Press Release, October 26, 2009

PROBA2 launch

Eyes focused on the Sun and space weather

November 2, 2009, will be a red-letter day for the Belgian space industry and space sciences. A rocket containing PROBA2 will be fired off at 02:50 Belgian time from a Russian launch base in Plesetsk. PROBA2 will be the first ESA space weather mission dedicated to observing the Sun. Another important item: the satellite was built in Belgium.

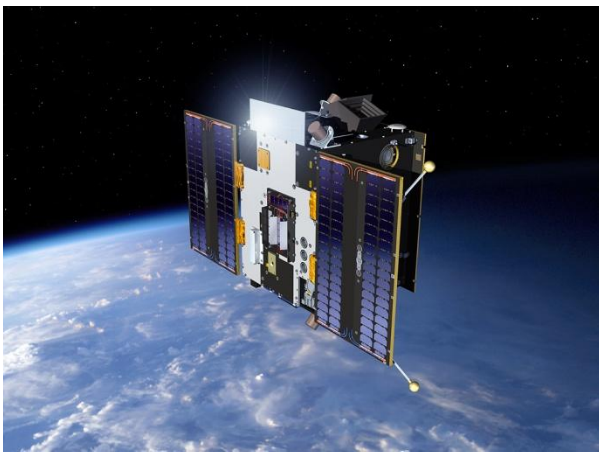

Figure 1 Impression of PROBA2 facing the Sun while orbiting Earth (image source: ESA)

The PROBA2 satellite is small, but is stuffed with brand new technologies that will be tested in space during real flight operations. It is what we call a technological demonstration mission. The fact that PROBA2 is small and inexpensive for a space mission gives small companies and scientific institutes the opportunity to build up experience working on space hardware. It also opens the door for creativity. PROBA2 will be launched together with another satellite in a former intercontinental ballistic missile. The rockets have been repurposed for peaceful use as Rockot satellite carriers.

After PROBA2 separates from the launch rocket, it will enter an orbit around the Earth. Its orbital path passes over the poles and will roughly follow the terminator, the boundary between day and night on Earth, giving PROBA2 an uninterrupted, front-row seat for observing the Sun. This round-the-clock view of the sun allows PROBA2 to fulfill its scientific mission: solar science. The Royal Observatory of Belgium has two solar instruments onboard, SWAP and LYRA. Observations from both will be used for scientific research into plasma physics and space weather. Space weather, like its more familiar counterpart closer to the ground, is the study of changing conditions in the region of outer space near the Earth. However, instead of studying wind and rain, space weather scientists measure electromagnetic radiation and the behavior of solar plasma.

The **S**un **W**atcher with **A**ctive Pixels and Image **P**rocessing (SWAP) images the solar atmosphere, which is called the solar corona. This outer layer is almost invisible because it mainly radiates in ultraviolet (UV) and extreme ultraviolet (EUV). SWAP 'translates' the EUV radiation to a visible picture. One of the novel features of SWAP is its wide field of view of the Sun and the space around. The instrument can even track plasma clouds that erupt and escape. In fact, SWAP can detect these space weather phenomena on its own, with no input from scientists on the ground. This is one of the key goals of PROBA2, whose name stands for PRoject for OnBoard Autonomy. A powerful computer is integrated into the satellite platform and serves as the brain with which the satellite can make independent decisions, navigate, and conduct special pointing maneuvers. SWAP is capable of recognizing space weather events and responding to them.

The **Ly**man-alpha **Ra**diometer (LYRA) measures the UV radiation that influences, for example, the production of ozone layer in Earth's atmosphere. LYRA also provides a test bed for some state of the art technology. The photo detectors are made of diamond, which makes LYRA blind for optical light while remaining sensitive to other parts of the electromagnetic spectrum. In conventional radiometers, different filters are used to filter out the visible light from the solar spectrum, but every filter also reduces the desired signal. This diamond technology solves that problem.

LYRA investigates the variability of the UV radiation. LYRA is sensitive to small changes in radiation and can observe with very high time resolution. The instruments we actually use today in the space weather prediction centre make measurements in only a narrow X-ray band pass. They are not sensitive when the radiation is below a threshold level. This is important during solar minimum which implies a lower level of solar radiation compared with a solar maximum. Currently, we are in such a minimum. But, LYRA, using a broader band pass, can still see the variation even if the level of radiation is low. LYRA can even detect short time light flashes, because of its high time resolution.

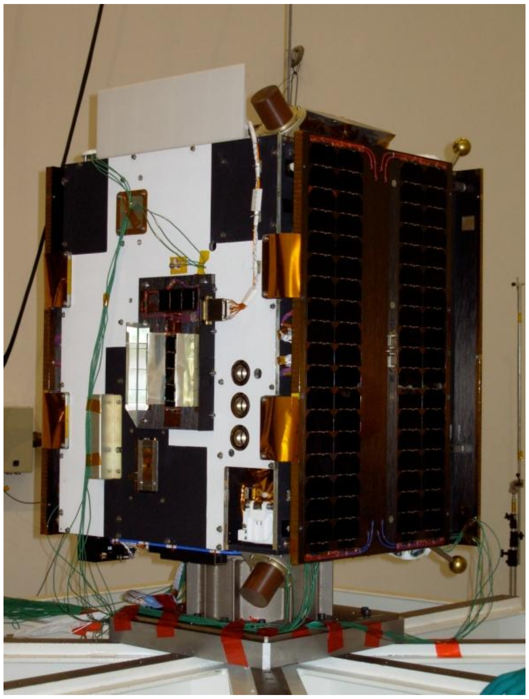

Figure 2 LYRA and SWAP after integration on the satellite. The three circles are the three eyes of LYRA. The rectangular opening under LYRA, gives a view on SWAP.

With aid of LYRA we will be able to measure the solar radiation and radiation peaks. With aid of SWAP, we will see the invisible radiation and flares in the solar atmosphere. Besides this, SWAP can also follow the solar plasma ejected from the Sun. Both the scientific research and space weather predictions will benefit from these solar instruments.

PROBA2 is a textbook example of technology designed to be better, more compact, and faster: better technologies in a compact configuration, better detectors, smaller instruments, low energy consumption, micro-level sizes...

Partners

The satellite has been developed under the lead of the Belgian firm Verhaert Space NV. The scientific lead of the SWAP and LYRA instruments was with the Royal Observatory of Belgium and the Belgian industrial lead with the Centre Spatial de Liège.

SWAP and LYRA are both examples of a successful international collaboration. LYRA was developed and built by a Belgian-Swiss-German consortium: ROB - PMOD/WRC, IMOMEC, CSL, MPS and BISA- IASB. Support for SWAP calibration was provided by the Max-Planck-Institut für Sonnensystemforschung, Germany.

The Belgian activities were funded by the Belgian Federal Science Policy Office (BELSPO), through the ESA/PRODEX program for the payload instruments, and the ESA/GSTP program for the platform.

Website

http://proba2.sidc.be

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