Herschel status

HUG#3 meeting, 3-4/05/2011

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Contents

Operational statistics

- Input from HScOM

Observing status

- Routinely generated statistics

Communications

Observing opportunities

- Lifetime status
- HST#45 discussions

Operational statistics –

Input by Leo Metcalfe, HScOM

HERSCHEL SPACE OBSERVATORY

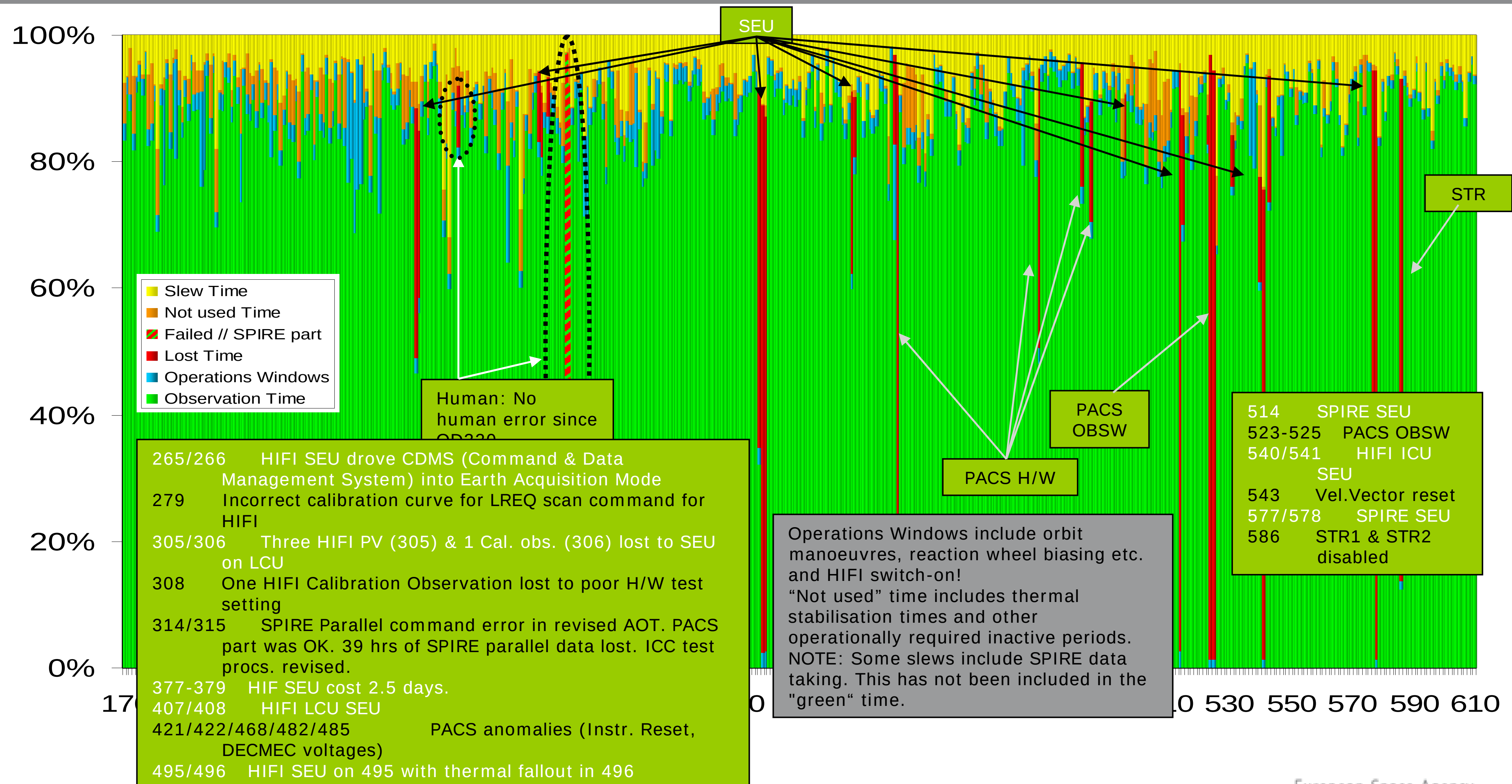
Introductory Remarks

- HSC thanks to the HUG for its detailed recommendations and the thoroughness of its work. This is very much appreciated.

- Due to the relatively short interval between HUG#2 and HUG#3, coupled with the detail of the HUG recommendations and the fact that we only have had the final HUG#2 report for a short time (this is not a criticism ref. (1) above), we have had limited time to develop our response to the HUG#2 report.
  We will do what we can to respond in this meeting, but we refer the HUG to the living response page at:

  http://herschel.esac.esa.int/twiki/bin/view/HSC/Hug2Response

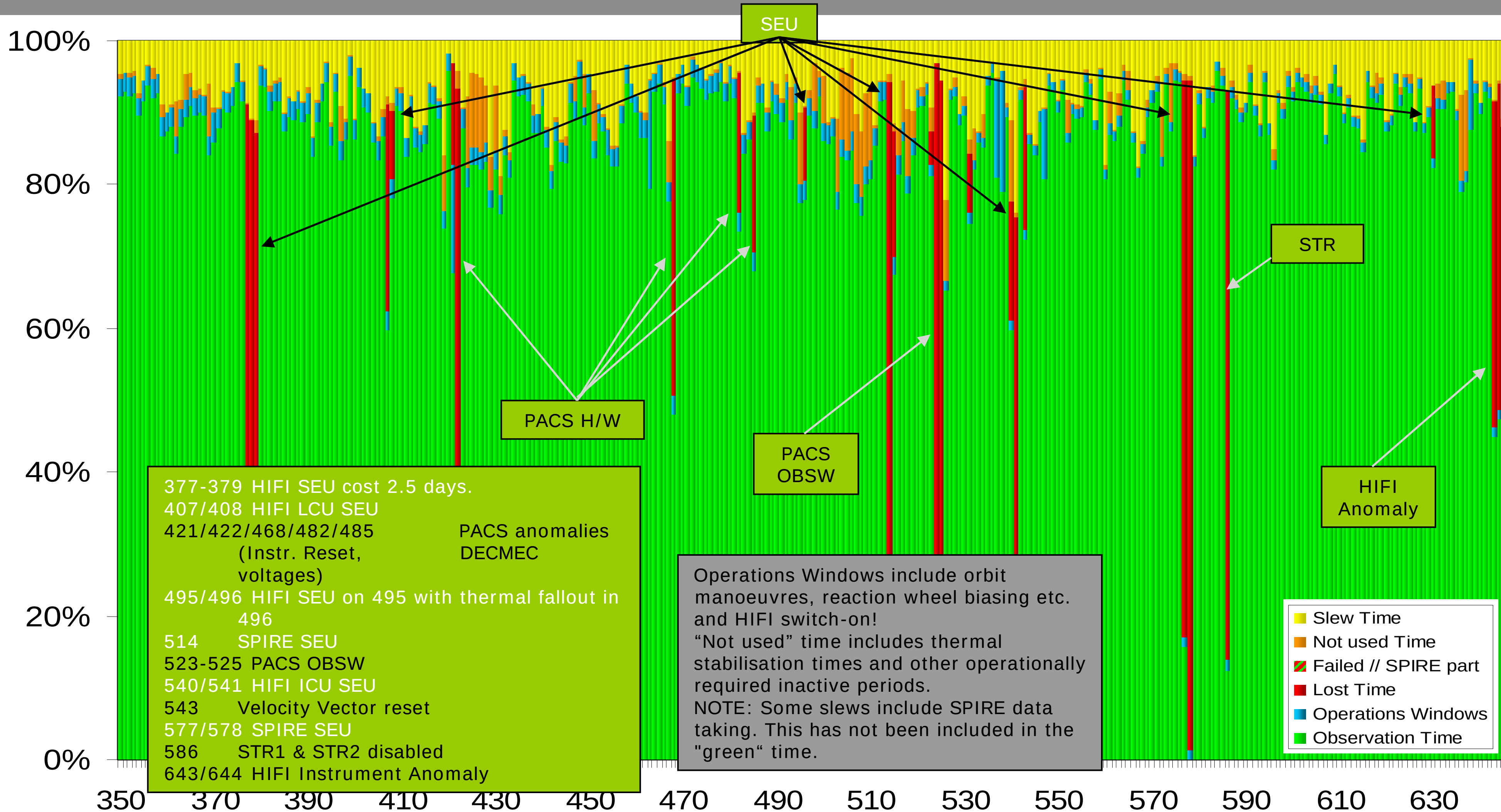
Herschel OD#170 to 610 – HST#44



European Space Agency

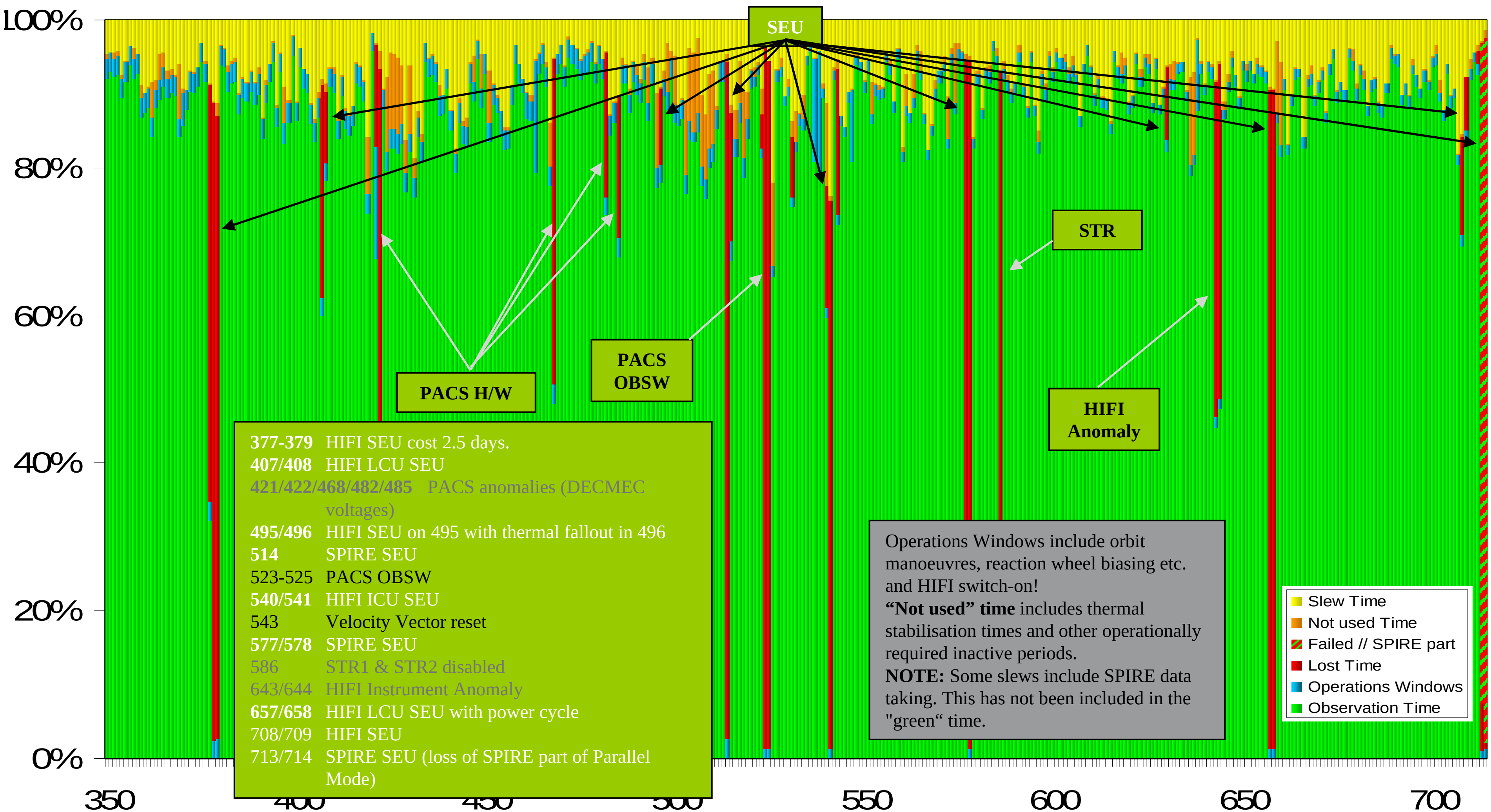
Total lost time from OD#170 to OD#610 from all sources : 336 hours (3.5%)

Herschel OD#350 to 645 – HUG#2



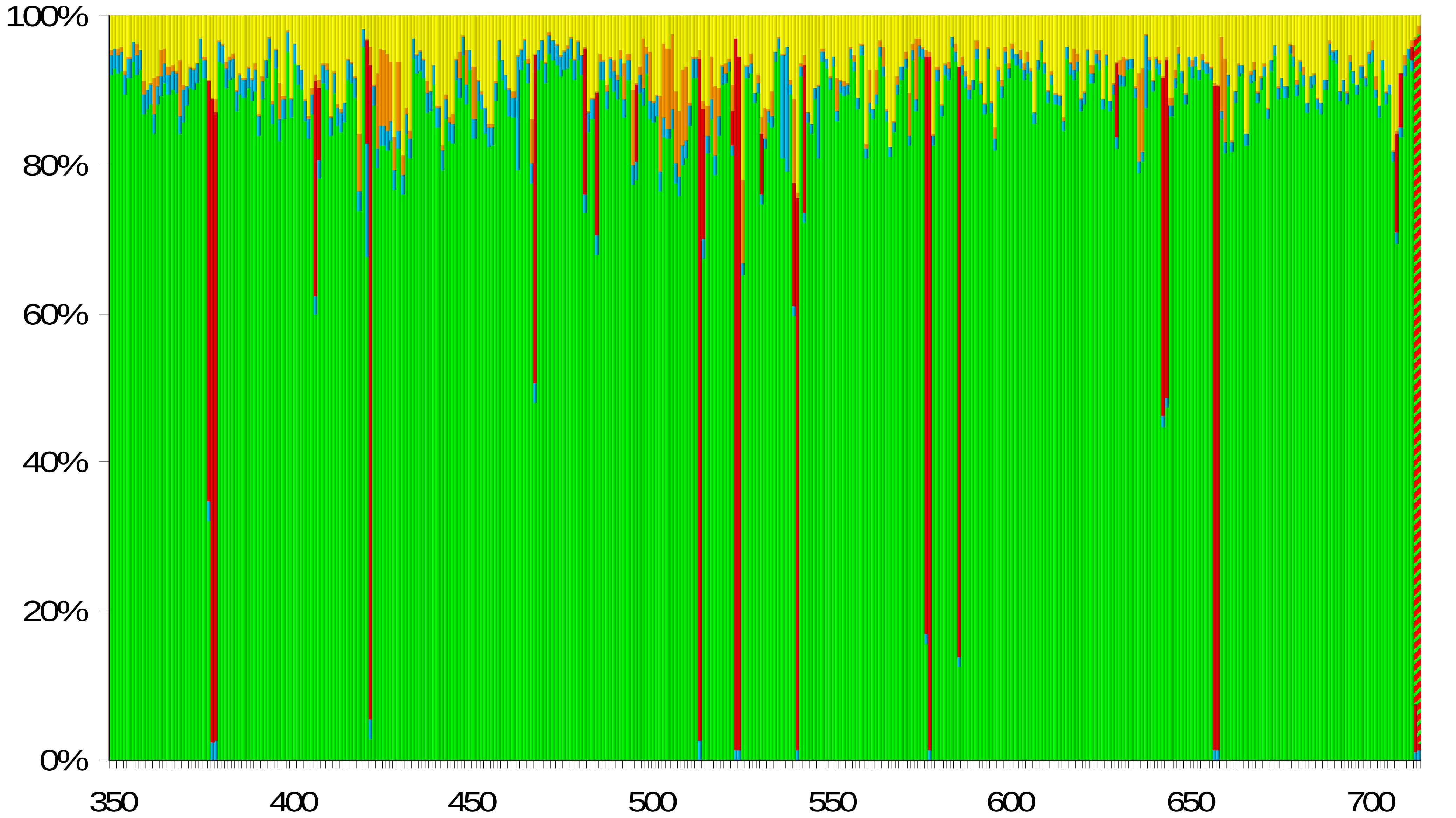
Total lost time from OD 170 to OD 645 – all sources : 357 hours (3.8%)

Herschel OD#350 to 714 – HUG#3

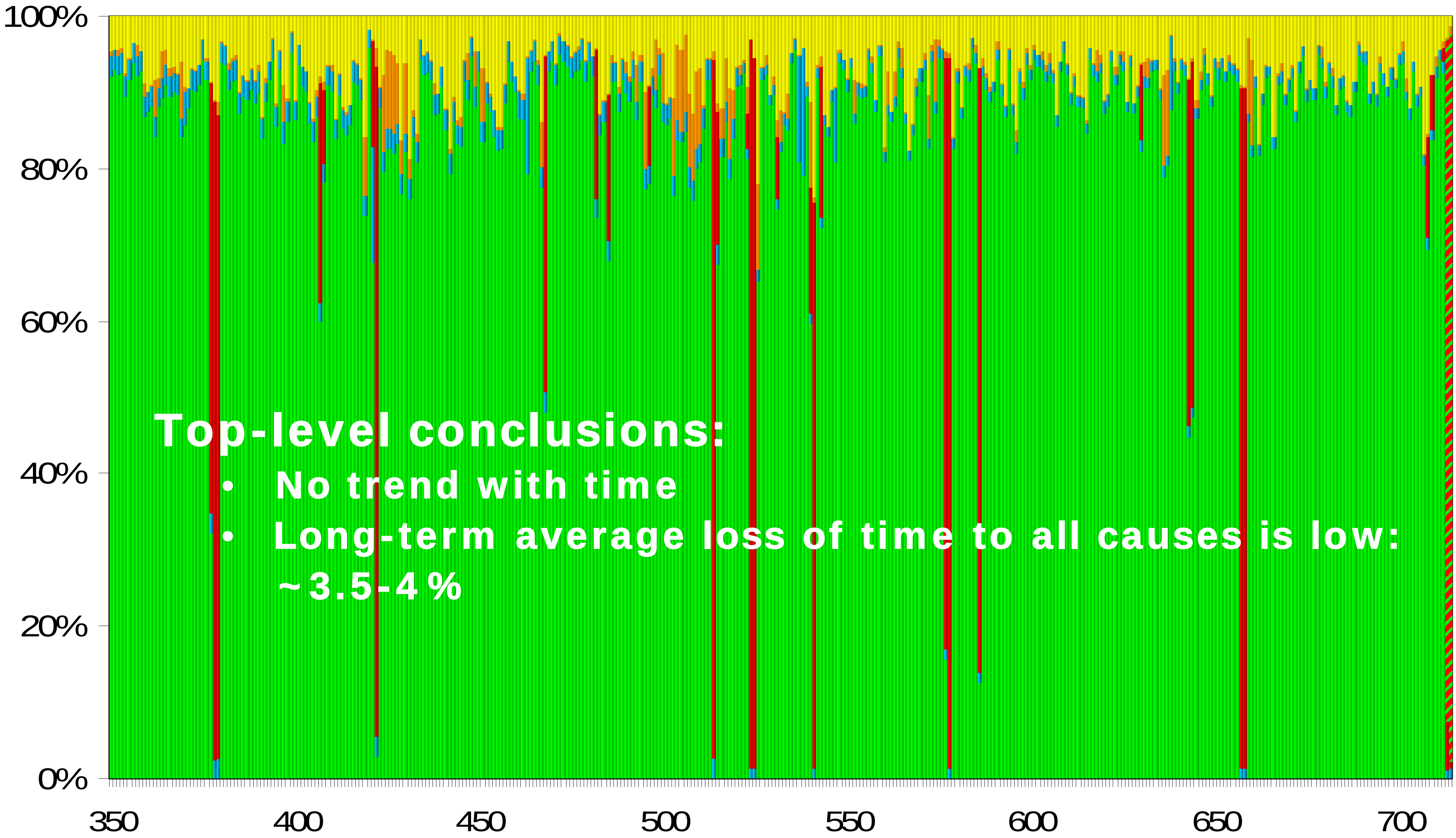


Total lost time from OD 170 to OD 700 – all sources : 421 hours (3.9%)

Herschel OD#350 to 714 – HUG#3



Herschel OD#350 to 714 – HUG#3



Top-level conclusions:

- No trend with time
- Long-term average loss of time to all causes is low: ~3.5-4%

Community Support: Notable Events

Events	Dates
Projected roll-out of HCSS/HIPEv6.0.3	Mar.09
ESAC DP Training Workshop	Mar.14-18
OT1 Phase 2 consolidation (almost) completed 31 Mar 2011	Mar.31
Stabilisation and testing of HCSS/HIPEv7.0 begins	Apr.07
AO-2/GT2 Call Opens	Apr.07
Bulk reprocessing of HSA with HCSS 6.1 begins	Apr.18
HST Meeting#45 @ ESTEC	Apr.14, 15
HUG Meeting#3 @ ESAC	May 3, 4
AO-2/GT2 Call Closes	May 12
DLCM#3	May 24
HSOCG#7 Meeting, followed by IOPR2 @ ESOC	May 25, 26, (27)
Herschel spectral map making workshop @ ESAC	May 26, 27
AO2/OT2 Call Opens	June 9

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Comm Suppt: Notable Events (cont'd)

Events	Dates
OT2 Observation Planning Workshop @ (both!) HSC & NHSC	June 20, 21
Stabilisation and testing of HCSS/HIPEv8.0 begins	June 21
HIPE Forum 2011 @ Garmisch (used to be CSDT meeting)	June 28-30
HST Meeting#46 @ ESAC	July 11, 12
AO-2/OT2 Call closes	Sep.15
Stabilisation and testing of HCSS/HIPEv9.0 begins	Oct. 4
HST Meeting#47 @ ESAC	Oct. 24, 25
DLCM#4 (TBD)	early Nov.
HOTAC OT2 meeting	Nov.8-11
Herschel Spectrometry Calibration Workshop (@ ESAC??)	Dec.7-9

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Community Support: Helpdesk

OT1 Call Closure →

Week Ending	Helpdesk questions	Week Ending	Helpdesk questions
July 23 2010	140		
December 03	87	February 18	56
December 10	14	February 25	40
December 17	33	March 04	24
December 24	20	March 11	38
December 31	1	March 18	24
Jan.07 2011	22	March 25	24
January 14	22	April 01	38
January 21	29	April 08	16
January 28	57	April 15	17
February 04	35	April 22	21
February 11	55	April 29	36

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Mission Planning: POS delivery to MOC

Week Ending	POSs delivered HSC to MOC	Look ahead (at delivery)	Week Ending	POSs delivered HSC to MOC	Look ahead (at delivery)
October 29	15	16 ODs	February 4	10	18 ODs
November 05	10	16 ODs	February 11	9	20 ODs
November 12	6	13 ODs	February 18	6	18 ODs
November 19	16	18 ODs	February 25	7	17 ODs
November 26	8	18 ODs	March 04	4	14 ODs
December 03	7	18 ODs	March 11	11	18 ODs
December 10	8	18 ODs	March 18	8	18 ODs
December 17	9	17 ODs	March 25	4	15 ODs
December 24	12	22 ODs	April 01	13	17 ODs
December 31	0	15 ODs	April 08	9	16 ODs
January 7	7	14 ODs	April 15	9	18 ODs
January 14	4	11 ODs	April 22	7	17 ODs
January 21	14	18 ODs	April 29	13	16 ODs
January 28	10	16 ODs	<average>	<8.7>	<16.7>

Mission Planning: Science time per OD

Recent Cycles*	Average time used per OD for observations (hrs)	Science** (hrs)	Calibration (hrs)	Engineering (hrs)
Cycle 35	23.77	**21.04**	1.33	1.37
Cycle 36	23.35	20.57	1.08	1.35
Cycle 37	22.82	19.94	0.89	2.0
Cycle 38	23.05	18.18	3.15	1.73
Cycles 25-38		*<19.44>*		

* → A planning cycle is 14 days long

** → Hours of science before time losses due to contingencies

DP: HIPE Downloads – by Oprtg System

Operating System	Number of HIPE downloads				TOTAL
	01 Jan.-28 Jan.	29 Jan.-25 Feb.	26 Feb.-25 Mar.	Mar.26-Apr.22	20 Jun.-15 Apr.
Linux32	30	16	42		291
Linux64	62	42	105		599
MacOSX	80	66	143		674
Windows32	26	14	20		210
Windows64	18	10	30		119

HERSCHEL SPACE OBSERVATORY

DP: HIPE Downloads – by version

HIPE Downloads 20 June 2010 to 15 April 2011 : 1893			
HIPE version	**Number of HIPE downloads**	**HIPE version**	**Number of HIPE downloads**
<v3	10	5.0.0*	224
3.0.1*	218	5.1.0*	233
3.1.1	33	5.2.0	64
3.2.0	20	5.3.0	55
4.0.0	100	6.0.0	52
4.1.0	25	6.0.1	10
4.2.0*	328	6.0.2	11
4.3.0	49	6.0.3*	308
4.4.0	64	6.1.0	44
4.5.0	21		
4.6.0	24		

* = major user releases

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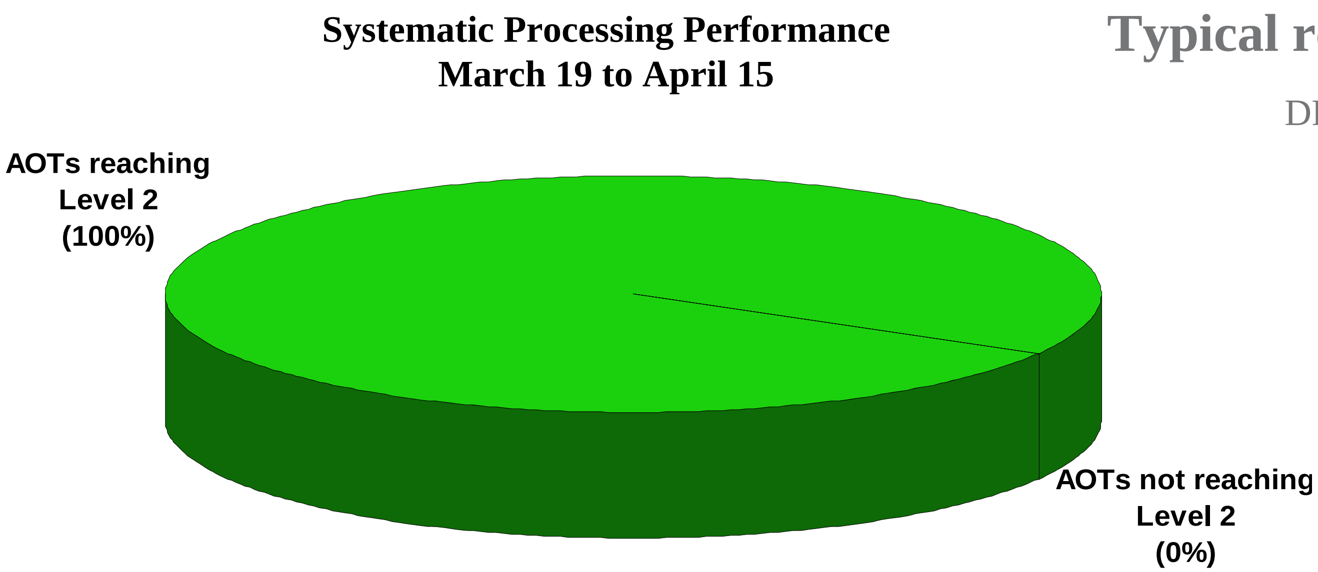
DP: Processing Pipeline (systematic)



Typical recent 4-week period

DP has been very reliable

ODs processed	[672-700]
AOT Observations	1349
AOTs Processed to Level 2	1349

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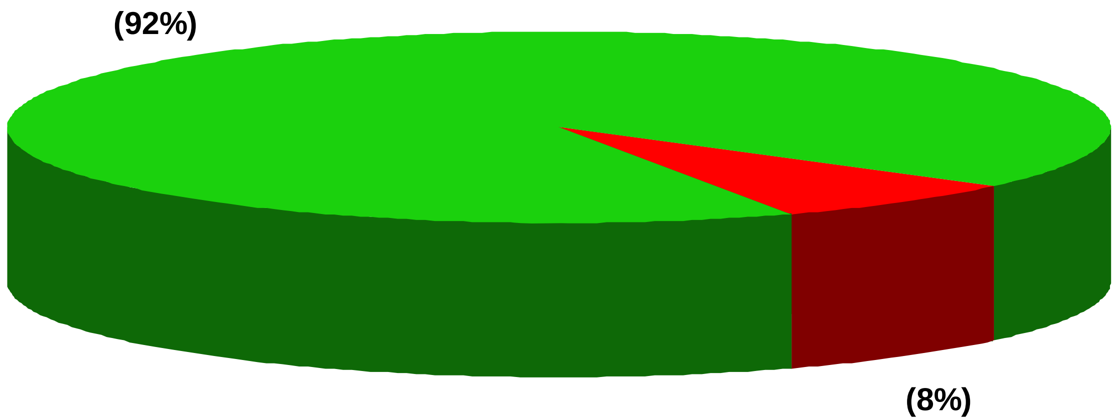
DP: Processing Pipeline (on-demand)

mid-Sept. 2010 - mid-Apr. 2011



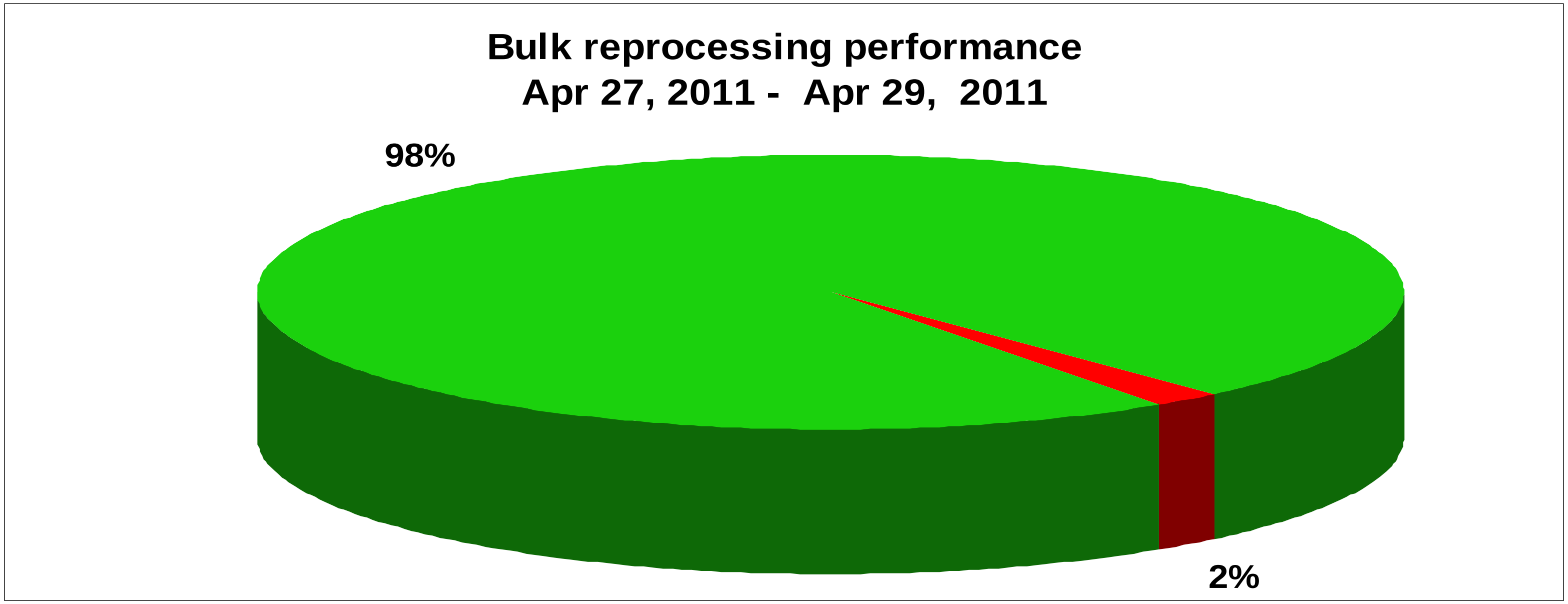
Total No. of on demand requests	73
Total No. of requests processed up to expected level	67

ON DEMAND REPROCESSING STATISTICS

(Still relatively little demand)

Bulk Reprocessing v6.1 Status (1)

Number of ODs reprocessed	51
Number of observations reprocessed	1789
Number of observations successfully reprocessed	1753
Number of observations unsuccessfully reprocessed	36



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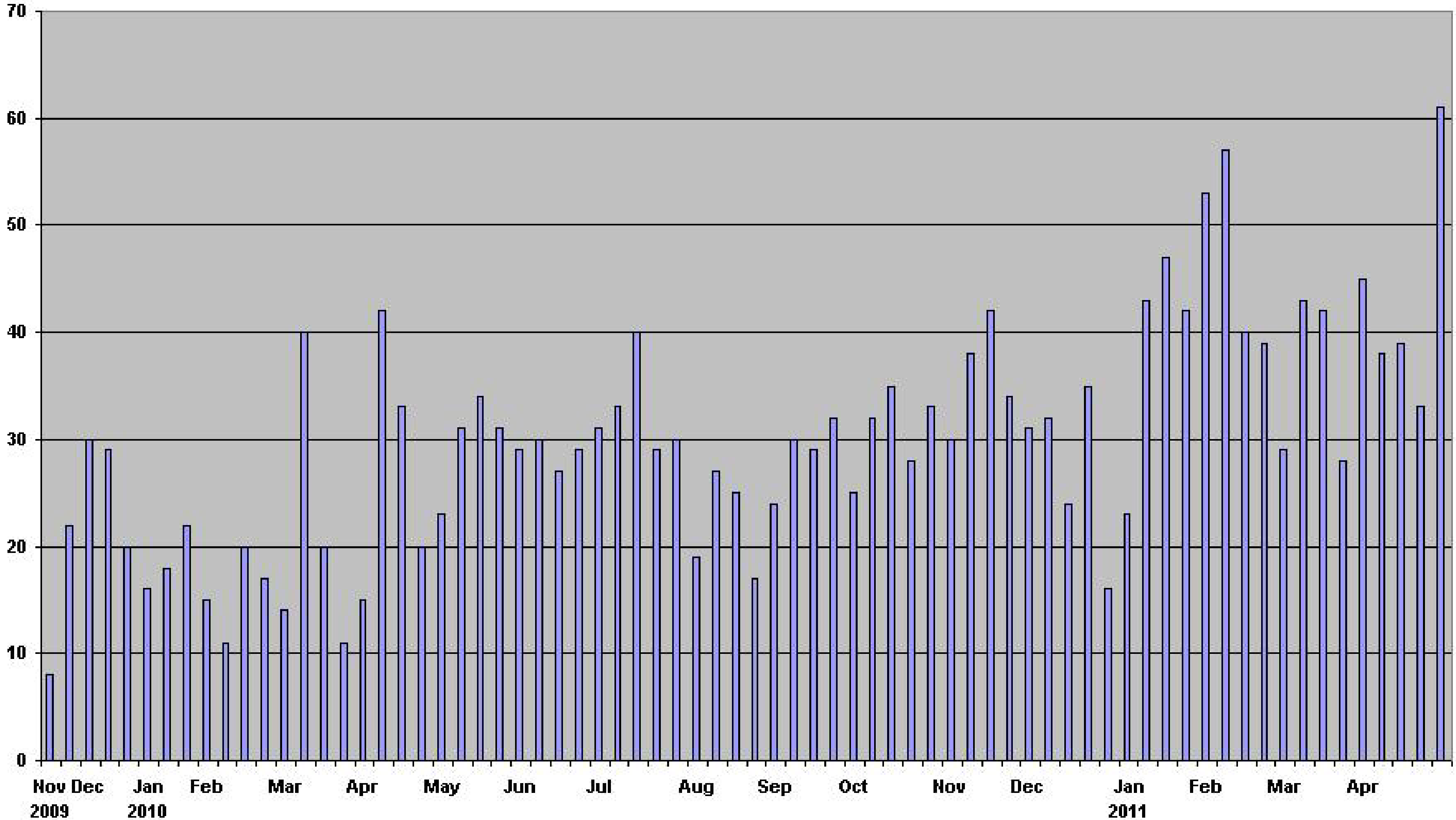
Bulk Reprocessing v6.1 Status (2)

System Throughput (S):

- Big leap forward (Excellent work from DP dev team !):
  - v4.1bulk (S < 4 ODs/day)
  - v6.1 bulk (S ~ 20 ODs/day)

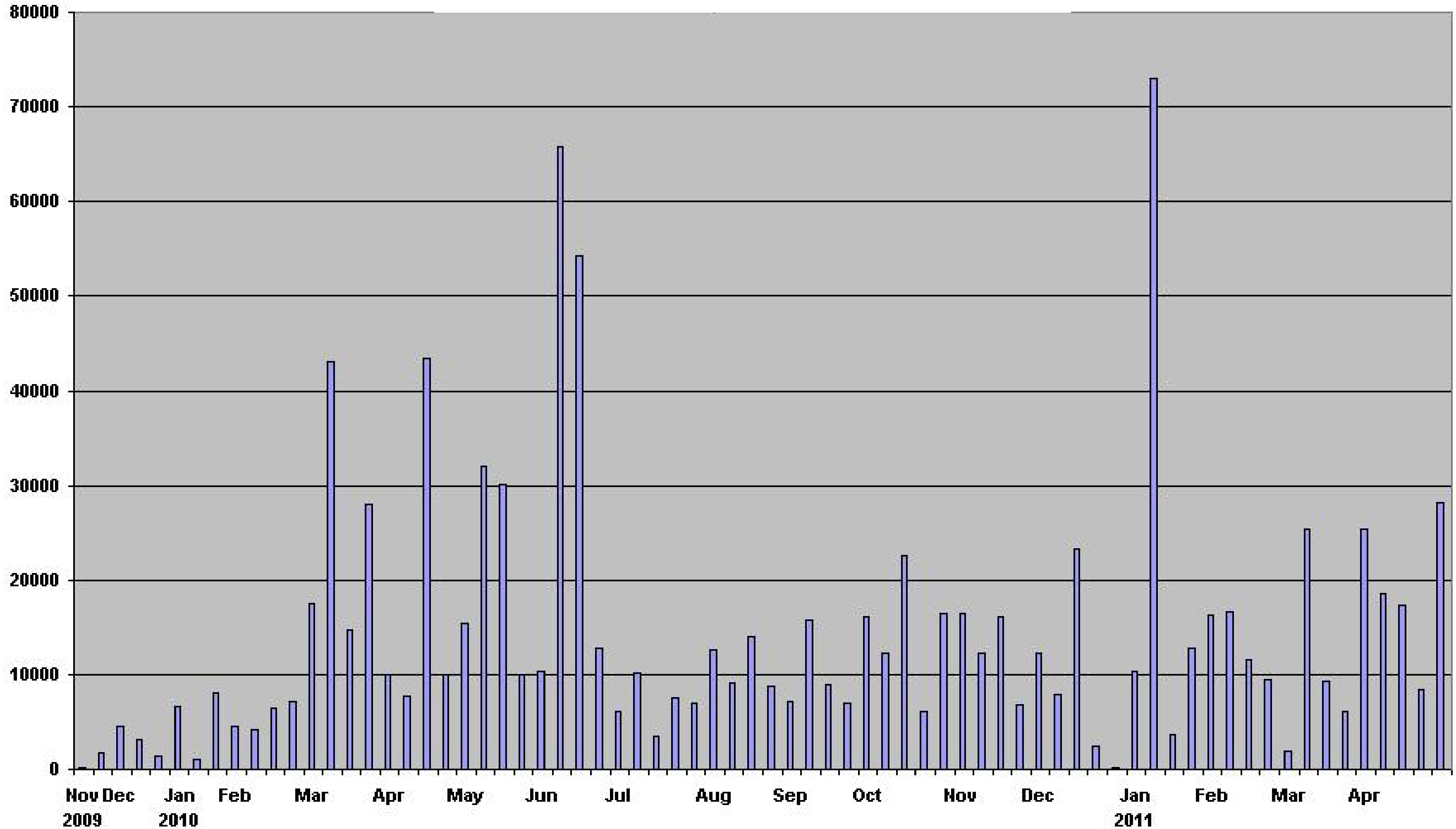
- **GRID Stability (Work ongoing):**
- Some remaining issues , requiring manual intervention to steer the process.
- Working in a change of HCSS-GRID interaction model to solve definitively recurring issues.

Archive (HAS): Users accessing HSA



HERSCHEL SPACE OBSERVATORY

Archive (HAS): Requests to Archive



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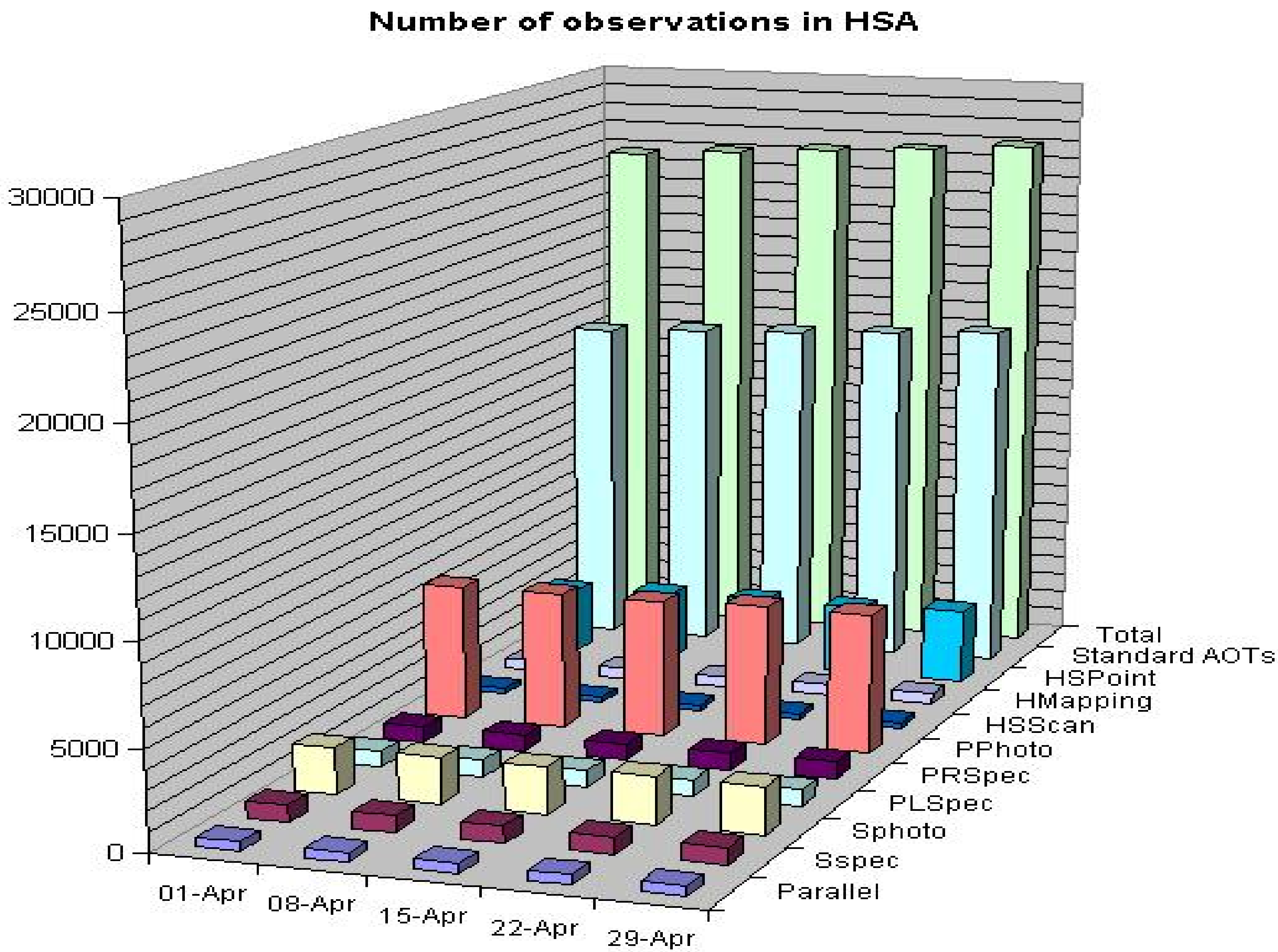
Archive (HAS): Growth of Content



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HSC Status Summary

– Today OD 719 is proceeding**:** all HSC Systems are Nominal

– High-priority to continue to address HUG recommendations

– The impact of contingencies is a little increased at 3.9% (but this is noise)

– AO2/GT2 closure approaching May 12

– New Observing Modes:

  – **PACS Unchopped Spectroscopy Bright-Line mode** (released in GT2 April 7)

  – On-board Gyro Propagation/CP Raster still undergoing tests

– Mission Planning is stable

HSC Status Summary

– DP is very stable. (See SO talk for progress in pipeline product quality)

  – **New Bulk reprocessing started this week with HCSSv6.1**

– The archive (HSA) is stable and in an advanced state

  – Pushing to have Browse Products for all instruments in HSA

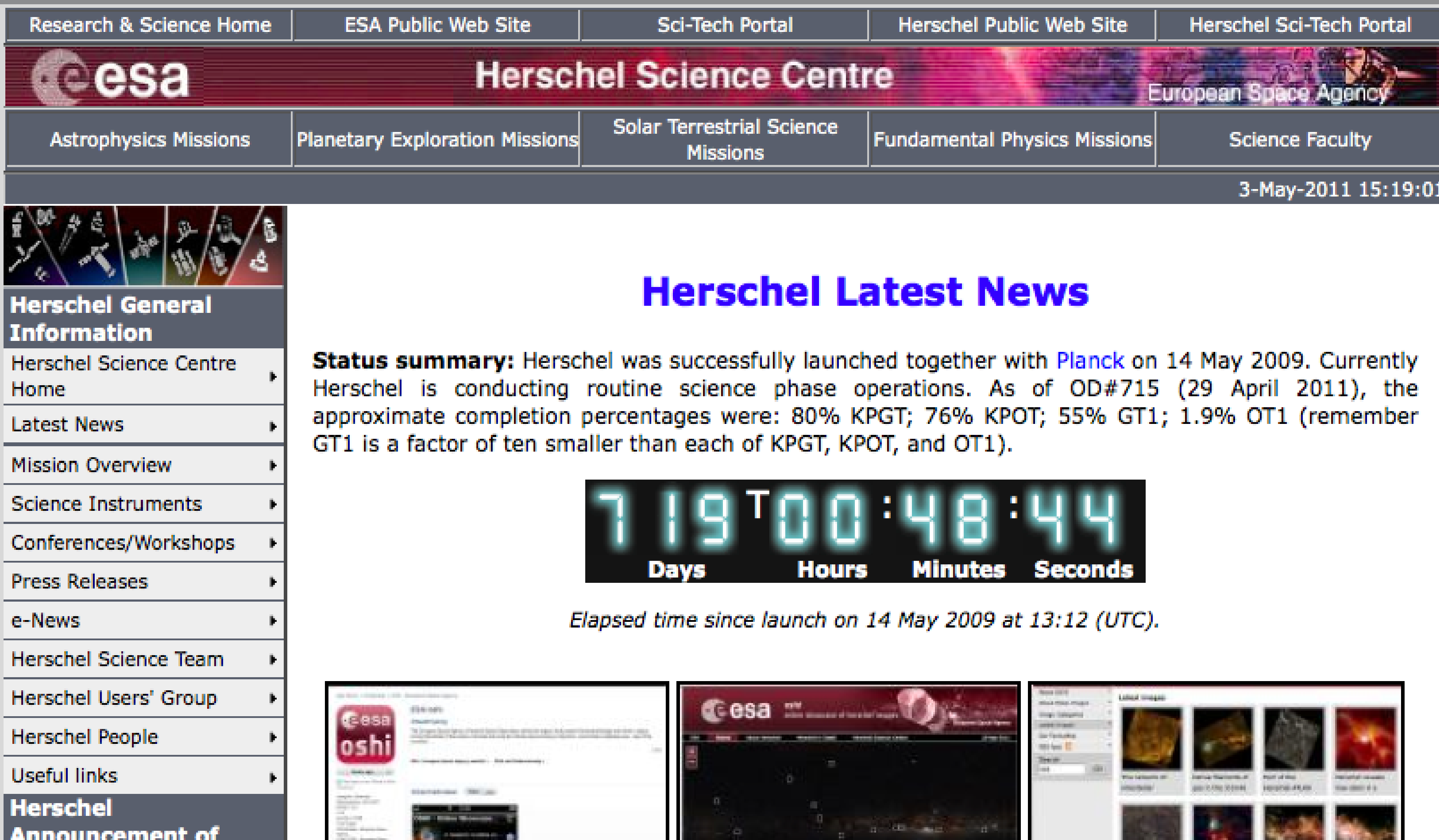
– Agreement with Planck/HFI to use HFI data in SPIRE calibration

– 2 of 3 new posts for HSC in Instr.Cal./Comm.Supp. area blocked

  – **1 position freed-up. Unlikely to get better than that!**

Observing status

Observing status



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Herschel Announcement of

Herschel Latest News

Status summary: Herschel was successfully launched together with Planck on 14 May 2009. Currently Herschel is conducting routine science phase operations. As of OD#715 (29 April 2011), the approximate completion percentages were: 80% KPGT; 76% KPOT; 55% GT1; 1.9% OT1 (remember GT1 is a factor of ten smaller than each of KPGT, KPOT, and OT1).

719 T 00 : 48 : 44

Days Hours Minutes Seconds

Elapsed time since launch on 14 May 2009 at 13:12 (UTC).

‘Top’ exe status OD#715 (29 Apr 2011)

Name	#AORs	Duration(h)	Alloc.(h)	# Executed	% # Executed	Executed(h)	% T Executed
TOO_alevan_3	5	0.85	0.00	5	100.00	0.85	100.00
DDT_ldecin_2	7	3.06	3.10	7	100.00	3.06	100.00
DDT_lorourke_14	2	0.96	1.00	2	100.00	0.96	100.00
GT1_azavagno_1	14	8.66	8.70	14	100.00	8.66	100.00
GT1_bdevries_1	1	3.88	3.90	1	100.00	3.88	100.00
GT1_epoleham_1	27	7.02	7.00	27	100.00	7.02	100.00
GT1_ivaltcha_1	7	12.05	12.00	7	100.00	12.05	100.00
GT1_jcernich_4	13	41.95	41.95	13	100.00	41.95	100.00
GT1_jfritz_1	4	18.33	18.20	4	100.00	18.33	100.00
GT1_mkidger_2	12	10.70	10.70	12	100.00	10.70	100.00
GT1_okrause_4	4	24.20	24.40	4	100.00	24.20	100.00
KPOT_aedge_1	77	129.27	140.50	77	100.00	129.27	100.00
KPOT_ckrame01_1	33	144.10	191.90	33	100.00	144.10	100.00
KPOT_delbaz_1	191	361.30	362.60	191	100.00	361.30	100.00
KPOT_mmeixner_1	29	234.83	238.00	29	100.00	234.83	100.00
KPOT_pvanderw_1	62	99.98	100.00	62	100.00	99.98	100.00
OT1_tpreibis_1	2	6.94	6.90	2	100.00	6.94	100.00
TOO_awehrle_2	55	5.12	11.00	55	100.00	5.12	100.00
TOO_scorbel_1	4	4.36	4.40	4	100.00	4.36	100.00
KPGT_rguesten_1	418	270.99	291.00	417	99.76	270.72	99.90
KPGT_seales01_1	237	95.15	112.60	235	99.16	94.81	99.64
KPGT_kmeisenh_1	404	149.24	156.00	394	97.52	145.99	97.82
KPOT_wlanger_1	573	223.19	223.00	559	97.56	216.79	97.13
GT1_magundez_1	66	10.41	10.41	64	96.97	10.11	97.13

HERSCHEL SPACE OBSERVATORY

KPGT exe status OD#715 (29 Apr 2011)

Name	#AORs	Duration(h)	Alloc.(h)	# Executed	% # Executed	Executed(h)	% T Executed
KPGT_aabergel_1	191	160.01	163.00	154	80.63	126.41	79.00
KPGT_cceccare_1	119	213.42	222.76	107	89.92	196.70	92.16
KPGT_cwilso01_1	102	144.68	143.90	69	67.65	111.68	77.19
KPGT_dlutz_1	376	663.18	654.90	353	93.88	614.57	92.67
KPGT_ebergin_1	301	325.09	346.80	287	95.35	313.26	96.36
KPGT_esturm_1	548	306.44	304.00	427	77.92	246.81	80.54
KPGT_evandish_1	743	397.84	410.16	705	94.89	368.62	92.66
KPGT_fmotte_1	88	133.81	126.00	72	81.82	118.58	88.62
KPGT_golofs01_1	43	63.07	61.00	41	95.35	60.21	95.47
KPGT_kmeisenh_1	404	149.24	156.00	394	97.52	145.99	97.82
KPGT_mgerin_1	954	112.77	112.98	872	91.40	100.27	88.91
KPGT_mgroen01_1	450	279.76	310.14	392	87.11	219.54	78.47
KPGT_okrause_1	240	84.89	95.20	238	99.17	82.34	96.99
KPGT_pandre_1	203	460.71	461.00	137	67.49	322.74	70.05
KPGT_pharto01_1	466	312.18	258.42	184	39.48	150.81	48.31
KPGT_rguesten_1	418	270.99	291.00	417	99.76	270.72	99.90
KPGT_seales01_1	237	95.15	112.60	235	99.16	94.81	99.64
KPGT_smadde01_1	298	105.03	104.90	266	89.26	83.76	79.75
KPGT_soliver_1	406	825.28	900.00	314	77.34	443.54	53.74
KPGT_vbujarra_1	327	180.37	190.99	305	93.27	167.72	92.99
KPGT_vossenko_1	284	138.84	138.89	211	74.30	78.28	56.38

KPOT exe status OD#715 (29 Apr 2011)

Name	#AORs	Duration(h)	Alloc.(h)	# Executed	% # Executed	Executed(h)	% T Executed
KPOT_aedge_1	77	129.27	140.50	77	100.00	129.27	100.00
KPOT_bdent_1	965	393.03	400.00	705	73.06	256.91	65.37
KPOT_bmatthew_1	865	139.67	140.00	647	74.80	106.62	76.33
KPOT_ceiroa_1	375	140.51	140.00	342	91.20	127.98	91.08
KPOT_ckrame01_1	33	144.10	191.90	33	100.00	144.10	100.00
KPOT_cmarti01_1	87	120.93	125.00	40	45.98	40.69	33.65
KPOT_delbaz_1	191	361.30	362.60	191	100.00	361.30	100.00
KPOT_eegami_1	132	308.91	292.30	124	93.94	291.52	94.37
KPOT_gsmith01_1	88	149.11	145.00	74	84.09	122.86	82.40
KPOT_jdavie01_1	30	242.75	286.00	28	93.33	226.57	93.34
KPOT_mjuvela_1	371	150.90	150.90	205	55.26	89.25	59.15
KPOT_mmeixner_1	29	234.83	238.00	29	100.00	234.83	100.00
KPOT_nevans_1	201	249.68	250.00	175	87.06	195.94	78.48
KPOT_pgolds01_1	147	139.83	140.00	131	89.12	127.77	91.38
KPOT_pvanderw_1	62	99.98	100.00	62	100.00	99.98	100.00
KPOT_rkennicu_1	499	536.83	536.60	349	69.94	276.80	51.56
KPOT_seales01_2	66	585.55	600.00	39	59.09	339.08	57.91
KPOT_smolinar_1	120	340.70	344.30	104	86.67	296.19	86.94
KPOT_thmuelle_1	1175	439.94	372.70	933	79.40	317.79	72.23
KPOT_tmegeath_2	378	199.84	200.00	166	43.92	75.75	37.91
KPOT_wlanger_1	573	223.19	223.00	559	97.56	216.79	97.13

Instr exe status OD#715 (29 Apr 2011)

Status	HIFI(#)	HIFI(AORs %)	HIFI(h)	HIFI(T%)	PACS(#)	PACS(AORs %)	PACS(h)	PACS(T%)
ACCEPTED	382	6.02	119.18	3.43	949	5.89	700.61	7.64
EXECUTED	3723	58.69	1,949.69	56.04	6378	39.55	4,135.09	45.11
RELEASED	2194	34.59	1,392.07	40.02	8491	52.66	4,168.26	45.47
SCHEDULED	44	0.69	17.92	0.52	273	1.69	140.93	1.54
SUBMITTED	0	0.00	0.00	0.00	34	0.21	21.74	0.24
TOTAL	6343	100.00	3,478.86	100.00	16125	100.00	9,166.63	100.00

Status	SPIRE(#)	SPIRE(AORs %)	SPIRE(h)	SPIRE(T%)	SP_PAR(#)	SP_PAR(AORs %)	SP_PAR(h)	SP_PAR(T %)
EXECUTED	246	5.47	250.81	10.07	0	0.00	0.00	0.00
SCHEDULED	1639	36.43	1,009.20	40.51	389	64.19	1,731.46	63.97
RELEASED	2526	56.15	1,204.80	48.36	185	30.53	819.56	30.28
ACCEPTED	82	1.82	18.34	0.74	28	4.62	144.28	5.33
SUBMITTED	6	0.13	8.21	0.33	4	0.66	11.30	0.42
TOTAL	4499	100.00	2,491.37	100.00	606	100.00	2,706.61	100.00

Execution status – longterm

Science scheduling & execution efficiency over the mission:

CYCLE #	OD_RANGE	
Cycle -4	119-132	1.01h
Cycle -3	133-146	1.33h
Cycle -2	147-160	8.61h
Cycle -1	161-174	8.02h
Cycle 0	175-188	11.01h
Cycle 1	189-202	11.47h
Cycle 2	203-216	15.39h
Cycle 3	217-230	19.08h
Cycle 4	231-244	18.64h
Cycle 5	245-258	15.16h
Cycle 6	259-272	10.53h
Cycle 7	273-286	7.28h
Cycle 8	287-300	18.10h
Cycle 9	301-314	10.80h
Cycle 10	315-328	15.39h
Cycle 11	329-342	15.05h
Cycle 12	343-356	16.66h
Cycle 13	357-370	17.29h
Cycle 14	371-384	15.98h
Cycle 15	385-398	16.17h
Cycle 16	399-412	16.54h
Cycle 17	413-426	17.39h
Cycle 18	427-440	17.49h

CYCLE #	OD_RANGE	
Cycle 19	441-454	18.37h / 18.13h
Cycle 20	455-468	17.85h / 17.34h
Cycle 21	469-482	20.71h / 20.34h
Cycle 22	483-496	18.97h / 18.62h
Cycle 23	497-510	19.83h / 19.83h
Cycle 24	511-524	18.16h / 15.41h
Cycle 25	525-538	19.52h / 17.75h
Cycle 26	539-552	18.86h / 17.03h
Cycle 27	553-566	19.15h / 19.15h
Cycle 28	567-580	18.08h / 15.32h
Cycle 29	581-594	19.49h / 18.12h
Cycle 30	595-608	18.33h / 18.33h
Cycle 31	609-622	20.18h / 20.18h
Cycle 32	623-636	19.09h / 19.01h
Cycle 33	637-650	19.50h / 17.96h
Cycle 34	651-664	20.15h / 17.16h
Cycle 35	665-678	21.04h / 21.04h
Cycle 36	679-692	20.57h / 20.57h
Cycle 37	693-706	19.94h / 19.94h
Cycle 38	707-720	18.18h / *18.18h??*
Average 25-38		19.44h / 18.55h*TBC!!*

As noted noted earlier:

- No obvious trend since attaining high level
- Average loss in Cycles #25-38: ~4.6%
- These are all HOTAC-approved observations ‘charged’ to observers
- This is the observing time we can offer e.g. in a call
- The RSP calibration and engineering obs. come on top

Communications

PR aka Communications

ESA wants to communicate your results

- Provides expertise/resources – science writers, image making
- Provides the channels – websites, mailing lists, etc
- All material can be used by others
- Wants to create win-win situation

Possibilities

- Web-releases – Portal and/or SciTech
- Exceptionally fully fledged press release
  - Press reps invited in person
  - Done in connection with 'First Results Symp' in May 2010

Project Scientist is your contact point

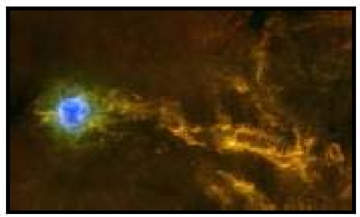
- PS will initiate process – applying for resources
- Web-page providing information to come...

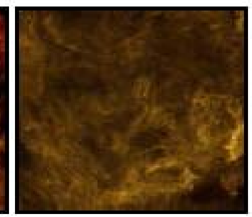
Herschel Latest News

Status summary: Herschel was successfully launched together with Planck on 14 May 2009. Currently Herschel is conducting routine science phase operations. As of OD#708 (22 April 2011), the approximate completion percentages were: 80% KPGT; 75% KPOT; 53% GT1; 1.5% OT1 (remember GT1 is a factor of ten smaller than each of KPGT, KPOT, and OT1).

Elapsed time since launch on 14 May 2009 at 13:12 (UTC).

Herschel OSHI app for iPhone has been released. The 'Online Showcase of Herschel Images' (OSHI) is a website providing Herschel images for viewing and downloading, with information about what they show and some metadata. Now the OSHI app for iPhone (and iPod touch and iPad) has been released and is available from your local iTunes app store for free. From left to right in the images above screenshots from the (Dutch) iTunes app store, OSHI website, and the latest additions to OSHI.





Herschel suggests filaments are created by supersonic turbulence. Herschel has already suggested a direct connection between interstellar filaments and star formation, in the sense that most of the protostars and 'prestellar cores' detected with Herschel lie along filaments (André al. 2010, A&&A, 518, L102). Now Herschel observations suggest that supersonic interstellar turbulence plays the dominating role in the formation of these filaments (Arzoumanian et al. 2011, A&A, 529, L6), rather than gravity or magnetic fields. In this picture star formation would then be a two-step process, turbulence creates filaments, then gravity creates the stars. In the images above IC5146 and Aquila (70, 250, 500 μm), and Polaris (250, 350, 500 μm) are shown from left to right, all have filaments, but no stars are forming in Polaris. For more information, including image captions, see the ESA Herschel SciTech webrelease, as well as the Space Science Portal.


Herschel A&A special features reprint booklet being shipped. The Astronomy & Astrophysics reprint booklet featuring the 202 Herschel first results papers from the A&A Special Issues volume 518 and 521 is now being shipped. The 1000+ pages booklet is about 4 cm thick and weighs over 2 kg. If all the copies produced were put in a pile it would be higher than the Ariane 5 that launched Herschel and have a mass in excess of the Herschel launch mass. In the picture above left Johannes Riedinger and Göran Pilbratt stand in front of the supply in ESTEC Stores, while above right Frank Helmich, Göran Pilbratt, Albrecht Poglitsch, and Matt Griffin are posing with one of the very first copies delivered to SRON Utrecht for a special event.

Mission Home
- Summary
- Fact Sheet
- Objectives
- Mission Team
- Industrial Team

News

Spacecraft
- 3D Model
- Instruments
- Test Campaign

Mission Operations
- Launch Information
- Orbit/Navigation
- Launch Vehicle
- Launch Campaign
- Status Reports

Science Operations
- Science Ground Segment
- Data Archive

Astronomers' Website

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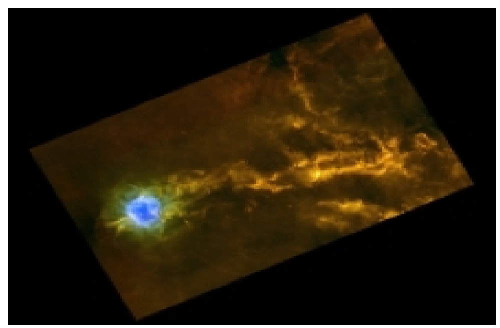
2-May-2011 15:33:34 UT

Herschel unravels the thread of star formation in the Gould Belt

13 Apr 2011

An intricate network of filamentary structure, exposed in extraordinary detail by the Herschel Space Observatory, has provided new evidence for how stars form from the diffuse interstellar medium. These filaments, located in giant molecular clouds in the Gould Belt, all exhibit remarkably similar widths - about one third of a light year - but only the densest ones contain pre-stellar cores, the seeds of future stars. These data suggest star formation is a two-step process: first turbulence stirs up the gas, giving rise to a web-like structure, then gravity takes over and governs the further fragmentation of filaments into stars.

Giant molecular clouds are huge complexes of gas and dust characterised by a very low density, even thinner than air. Many of these clouds are the sites of stellar birth, but how this diffuse mixture condenses into compact cores, which later evolve into stars, is still an open question in astrophysics.



The star-forming cloud IC 5146. *Credit: ESA/Herschel/SPIRE/PACS/D. Arzoumanian (CEA Saclay) for the "Gould Belt survey" Key Programme Consortium*

"Filaments are the first structures to develop in the fragmentation process of molecular clouds, hence they're the objects to watch when investigating the very early stages of stellar formation," explains Philippe André from the Commissariat à l'énergie atomique et aux énergies alternatives (CEA), France. André is Principal Investigator for a Herschel Key Programme focussing on the Gould Belt, a giant ring of stars and star-forming regions in the vicinity of the Sun.

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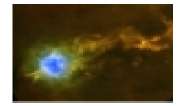
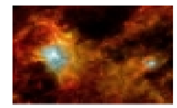
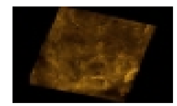
IMAGES AND VIDEOS



Herschel image of IC 5146



Herschel image of Aquila Rift



Herschel image of the Polaris Flare

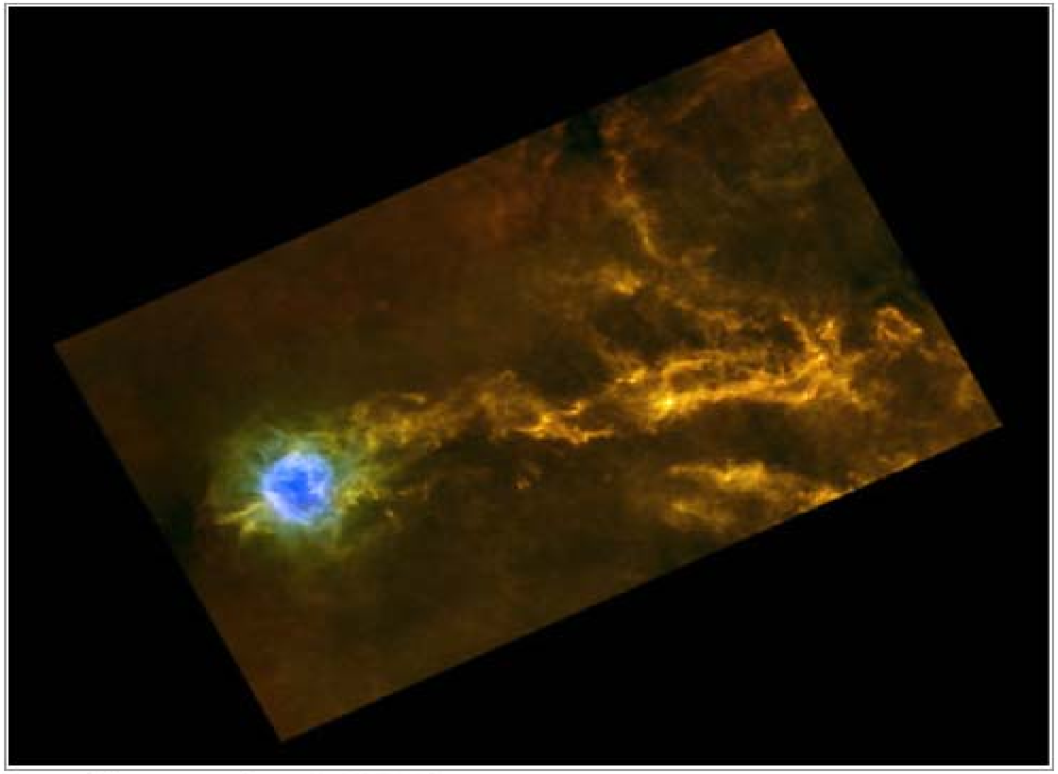
MORE

SEE ALSO
- Herschel links star formation to sonic booms

RELATED LINKS
- The Gould Belt Survey

RELATED PUBLICATIONS
- Arzoumanian, D., et al. [2011]
- André, Ph., et al. [2010]

Herschel links star formation to sonic booms



Dense filaments of gas in IC5146

13 April 2011

ESA's Herschel space observatory has revealed that nearby interstellar clouds contain networks of tangled gaseous filaments. Intriguingly, each filament is approximately the same width, hinting that they may result from interstellar sonic booms throughout our Galaxy.

Herschel: ESA's giant infrared observatory

More information
- Herschel overview
- Online Showcase of Herschel Images OSHI

Herschel on YouTube
- Inside Herschel
- Herschel mission objectives

Related articles
- Herschel links star formation to sonic booms
- Herschel finds less dark matter but more stars
- Andromeda's once and future stars
- Recipe for water: just add starlight
- Herschel and Planck win the French Grand Prix
- Herschel finds a hole in space
- Herschel reveals the hidden side of star birth
- Herschel takes the temperature of an

Observing oppportunities

AO-2 overall schedule

GT2

- Opening: 7 April 2011
- Proposal submission deadline: 12 May 2011
- Followed by:
  - D/SRE decision
  - ‘phase 2’ AOR consolidation
  - HROST update for OT phase

OT2

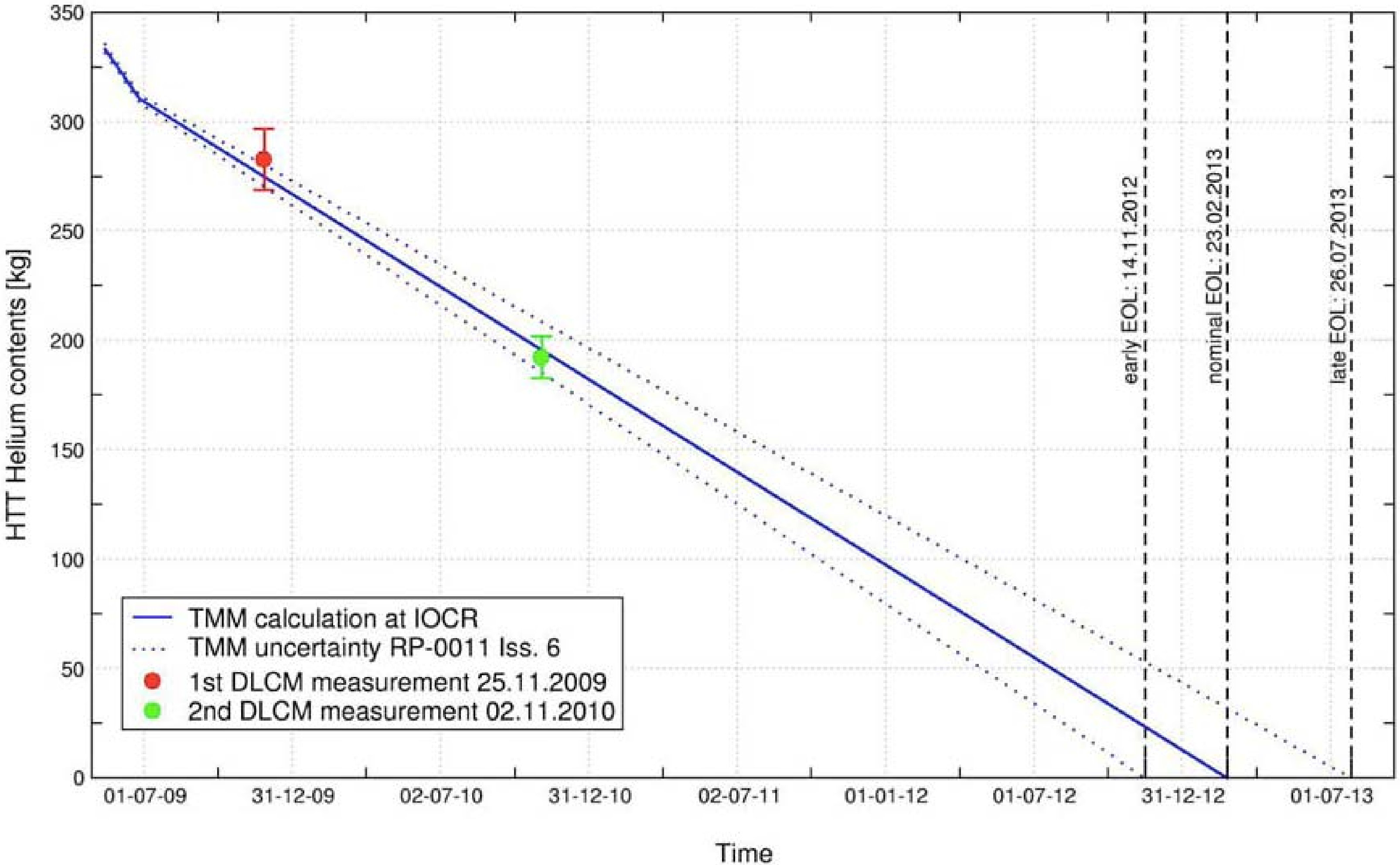
- Opening: 9 June 2011
- Proposal submission deadline: 15 September 2011
- HOTAC meeting: week of 7 November 2011
- Followed by:
  - D/SRE decision
  - ‘phase 2’ AOR consolidation
  - HROST update

Need first to talk about:

Mission lifetime

Mission (cryostat) lifetime

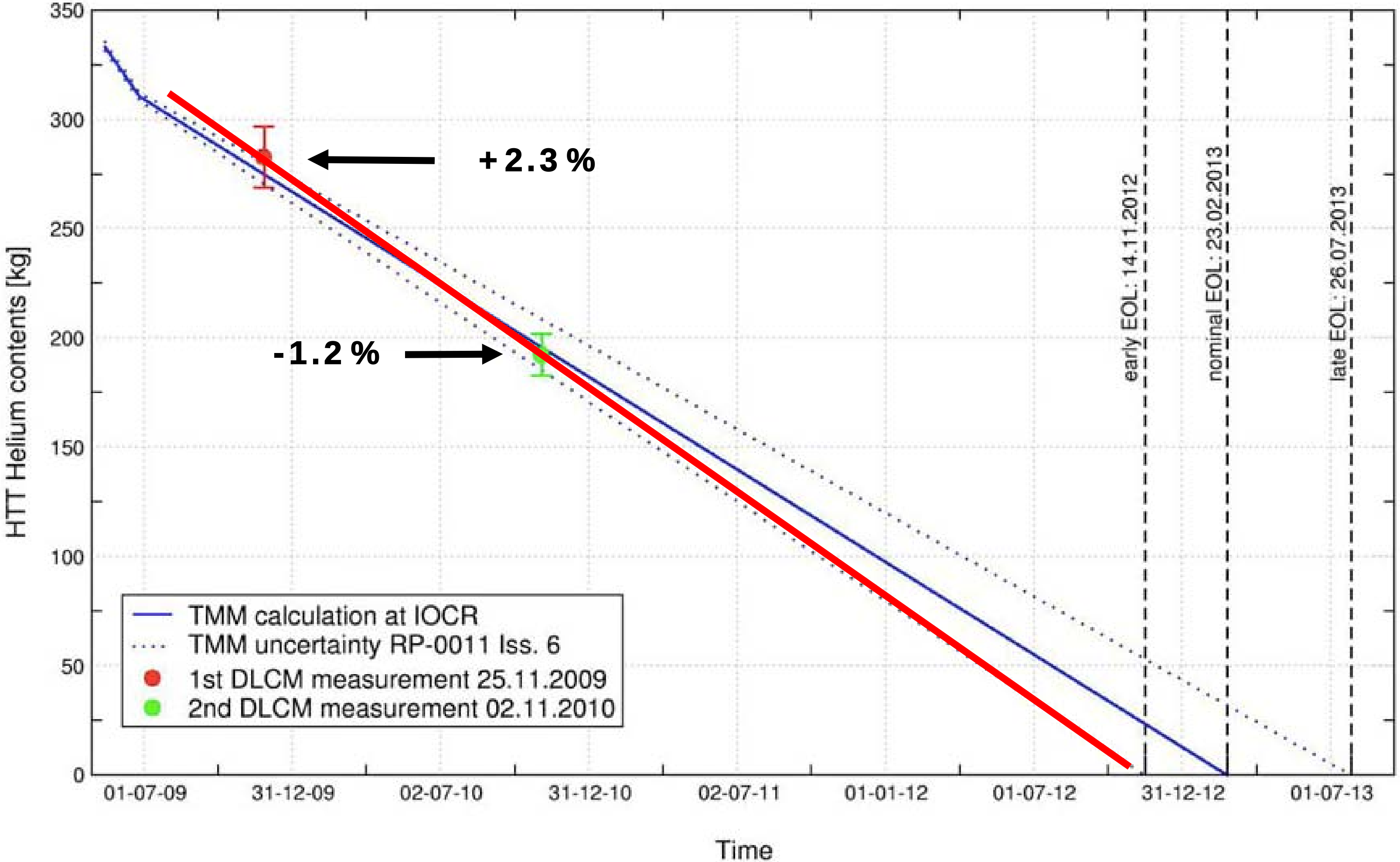
(i) Thermal modelling, and (ii) He mass measurements



HERSCHEL SPACE OBSERVATORY

Mission (cryostat) lifetime

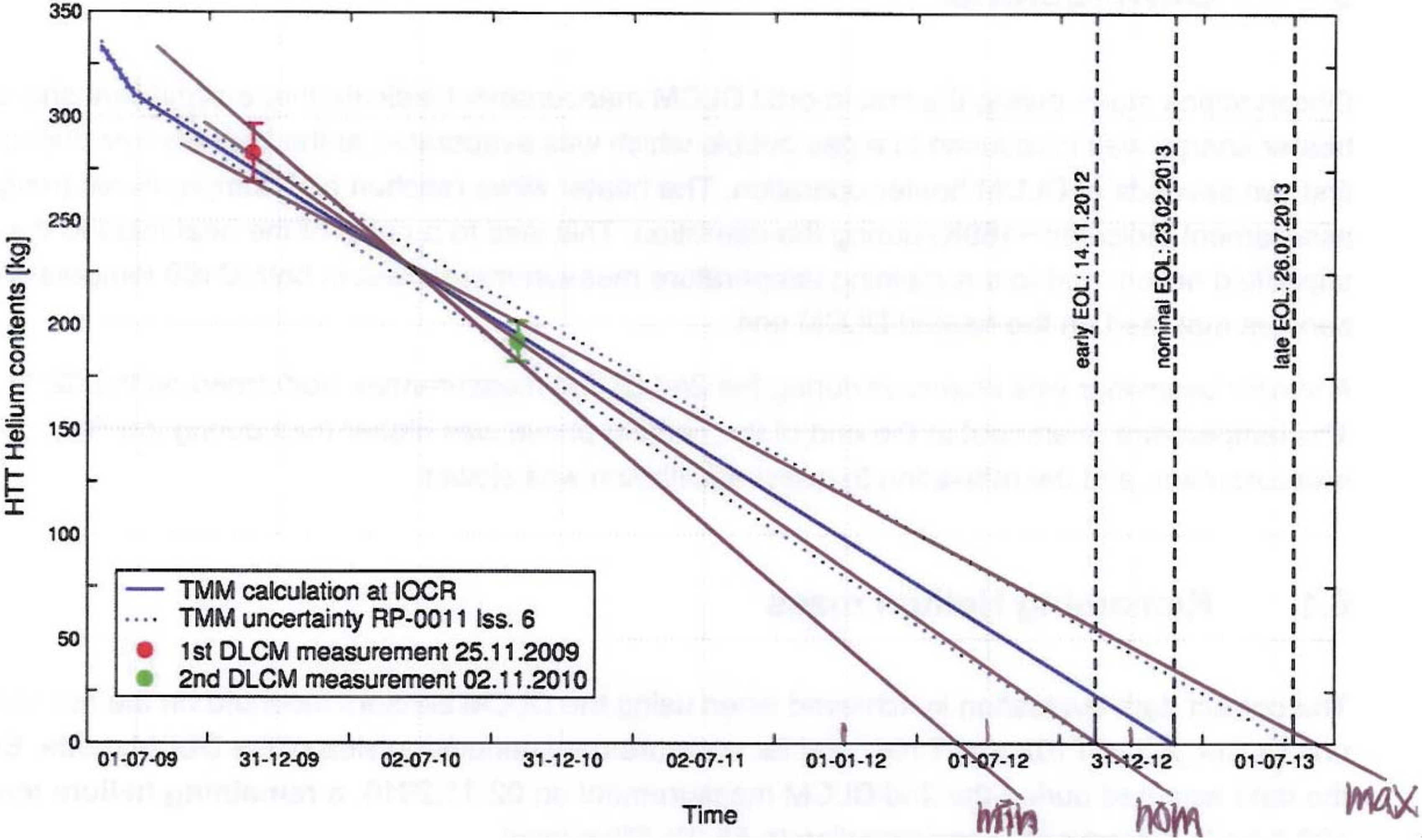
One prediction ...



HERSCHEL SPACE OBSERVATORY

Mission (cryostat) lifetime

… but large uncertainties (and neglecting TMM)



AO-2 overall issue

Uncertainties in predicted lifetime hampers AO-2 planning

- How much observing time is there to offer!?

Question put to industry:

What can be done to arrive at the best possible lifetime prediction??

HERSCHEL SPACE OBSERVATORY

Mission lifetime prediction

Thermal modelling

- Based on in-flight stationary conditions
- Not updated since In-Orbit Commissioning Review in July 2009??

DLCM measurements

- At first sight ‘confirm’ the TMM prediction
- But how significant are the error bars?
- What about systematics?

Can modelling and measurements be ‘combined’?

Can other ‘indicators’ be gainfully employed?

- I sent an email asking this kind of questions on 1 Dec 2010

HERSCHEL SPACE OBSERVATORY

Mission lifetime prediction – way fwd!?

Informal discussions has led me to a proposal

- Containing a number of possible actions
- For discussion in this meeting

Perform additional DLCMs

- Additional DLCMs – ‘cost’ is ~8 hr observing time per measurement
  - Perform DLCM#3 as late as possible with result available in early June – for release of OT2 call (early indication)
  - Perform DLCM#4 as late as possible with result available in early November – for OT2 time allocation (better indication)

Analyse the PACS & SPIRE cooler recyclings

- Constitute set of ‘mini-DLCMs’
- ‘Worse’ measurements – but much more frequent
- Can be ‘calibrated’ using ‘real’ DLCMs

Analyse the warm-up of SPIRE JFETs at turn-on

- Provide handle on instantaneous mass-flow as function of time

HERSCHEL SPACE OBSERVATORY

Mission lifetime prediction – way fwd!?

Update the TMM based on all current knowledge

- Is e.g. the slow rise of cryostat temperature already included??

Put forward to industry in PM#4 on 31 March 2011

A separate but related point

- Is the 'mission lifetime' really the valid 'lifetime' concept?
  - Do we have all science capabilities until the last day?
- I have asked this question to both industry and ex-Project (HerschelST#43-Action#4)
  - Industry (BC): Will work close to boil-off. (What is 'close to'?)
  - Project (CJ/ThP): There is a requirement that the cryostat should provide full functionality at least down to 5 kg (~3 weeks) of SLHe left. (Validation?)
- Also need addressing (but hopefully is not very important)

Mission lifetime prediction – way fwd!

Decision…

- DLCM#3 in late May as requested!
  - Current date is 24 May
- No decision about DLCM#4
  - ‘We only decide about the next measurement’
- Need to argue based on DLCM#3 outcome

Possible alternatives/additions

- Talk by Bernard Collaudin

Alternatives to DLCM

- Few Alternative/Complimentary measurements can be considered:
  - Use of Cooler recycling regeneration heat (similar DLCM)
  - Use of SPIRE JFET (= measure of mass flow rate)
  - L1 (vent line)

Conclusion

- Alternative methods cannot replace DLCM
  - Lower precision, unknown parameters
  - But allow to identify on regular basis if abnormal behaviour happens

'PACS method'

HerschelST Meeting #45 14/15 Apr 2011

Alternative Forecast for Herschel's Operational Lifetime

Extract L0 temperatures for the entire mission and measure the temperature changes due to cooler recycling

$$\Delta T = \Delta E/C$$

with ΔT = temperature change; ΔE = deposited energy; C =heat capacity

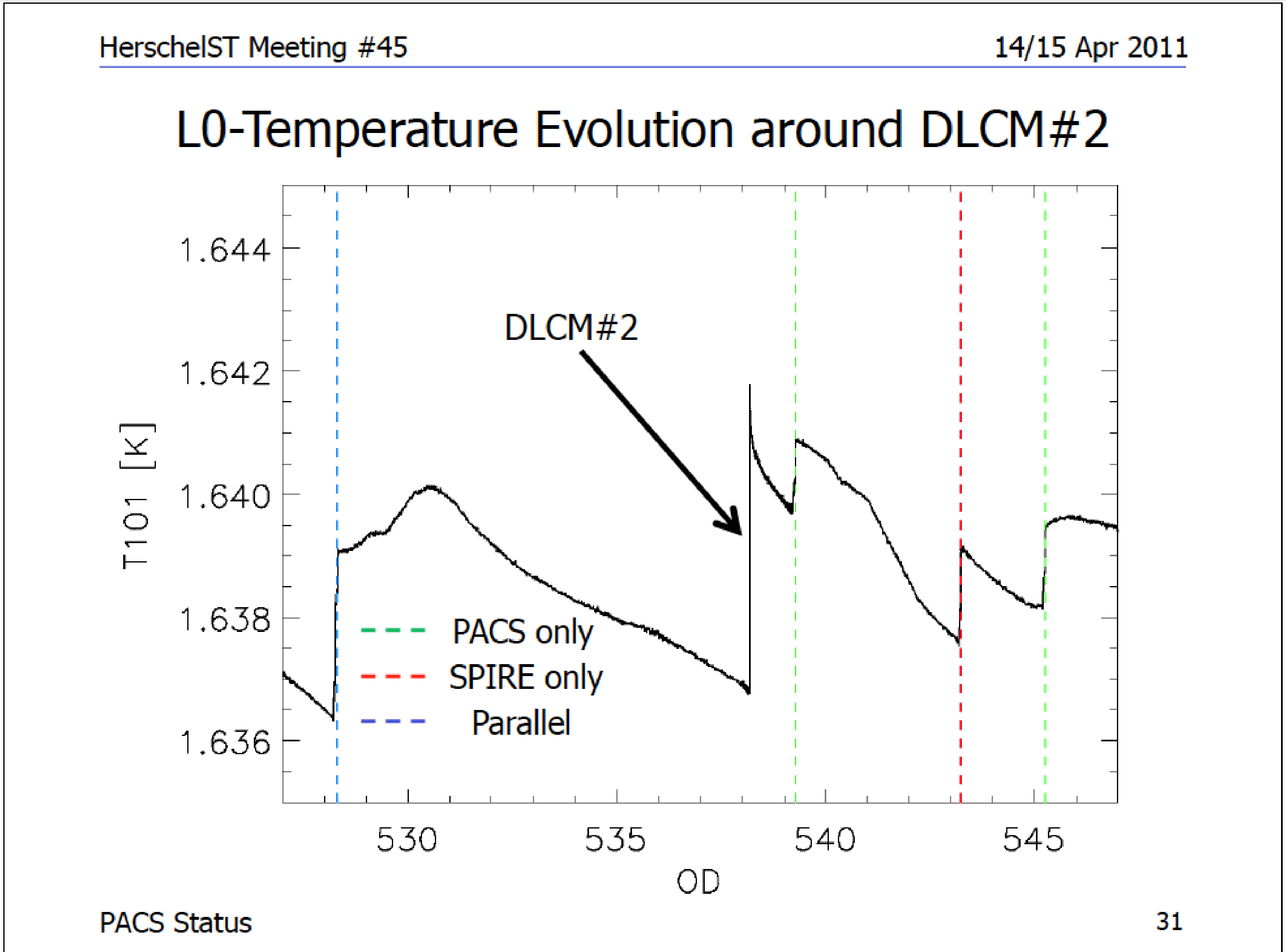
- C ~ LHe mass → $1/\Delta T$ is a measure of the Lifetime
- Extracted sensors: T101 and T107
- ΔE = energy dumped into the LHe when the "hot" pump of the coolers is being connected to the HTT bath by the sorption pump switch

- ΔE is a constant for PACS as long as the evaporator of the cooler is really empty!

PACS Status 29

HERSCHEL SPACE OBSERVATORY

‘PACS method’

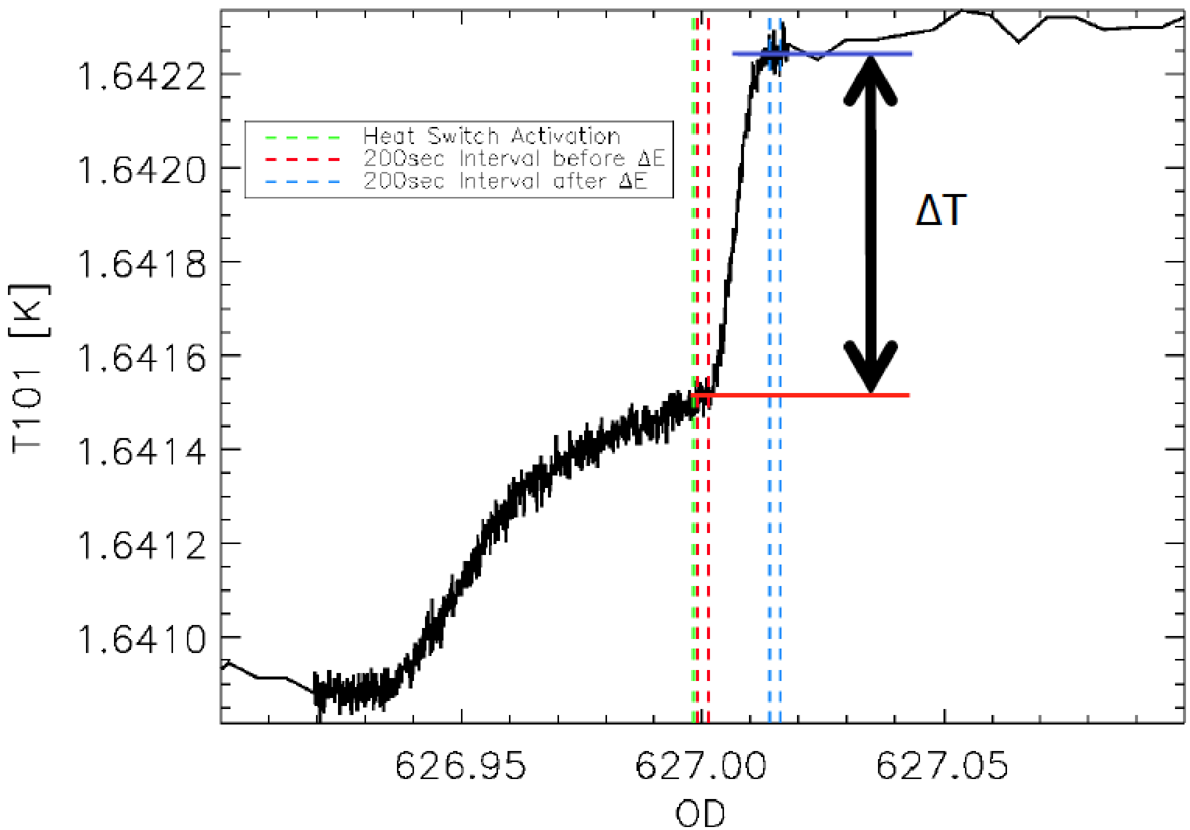


HERSCHEL SPACE OBSERVATORY

‘PACS method’

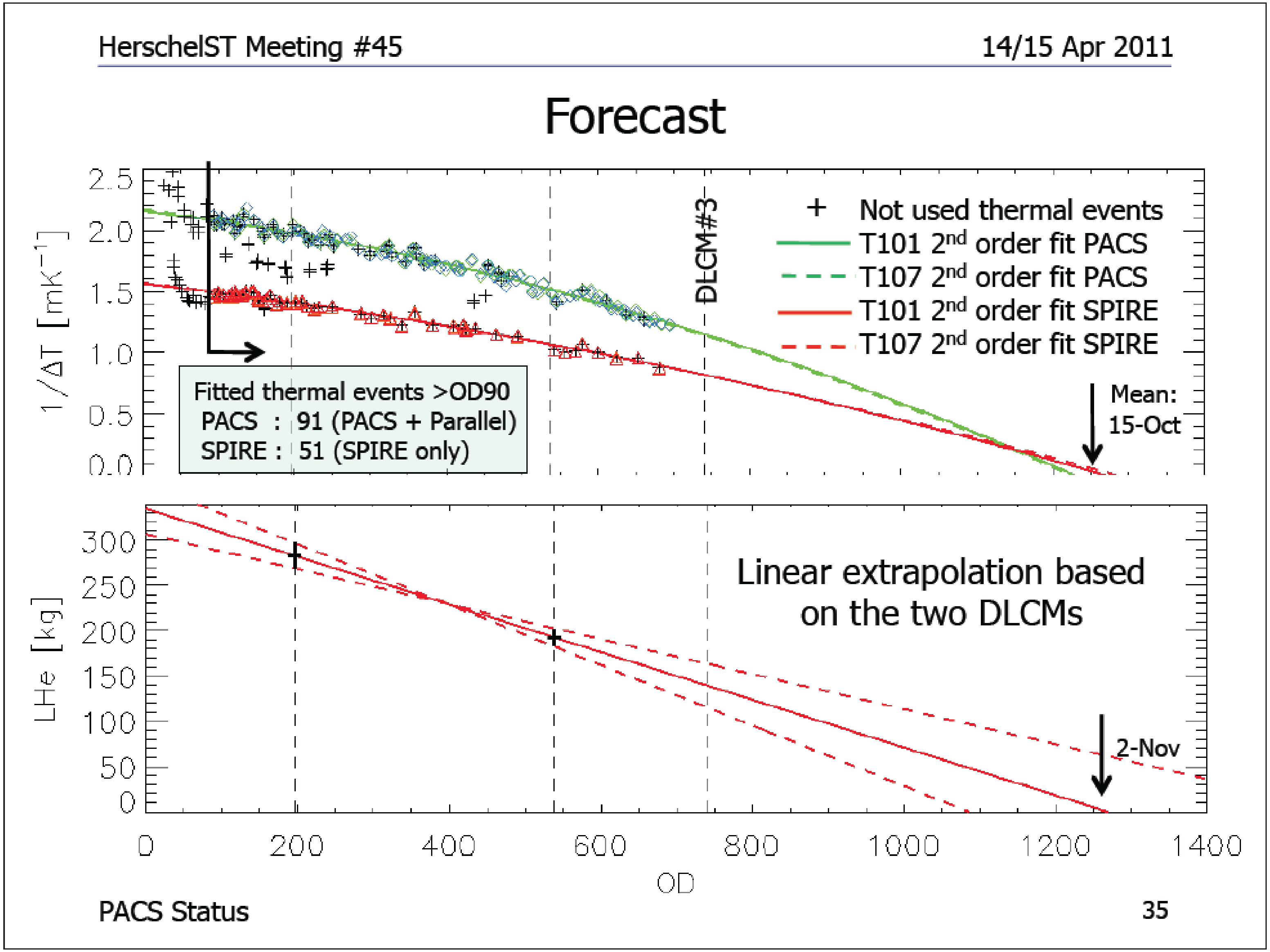
HerschelST Meeting #45 14/15 Apr 2011

Measurement of ΔT



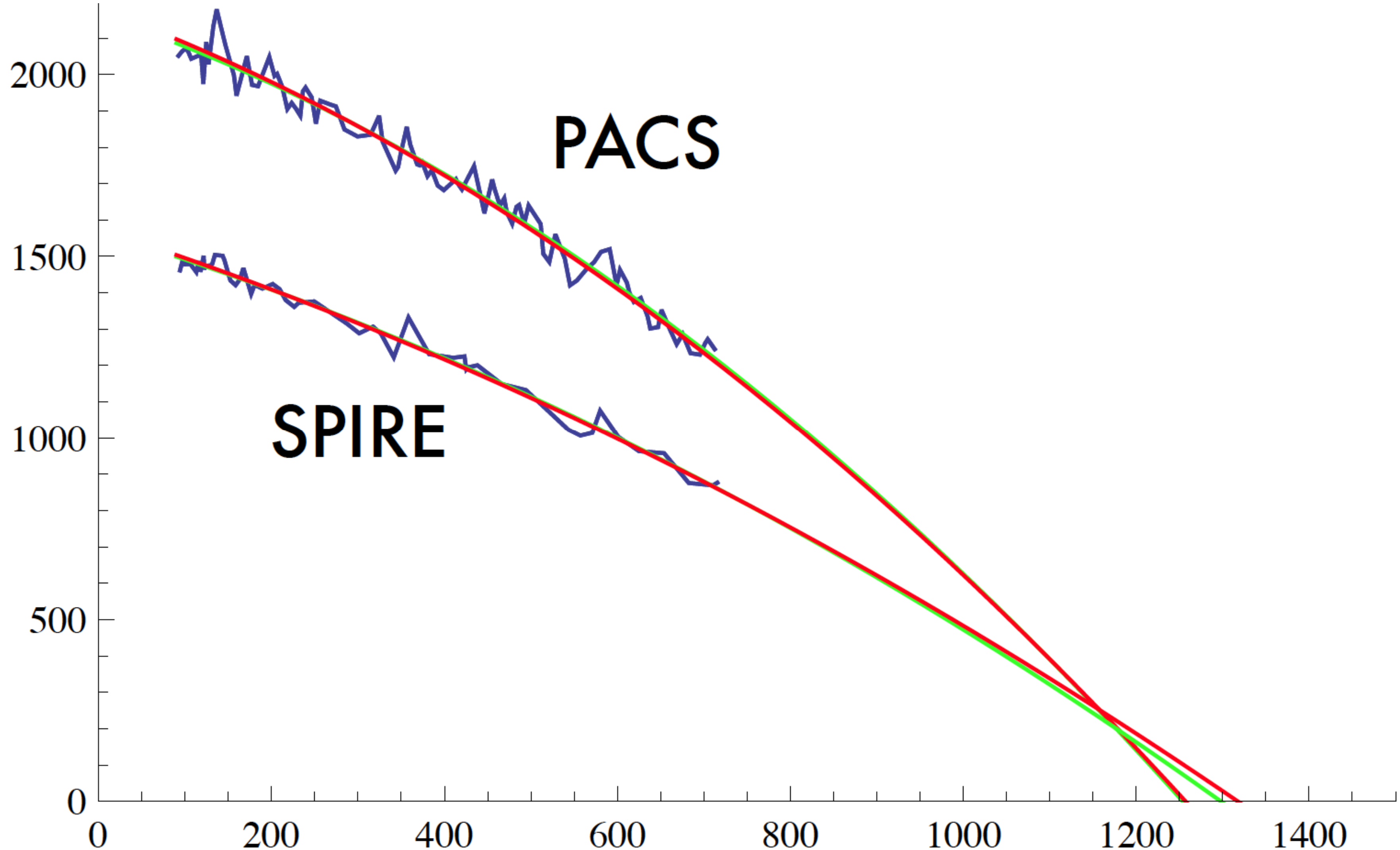
PACS Status 34

'PACS method'

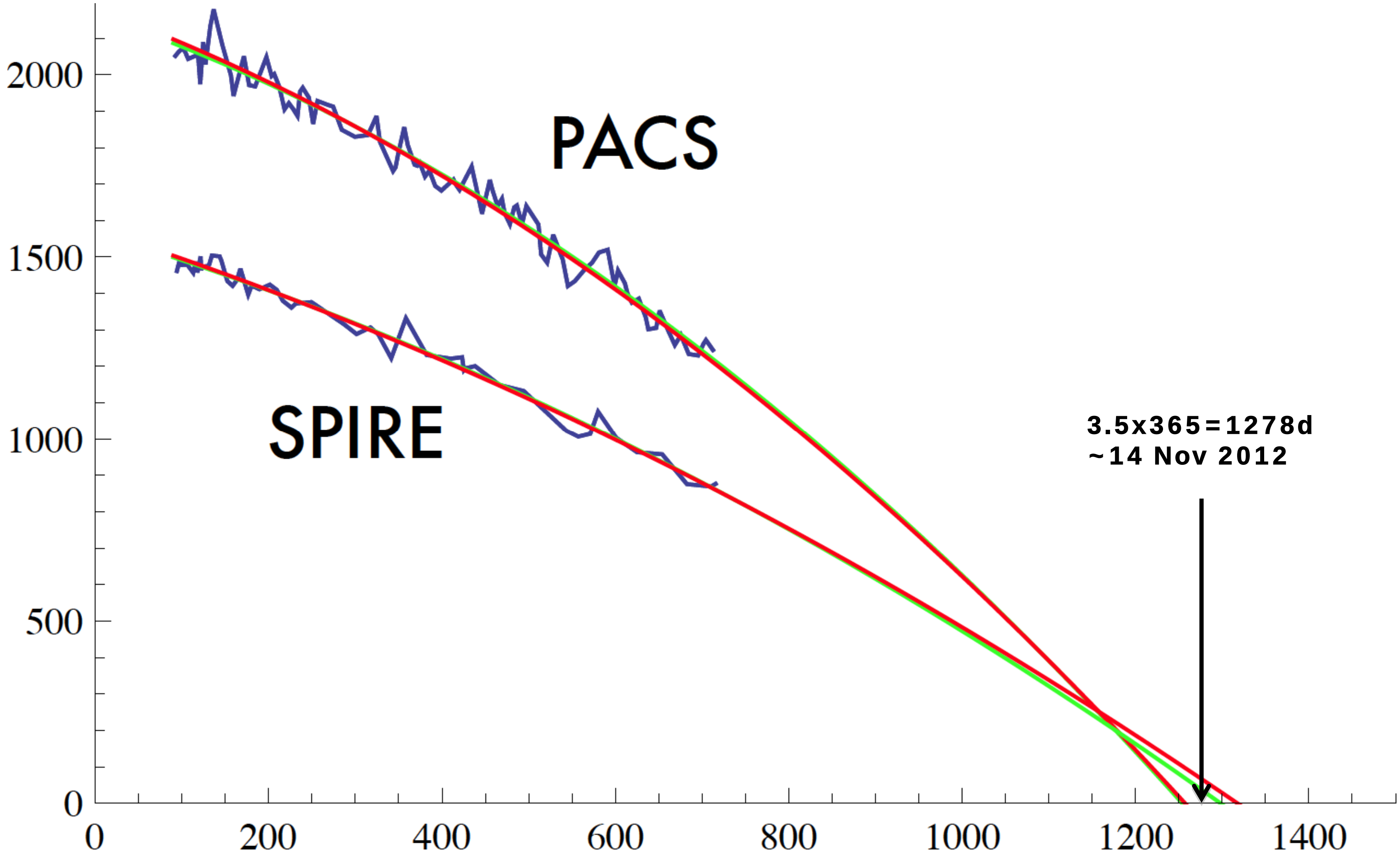


HerschelST Meeting #45
14/15 Apr 2011
Forecast
1/ΔT [mK⁻¹]
2.5
2.0
1.5
1.0
0.5
0.0
DLCM#3
Not used thermal events
T101 2nd order fit PACS
T107 2nd order fit PACS
T101 2nd order fit SPIRE
T107 2nd order fit SPIRE
Fitted thermal events >OD90
PACS : 91 (PACS + Parallel)
SPIRE : 51 (SPIRE only)
Mean:
15-Oct
LHe [kg]
300
250
200
150
100
50
0
Linear extrapolation based
on the two DLCMs
2-Nov
0
200
400
600
800
1000
1200
1400
OD
PACS Status
35

‘PACS method’

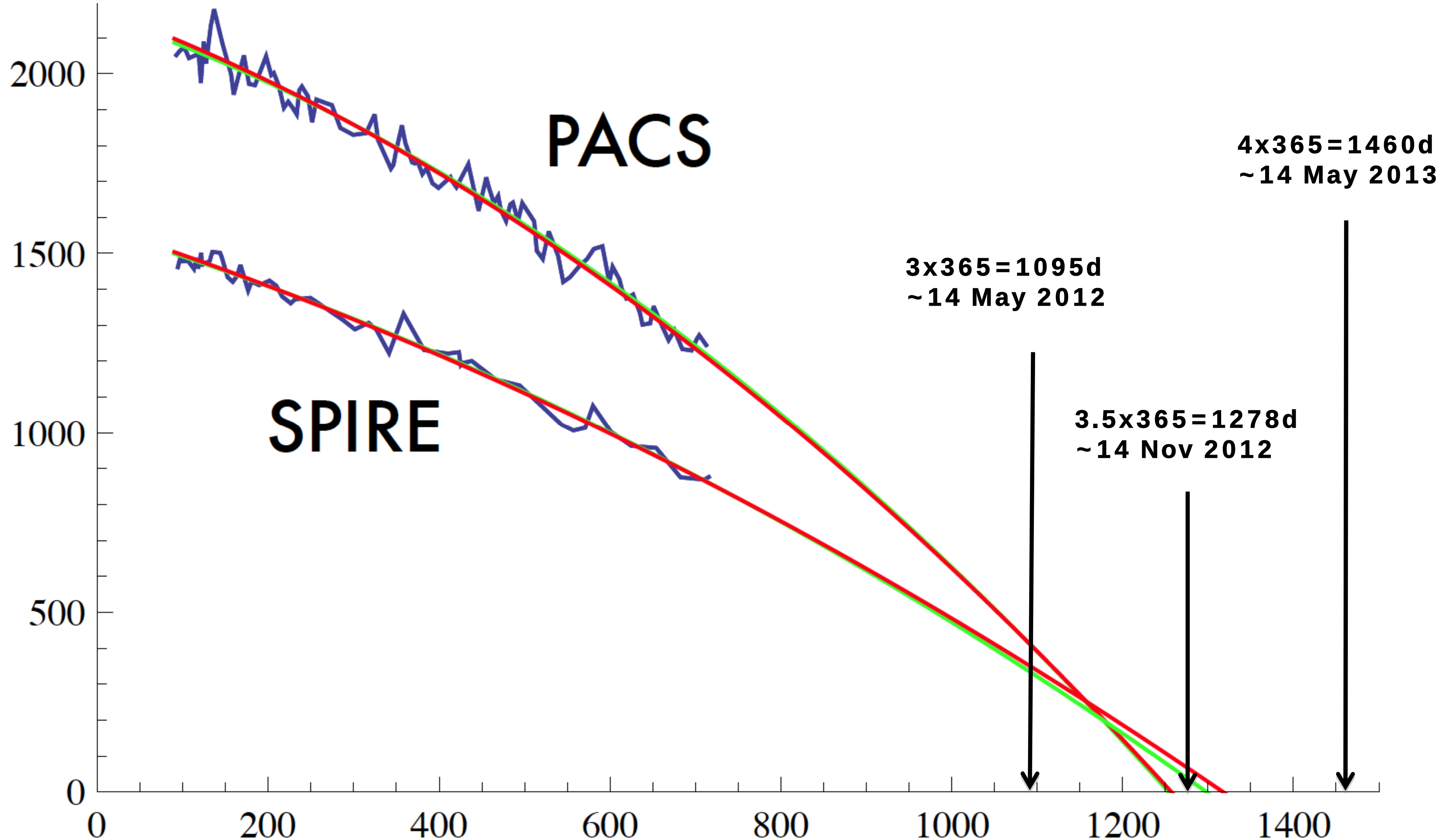

PACS
SPIRE
2000
1500
1000
500
0
0
200
400
600
800
1000
1200
1400

‘PACS method’



2000
1500
1000
500
0
0
200
400
600
800
1000
1200
1400
PACS
SPIRE
3.5x365=1278d
~14 Nov 2012

'PACS method'



PACS
SPIRE
3x365=1095d
~14 May 2012
3.5x365=1278d
~14 Nov 2012
4x365=1460d
~14 May 2013
0
500
1000
1500
2000
0
200
400
600
800
1000
1200
1400

Now we can talk about:

Observing opportunities

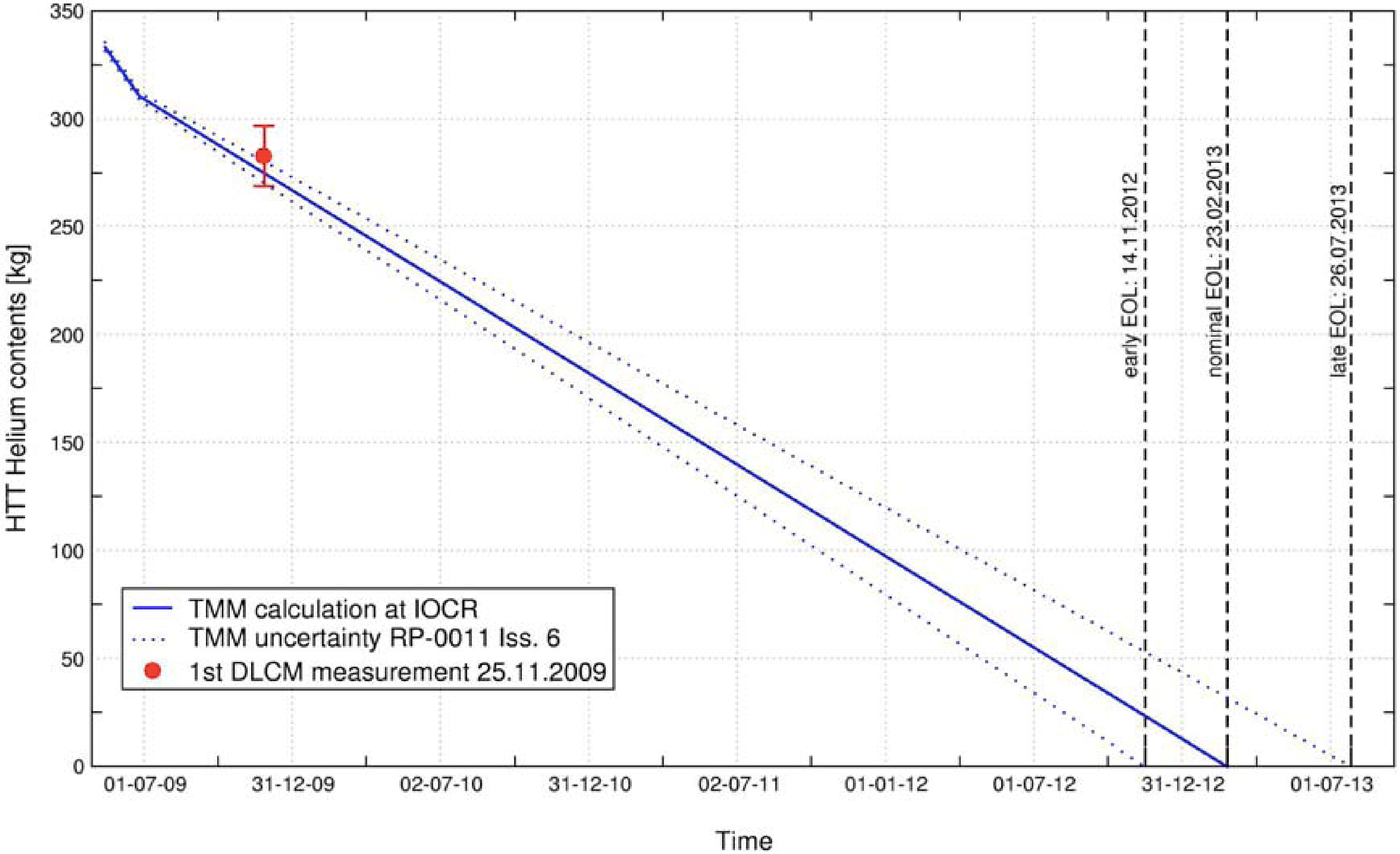
AO-2 overall issue

The crucial point:

The world has changed between the OT1 call and the OT2 call

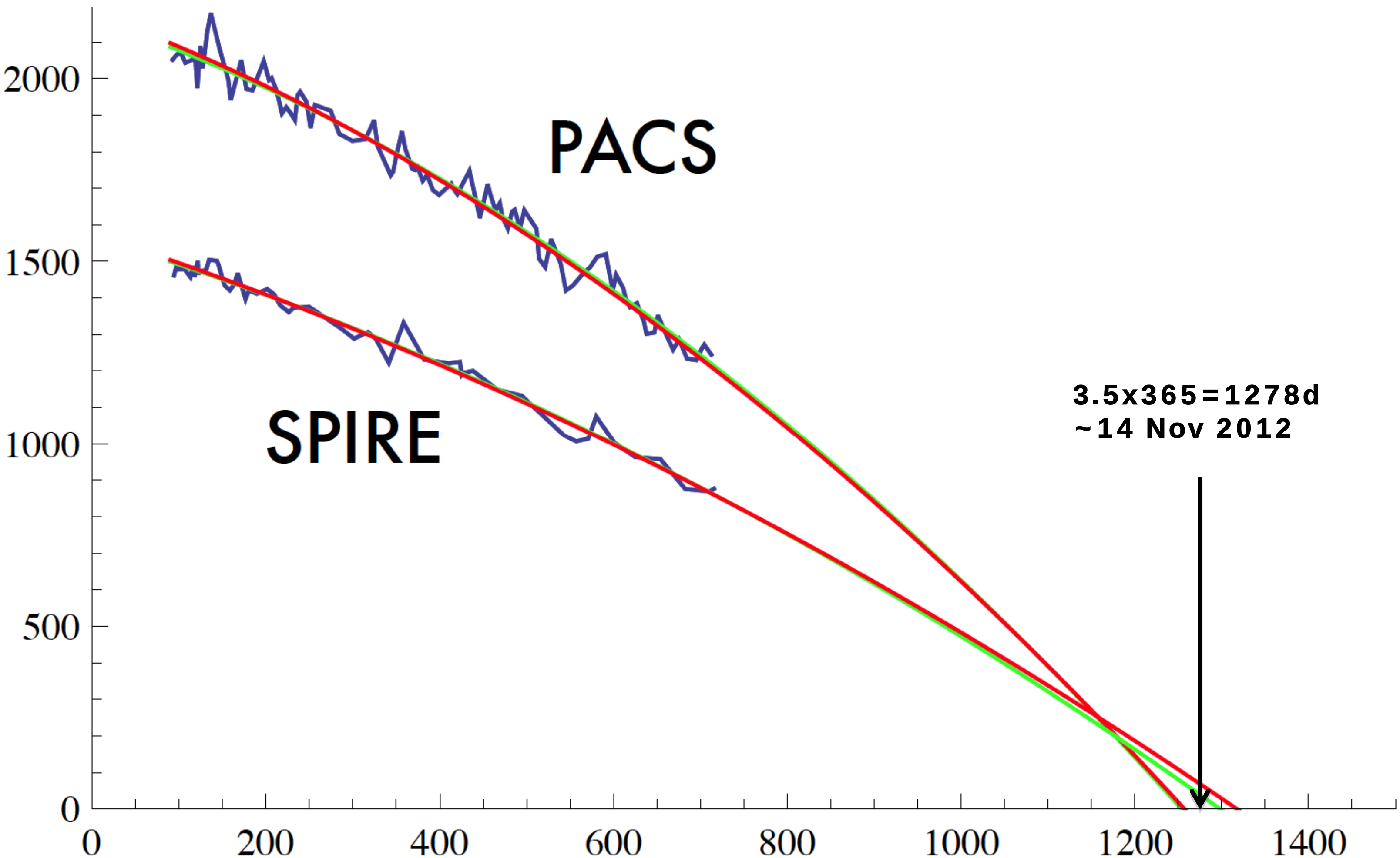
Predicted lifetime at OT1 call

At the time of OT1 – end of mission Feb-Mar 2013



Predicted lifetime at OT2 call

At the time of OT2 – end of mission '~Novemberish' 2012



HERSCHEL SPACE OBSERVATORY

Execution status

Approved observations yet to be executed by end Q1/2011

- These are actual numbers as per end of March 2011

As per the end of Q1/2011 the following amounts of allocated time are still to be executed:

KPGT	1446 hr	=>	80/76/72 days with 18/19/20 hr/day
KPOT	1582 hr	=>	88/83/79 days with 18/19/20 hr/day
GT1	286 hr	=>	16/15/14 days with 18/19/20 hr/day
OT1p1	4894 hr	=>	272/258/245 days with 18/19/20 hr day
OT1p2	1590 hr	=>	88/84/80 days with 18/19/20 hr/day

If KPGT/KPOT/GT1 are added together then what is yet to be executed amounts to 184/174/165 days with 18/19/20 hr/day executed. This is 6.1/5.8/5.5 months (with 30-day months).

For OT1p1 this amounts to 9.1/8.6/8.2 months, and for OT1p2 it amounts to 2.9/2.8/2.7 months.

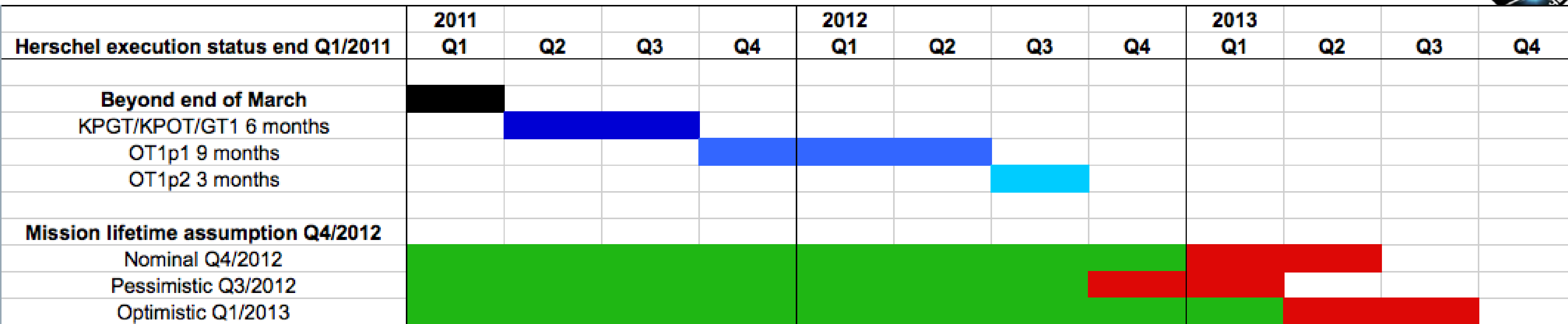
In the most recent 13 mission planning cycles (cycles 24-36, each cycle is 2 weeks), thus in the most recent 6 months, the actual execution achieved is 18.2 hr/day. (In the last two cycles it is 20.8 hr/day.)

Conservatively, it can be concluded that for **KPGT/KPOT/GT1 together need 6 months** for execution, while **OT1p1 needs 9 months**, and **OT1p2 needs 3 months** (almost). These numbers of course assume no major increase in problems compared to the situation experienced in the last 6 months.

HERSCHEL SPACE OBSERVATORY

How much can we (hope to) observe?

Assume lifetime end Q4/2012 – uncertainty ± 3 months



HST#45 discussion

What to do …?

- Clearly there is an 'issue' with (the amount of) available time to offer in the OT2 call
- Lots of discussion in the HST#45
- Two extreme cases illustrated (note: always need 6 months 'extra')

Case 1:

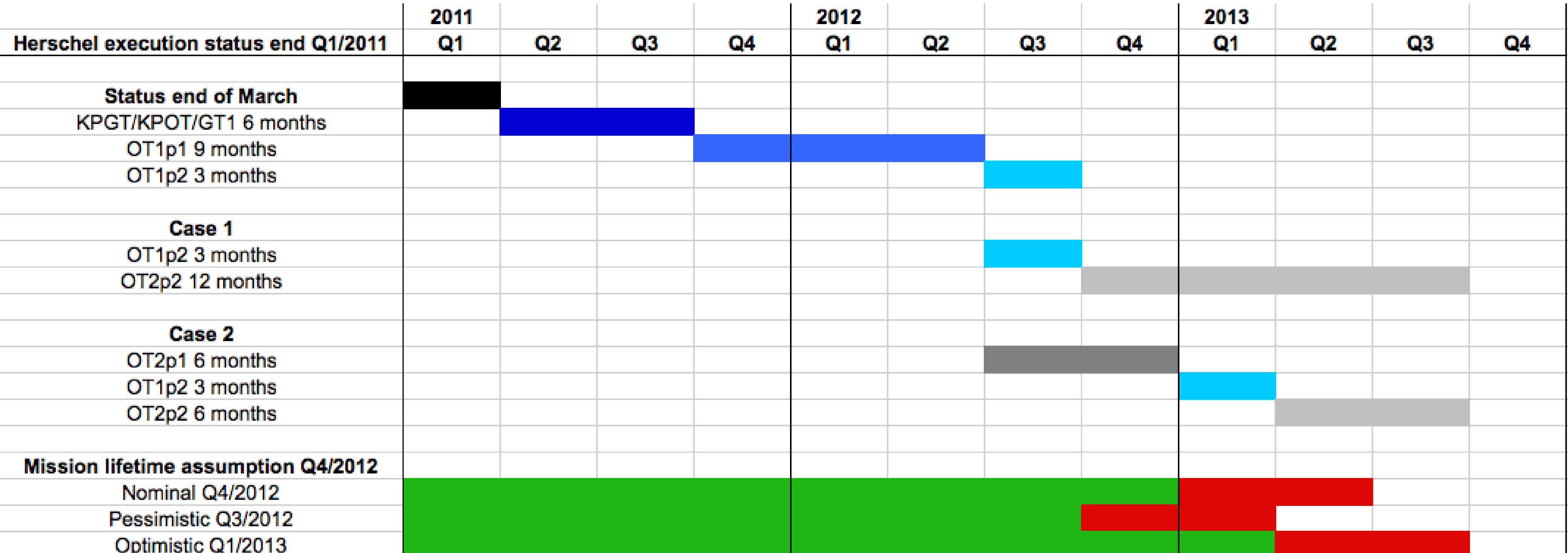
- **All** OT1 observations (both OT1p1 and p2) take precedence over **all** OT2 (both OT2p1 and p2) observations
- **All** OT*p1 observations **will** be executed with high confidence (use **pessimistic** end of lifetime uncertainty)
- There is realistically **no** time to offer for OT2p1

Case 2:

- OT1p1 (but not OT1p2) observations take precedence over OT2p1
- **All** OT*p1 observations **will** be executed with fair confidence (use **nominal** end of lifetime)
- Then 6 months of OT2p1 time can be offered

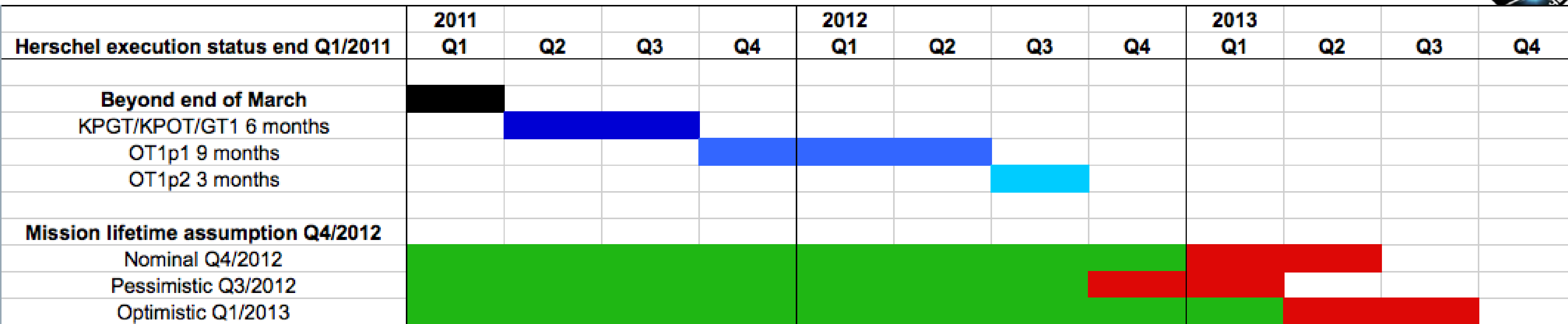
How much can we (hope to) observe?

Assume lifetime end Q4/2012 – uncertainty ± 3 months

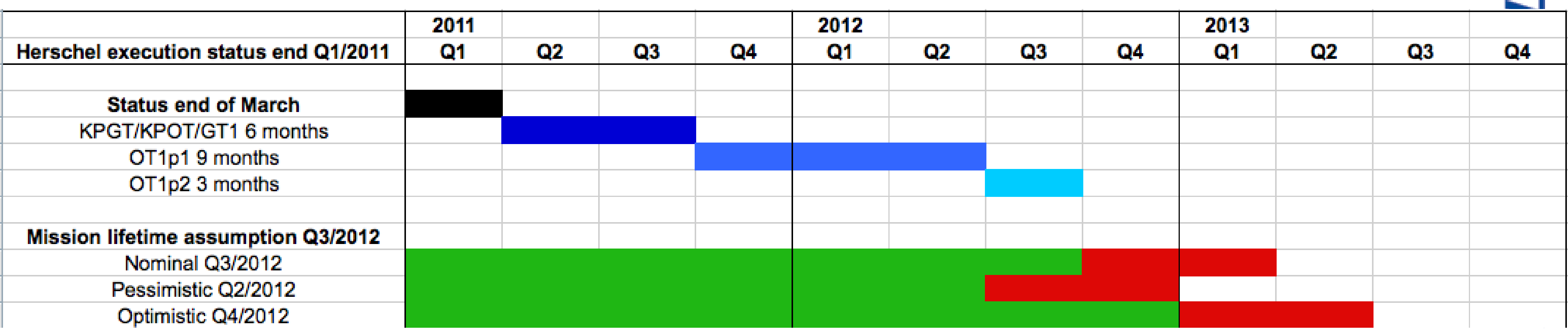


How much can we (hope to) observe?

Assume lifetime end Q4/2012 – uncertainty ± 3 months



Assume lifetime end Q3/2012 – uncertainty ± 3 months



HST#45 discussion

What to do …?

- Clearly there is an 'issue' with (the amount of) available time to offer in the OT2 call
- Lots of discussion in the HST#45
- Two extreme cases illustrated (note: always need 6 months 'extra')

Case 1:

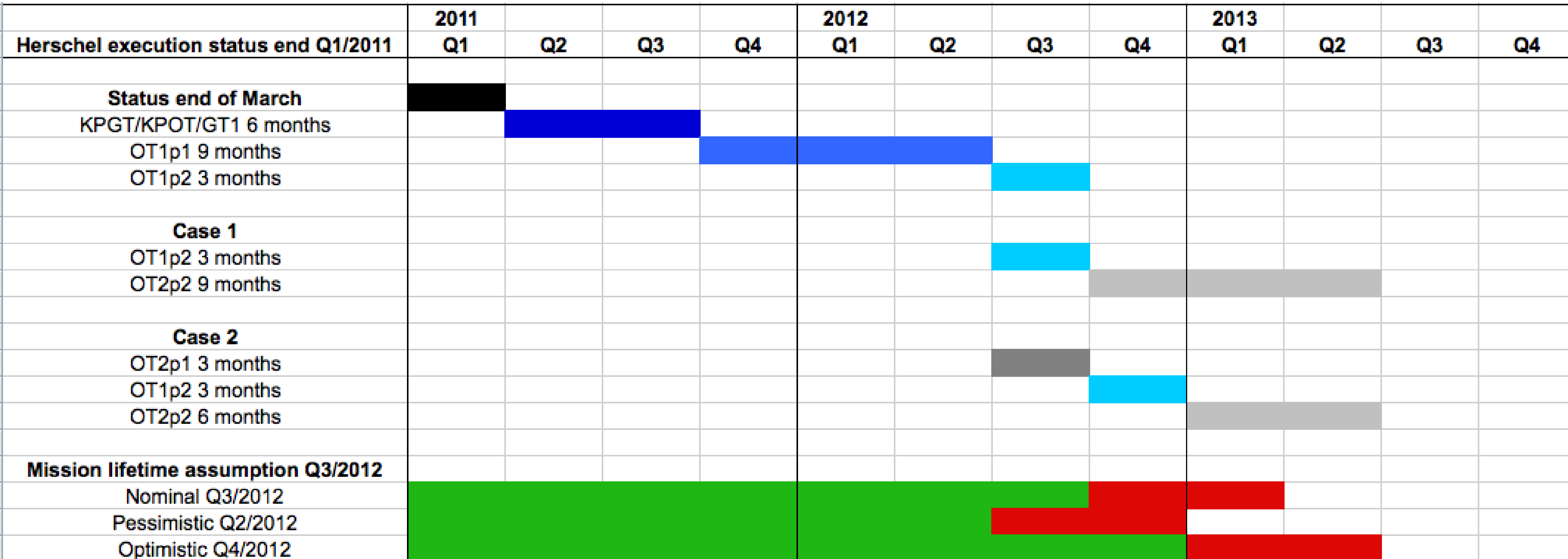
- **All** OT1 observations (both OT1p1 and p2) take precedence over **all** OT2 (both OT2p1 and p2) observations
- **All** OT*p1 observations **will** be executed with high confidence (use **pessimistic** end of lifetime uncertainty)
- There is **no** time to offer for OT2p1 (and even OT1p2 problem)

Case 2:

- OT1p1 (but not OT1p2) observations take precedence over OT2p1
- **All** OT*p1 observations **will** be executed with fair confidence (use **nominal** end of lifetime)
- Then 3 months of OT2p1 time can be offered

How much can we (hope to) observe?

Assume lifetime end Q3/2012 – uncertainty ± 3 months



HST#45 discussion

What to do ...?

- Clearly there is an 'issue' with (the amount of) available time to offer in the OT2 call – end of Q3 looks more realistic than end Q4

What was agreed:

- We all agree that room must be created for new proposals.
- The 'world has changed' since the time of the OT1 call, therefore reasonable to 'change rules'
- This means that OT2p1 proposals must have higher priority than OT1p2 observations.
- The limited time available (current best estimate of order 3-4 months) should be offered for new OT2p1 proposals

What was not agreed:

- How to treat the OT1p2 proposals; three options were discussed:
    - (i) 'stay as is' (remain as OT1p2 with low chance of execution)
    - (ii) 'throw them all in' (basically people loose their allocations, but can possibly 'regain' at a higher priority)
    - (iii) 'some intermediate concept' (e.g. ask people re (i) or (ii)??)

THANK YOU!