests the time to learn it.

-There are GUI's and script based control, if you run the GUI first time, it will produce a script which is a useful approach to learning the system

-data access can be done directly through HIPE from the HSC

-Have the Herschel instrument teams tested the HIPE? the answer is yes, all have used it.

- NHSC science staff is expert on using this system and will use it for the PV phase of the Herschel mission. They have been contributing

-software packages to HIPE: liked how the NHSC is using the local expertise to help solve the 1/f noise problem of the bolometer output. This work is an example of a great contribution to the project, good work!

- advice through the Herschel Users Panel

-January 2009; Alpha Test version released to KP teams

Very valuable having NHSC people exploring different packages, knowing where to point people is good

Interest Groups are useful for new users, it is a way for the community to act as a resource for users and could be a way to coordinate and share efforts among the KP teams:

-primarily instrument based, and topical (e.g. mapping tools)

-probably observing mode based, e.g. HIFI Spectral Scans group

-Initially lead/coordinated by HSC.ICCs.NHSC, by instrument specialists including uplink and DP

Concerns about the package:

-The general user community is not familiar with the HIPE; e.g. compared to Spitzer, Herschel is behind the curve with the software releases and workshops on it. This is the HSC's responsibility, but it's a difficult boundary condition for the NHSC

-Object-oriented Java/Python system not intuitive. Caveat: younger astronomers may be comfortable with this system; it would be a good idea to incorporate these younger viewpoints

-driven by ICC Calibration Scientists, not users

-extended tools for astronomer use is very much under development

- No clear prioritization of tasks for the programmers, and the decentralized nature of the program makes it difficult.

- Will released version of software at some point have no open problem reports/issues? It is a little worrisome that there are thousands of open problems/change requests. If these are not solved before the release, an extensive caveat list or known bug list would have to be released along with the software. This will not instill much confidence in the system by users.

Platform problems:

- 64 bit linux laptops
- some machines are supported and others are not

-The US investigators are at a greater risk of being behind the curve for the Herschel data processing. For US based missions, e.g. Spitzer, HST and Chandra, the instrument team sites were an additional source of information on instrument performance and expertise. Herschel is an ESA mission and all of the instrument PIs are in Europe. Thus, there is less of a knowledge base rooted in the US. The NHSC will be the sole source of knowledge in the US for the community. For that reason, there is probably more need for Herschel DP workshops in the US compared to Europe.

-Herschel DP workshops, Launch + 9 months, there may be need for one earlier if possible.

-It is worth the investment to make the community comfortable with the HIPE black box. This course of action will lighten the load of future work to prevent people from jumping out of HIPE and into their own data processing system.

The importance of Documentation:

- We sometimes do not put into effort into documentation “to save time”, but good documentation is really a time saver.
- The NHSC should place links to key documents right on the front page of their website.
- A cookbook does not exist: this may be a good investment.

For the early science, where people will be impatient to get their papers out....

Top 10 priority: Make sure that the level 1 products are portable in FITS formats, need to export fits files into the formats that commonly used, existing programs can import with no major additional work by the users.

The importance is the key words, to make sure the necessary ones are there for the external software to be able to correctly understand the data.

Tests need to be made for the following software packages:

Radio astronomers  
-MIRIAD  
-GILDAS (CLASS)  
-CASA (ALMA users)

Hora:

DS9, FV image display programs (correct flux, WCS information)  
IRAF/PYRAF spectral analysis tasks  
IDL/Astrolib fits compatible

The NHSC's effort to adapt MOPEX for Herschel could be very useful for small area maps and regions requiring source extraction.

MADmap is best for large scale structure maps.

Communicating the status of these tools and the pros and cons of using MOPEX vs. MADmap would be very useful in the data processing workshops and support web pages.

Extended tools webpage - this is great, it should be made more visible (i.e., not tucked away on the "telecon" webpage), and enhanced with links to people working in the various topics, teams, etc. Or maybe there is a better way for the project and OTKP teams to communicate on what is being developed by who and when, this may enable more sharing of effort between the teams.

[http://www.ipac.caltech.edu/Herschel/extended\\_tools.html](http://www.ipac.caltech.edu/Herschel/extended_tools.html)

The panel thought this page was very useful and would be even more so if expanded slightly. Items to consider for inclusion in the packages:

1. For the work packages in the DP system, it would be useful to have a status and/or a expected date that the tool is expected to be in the system and functional. It was my impression that some of these items might not be in the early releases of the system.
2. A section could be added for the various OTKP teams on what post-pipeline software they anticipate developing or using. The entries for these would list all the information like the current tables, plus the team name and hopefully some contacts to members of the team responsible.
3. It could be indicated which of the external tools would be supported in the sense of exporting FITS files that would be readable by the other systems. For example, they mentioned that the system will write FITS images that ds9 will read in, and the wcs and other things work. However, something like Cubism might require a lot of work to adapt it to read in and use the Herschel data. In other words, not only writing the correct FITS files out, but the Cubism group would have to modify it to adapt for Herschel data. Is that planned or in progress anywhere?

Outreach Effort is good:

-NHSC sponsors Four WIKI pages for the Herschel KPs that are self administered

-August workshop was a NHSC collection of information of what was needed for 21 OTKP

-KP Liasons have been setup, and at least one anecdotal experience shows they are useful. Goldsmith: One point I did want to make concerns the Liason Scientist for the OTKP. I was really impressed with Colin Borys and his knowledge of the "Herschel Oxygen Project". He was familiar with our AORs, and had rerun them through latest version of HSPOT. He had some questions about observing modes, and other such details, but it was all very helpful and professional. The European participants were particularly impressed by the attention from NHSC! Colin also gave a quite detailed run down about the data reduction pipeline and its status.

-AAS January 2009: booth DP demonstrations, 5 OTKP 1 hr+

-Data sessions, for the June AAS meetings

-There are Observation Preparation Workshops to help new people get into Herschel, keep very open

-We like the initiative of including the NRAO joint science conferences, that will help draw in the radio community

-Science conference in 2010 is planned, about Herschel Science

Areas of Concern/Suggestions for Improvement:

-DP workshops: April 8-10, will be very important; some concern that the attendance to this workshop is limited to two from a KP team

Have NRAO advertise Herschel/ HIFI for you, people who

Have to go beyond the technologies, and think about the capabilities...and advertise the capabilities of the instrument,

- User dependencies on developers: Need to state up front that it will require minimum 1 week to become proficient, but then need to keep using
- Small user 20 h program, a 1 week plus investment is a lot for the program  
But worth it for the very large programs
- Generational thing: young astronomers will be more interested and enthusiastic about python than older astronomers: key is to hire a young postdoc interested in this work