

Herschel First Results Symposium

4-7 May 2010 ESA ESTEC, Noordwijk, The Netherlands

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European Space Agency



Herschel – one year into the mission

Göran Pilbratt Herschel First Results Symposium – ESLAB 2010 Noordwijk, 4/05/2010

European Space Agency



V188 launch on 14 May 2009



service & solutions	ARIANE VOL 188 HERSCHEL/ PLANCK ORBITE A L'INJECTION				
Diagnostic provisoire de la mission lanceur					
Mise à feu (HO) le 14/05/09 à 13 h 12 min 00 s (UT)					
soit le	14/05/09 à 10 h 12 min 00 s (Kourou)				
ORBITE	ESTIMATION PROVISOIRE	MIN	VISEE	MAX	
Perigee (km)	270.0	265.5	270.0	274.5	
Apogee (km)	1 197 080.	1 041 822.	1 193 622.	1 345 422. + 151900	
Inclinaison (deg)	5.99	5.94	6.00	6.06	
Le Chef de Mission		Le Responsable	Charge Utile A	riane	

Herschel orbit

Two LEOP maneouvres

•OCM2009-05-15T15:28:20.6549.01 m/s•Touch-up OCM 2009-05-18T18:13:02.56661.01 m/s

Since then nine maneouvres

Transfer OCMs 1 & 2 total 0.90 m/s
Station keeping OCMs 1-7 total 1.27 m/s
Typical OCMs 4-6 weeks apart with typical Δv ~0.1-0.2 m/s

Herschel has been in final 'orbit' since day#2!

Orbit maintenance, but no orbit insertion (as opposed to Planck)
LEOP OCM put Herschel on 'stable manifold' for large amplitude 'semi halo' orbit







Mon 29 Jun 2009 03:19:38 PM CEST Real time **Herschel orbit** Herschel Blanck Earth Moon



Thermal stabilisation - HTT





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Thermal stabilisation – levels 0, 1, 2, 3



Flight Data from MUST server , Prediction from M.Linder (30/5/09)



Thermal stabilisation – CVV & shields

Herschel Post Launch transient - CVV - Shields



Flight Data from MUST server , Prediction from M.Linder (30/5/09)

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HERSCHEL OBSERVATORY



Herschel Post Launch transient - CVV - LOU-Telescope

Flight Data from MUST server, Prediction from M.Linder (30/5/09)

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Garchinner		übertrag	759,50
Gai ci ta i Mai		Z x 0,51 Weißbier dunkel à 3,00	6,00
Ruroerstuhen		3 x Lugana 0,21 à 4,50	13,50
an wat the set of the barrier to the		19 x 0.51 Helles à 3,00	57,00
, Fam. limmermann		2 × 0,51 Still à 2,80	5,60
Rürnernlatz 9		11 x 0,51 Radler à 3,00	33,00
85748 Garching		2 x 0,51 Weissbier Leicht à 3,00	6,00
Tal + 089-7 20 49 27		Rosso di Montalcino	24,90
Fav 089-72 92 94 74		2 x 0,31 Radeberger Pils à 3,00	6,00
Rechning Nr 14		3 x 0,51 Apfelschorle à 2,90	8,70
Storper Nr 147-827-10114		0,51 Mineralwasser	2,60
Tisch HIA		kellerbier	3,00
17201 474		0,51 Johannisbeerschorle	2,90
R v coarcelource à 4 20	11.55	2 x Villa Antinori Rosso à 34,60	69,20
A spargersuppe a type	75.40	Tasse Cappuccino	2,30
7 v THYEREI GIRDE & 5 20	15,40	Ramazotti	3,40
DONTCHEDC	4 20	5 x Espresso à 1,90	9,50
DADDADTE ENTENDOUST	16.90	Saldo	1013,10
2 V THTEREI ROSTROATEN & 14 50	33.00	Umsatz 19% exkl.	851,34
2 v correal schnitzel à 17 50	35.00	MwSt 19%	161,76
2 v SVI TEP ETGENDEANNE & 14 90	33.80	Rom	1017 10
2 x Sicilar Filet 2000 5 19 90	179.10	P(3)	2020120
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10 x 0.51 Weissbier à 3.00	30.00		
2 x 0.51 Altbayrisch Dunkel à 3.00	6.00		
7 4 5	759.50		

Spitzer 24 um and Herschel 100 um





Spiral Galaxy M51 ("Whirlpool Galaxy") at 24µm (MIPS) and 100µm (PACS)

Herschel at 160, 100, and 70 um



Herschel/PACS Images of M51 ("Whirlpool Galaxy")



Encircled energy and PSF by PACS





EEFs in blue (70), green (100), and red (160) um bands

PSFs based on Vesta observations; top->bottom: blue, green, & red bands; left->right: scaled to peak, 10% and 1%



Thermal anomaly – CVV temperature



Herschel Post Launch transient - CVV - LOU-Telescope

Flight Data from MUST server, Prediction from M.Linder (30/5/09)

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Mission (cryostat) lifetime



- Mid-July just reached stationary conditions
- Amount of He at launch known at 333.5 kg
- Transient phase use modelled/estimated
- Stationary conditions
 - CVV average stationary outside temperatures measured
 - Stationary average dissipation
 - \Rightarrow Average He mass-flow modelled at 2.668 mg/s
- \Rightarrow Mission lifetime estimated at 3.78 years

First DLCM on OD#195 (25 November 2009)

- Remaining amount He measured at 283 ± 14 kg (269-297 kg)
- Use 2.668 mg/s => 1228 ± 50 days (1168-1288 days)
- Compute total mission lifetime => 3.65-3.98 years
- Estimated amount of He was 275 kg (consistent)
- \Rightarrow Mission lifetime given as 3.8 years (end ~March 2013)



esa

Mission (cryostat) lifetime



Large uncertainties remain, but confidence in ≥ 3.5 years





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Pointing performance

esa

Fine pointing ('staring') and tracking (18 Melpomene 67"/hr)

- Prediction of 2" of verified, possibly slightly better
- SAA range restricted to 60°-110° (rapid excursions to 120°)







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Pointing performance





Scanning works well

- Prediction of 2" of verified, possibly slightly better
- SAA range restricted to 60°-110° (rapid excursions to 120°)

`Speedbumps'

- Observed in scanning, attributed to 'warm pixels'
- Could ruin pointed observ. and we would not know
- STR CCD temperature was lowered to -10°C (was +13°C) before OD#320 (29 March 2010)
- Limited statistics, but very encouraging results

SPACE OBSERVATO ERSCHE

No HIFI 2 August 2009-10 January 2010 CSA





HERSCHEL OBSERVATORY

No HIFI 2 August 2009-10 January 2010 🌘 esa





HIFI Spectrum of Water and Organics in the Orion Nebula

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Taking stock – status observing

Launched on 14 May 2009

- 14 June 2009 cryo-cover opening, followed by first observation
- 15 July 2009 Performance Verification Phase commenced
- 2 August 2009 HIFI anomaly
- 12 September 2009 first Science Demonstration Phase observation
- 18 October 2009 first Routine Science Phase observation

SDP Initial Results workshop 17-18 December 2009

- 10-14 January 2010 HIFI turned on
- February-April 2010 HIFI catching up
- 9 March 2010 HSA and HIPE publicly available
- 31 March 2010 submission deadline A&A Special Issue papers

HIFI Initial Results workshop 12-13 April 2010

• Consolidating Key Programmes in progress

Herschel First Results symposium 4-7 May 2010

- 14 May 2010 deadline for Key Programme AORs
- 15 May 2010 acceptance deadline for A&A Special Issue papers



Taking stock – status observing

Status on 30 April 2010

- SDP observations
 - 86.7% out of 699.5 hr executed
 - remaining 'SDP observations' revert back to KP observations
- KP observations
 - 19.6% out of 11,010.3 hr executed, another 1.8% scheduled
 - another 24.7% released
 - remaining 53.9% not yet released

Consolidation of Key Programmes

- Note that 14 May 2010 is deadline for AOR delivery for inclusion in the Reserved Observations List (ROL) for the upcoming OT1 release
- ROL will be frozen during the OT1 process, until final delivery of AORs of consolidated accepted OT1 programmes =>November 2010







Future AOs

Mission lifetime 3.5-4 years

- Routine science phase duration 3-3.5 years
- About 6600 hours science time per year

• Key Programmes

Allocated ~11000 hours or ~1.7 years

Time available to be allocated

- Total RSP KP allocated = $\sim 1.3-1.8$ years
- Resonable to have 2 AOs (3 has been suggested, but overkill)

Timing for future AOs

- Existing KPs cover 'in one block' (unrealistic) to mid-2011
- Want many available AORs to ensure efficient scheduling
- HIFI experience shows you need to robust against instrument temporarily out of action
- \Rightarrow want AO-1 AORs by late 2010, issue AO early 2010







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Future AOs

• GT1 process

- 31 March 2010 14 May2010
- About 550 hours

• OT1 process

- Offer 1 year of observations (~6600 hours)
- Release: 20 May 2010 (large and `normal' proposals)
- AKARI FIS and IRC compact source catalogues will be incorporated in HSpot v5.0
- Submission deadline: 22 July 2010
- Technical checking: until end September 2010
- HOTAC meetings: October 2010
- Final AOR updating by successful proposers October 2010
- OT1 AORs available for scheduling from November 2010

• GT2 & OT2

About a year later – exact dates (TBD)







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Future AOs

AO documention:

- Herschel Announcement of Opportunity
- Executive Summary
- Policies and Procedures
- Herschel Observers' Manual
- HIFI Observers' Manual
- PACS Observers' Manual
- SPIRE Observers' Manual
- SPIRE/PACS Parallel Mode Observers' Manual

AO tools:

- HerschelFORM PDFLaTeX package
- Reserved Observations Search Tool & Duplications Policy
- HSpot Observing Planning Tool

Plus:

ESLAB presentations & A&A papers on astro/ph!









