



OTKP DP/Analysis Synergies Telecon #1 02 May 2008

Summary of the NHSC Telecon #1 and some useful additional notes

*Note: We have added some useful additional links and a few comments to the minutes which we hope you will find useful. For those of you who were not at the telecon, we welcome your comments and suggestion on Herschel DP and Analysis tools.

Please open a ticket via the helpdesk at:

<http://www.ipac.caltech.edu/Herschel/helpdesk.shtml>

TELECON

Roll call: 20 of 21 OTKP teams represented.

Organization and Scope/Limits of Telecon 1 (Appleton, NHSC)

SCOPE : The idea for the telecon arose when we perceived a need for “early phase” discussions/interactions between you, the successful Open Time Key Program winners, and us, the NASA Herschel Science Center. It seemed especially important to start a dialog because the main Pre-launch Data Workshops are planned for the end of the year in both Europe and in Pasadena—quite a while in the future.

PURPOSE: Today’s telecon aims at two things:

- a) To provide a very quick overview of the resources at the NHSC that are available for those who are not familiar with our operation.
- b) This telecon is an opportunity for each of the teams (starting with US-led OTKP’s,) to discuss their individual DP needs and to look for possible synergies with other teams.

We wish to make sure you are aware of the DP and Analysis tools that are under development as part of Herschel DP as well in some cases external to it. This should avoid duplication of effort within your own teams.

Opening Remarks by Bill Latter, NHSC Deputy Director

First, on behalf of the NHSC, I would like to congratulate you on your successful proposals.

Over the past several years, we have been building a team and positioning ourselves in the best possible place to support the US community to take advantage of the Herschel opportunity. Your success is just the start. To provide the support you will need, we have integrated into all aspects of Herschel development and operations that are important to observers. We are part of the Science Ground System management and integral to the three Instrument Control Centers. We have been representing the US community on the Data Processing Users Group, Documentation and Calibration Working Groups, and numerous others. It is important for you to understand that your interactions with the NHSC will bring you as much support and as full a knowledge base as can be made available to anyone in the international Herschel community.

The Project is committed to launch before 2008; there is a strong push, but Herschel is a complex system.



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Overview of NHSC Resources for HIFI, PACS, SPIRE, and Observer Support teams by Morris/Ali/Schulz/Appleton NHSC)

Pat Morris for HIFI: HIFI group at NHSC introduced: Scientists Pat Morris, Adwin Boogert, Colin Borys, Steve Lord, and developer Joan Xie. The group has a working relationship with the JPL HIFI hardware and HIFI ICC in Groningen. The group is contributing resources to all phases of HIFI AOT development and testing, and strongly involved in the ground-based and flight verification planning. The group is also contributing to instrument characterization, helping the ICC conduct and analyze test data from the instrument during assembly in the lab and integration on the observatory. Standing waves, LO performances (spurious response detection/removal) are examples. The group is also contributing to data processing software, in the pipeline and in "higher level" applications, with special emphasis on products, interfaces, and dual sideband deconvolution of Spectral Scan data. A standing wave characterization/removal package is also under development here. Other important "science analysis" packages such as CASSIS (a spectral line fitting/modeling package tailored for HIFI science) and Splatalog (NRAO/ALMA tool for interacting with laboratory molecular line databases) are supported scientifically here.

Babar Ali for PACS: The NHSC PACS team has 4 scientist (Dave Frayer, Phil Appleton, Dario Fadda and Babar Ali) and 2 developers (Jeff Jacobson and Cate Liu) equally divided among the PACS spectrometer and PACS photometer. All have multi-mission experience including Spitzer and ISO. The PACS team has worked closely over the last few years with the instrument team in Europe. For the purpose of DP, it has been our goal to understand the instrument noise characteristics, systematics and other quirks to perform a proper analysis of PACS data. Our involvement is on both the technical (implementation of algorithms) and scientific (design of algorithms) side. As part of the NHSC charter, we provide this expertise to the US astronomers. We have, and can provide ancillary data (e.g. filter profiles, PSFs, etc.). In addition, the NHSC has been heavily involved in the development of a user-level photometer simulator. The simulator is currently in testing phase for a release later this year.

Bernhard Schulz for SPIRE: The SPIRE team at NHSC includes 4 scientists and 2 developers. Scientists: Bernhard Schulz (team lead & bolometer expert), Kevin Xu (Photometer & map-making specialist), Nanyao Lu (Spectrometer & linearization specialist), David Shupe (Observer Support liaison & python expert). Developers: Lijun Zhang (user interfaces & numerics), Arnold Schwartz (pipeline modules & numerics). The SPIRE team at NHSC has been very closely involved for 6 years with detector development and testing, thanks to proximity to JPL where the bolometers originated. We provided data reduction software and analysis of load curves, noise, and time constants etc. This participation has continued through all the ground tests at Rutherford Appleton Laboratory, and will extend through the performance verification phase and routine operations, being well embedded in the SPIRE ICC. Our team is developing 3 pipeline modules and helping with interfacing the instrument simulator to the pipelines, as well as testing of map-making algorithms, and providing requirements for the spectrum viewer. We are close to the action, and very well-prepared to support US astronomers in the use of the SPIRE instrument.

List of Observer Support Team Members Phil Appleton (group lead), Dave Shupe (user interface tools developer), Bidushi Bhattacharya (DP workshop coordinator, solar system support)

For more information on the NHSC Instrument teams and pages, goto

See <http://www.ipac.caltech.edu/Herschel/instr.shtml>

Web-list of known extended work packages for data processing or analysis (Bhattacharya, NHSC)

See http://www.ipac.caltech.edu/Herschel/extended_tools.html

Teams describe their programs and outline immediate needs/concerns

Chris Martin, Oberlin College, HIGSS, 125 hrs HIFI map PACS spec: Will look at lines in small areas in vicinity of the galactic center. Wants to know what data products will look like. Webpage (item 4) very helpful. Challenges



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include theoretical framework for understanding emission line properties as function of temperature, density, etc. *Ali*: There will be at least 3 products available to users from the PACS pipeline. These span the range from raw to highly processed data. Details are still being worked out and will be made available to the users this year.

Bill Langer, JPL, Got Cplus, 223 hrs HIFI: The program will carry out a C+ survey towards the galactic center.

Morris: MADCUBA is the HIFI package to process OTF maps, and the standing waves (ripples) or residuals of them (if sky reference spectra are taken with the load chopped observations) in both pointed and mapped observations can be treated with a standing wave detection/removal package in development at NHSC for all HIFI users. Other measurements (baselines, spectral lines) can be carried out with a spectral toolbox in the distributed Herschel DP environment, or with CASSIS (spectrum analysis package) which will be distributed from CESR (see Sec. 4).

Paul Goldsmith, JPL, Herschel Oxygen Project, 140 hrs HIFI: Molecular oxygen search of 20 positions with up to 3 hr integrations; deep data will test ability to get high quality obs w/ low rms. Concerned about deconvolving double sidebands with low number of LO settings. *Morris*: The problem of deconvolving several concatenated LO frequencies as a mini-spectral scan has been under discussion, no practical work in progress other than line "ghost busting" methods for spectral scans which can probably be applied here. [S. Lord on the call agrees.] We can look into this further, select some of Paul's O₂ AORs and attempt to generate simulated DSB spectra to work out a more detailed assessment of how to treat these mini-scan cases.

Tom Megeath, U of Toledo, HOPS, 200 hrs PACS phot/spec: Looking at protostars in Orion. Issues include combining scan maps and while minimizing 1/f noise. May need to reprocess output from spectroscopy pipelines. Concerned about dealing with pipeline given our lack of familiarity with Java. *Ali*: Pipelines work on individual AOR basis only, so users will need to combine Level 1 products. Users can also select from standalone tools like mopex. Spectroscopy pipeline modules will generate Level 1, and users can move forward with this. Cube Factory and Spectral Interpolation tool being developed. Herschel project is very aware of user needs. *Appleton*: We believe that the kind of software needed to fully exploit the science from the Herschel Spectrometers is maturing and is beginning to look good, but it is not fully ready yet. However, we are optimistic that we will have sophisticated tools for both PACS and SPIRE comparable to the already mature CASSIS package for HIFI by launch. Ideas are welcome. (*Morris*—NOTE added later: The project plans to embrace CASSIS also for SPIRE and PACS spectrometer science analysis. This has been known (in the plans) for almost a year, but there are currently some technical issues with respect to products (esp the maps).) *Schulz*: The DP software provides a high-level scripting language (Jython), so users will not need to know Java. Users will be able to run pipelines step by step and examine intermediate results in an interactive way.

Neal Evans, U of Texas, DIGIT, 250 hrs HIFI, PACS spec/phot, SPIRE phot: Dust, ice, and gas evolution in envelopes, stars. No specific data concerns at this time, but Spitzer had issues for names/formats of files so good to get this resolved early.

Eiichi Egami, U of Arizona, Herschel Lensing Survey (292 hrs PACS/SPIRE phot) and LoCuSS (145 hrs PACS phot): Lens survey and imaging massive galaxy clusters. Deep SPIRE/PACS imaging per cluster. Challenge will be to get cleanest images w/ greatest sensitivity. Has included instrument team people on program. *Frayer, Ali, Appleton, NHSC*: For those who are interested in point sources only, it is possible to use high pass filters to remove the 1/f noise.

Margaret Meixner, STScI, HERITAGE, 238 hrs PACS/SPIRE parallel: LMC, SMC, bridge maps. Need clean images of emission; will extract sources to generate database. Some instrument team people on program. Immediate concerns include quality of data from calibration pipeline; believes data processing for basic calibration will have to be revisited; wants basic calibration tools and ground test or simulator data; would like some idea of schedule for availability of these items. *Ali, Latter*: DP workshops at end of year will provide sample data for users. PACS today has tools to get point/extended source emission, though still usable only by expert users. The HSC will provide various types of test data in time for the December workshop.



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Peregrine McGehee, IPAC/Caltech, Cold Cores, 151 hrs, PACS/SPIRE phot: Maps of cold molecular clouds identified by Planck. Issues include support to develop SPIRE scan map combination. *Schulz:* Level 1 will provide time-ordered calibrated fluxes; Level 2 (still under development) will provide reconstructed maps. Have map reconstruction algorithm, MADmap, that should allow for extended emission reconstruction as well; team is assessing this aspect of DP and in the end it may be necessary to combine a number of techniques to get best photometry for extended, point sources. Good news: SPIRE 1/f noise so far is smaller than expected.

Mark Dickinson, NOAO, Herschel GOODS, 363 hrs PACS/SPIRE phot: Very deep observations, so similar issues to Eiichi with point sources, 1/f noise. Things that take time include, artifacts, etc., that cannot be predicted beforehand. What is timeline for performance verification (PV) data access: *Latter:* Policy for release is being determined, but we intend to provide users with sample data (either simulated data-sets or engineering data pre-flight, and of course, flight AOT data from the PV-phase when available). (*NOTE ADDED: How these data sets will be released is not yet decided—though it is hoped that some sample data will be available for the DP Workshops later this year.*) In coordination with HSC, will provide PV schedule. Note that PV is a dynamic observation period, and schedule may be adjusted.

Harold Butner, James Madison University, DEBRIS, 140 hrs PACS/SPIRE phot: Debris disk survey of size, temp, mass, KBO detection. *Paul Harvey, U of Texas:* Needs to understand psf's and absolute calibration very well. *Note added by Schulz:* We are participating in the Herschel Calibration steering group and are leading a program to cross-calibrate SPIRE with Planck and as such we are well prepared.

Daniela Calzetti, U of Massachusetts, KINGFISH, 537 hrs PACS spec, PACS/SPIRE phot: Nearby SINGS galaxy survey for dust, star formation. Wants to use wavelength switching for PACS spectroscopy; no major DP requests yet. *Appleton:* It seems that few OTKP are using this mode, and tests made in PV will help to resolve issues associated with this mode. The wavelength switching mode of PACS has been adopted by the NHSC within the PACS Instrument Control Center in Europe as an area where we are actively contributing ideas, software and effort. We will ensure that this knowledge is passed onto the KINGFISH team. We are hoping to work closely with KINGFISH during all phases of early data collection to try to maximize science return.

Bhattacharya for NHSC: Known dates of relevant upcoming meetings and possible NHSC mini-workshop

- **Herschel Key Project Coordination and Science Exploitation Workshop, ESTEC, Noordwijk, July 1-2.** This is a mini-DP workshop conceived by Matt Griffin and will be in the same vein as today's telecon
- **NHSC mini-DP workshop, Pasadena, August.** This will provide US observers the opportunity to attend a workshop similar to the ESTEC one.
- **DP workshop, ESAC, Madrid, Winter 2008.** This more comprehensive workshop will provide users with DP sw as well as sample data. Tentative date under consideration is December 4/5 2008.
- **DP workshop, NHSC, (Possible Jan 9 2009 after AAS in Long Beach??DATE ADDED TO MINUTES**).** This will provide US observers the opportunity to attend a workshop similar to the early December one at ESAC.

Shupe for NHSC: Potential NHSC resources, to gauge OTKP team interest (feedback requested)

- 1) NHSC staff participates in Herschel DP User Group and other working groups, and we can bring OTKP concerns to these groups.
- 2) Instrument interest groups with telecons and email lists
- 3) Identify NHSC liaison for each team if they wish
- 4) Secure NHSC data area for OTKP teams to put files; would allow for interactive diagnosis of DP issues
- 5) Web forums or wikis for individual teams or shared between teams
- 6) Video demos of DP sw -- recorded or real-time