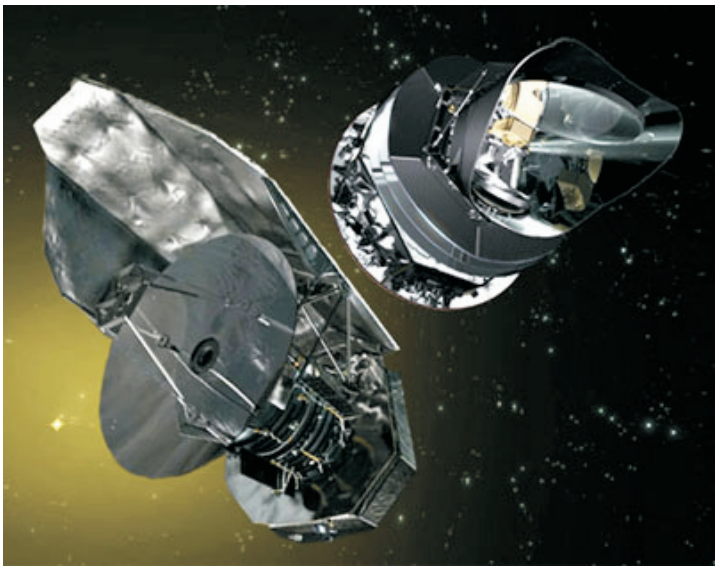
Herschel and Planck

In the Correct Orbit – What Next?



Herschel and Planck. Photo credit: ESA.

With a successful launch 14 May last year following a successful travel to the final Lagrange L2 point 1.5 million kilometres from earth, both satellites are now in the operational phase. Thus, two very large projects have passed a very important milestone; however, the project is not over by far. Now remains a rational use of the data the satellites send back. The observation time at the satellites is desirable, but the distribution is somewhat different for the two satellites. In principle, at Herschel everybody can get observation time if the scientific objective is regarded as sufficient enough. Regarding Planck, a so-called PI-project, only the investigation teams have access to the data.

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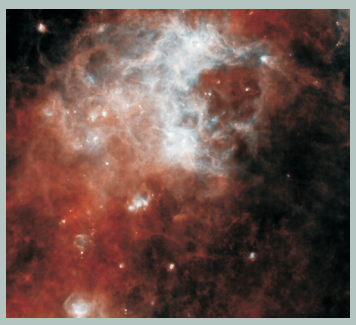


Cover photo:

Cold gas in the Milky Way

Herschel infrared image of a reservoir of cold gas in the constellation of the Southern Cross. The region is located about 60 degree from the Galactic Centre, thousands lightyears from the Earth. The Images cover an area of 2 x 2 degree of the sky.

Photo credits: ESA and the PACS consortium

The Nordic countries are involved in both programmes; Sweden is mainly involved in Herschel, Denmark, Finland and Norway mainly in Planck. Thus, institutes in these countries may look forward to a great amount of data, and as far as the first results indicate this data is very good.

Managing and Data Sampling.

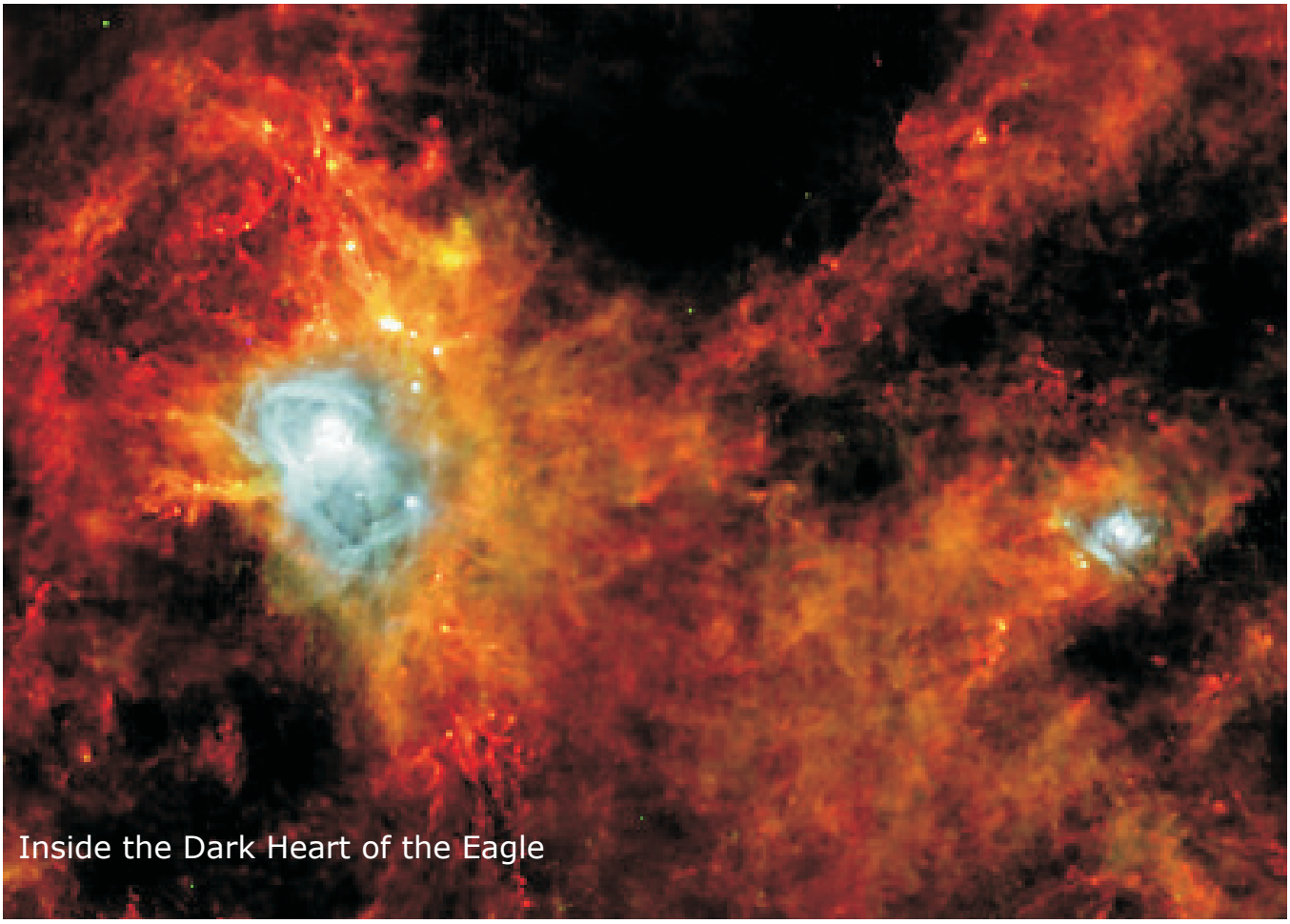
Like most of the scientific missions, the volume of received data is enormous. The challenge is to manage and extract the most valuable data. The idea is that data from the two missions will constitute a basis for a series of scientific theses, thus, providing answers to several questions the scientific community has had.

The Herschel Mission Operations Center (MOC) is located at ESOC, Darmstadt, Germany. In addition to MOC, the ground segment comprises the Herschel Science Centre (HSC), supported by NASA's Herschel Science Center (NHSC) USA, which acts as the point of interface to the American science community.

There are also three dedicated Instrument Control Centres (ICCs),

The first results

During the autumn 2009 the first results from the satellites were published; results that provided hopes for the researchers about epoch- making results.



16 December 2009 ESA published pictures Herschel has peered inside an unseen stellar nursery and revealed surprising amounts of activity. Some 700 newly-forming stars are estimated to be crowded into filaments of dust stretching through the image. The image is the first new release of 'OSHI', ESA's Online Showcase of Herschel Images.
This image shows a dark cloud 1000 light-years away in the constellation Aquila, the Eagle. It covers an area 65 light-years across and is so shrouded in dust that no previous infrared satellite has been able to look through it. Now, thanks to Herschel's superior sensitivity at the longest wavelengths of the infrared, astronomers have their first picture of the interior of this cloud.

It was taken on 24 October using two of Herschel's instruments: the Photo-detector Array Camera and Spectrometer (PACS) and the Spectral and Photometric Imaging Receiver (SPIRE). The two bright regions are areas where large newborn stars are causing hydrogen gas to shine.

one for each instrument on board the spacecrafts, provided by the respective principal investigators. Data from Herschel is accessible for the whole scientific community, after evolution of the scientific committee for the project. Herschel has been designed to perform routine science operations for a minimum of three years at its orbit around L2. The mission will end when the helium used to cool the focal plane of the scientific instruments is depleted.

The Planck Mission Operations Control Centre (MOC) is also located at ESOC. The Planck Science Operations Centre (SOC) is situated at the European Space Astronomy Centre (ESA/ESAC), in Villafranca, Spain, and there are two Data Processing Centres (DPCs) - one for each on-board instrument. Routine observations are planned to last 15 months (enough to survey the whole sky twice over); but a mission extension of about one year is possible. Data from Planck is reserved the investigation teams.

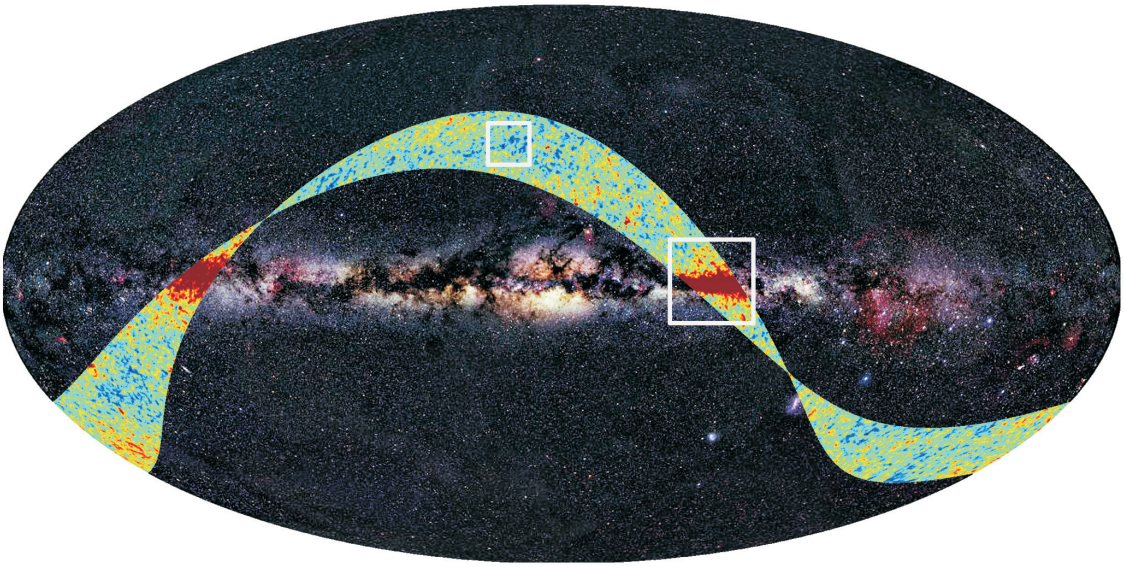
The First Light from Planck

The so-called "first light" survey, which started 13 August, was a two-week period in which Planck continuously surveyed a strip of sky. It was performed to verify that the instruments were sufficiently stable and that it was possible to calibrate them over long periods of time with the extreme accuracy required.

This study was completed 27 August, and has given map of a strip of sky; a map for each of the nine Planck frequencies. Each map is a ring, about 15 ° wide, across the entire sky. Preliminary analyses show that the quality of data is excellent.

Routine operations began immediately when this "first light" investigation was finished, and now the Planck observes the sky at least 15 months without intermissions or delays. In the course of about 6 months it will be possible to create a first map of the entire sky.

Within the measured observation time of 15 months, Planck will collect data for two complete maps of the sky. In order to exploit the extremely high sensitivity of Planck, the data must undergo very precise adjustments and very thorough investigations.



A map of the sky in the light shows a strong horizontal band. It is the light that shines from the Milky Way, our own galaxy. On top of this map is the strip that shows the part of the sky that is mapped by Planck in the "first light" survey. Colour scales show how much the temperature of the cosmic microwave background (CMB) deviates from the average, as measured by Planck at a frequency that is near the peak of the CMB spectrum (red is hotter and colder is blue). The powerful red stripes come from the radio emission from the Milky Way, while the small spots farther away from the Milky Way show the tiny variations in the cosmic microwave background that is the Planck's target.

Photo: ESA, LFI and HFI-consortia. The optical background image: Axel Melli Collector.