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Herschel Long Term Mission Planning User Requirements

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Document approval

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1 Introduction

This document collects the requirements of the Long Term Mission Planning, both the more general ones reflected in the HSS user Requirements Document (see AD-1) and the more detailed ones identified a posteriori.

At present the final interaction between the Long Term Mission Planning and the short term mission planning is not yet defined, therefore the requirements in this subject are very soft.

1.1 Scheduling cycle definition

The scheduling cycle is defined in such a way that the relative usage of each subinstrument is kept, fitting an integer number of weeks to simplify procedures during operations. This cycle has been already defined for the KP observations. It lasts 21 OD and is based on the basic instrument scheduling schemes, which is the minimum subinstrument block.

1.2 Instrument macro scheduling schemes definition

Is the subinstrument block inside the scheduling cycle. For KP observations the macro scheduling schemes are as follows:

- 6 ODs of PACS-P
- 4 ODs of PACS-S
- 5 ODs of HIFI
- 4 ODs of SP-PAR
- every other cycle:
 - 2 ODs of SPIRE-P
 - 1 OD of SPIRE-P + 1 OD of SPIRE-S

This scheme could be split if necessary, but without violating the basic instrument

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scheduling schemes (see AD-2).

It would be desirable to have sequences of PACS-P + SP-PAR + SPIRE-P to minimize He consumption.

This sequence should be revised, both after Phase 3 and during the KP operational phase, since the instrument relative usage have been rounded and will deviate from reality at certain point of the operational phase. The aim is to keep at all moment a x7 instrument cycle in order to keep the mission planning activities at the same day of the week.



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2 Requirements of the Long Term Mission Planning Tool

2.1 General Requirements

LTP-UR-01- 0001
(HCSS-UR-3.1-0620) The HCSS shall support the user in the generation of the long-term plans. The generation of these plans must not interfere with the “normal” mission planning (comment not applicable??).

The long term plan is not a long term schedule, but a high level long term allocation of the key observations prepared by the mission planning scientist. The HCSS provides with the tools for the generation of the long term plan and for the definition of the mission planning strategy.

LTP-UR-01-0002
(HCSS-UR-3.1-0630) The generation of a long-term plan shall take into account the scheduling constraints, as specified in [AD-8], and the Observation status (i.e. already executed Observations are not considered).

LTP-UR-01-0003
(HCSS-UR-3.1-0631) Certain scheduling constraints parameters shall be editable by the user. Examples of editable scheduling constraints are:

- *Instruments to be operated*
- *Solar Aspect Angle (for improved pointing performance)*

LTP-UR-01-0004
(HCSS-UR-3.1-0640) The HCSS shall be able to automatically generate statistics from a long term plan.

LTP-UR-01-0005
(HCSS-UR-3.1-0641) The HCSS shall generate statistics from the Observation database taking into account the satellite and instrument scheduling constraints.

Important indicators are the number of schedulable Observations per OD, and the percentage of Observations

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that are visible with a given instrument schedule scheme.

LTP-UR-01-0006
(HCSS-UR-3.1-0650) It shall be possible to retain a generated long-term plan and the constraints used to generate it.

Note that the HCSS will not support the generation of Schedules from a long-term plan.
(comment not applicable??)

LTP-UR-01-0007 LTP shall have browsing capabilities. It should be able to select observations according to general criteria and display them in the graphical interface.

LTP-UR-01-0008 LTP shall take into account the scheduling cycle definition.

LTP-UR-01-0009 LTP shall take into account the subinstrument macro scheduling schemes.

LTP-UR-01-0010 LTP shall be able to swap the individual subinstrument macro scheduling schemes within one scheduling cycle based on the scheduling optimization.

LTP-UR-01-0011 LTP shall be run for a predefined and configurable range of ODs.

LTP-UR-01-0012 The LTP tool shall be able to modify at OD basis the window booked for calibration.

LTP-UR-01-0013 LTP shall be run for different predefined strategies in order to optimize the mission lifetime and scheduled time.

2.2 Graphical interface

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LTP-UR-02-0001 The LTP tool shall provide a visualization of a scheduling period defined by the user (default 6 months), marking instrument schedule windows (e.g. PACS ODs, HIFI ODs), DTCP and calibration windows. It shall also mark the scheduled and idle time for each OD.

LTP-UR-02-0002 The LTP tool shall provide a sky visualization of a particular OD with the relevant constraints and DTCP areas. The sky projection will change when scanning the range of selected ODs.

LTP-UR-02-0003
(HCSS-UR-3.1-0642) The LTP tool shall provide a sky distribution display of the Observations selected by the user according to certain criteria (e.g. time period, instrument).

LTP-UR-02-0004 The LTP tool shall be able to handle properly SSO observations.

LTP-UR-02-0005 Allocated Observations shall be represented with bars of length proportional to their duration. Uplink information shall be provided on request for each allocated Observation.

LTP-UR-02-0006 The LTP tool shall provide graphically the visibility information of a selected observation.

2.3 Observations allocation

LTP-UR-03-0001 The LTP tool shall allocate observations in a given OD (or a given subinstrument macro scheduling scheme) according to predefined sorting criteria.

LTP-UR-03-0002 The LTP shall be able to handle properly the constraints given by the observer (concatenations, time constraint ...)

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- LTP-UR-03-0003** The LTP tool shall allocate fixed time and highly constrained Observations in the long term plan and show them in the visualization tool.
- LTP-UR-03-0004** The LTP tool shall allocate in the long term plan the Observations selected by the user, and show them in the visualization tool.
- LTP-UR-03-0005** The LTP tool shall allow the user to manually allocate selected Observations in the long term plan (e.g. by click-and-drag) and show the result in the visualization tool.
- LTP-UR-03-0006** The LTP tool shall allow to modify the minimum/maximum assignable date for a given program/proposal. It should be possible to bring forward/backward the completion of a selected set of observations.
- LTP-UR-03-0007** The LTP shall be able to adapt to new circumstances, for example unavailability of certain mode/instrument in such a way that the cycle is predefined and new strategies are explored.
- LTP-UR-03-0008** The LTP shall be able to make the transition between phases, i.e. between PV phase and routine phase, and from KP phase to regular phase.
- LTP-UR-03-0009** The LTP shall be able to assign priorities to a certain program/proposal/sub-proposal.

2.4 Interaction with smps

- LTP-UR-04-0001** The input provided for the LTP tool should be synchronized with

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the operational database, in such a way that changes made via smps are collected for the LTP run.

LTP-UR-04-0002 The LTP results shall be saved only when explicitly requested by the user.

LTP-UR-04-0003 LTP shall indicate to smps the subinstrument to be operated in a given OD.

LTP-UR-04-0004 LTP shall indicate to smps the mandatory/recommended Observations to be scheduled at each OD (or subinstrument macro-scheduling scheme).

2.5 LTP statistics

LTP-UR-05-0001 LTP shall produce general statistics, both graphical and numerical: scheduled/idle time, sky distribution and visibility of unscheduled observations...

LTP-UR-05-0002 LTP shall be able to retail the generated statistics in order to compare results from different runs.

LTP-UR-05-0003 The LTP shall allow to make statistics on the relative completion of proposals. The aim is to build a big Herschel community early on.

LTP-UR-05-0004 The LTP shall allow to make statistics on the schedulable (candidates) observations per OD in order to assess the filling factor of different regions of the sky (epoch of the year)

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3 Applicable documents

AD-1 HCSS User Requirement Document, Issue 2.2, Nov 2005 (HSC/DOC/0115)

AD-2 Herschel Instrument Scheduling Schemes, Issue 2.0, May 2007 (HSC/DOC/0334)