



HSpot and Proposal Handling System Known Problems in HSpot 6.0.0

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Table of Contents

| | |
|--|----|
| 1. Introduction | 1 |
| 2. Known problems and bugs in HSpot and proposal handling | 2 |
| 2.1. General issues | 2 |
| 2.2. Herschel Tools | 2 |
| 2.2.1. Herschel Confusion Noise Estimator (HCNE) bugs | 3 |
| 2.2.2. Herschel Reserved Observation Search Tool (HROST) bugs | 3 |
| 2.3. Instrument AOT and AOR issues | 3 |
| 2.3.1. PACS bugs | 3 |
| 2.3.2. SPIRE bugs | 4 |
| 2.3.3. HIFI bugs and issues | 4 |
| 2.3.4. SPIRE PACS Parallel Mode bugs | 7 |
| 2.4. On-line catalogues and display issues when preparing AORs | 7 |
| 2.5. Proposal submission | 9 |
| 2.6. Proposal handling system | 9 |
| 3. Change record | 10 |
| 3.1. Bugs removed in HSpot v6.0 | 10 |
| 3.1.1. General Bugs | 10 |
| 3.2. Bugs removed in HSpot v5.0 | 10 |
| 3.2.1. PACS Bugs | 10 |
| 3.2.2. HIFI Bugs | 10 |
| 3.2.3. Display Bugs | 11 |
| 3.2.4. Catalogue issues | 12 |
| 3.3. Bugs removed in HSpot v4.2 | 12 |
| 3.3.1. PACS Bugs | 12 |
| 3.4. Bugs removed in HSpot v3.4 | 13 |
| 3.4.1. Introduction | 13 |
| 3.4.2. General Bugs fixed | 14 |
| 3.4.3. SPIRE Spectroscopy Bugs fixed | 14 |
| 3.5. Bugs removed in HSpot v3.1 | 14 |
| 3.5.1. Changes in HSpot v3.1 | 14 |
| 3.5.2. Bugs removed in HSpot v3.1 | 15 |
| 3.6. Bugs removed in HSpot v3.0 | 15 |
| 3.6.1. General issues | 15 |
| 3.6.2. PACS bugs | 15 |
| 3.6.3. SPIRE Photometer | 16 |
| 3.6.4. SPIRE Spectrometer | 17 |
| 3.6.5. SPIRE PACS Parallel Mode bugs | 18 |
| 3.6.6. Catalogue bugs | 19 |
| 3.6.7. Proposal submission | 19 |

Chapter 1. Introduction

HSpot is a huge and increasingly complex piece of code (more than 170 000 lines of Java code) that has seen constant increases in functionality and that has involved now around 30 Man-Years of development. It has gone through extensive testing on Windows, Mac, Linux and Solaris. We believe that all of the major and many of the minor bugs that are under our control have been located in these campaigns although sometimes new issues can appear unexpectedly due to an apparently innocent change in the code to correct a quite unrelated problem. With Herschel in operations constant, small updates have been made in the light of the in-flight performance of instruments (e.g. sensitivities and HIFI band widths) there have been numerous changes, some major, as AOTs have been tested and refined in space and better ways have been found of taking data than those initially envisaged on the ground and new, second generation observing modes have been developed. Most observing modes are now quite stable, but further changes are possible with more detailed characterisation based on a larger quantity of in-flight calibration.

Where we are aware of a significant problem that has not yet been fixed or issue that the user should be aware of, it is listed below. Please note though that not all issues that are reported are under our direct control as HSpot also uses some external facilities and also some problems refer to parts of the code that are Spot Core and thus not maintained at the Herschel Science Centre.

As Herschel moved over to operations and HSpot is being used by astronomers in increasingly complex ways, particularly by the instrument specialists who are planning and carrying out observations on board who have been modifying and adapting, sometimes extensively, the way that observations are carried out, it is natural that the number of issues reported started to increase again. Please note though that, in most cases, the average user will not even be aware of these problems and their impact on normal HSpot use will be small, if any. The typical problem that is reported is a minor irritation to the average user and something that can be worked around, even if he or she is even aware of it, rather than representing a serious issue for the astronomical community.

The problems are divided into HSpot issues and proposal handling issues. Within each, they are subdivided into sections for ease of search.

Chapter 2. Known problems and bugs in HSpot and proposal handling

2.1. General issues

- On rare occasions HSpot may not install cleanly when upgrading from an older version. This can be manifested by the failure of certain HSpot applications, such as the reading in of AORs from disk on first opening a new version of HSpot.

- Implication for user: Extremely disconcerting when experienced, but ultimately not serious as it has a simple fix. Probably due to old files remaining on disk after the update.

- Recommended action: This will almost always be solved by closing down HSpot and re-opening the program. To avoid this issue completely, uninstall HSpot using the HSpot uninstaller and remove any remaining Herschel files and directories by hand by entering the Herschel directory on disk (see the HSpot Manual for details of where this is on different operating systems) and then install a new version.

- HSpot will no longer install on older Macs without a dual core.

HSpot versions from 4.2 require Java 1.6 with 64 bits. This release will only work on Macs with an operating system version of 10.5.1 or later. To be able to install OS 10.5.1 on Mac requires a dual-core machine rather than the older core-duo machines.

Recommended action: Ensure that you have a dual core and that you have the latest Mac operating system installed. If you have an older core duo machine you will not be able to install Java 1.6 and thus not run HSpot 4.2 or later. The only solution is to buy a new computer!

- There may be problems with editing constraints if an AOR within a constraint is renamed.

- Implication for user: The AOR may become corrupted and uneditable.

- Recommended action: This is a consequence of changing the default starting string of the AOR name (i.e. PSpec, HPoint, ...). We strongly recommend not renaming AORs within constraints after setting up the constraint or, if you need to do it, changing the termination of the identifier, e.g. PPhoto-0000 --> Photo-0000-M31_1.

If you have done it inadvertently and find that your AOR has been corrupted, it is possible to edit the XML file on disk with a text editor to restore it. In case of problems, contact Helpdesk describing carefully the steps that you carried out.

- Numbers in HSpot do not follow the recommended ISO 31-0 standard. Users who are not familiar with the American system of commas to separate thousands and a decimal point should be wary when reading numbers that HSpot presents when you give an input.

- Implication for user: The non-standard implementation offers ample scope for confusion and the possibility of users believing that HSpot has read their input incorrectly when, in fact, the input is correct.

- Recommended action: Users are urged to take care when checking numbers entered in HSpot and to be aware of the possible confusion between the decimal point and the comma(s) separating thousands.

2.2. Herschel Tools

2.2.1. Herschel Confusion Noise Estimator (HCNE) bugs

- None

2.2.2. Herschel Reserved Observation Search Tool (HROST) bugs

- No issues.

2.3. Instrument AOT and AOR issues

2.3.1. PACS bugs

2.3.1.1. Photometer AOT

- None

2.3.1.2. Spectrometer AOTs

Line Spectroscopy AOT

- When a set of raster map AORs are created and saved to disk, the reference parameters that are displayed are set back to default in the HSpot display on starting a new session, which may make it appear that the reference frame of the AORs has changed from "Instrument" to "Sky" and the reference position has re-set to an offset of "0, 0". This appears to be a platform-dependent issue and does not happen on all platforms.
 - Implication for user: The parameters are actually correctly saved to disk. Only the information that is displayed in HSpot is incorrect.
 - Recommended action: If you enter the editor you should be careful not to accept these false parameters as then they would overwrite what has been previously correctly stored to disk.
- Currently, although HSpot correctly estimates the time required to make observations in unchopped grating scan mode, the HSpot back-end is still being revised and the results currently should be treated as approximate values based on previous wavelength-switching data obtained in Performance Verification phase.
 - Implication for user: We believe that the S/N estimation currently calculated underestimates the expected S/N by a factor of roughly $\sqrt{2}$.
 - Recommended action: Treat the estimate S/N values as probably representing lower limits.

Range Spectroscopy AOT

- For pointed observations in unchopped range scan mode, the number of instrument cycles defined on the AOT front-end is not taken into account.
 - Implication for user: The time estimate calculated will be incorrect.

- Recommended action: Please use range repetition instead in order to get a proper time estimate.

2.3.2. SPIRE bugs

- In the Time Estimation Details the times sometimes do not agree with those in the Time Estimation Summary.
 - Implication for user: Minor inconvenience when Time Estimation Details are displayed.
 - Recommended action: The times given in the Time Estimation Summary are the ones that should be used.

2.3.2.1. SPIRE Photometer

- None.

2.3.2.2. SPIRE Spectrometer

- None

2.3.3. HIFI bugs and issues

- When working near the limit of the WBS, the time estimation for an observation will jump suddenly for a very small change in the Res. Max. value .
 - Implication for user: If you set, for example, observation parameters that are - LO frequency = 532 GHz, observing mode = DBS, noise goal for max width = 0.008 K, spectrometer choice = WBS + HRS, the total time estimate for the observation will increase by a factor of 2 suddenly between Width = 0.62 and 0.63 km s⁻¹
 - Recommended action: This is a feature of HIFI when close to the limit of the WBS. Below 0.63 km/s, the resolution is too much for the WBS, but you can get it with the HRS -- that is what you get in the noise calculator. If you put in line widths larger than this, then the lowest resolution information can be obtained with the WBS but this has a fluctuation bandwidth nearer 1.6 MHz. Note that the noise estimator allows you to calculate the noise at high resolutions and low resolutions at the same time. So you can always use this to get WBS and HRS noise values at the same time for two resolutions you are interested in.
 - So -- you see a jump in the effective fluctuation bandwidth being used for your observations due to the fact that you chose a line width for the lowest resolution in the time estimator that was right on the edge of what is possible with the WBS and below this value the time estimator had to consider using the HRS instead (which is also somewhat less sensitive)..
- When HIFI AORs are saved to disk and read back in an error message may be shown stating that an AOR is invalid because the value for "Frame" should be one of "LSR", "Heliocentric", or "Geocentric". This happens because when the AORs are written back to disk they may be saved as all lower case.
 - Implication for user: Inconvenience only
 - Recommended action: HSpot 6.0.0 will now automatically set anything appearing as "frame=heliocentric" to "frame=Heliocentric", and that it is strongly advised to verify that this

frame is indeed the one intended for a given AOR.

- There is a known bug in the LO frequency computation when a high velocity/redshift change is applied to an existing frequency setting. For high velocity/redshift, the new LO frequency is not fully accurate and therefore imply that the line position in the IF is not properly maintained. This means for example that HRS sub-band previously set may no longer cover the lines of interest once the LO frequency shift is applied.
 - Implication for user: Potentially serious.
 - Recommended action: When observations at high velocity/redshift are prepared, it is advisable to prepared their frequency settings from scratch instead of adapting an already existing AOR done at another velocity/redshift. On existing AORs, users should verify that the respective spectrometers do cover the lines of interest as requested. HSpot 6.0.0 will now issue a warning message whenever a redshift change is involved in an AOR which does not have an initial redshift value of 0.
- The frequency range restriction applying to the manually entered values for "Observed frequency" or "Rest frequency" in the frequency editor will be the same for the WBS and the HRS. Because this restriction takes into account the HRS sub-band width in the case of this latter backend, the range of frequency allowable for the WBS will be slightly truncated by this small margin.
 - Implication for user: Mainly an inconvenience only
 - Recommended action: The user has to accept this, "as is".
- A serious bug has been found when working with HIFI in HSpot with Linux SUSE 9.1 and the KDE window manager. This bug, which is in KDE, causes system crashes when windows are opened to define HIFI AORs.
 - Implication for user: Serious.
 - Recommended action: Do not try to run HIFI AORs with this OS/platform combination.
- From HSpot 5.0.4 onwards, the treatment of the spacecraft velocity shift needed on the HIFI Local Oscillator (LO) frequency has been revised. So far, HSpot was only taking care of the shift due to the source velocity entered by the user in the AOR main panel. At the time of submission, the Mission Planning System was using the reference frame provided by the user and did compute the remaining Spacecraft velocity at the time of the observation. For the LSR frame, which is used by most of the HIFI observations, this velocity can be as high as +/- 51 km/s. However, an erroneous truncation did apply in the uplink code used so far, which clipped this velocity to +/- 31 km/s. The effect was only really noticeable in HRS observations, where the intended line could appear mis-centred compared to the sub-band centre, and in the worse cases (at high frequencies) drop outside of the band coverage.

When this error was discovered, the HSC took measures to not schedule observations where this truncation applied so that the effect on observations collected so far was extremely limited. By waiting a couple of weeks usually, the velocity applying to a given observations would fall within the acceptable limit so this also did not force us to delay observations too significantly.

In order to solve this problem, HSpot will automatically shift the LO frequency into the Solar System Barycentre (SSB) frame, in which the Spacecraft velocity is always within the +/- 31 km/s range. In this way, the uplink code will never abusively truncate the intended LO frequency. In effect, this means that beyond HSpot, all observations will be treated in this common SSB frame. Of course this additional redshift will be considered on top of the source velocity that has been entered by the user in the main AOR panel.

There are some important consequences to take note of here:

- 1.- This shift is NOT date-dependent and only varies on the source co-ordinate. This is why when changing source in a given AOR, HSpot will ask you whether you want to apply the cor-

responding frequency shift to the existing Local Oscillator setting in your AOR - you should say YES.

2.- This shift does NOT apply to moving targets because the spacecraft velocity with respect to the target will always depend on the date and will be fully computed by the Mission Planning System at the time of observation.

3.- This shift does NOT apply to Spectral Scans because there is not entry for redshift of velocity frame needed in this mode.

4.- Most important: if you re-load an AOR prepared by an HSpot version older than 5.0.4, HSpot will not apply this correction as it will assume that this latter was already applied when the AOR was initially designed. So In order to have this additional correction properly taken into account the frequency setting has to be prepared from scratch in the frequency editor. This means that if you want to re-use AORs that you may have prepared in earlier programs with HSpot version older than 5.0.4, you will have to reset the settings in the Frequency Editor window.

For already existing AORs in the HSC data-base, a bulk correction has already been applied and we will contact each user individually to inform them about the changes.

- A serious bug has been found when working with HIFI in HSpot with Linux SUSE 9.1 and the KDE window manager. This bug, which is in KDE, causes system crashes when windows are opened to define HIFI AORs.

- Implication for user: Serious.

- Recommended action: Do not try to run HIFI AORs with this OS/platform combination.

- There is a bug in the frequency editor when only the HRS is to be used. In the first (or only, if high-resolution mode is selected) scroll-down menu for the transition, the menu only features the -no line- tab, despite the presence of an available transition in the window of interest.

- Implication for user: the user cannot select the transition of interest in the first HRS sub-band scroll-down menu.

- Recommended action: we can propose two work-arounds for this problem:

i) Select WBS simultaneously, then go to the frequency editor to assign the lines as needed (the bug does not apply then). Go back to the main window, deselect the WBS: the settings are kept for the HRS (please check again the settings in the frequency editor to confirm that they have remained as desired).

ii) The second approach consists of filling in manually the value of the requested frequency in the "Observed Frequency" box (it should turn white when ready to be filled in). Click somewhere else in order to get the chosen frequency applied.

- HIFI time estimation can take more than the nominal 10 seconds for AORs of more complicated modes (spectral scans and mapping AORs with OFF positions). In extreme cases a time estimation make take up to a minute. Users should beware not to hit the Abort button too soon!



Note

This problem has been greatly reduced since the release of HSpot v3.3 and the situation appears to have improved slightly more since HSpot v3.4, but may still be important on occasions when the system is under heavy load such as before a call for proposals. For most HIFI modes the 5.* HSpot version is tolerably quick at time estimation, but large numbers of HIFI AORs may still take a long time to estimate even with no other system load.

Important changes in the Sequencer code for HIFI in HSpot 6.0 have made time estimation slightly slower again, but only by about 8%. Users may notice that it takes slightly longer to estimate their HIFI AORs.

- Implication for user: Can be serious. HIFI time estimation may be extremely slow if many AORs must be computed.
- Recommended action: This problem is particularly serious when there is heavy load on the system, but there is no real solution at present apart from exercising patience. The user should be aware of this and try not to run large numbers of time estimates at peak times (e.g. near an AO closure).
- For the HIFI load chop with OFF and frequency switch point modes there is the possibility of providing an OFF position that is offset in RA and Dec from the target position. Currently, if the offset reference box is checked then the following two errors are seen.
 - 1.- If any RA offset is used the OFF position does not change its RA but changes its declination position in the visualisation overlay instead.
 - 2.- The target position (on position) is not shown at all.
- Implication for user: Visualisation of AORs does not work correctly. AORs must be hand-checked to ensure that they are correct.
- Recommended action: If an offset in declination only is used then the visualisation is correct.
- Time estimations for spectral scan AORs currently will not be given accurately if nominal times (a few minutes) are placed as a time goal to scan a whole band.
 - Implication for user:
 - Recommended action: Users are advised to use time goals closer to the minimum times needed (3000+ seconds).
- When the WBS-only is selected, the best goal resolution possible should be at least 1.1 MHz. However, in the default time estimator window, this value is set at 0.480 MHz, which will result in an error and an explanatory error message. When the WBS-only is selected, the user should adapt the best goal resolution possible accordingly.
 - Implication for user: .
 - Recommended action:

2.3.4. SPIRE PACS Parallel Mode bugs

- In the Time Estimation Details the times sometimes do not agree with those in the Time Estimation Summary.
 - Implication for user: Minor inconvenience when Time Estimation Details are displayed.
 - Recommended action: The times given in the Time Estimation Summary are the ones that should be used.

2.4. On-line catalogues and display issues when preparing AORs

- When overlaying AORs on full sky images, the AOR projection is not correct: this effect is more evident as the AOR is close to the map's edges.
 - Implication for user: This can be important for large scan maps that can only be displayed on

an all-sky image. The overlay display will not correspond to the true map area, making AOR optimisation difficult or impossible for the user.

- Recommended action: To overcome this issue, you need to use a map with a different projection, e.g. a tangential projection centered on the AORs area. If you don't have such a map or you don't know how to produce it from available datasets, please ask the HSC to provide one, specifying the centre and boundaries of the area you are interested in.

- HSpot only shows executed observations in the HROST overlay option.
 - Implication for user: At present, when you select observations to overlay in HSpot from the HROST, you will not see observations that are in the HROST and thus are potential duplications, but not yet executed.
 - Recommended action: This will be patched in an upcoming version of HSpot. If you search HROST directly using the HROST search tool, you **WILL** find all reserved observations. Accept updates to HSpot 6.0.0, when released.
- when overlaying multiple AORs (close to each other, usually having same target) on the same image, from time to time a message pop-ups saying that the specified AOR is outside the image and the user is asked if he or she wants to use a full-sky image instead.
 - Implication for user: This is principally an inconvenience.
 - Recommended action: The only solution is to close the image, re-download it and re-plot the AORs on it.
- If an AOR is prepared with a visibility constraint and the AOR is then calculated, when that AOR is overlaid, the constrained visibility windows are retained.
 - Implication for user: This is principally an inconvenience.
 - Recommended action: This is principally an inconvenience to users but, if it presents a serious problem, the best solution is to select and overlay a different, unconstrained AOR, before switching back to the original to overlay.
- There are display issues close to the celestial poles.
 - Implication for user: This is principally an inconvenience.
 - Recommended action: For AORs very close to the poles we are aware of various issues that are mainly irritations to the user, although these are being fixed progressively. These do not stop users from preparing AORs in these regions, but grid and AOR overlays should be treated with suspicion as they may sometimes be incorrect.
- There are some pending issues of relatively minor importance with the display of moving targets. In particular, if you display a moving target with a 3-colour image background the display parameters for the first colour layer are not propagated to other layers, so you must take care to enter the same date for each layer of the image.
 - Implication for user: This is principally an inconvenience.
 - Recommended action: If working with a three colour plot as background, note down carefully the date that you have chosen to display so that you enter the same date and time for each layer. Alternatively, work with a monochrome image.
- Buttons not visible (only in Mac)

Sometimes, depending on the screen resolution, some buttons on the bottom of the AOT window may become cut out and not visible.

 - Implication for user: There is no indication about this (no scroll bar is displayed) and the user cannot open an observation estimation window, or do a visibility check. This usually happens if

the AOT window cannot use the whole vertical space of the screen, as in cases when there is a dock bar on the bottom.

- Recommended action: To overcome this situation, a way out is to auto hide the dock or change its placement before opening the AOT window. However, this problem should be very much reduced in importance for users in HSpot v5.0.4.

2.5. Proposal submission

- Users of Linux may find that the password field does not allow an entry to be made. This is a Java bug, unrelated to HSpot.
 - Implication for user: Normally an inconvenience only.
 - Recommended action: If this happens, almost invariably if you press submit without entering a password and accept the warning that you should enter a password, the problem will be fixed and the password field will allow entry. If this fails, the only solution may be to save your proposal and AORs to local disk and re-start your session.
- There is a known problem in the system whereby, occasionally, the submission of a proposal may hang silently without returning the pop-up confirming successful submission. This only happens when the system is under heavy load such as closure of Calls for Proposals.
 - Implication for user: Inconvenience only.
 - Recommended action: If more than a minute passes without the pop-up being returned, the proposal submission should be aborted and repeated.

2.6. Proposal handling system

In the Proposal Handling Service, whereby a PI has logged in to see his/her proposal, the PI has the possibility of adding a co-user to his/her proposal by clicking on the menu option "adding a co-user to proposal". Once this option is selected then he/she must insert the user-id of that person in the appropriate window and corresponding to the relevant proposal in question. If the person is within the RSSD LDAP system but not yet signed on for Herschel via the Proposal Handling Service, then the 1st time that the user-id is added it will not appear against the proposal. It will only appear on the second attempt.

- Implication for user: this is a minor bug that the user can resolve without outside assistance.
- Recommended action: If this occurs, enter the required co-user name twice in order to get it into the system.

Chapter 3. Change record

3.1. Bugs removed in HSpot v6.0

3.1.1. General Bugs

- Duplicating existing aors and saving in a new file may produce a corrupted aor file.
 - Implication for user: The AORs may become corrupted and uneditable. This is due to a library mismatch external to HSpot.
 - Recommended action: It may be possible to edit the XML file on disk with a text editor to restore it, but it is likely that the only solution is to re-do the AORs.

3.2. Bugs removed in HSpot v5.0

3.2.1. PACS Bugs

- Latest instrument ground tests have shown that the time spent per grating position in Nyquist sampling and SED mode are too low.
 - Implication for the user : observations may produce unusable data.
 - Recommended action: A minimum repetition factor of 2 must be entered in HSpot for AORs using range scans in Nyquist sampling and SED modes.
- In the range sensitivity plot functionality, the units on the Y-axis can disappear in the line sensitivity plot, after zooming too much.
 - Implication for user: sometimes inconvenient when reading the Y scale
 - Recommended action: none.
- In the three SED modes the reference wavelength is always used in the time estimator calculations, however HSpot does not automatically add a range in the SED mode.
 - Implication for user: The user needs to enter range and a reference wavelength in the PACS range editor.
 - Recommended action: Use the range sensitivity plot GUI to get the sensitivity at the user desired reference wavelength.
- Depth of coverage maps.

The PACS photometer depth of coverage maps are unfortunately offset by about 10 arcmin, as a side effect of the new way of handling instrument apertures in HSpot. This is the same problem as for the AOR overlays.

3.2.2. HIFI Bugs

- There is a bug in the computation of the noise rms for spectral surveys performed over a partial

range of the available mixer frequency range. The noise temperature used in the computation is estimated on the assumption of a full band survey. This means that noise estimates in areas of potential low T_{sys} in comparison to the average distribution over the band will be over-estimated. Similarly, the opposite effect can also occur.

- Implication for user: not too serious as the T_{sys} distribution is usually smooth, with the possible exception of band 5, and in the case of very reduced surveys (some GHz).

- Recommended action: if you run time estimates with a noise goal, the time you effectively need is the one returned by HSpot, divided by square root of the ratio of the T_{sys} in the limited area by the average T_{sys} over the band. You can then run the time estimate again, but set the time computed according to the previous correction as the goal constraint.

- Time estimation for HIFI AORs may fail with a server error when the system is under heavy load. An "Array Index Out of Bounds" exception is given.

- Implication for user: This is usually a minor inconvenience only. However, if time estimation is to be run for large numbers of HIFI AORs this operation should be carried out with the user present to respond to any errors that may occur, rather than being left to run alone.

- Recommended action: Restart time estimation, either from the beginning, or from the AOR at which the error occurred. The sequencer parameters are cached, so little time is lost even if the entire file is recalculated. However, it is even quicker to select the option of calculating time estimates only from the AOR at which the problem occurred, i.e. for "Out of date AORs".

- Mapping (and visualisation) for the HIFI DBS raster map mode is using a position angle which is with respect to the Z axis of the telescope. This should be corrected to giving a PA with respect to north on the sky.

- Implication for user: The position angle and thus visualisation changes depending on the date of observation.

- Recommended action: There is no solution for users right now other than to be aware of the problem, although this bug should be fixed fairly quickly within HSpot.

3.2.3. Display Bugs

- AOR visibility calculated in HSpot may not agree exactly with the visibility calculated in the Mission Planning System.

- Implication for user: HSpot may over-estimate the visibility window by up to 6 days when close to the limit of permanent visibility. In normal cases the true visibility may be 1-2 days less than calculated in HSpot.

- Recommended action: This is a consequence of an approximation made when calculating visibilities in HSpot. It principally affects observations that are strongly constrained, for example, by setting a very narrow range of orientation angles for a scan. Users should avoid over-constraining observations and should be aware that these are essentially severely time-constrained observations that may not ultimately be schedulable. An urgent fix of this problem is planned.

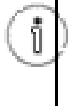
1. Bugs removed in HSpot v4.4

1.1. Display Bugs

- An AOR overlay will sometimes fail to plot

Implication for user: Sometimes AOR overlays will fail to appear due to the size of background map for AOR overlay being insufficient.

- Recommended action: In order to display the footprint on the sky of PACS photometer AORs , a significantly larger background map that the actual size of the AOR footprint has to be used in most of the cases. For instance to display a point-source AOR of less than 3 arcmin x 4 arcmin in the sky a oversized map of minimum size 0.35 x 0.35 degree has to be used.



Tip

Users have found that, as a temporary solution, the overlay can also be added by hand by drawing chords with the distance tool on a background image. If you do this for one image the same overlay is added to all open images.

3.2.4. Catalogue issues

- CDMS line list library gave a broken link

Implication for user: It was not possible to use the CDMS line library to update, or to check proposals with spectroscopy AORs.

- Now fixed. The URL at the University of Cologne had changed

3.3. Bugs removed in HSpot v4.2

3.3.1. PACS Bugs

3.3.1.1. Photometer AOT

- On rare occasions, for scan maps with homogeneous coverages in array reference frame, the exposure map overlay can display one scan less than for certain values of the orientation angle. The AOT overlay display functionality is the reference in case of difference.

- Implication for user: the predicted exposure map can be smaller than the one defined in the AOR.

- Recommended action: rely on AOR overlay to assess mapped area instead of exposure map.

3.3.1.2. Spectrometer AOTs

Line Spectroscopy AOT

- Latest instrument ground tests have shown that the time spent per grating position in this mode is too low.

- Implication for the user : observations may produce unusable data.

- Recommended action: A minimum repetition factor of 2 must be entered in HSpot for AORs in chopping/nodding (bright lines).

- Although the wavelength switching mode is currently available in "pointed" and "pointed with dither" in HSpot, this option will be disabled in the future.

- Implication for the user : AORs that use this option will become invalid and will have to be re-

entered before execution.

- Recommended action: Wavelength switching should only be used in combination with the mapping pointing mode, with a minimum raster size of 2 x 2.

Range Spectroscopy AOT

- In the observing mode "mapping with OFF position", if the OFF position is defined relative to the centre of the map, i.e. option "by offset", negative relative offsets are not possible, due to a software bug.
 - Implication for the user : relative OFF positions towards the south or the west are not possible.
 - Recommended action: define an absolute OFF position with the option "by position".
- A range scan defined in the [55-73] and [102-210] micron range will fail if
 - 1) The short wavelength edge is between 110 and 120 micronsAND
 - 2) The long wavelength range is above 120 microns.
 - Implication for user: A range scan in the [55-73] and [102-210] microns range that has the conditions defined above is not currently feasible. The parallel range in the extended 2nd order cannot be performed.
 - Recommended action: change the wavelength settings to "Range scan in [71-98] and [102-210] microns (2nd and 1st orders)", if it fails for the [55-73] and [102-210] micron range. It will be possible to change back to the [55-73] and [102-210] microns range scan in the next HSpot release.
- Range scans defined in the second order with the red edge wavelength lower than 73 microns are not possible due to a software bug.
 - Implication for user: this range shall be performed in the third order instead.
 - Recommended action: If a range scan fully bracketed in the range 71-73 microns is to be entered in HSpot, the user shall select the third order, where the line sensitivity is better (but not the continuum sensitivity), and switch back to second order in a future HSpot version is needed.
- Range scans defined in the first order with the red edge wavelength lower than 105 microns are not possible due to a software bug.
 - Implication for user: Range scan fully bracketed in the range 102-105 microns are not possible.
 - Recommended action: Extend the red edge wavelength beyond 105.0 microns to make it possible in HSpot.

3.4. Bugs removed in HSpot v3.4

3.4.1. Introduction

Release v3.4 has fixed several bugs that affect the handling of constrained observations, particularly concatenated and follow-up observations.

The bugs with SPIRE spectroscopy have also been fixed.

3.4.2. General Bugs fixed

- Timing information is lost when concatenated AORs are saved to disk and then recovered.

This problem and the ones that follow immediately below all seem to be related and due to a problem in the way that the links to concatenations are stored to disk by HSpot.

- Implication for user: When an AOR file is saved and recovered the time estimates for all concatenated AORs are lost and must be recalculated.

- Recommended action: This problem has no solution at present other than to recalculate the times for all out of date AORs. Only concatenated AORs are affected, so it is not necessary to recalculate for all AORs.

- If a constraint has been defined, the time estimate will change to out of date if the constraint editor is opened to view the constraint, even if no changes are made in the constraint and the user cancels out of constraint editor.

This bug is not present in Solaris. It is present in Mac and Windows and, to a lesser degree (i.e. for some reason fewer AORs get declared out of date), in Linux.

- Implication for user: This is an annoyance rather than a serious bug.

- Recommended action: Ensure that your time estimates are up to date before proposal submission if you have opened the constraint editor at any point, otherwise the total time displayed by HSpot will be out of date.

3.4.3. SPIRE Spectroscopy Bugs fixed

- Certain sequences of events can lead to Continuum Estimates going missing when reopening the Source Flux Estimates panel.

- Implication for user: Values are not always displayed in the window effects displaying the values and they are not always used in Time Estimation, however they are not lost from memory.

- Recommended action: To get back your estimates press cancel in the Source Flux Estimates window. Then press cancel on the AOR window. Now reopen your AOR and the Source Flux Estimates, you should see that they are displayed again.

- Certain sequence of events can lead to default values not being set correctly when changing between "High and Low" resolution and other resolutions.

- Implication for user: When you change resolutions the default value might not be displayed.

- Recommended action: Always check the values of parameters when you change settings, do not trust that the usual values will appear, this is good practice anyway.

3.5. Bugs removed in HSpot v3.1

3.5.1. Changes in HSpot v3.1

Release v3.1 has few changes that are visible to the user apart from the change in the method of Proposal Submission, which suppresses two previously recorded bugs in the Proposal Submission process.

An important change is that the SkyView image option, which has had various interface problems with HSpot, has recently ceased functioning completely. Further details in Section 2.4.

3.5.2. Bugs removed in HSpot v3.1

3.5.2.1. Herschel Tools

Herschel Confusion Noise Estimator (HCNE) bugs

- The Confusion noise estimation summary tables in HSpot contain swapped values for the "Confusion level for point sources" and "Confusion level per pixel" columns, i.e. the values displayed in the first and third columns are exchanged. The estimates otherwise up-to-date and conform with the latest v0.15 release of HCNE.

Implication for the user: Confusion noise estimates per pixel and for a point source provide incorrect values, the error is typically within a factor of two.

Recommended action: Please re-check your confusion limits especially for deep PACS and SPIRE exposures. You need to swap around the values displayed in the first and third columns until this bug is fixed.

3.6. Bugs removed in HSpot v3.0

3.6.1. General issues

- The current iteration of the Herschel orbit ephemeris has a duration of only 1003 days, cutting off at 2011 April 30th. This is significantly less than the expected duration of the Herschel mission and means that, at present, no visibility windows will be generated beyond this date.
 - Implication for user: This should have little impact on the initial Key Programme call except for extended monitoring programmes and solar system objects that only have visibility towards the end of the mission.
 - Recommended action: Please inform the Helpdesk (<http://herchel.esac.esa.int/>) if your programme is affected.

3.6.2. PACS bugs

3.6.2.1. Photometer AOT

- The estimated source flux density is limited to 10 Jy instead of 100 000 Jy. - Implication for user: i) the signal-to-noise cannot be calculated (but the noise estimation from HSpot is still valid) and ii) the low-gain mode is never activated, as the dynamic range of the high gain mode goes up to ~2000 Jy. - Recommended action: None, this parameter is not mandatory.

3.6.2.2. Spectrometer AOTs

- The size of raster maps is limited to 2x2 arcmin instead of 6x6 arcmin in chopping/nodding mode. - Implication for user: the map size is limited to 2x2 arcmin. - Recommended action: to cover larger area, use the wavelength switching mode, which has no such limitation in map size. The AOR in this mode has a similar duration.
- Time Estimation summary for PACS line and range spectroscopy AOTs does not provide "Instrument and observation overheads" (always zero) but this information can be obtained from the Time Estimation Messages. - Implication for user: overhead cannot be easily estimated. - Recommended action: if necessary, this information can be obtained from the Time Estimation

Messages.

- In the "pointed with dither" mode, HSpot returns the sensitivity for one of the 3 pointings and not the total for the AOR. - Implication for user: the sensitivity of the AOR is underestimated by a factor $\sqrt{3}$. - Recommended action: divide the sensitivity returned by HSpot by 1.7 to get the overall sensibility of the AOR.

3.6.2.3. Line Spectroscopy AOT

- In wavelength switching mode, the sensitivity returned by HSpot is underestimated by a factor $\sqrt{2}$. - Implication for user: sensitivity returned by HSpot too pessimistic. - Recommended action: divide the sensitivity returned by HSpot by 1.4.
- No signal-to-noise calculation (the input flux is not being used). - Implication for user: the user has to compute the signal-to-noise himself. - Recommended action: compute the signal-to-noise by dividing the flux by the sensitivity returned by HSpot.
- The line width is only as a warning limit to ensure the whole line profile is covered by the highest sensitivity part of the predefined wavelength range. - Implication for user: None - Recommended action: None
- In wavelength switching mode, the parameter "number of cycles" is currently ignored. - Implication for user: the sensitivity cannot be increased by increasing the number of cycles.
- - Recommended action: use the line repetition factor (up to 10) instead, in order to increase the sensitivity.

3.6.2.4. Range Spectroscopy AOT

- In range spectroscopy, if a very narrow wavelength range is entered, for instance for a fast raster mapping of an emission line, below a certain width the sensitivities returned by HSpot are overestimated by up to a factor two or more. The exact threshold depends on the wavelength and the order, but it is about 0.3 micron in the 3rd order up to 1.6 micron in the first order. - Implication for user: erroneous overestimated sensitivities - Recommended action: Contact the Helpdesk (<http://herschel.esac.esa.int/>) to get estimates of sensitivities for very narrow wavelength ranges.
- No use of reference wavelength (no rms sensitivity provided and signal-to-noise calculation is made at this wavelength). - Implication for user: sensitivity cannot be estimated at desired wavelength. - Recommended action: defined a temporary AOR with small interval around the reference wavelength of only 3 microns to estimate the sensitivity in this range.
- No signal-to-noise calculation (the input flux and line width information is not being used). - Implication for user: signal-to-noise cannot be estimated. - Recommended action: None.
- No sensitivity estimates are provided for parallel channel data. - Implication for user: the sensitivity has to be estimated by the user. - Recommended action: consult the PACS Observer's Manual.
- Mapping with off-position does not apply the off-position yet (as a consequence the footprint visualization tool does not show the off-position). Hence the time estimation is underestimated for this mode. - Implication for user: the AOR observation duration is slightly underestimated for this mode. The estimated sensitivity underestimated as well by factor $\sqrt{2}$. Moreover the footprint visualisation tool does not show the off-position - Recommended action: to get the right sensitivity, divide the number returned by HSpot by 1.4.

3.6.3. SPIRE Photometer

- Small map visualisation overlay is shifted by ~1 arcmin with respect to the target, see SPIRE Observers' Manual Figure 4.4 for correct image.

- Implication for user: AOR overlay is shifted by ~1 arcmin with respect to the target.

- Recommended action: When visualising imagine (for given observation date) the overlay to be centred on the target coordinates. Note that only a circle with radius of 2 arcmin can be guaranteed regardless of the time of the observation.

SPR-2921 Fixed in HSpot v2.0.2

3.6.4. SPIRE Spectrometer

- The total on-source integration time can be out by up to 2 seconds due to a value being converted to an integer.

- Implication for user: In case of many SPIRE Spectrometer observations in a proposal this can be significant.

- Recommended action: Calculate the correction by multiplying the on-source time per FTS scan by the number of FTS scans (for spectral resolution High and Low do this for each resolution). Use this to modify the Total Time that you request for the observations and proposal.

- Repetition factors that are too large for the parameters selected will produce an error about "tp out of range".

- Implication for user: Only effects pointings lasting nearly 14 hours or more. The maximum Repetition factor needs to be worked out for each combination of parameters used.

- Recommended action: Decrease the repetition factor.

SPR-3125 Fixed in HSpot v2.0.2

- Re-loading of saved AOR does not work when inputted Source Flux Estimates include Estimated Continuum value(s) of 0 (or 0.0) or if the box is left blank for a row where other data have been inputted.

- Implication for user: On attempted re-loading an error message will appear and no AORs will be loaded.

- Recommended action: If you put in any Estimated line fluxes into the Source Flux Estimates, always also put in Estimated Continuum values of 0.1 or greater.

If you already have a saved AOR file that does not load, you should edit the file with a text editor as follows to enable reloading:

Save file to a different name.

Find `<v05:continuum>0.0</v05:continuum>` and replace with `<v05:continuum>0.1</v05:continuum>`

Find `<v05:continuum>-1.0</v05:continuum>` and replace with `<v05:continuum>0.1</v05:continuum>`

Now save the updated file and load it into HSpot.

Notes: -1.0 in the saved file represents a blank box. You can put in any value greater than 0.1. Note S/N values will be returned with this new value if you do a time estimate.

SPR-2956 Fixed in HSpot v2.0.2

3.6.5. SPIRE PACS Parallel Mode bugs

- The Observation Estimation for the settings Slow Scan Speed and Orthogonal Scan Direction gives an error.
 - Implication for user: The results of the Observation Estimate calculation for those settings are not produced.
 - Recommended action: Select Slow Scan Speed with Nominal Scan Direction and use those results instead as the times and sensitivities are the same as for the Orthogonal Scan Direction. Submit this as a sample AOR and say you also would do a coverage in the orthogonal direction and modify the total time of the proposal accordingly. Note that visualisation works correctly for both scan directions and should be used to compare the two areas covered.
- The correction for the distance in the cross-scan direction (to work out the distance needed to ensure that both PACS and SPIRE cover the area properly) is subtracted rather than added to the required distance (SPR-2882).
 - Implication for user: The height of the map is 26 arcmin smaller than requested.
 - Recommended action: Please add 26 arcmin to the height of your map before you enter the number to enable HSpot to compute the correct time for your observation.
- The Observation Estimation for the settings Slow Scan Speed and Orthogonal Scan Direction gives an error.
 - Implication for user: The results of the Observation Estimate calculation for those settings are not produced.
 - Recommended action: Select Slow Scan Speed with Nominal Scan Direction and use those results instead as the times and sensitivities are the same as for the Orthogonal Scan Direction. Submit this as a sample AOR and say you also would do a coverage in the orthogonal direction and modify the total time of the proposal accordingly. Note that visualisation works correctly for both scan directions and should be used to compare the two areas covered.
- The efficiency value is computed incorrectly because of this. Look at visualisation to compare the common area mapped, with the area that is not common to get a visual estimate of the efficiency. Basically the larger the requested map, the higher the efficiency (SPR-2855).
 - Implication for user: The mapping efficiency estimate in the Parallel Mode Time Estimation is incorrect.
 - Recommended action: The efficiency can be calculated as the requested area divided by the area painted by one of the instruments ("Height" x "Length") / [("Height" + 13 arcmin) x ("Length"+22 arcmin)].
- The PACS Red band sensitivity reported in HSpot is wrong.
 - Implication for user: Ignore HSpot PACS red band sensitivity estimates for Parallel Mode.
 - Recommended action: Please look at the SPIRE PACS Parallel Mode Observers' Manual for the correct values.
- Sensitivities for SPIRE in this mode are pessimistic.
 - Implication for user: A factor of ~0.63 improvement in map averaged SPIRE sensitivities has to be considered with respect the numbers provided by HSpot.
 - Recommended action: Please look at the SPIRE PACS Parallel Mode Observers' Manual for the correction factor.
- The maximum value that should be entered for the height is 240 arcmin (values much larger than this will give errors as a map that large cannot be made). [Note that the maximum length is 1173

arcmin] (SPR-2771)

- Implication for user: Map height parameters are accepted out of range.
- Recommended action: Limit the map height value to 240 arcmin.
- Time Estimation Details window is entitled SPIRE Time Estimation Details: it should say SPIRE PACS Parallel Mode Time Estimation Details (SPR-2771).
 - Implication for user: -
 - Recommended action: -
- In the Time Estimation Details the times sometimes do not agree with those in the Time Estimation Summary.
 - Implication for user: Minor inconvenience when Time Estimation Details are displayed.
 - Recommended action: The times given in the Time Estimation Summary are the ones that should be used.

3.6.6. Catalogue bugs

- If you display an AOR for a certain date and look at the pointings table, the roll angle displayed does not update if you then change the display to a new date.
 - Implication for user: Important if you wish to define a constraint.
 - Recommended action: Check the roll angle for the given date in the visibility window and use this value if defining a constraint.

SPR-2855. Fixed in HSpot v2.0.2

3.6.7. Proposal submission

- The Proposal cover sheet generated by HSpot V2.0.0 does not contain the name, affiliation and e-mail address of the proposal PI.
 - Implication for user: This is a relatively minor issue with proposal identification.
 - Recommended action: Ensure that any co-Users know your user-id so that they can identify the proposal in the database.
- Proposals submitted to the HSC should be assigned to one, and only one Science Category. In HSpot v2.0.0 it is still allowed to select more than one Science Category without getting a proper warning message when leaving the Science Category selection window. Instead, the field appear as 'Incomplete' in the 'Proposal Submission Tool' window. The error message is only properly generated when the user tries to submit the proposal.
 - Implication for user: Annoyance only. HSpot will not allow you to submit a proposal with two selected science categories.
 - Recommended action: Follow the instructions in the HSpot Manual with care to avoid problems.

SCR-2774, Fixed in HSpot v3.0