Tour of HIFI data

Outline

- Opening the observation context
- Straight to the ‘science’ result (level 2)
- A casual look at the HIPE GUI presentation of your data
- The HISTORY section.
- The AUXILIARY section
- The CALIBRATION section
- The QUALITY section
- The Trend Analysis section

Opening the observation context

Within HIPE, open and run the 'HIFI_DP_WS_Feb2012.py' script.

You must first load your data, either from the Archive, or from the local pool you have copied to you disk

```
obspoint_hipe6=getObservation("1342190183" \
,poolName="1342190183_hipe6")
```

Or

```
obspoint_hipe6=getObservation(1342190183, useHsa=True)
```

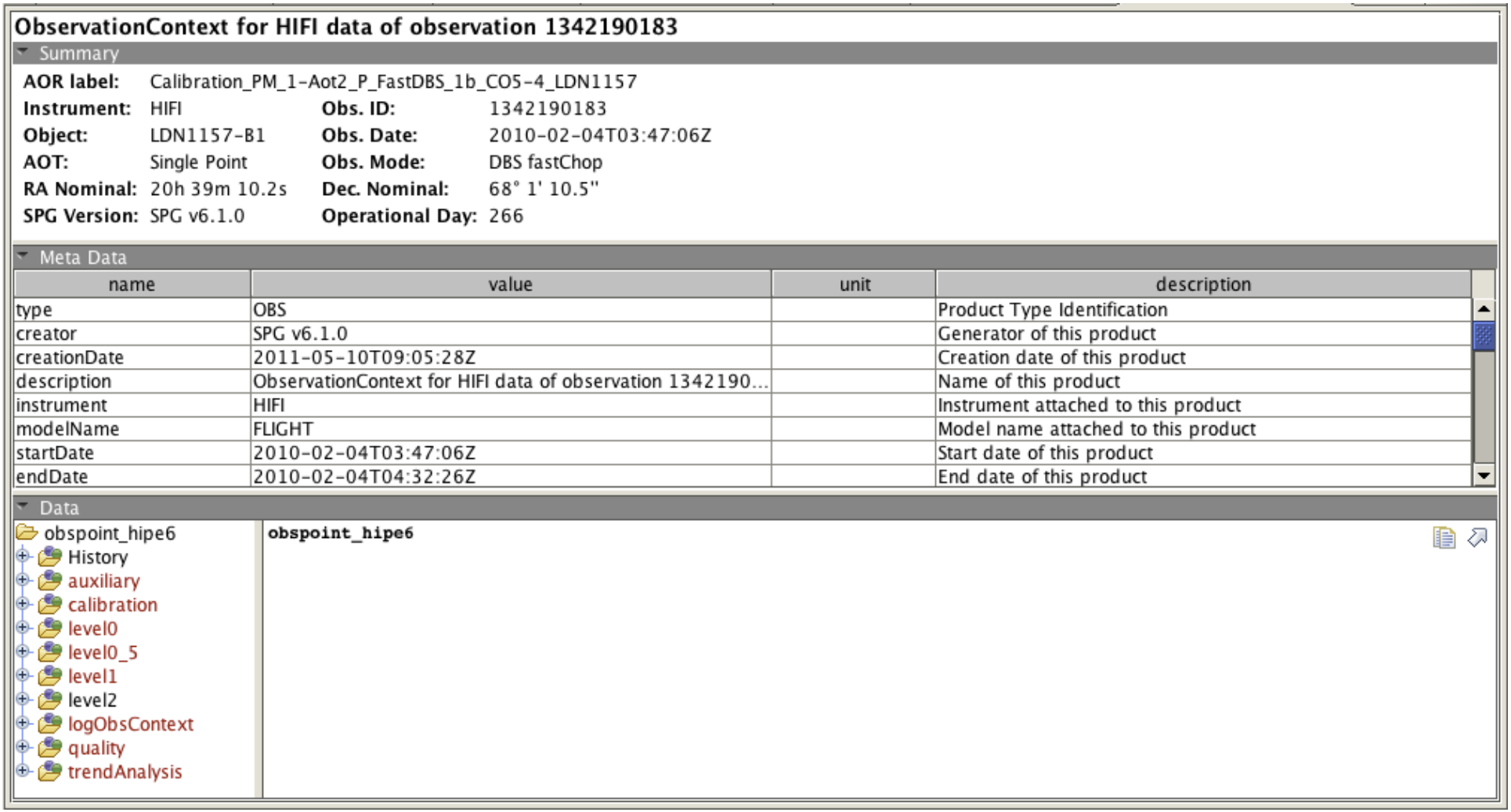
The HIPE GUI and your data

- The HIPE display for an observation context is a lot like a graphical file system listing. In this analogy, directories are what we call ‘Products’, and the files in directories called ‘datasets’.
- Products can contain other products, just like a directory can have subdirectories.

- The GUI is broken up into a tree listing (side), a summary/meta data description (top), and a dataset display tool (right)

- Used properly, the GUI can be very powerful in letting you navigate and assess the quality and content of your data.

The HIPE GUI and your data



HIFI Observation Contexts

- The observation context contains everything you need to reprocess your data. Pointing data, calibration files, and raw data are all contained in different parts of the tree.

- The caveat to this is that if new calibration information is uploaded to HSA, one needs to fetch it first before (or during) any reprocessing.

- The different 'levels' of data denote various levels of processing. Level 0 is the raw data, while Level 2 is fully calibrated and corrected for spacecraft motion. In the future (HIPE 9), a Level 2.5 will be introduced to store the regridded cubed in case of maps, or the deconvolved spectral scans

HISTORY SECTION

- Most users will not use this section. It contains an accounting of what tasks were run to process the data, and what the parameters were.

- In general the tasks are always going to be ‘xxxPipeline’

AUXILIARY Section

- This section contains an abundance of pointing information, and in general is far beyond what users need to to worry about.

- The ‘EventsLogProduct’ contains a listings of anomalies that were flagged during the time your data was taken. In general there will be a lot of them, and can be safely ignored.

- One section that users may refer to more often is the ‘UplinkProduct’, which contains details from your proposal and AOR settings.

The CALIBRATION Section

- This section contains a set of static tables stored at the HSA, as well as calibration related information determined during processing of the data.

- Sideband gains, the efficiencies, and so on are stored in the DOWNLINK part of the table. You can, if you so wish, modify these tables manually and re-pipeline you data using the new values.

- A list of bad pixels, Tsys measurements from the loads, etc, are stored in the PIPELINE-OUT section. Changes made here will, in general, get overwritten if you re-pipeline your data.

- From HIPE 8 onwards, there will be a new “Uplink” calibration product used to derive the optimum grid parameters in case of mapping observations (see slide on cubes)

The QUALITY Section

- Although the tree stores a lot of information (much of which is admittedly opaque to the general user), the topmost level summary is the best way to quickly assess your data

- Critical items will be highlighted in color, though in most cases the quality section is populated mainly with warning messages that can be safely ignored.

The TREND ANALYSIS Section

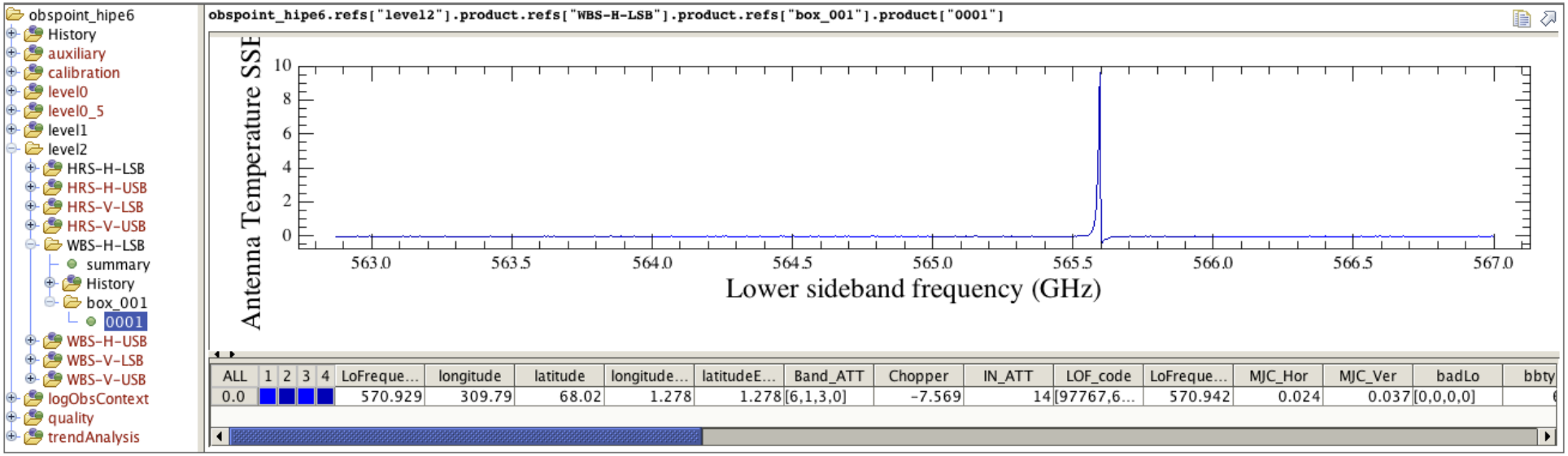
- Everything in this section is derived from measurements of the data in the current observation context.

- It stores the fits to the comb observations (frequency calibration), estimates of the Tsys based on the load observations, and also a table of spurs or other spectral anomalies found in the data (more on this in the SPUR presentation).

The HifiTimelineProduct

- Within each data ‘level’, the tree is broken up into sections for the four backends.

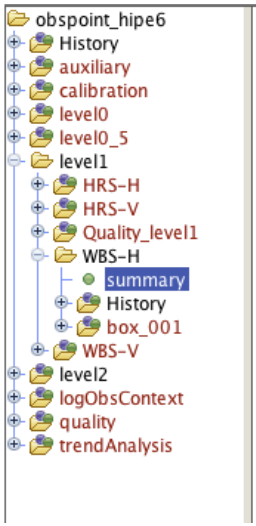
- For each backend, data is stored in what we call a “HifiTimelineProduct”, or HTP. Within a HTP, spectra are stored in the order they are taken.



The HifiTimelineProduct

- The best way to examine the order is via the SUMMARY TABLE.

- The BBID indicates what type of observation is being done.
- The 'isLine' flag is TRUE when the primary beam is on target.
- isHRS and isWBS indicate when those backends are collecting data
- 'length' tells you how many spectra were obtained for that cycle.



`obspoint_hipe6.refs["level1"].product.refs["WBS-H"].product["summary"]`

Index	dataset	type	Bbid	bbNumber	isLine	isHrs	isWbs	fullName	LoFrequency [GHz]	LO-Throw [GHz]	start	length
0	1	tune	6613	1	false	true	true	WBS_attenuators_block	570.942	0.0	0	3
1	2	comb	6004	1	false	true	true	WBS_Zero_Comb	570.942	0.0	3	2
2	3	hc	6005	1	false	true	true	HIFI_Calibrate_hot_cold	570.942	0.0	5	2
3	4	science	6042	1	true	true	true	HIFIFastChopOnIntegration	570.942	0.0	7	7
4	5	science	6043	1	false	true	true	HIFIFastChopOffIntegration	570.942	0.0	14	7
5	6	science	6043	2	false	true	true	HIFIFastChopOffIntegration	570.942	0.0	21	7
6	7	science	6042	2	true	true	true	HIFIFastChopOnIntegration	570.942	0.0	28	7
7	8	science	6042	3	true	true	true	HIFIFastChopOnIntegration	570.942	0.0	35	7
8	9	comb	6004	2	false	true	true	WBS_Zero_Comb	570.942	0.0	42	2
9	10	hc	6005	2	false	true	true	HIFI_Calibrate_hot_cold	570.942	0.0	44	2
10	11	science	6043	3	false	true	true	HIFIFastChopOffIntegration	570.942	0.0	46	7
11	12	science	6043	4	false	true	true	HIFIFastChopOffIntegration	570.942	0.0	53	7
12	13	science	6042	4	true	true	true	HIFIFastChopOnIntegration	570.942	0.0	60	7
13	14	science	6042	5	true	true	true	HIFIFastChopOnIntegration	570.942	0.0	67	7
14	15	science	6043	5	false	true	true	HIFIFastChopOffIntegration	570.942	0.0	74	7
15	16	science	6043	6	false	true	true	HIFIFastChopOffIntegration	570.942	0.0	81	7
16	17	comb	6004	3	false	true	true	WBS_Zero_Comb	570.942	0.0	88	2
17	18	hc	6005	3	false	true	true	HIFI_Calibrate_hot_cold	570.942	0.0	90	2
18	19	science	6042	6	true	true	true	HIFIFastChopOnIntegration	570.942	0.0	92	7

Cube products

- For mapping observations, cubes are also created at the level2. They use a grid computed in agreement with how the observations were taken.
- The gridding parameters were not optimally computed until HIPE 8. When reprocessing with HIPE 8, a special series of command needs to be run in order to populate the uplink information required to properly prepare the grid – see the documentation

- Presently, there is one cube per spectrometer sub-band, and per mixer side-band (USB and LSB). In the future, stitched cubes will be made available
- In HIPE 9, the cubes will be moved to a new level 2.5