09 Oct 2012 -16:05

Belgian Operations Center gets the ISS rotated

For the very first time, the International Space Station (ISS) will be rotated for science objectives in December 2012. It was the Belgian Operations Center B.USOC that managed to get this scoop. B.USOC is responsible for the SOLAR platform, which is mounted on the exterior of the European Columbus Module. SOLAR carries three Sun observing instruments, of which one, SOLSPEC, was developed at the Belgian Institute for Space Aeronomy (BIRA-IASB) in collaboration with the French LATMOS.

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SOLAR was installed on Columbus the same day the module itself was attached to the other modules of the space station. Being in space since February 2008, SOLAR will soon be celebrating its 5th birthday. "This is quite an achievement", says Nadia This, operations engineer at B.USOC, "since SOLAR was designed to operate for 18 months only."

The instruments on SOLAR observe the Sun, and due to the movement of the ISS, the instruments must be kept pointed at the Sun actively with a rotating platform, SOLAR. However the orbit of the ISS changes significantly over the course of a month, and as a consequence, the Sun can be seen by SOLAR only about 2 weeks per month. To overcome this constraint, the ISS will be rotated. "We wanted to extend this period, because it is scientifically very interesting to observe a full rotation of the Sun, which takes about 25 days at the solar equator", adds Nadia This.

Logically, achieving an adaptation of orientation as will be done for SOLAR is not easy. Nadia This: "If I remember correctly, it took 2 years from the first idea, until the final approval by the Space Station Program Control Board". The idea was first brought up to the European Space Agency (ESA) by B.USOC and the scientists associated with the instruments. Once ESA was convinced of the scientific need, a lot of analyses started to prepare for the questions NASA and the other international partners would be asking: how long was the rotation needed, what would be the impact on the ISS systems (e.g. solar arrays and antenna's might have to be pointed differently, the temperature gradient on the ISS is not as usual), would other instruments be influenced, etc. Only when the proposal was water-tight, ESA went to NASA to ask officially for a 'change in ISS attitude'. "The idea was presented at several boards at NASA, only at the highest level they can decide about such an attitude change. It is thanks to the good preparation of the SOLAR team and the excellent support of ESA that we succeeded", says Nadia This.

The SOLAR instruments measure the energy flow of the Sun from the infrared to the ultraviolet wavelengths. The French-Belgian SOLSPEC is a spectroradiometer covering infrared, visual en ultraviolet wavelengths, while the German SolACES is focused on the extreme ultraviolet wavelengths. SOVIM (Swiss-Belgian) was an instrument aimed at measuring the total solar energy reaching the Earth, but it was declared lost in 2008.

SOLAR data are used for 2 main goals: one is of course studying the Sun itself. Scientists are modeling the

composition, the temperature and the density of the Sun’s atmosphere and their variability in time. Continuous measurements of the solar spectrum are necessary to verify these models. With the maximum of the 11-year solar cycle coming up in 2013, increased Solar activity is expected.

B.USOC is an operations centre co-managed by the Belgian Science Policy (BELSPO)/R&D division and the Belgian Institute for Space Aeronomy.

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