B.USOC role in the ASIM operations on the ISS.

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B.USOC is one of the distributed operation centres managing European scientific payloads on the International Space Station. B.USOC, beside pressurised payloads, is Facility Responsible Centre (FRC) for the SOLAR package, a set of instruments monitoring solar spectral irradiance operating since the Columbus module launch in February 2008. ESA has assigned the same role to B.USOC for ASIM external payload operations. B.USOC was already active during the LSO operations performed during the ODISSEA taxi-flight in 2002 and managed the operations of the CNES PICARD Myriade satellite monitoring solar activity. In this respect, B.USOC is ideally positioned to coordinate possible synergies between ASIM, TARANIS other space instruments and ground based networks.

B.USOC and the USOC's network.

When ESA decided to participate to the International Space Station, the national delegations choose a distributed operation centre concept to operate scientific payloads. B.USOC is one of these centres.

B.USOC is currently a services centre of the Belgian Science Policy (BELSPO)/R&S division. Its mission is to provide operational services for Belgian scientific institutions and space agencies.

Its dedicated engineering and operations teams carry out experiments on board the International Space Station (ISS) and Satellite ranging from the integration of payloads to their in-orbit operation, astronaut training, processing, archiving and dissemination of the scientific data obtained.

The current activities of B.USOC are: Ground Control Segment Design support, Installation and Validation, satellite commissioning and operations, decentralized Science Operations Centre for CNES PICARD micro-satellite, ESA Facility Responsible Centre for ISS/SOLAR, Fluid Science Laboratory (FSL), METERON and ASIM.

B.USOC has also non-operational activities as in knowledge management where it studies both the optimal data distribution and data long term preservation.

B.USOC and ASIM

The ASIM mission [1,2] constitutes of a package of two nadir instruments : one for the visible and another for the X ray and radio frequencies, the normal operating mode is a trigger mode where both instruments are continuously measuring but do not record data below thresholds to be determined by the science team. Another mode is a "timed mode" where at a certain time and at a certain location on earth, the observations are recorded even in the absence of triggers.

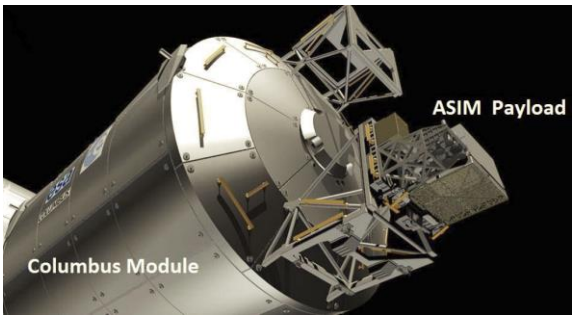

Fig.1: the ASIM payload on the ISS COLUMBUS module, the SOLAR payload is presently on the empty platform on top of COLUMBUS. (ESA artist representation).

The timed mode demands from both the science team and the USOC a lot of flexibility, ASIM main target: sprites and elves are related to intense thunderstorms and thus request reliable meteorological forecasts in the entire range of ISS latitudes. Auroras and other luminous phenomena have a direct relation to solar activity and thus would need a link with the ESA/SSA Space Weather Coordination Centre (SSCC) which is localised on the same campus as B.USOC at the Royal Observatory of Belgium.

ASIM is also sensitive to a large number of optical phenomena which have been studied for a long time without being subject to the systematic observations allowed by a space platform. These are noctilucent clouds, earth observations including man made lights, volcanic eruptions, large fires and even the evasive earthquake lights.

Fig.3: image obtained from the space shuttle COLUMBIA during its last mission using the MEIDEX optical package over North Africa [4], the upper part shows a sprite on top of a thunderstorm cloud, below, the lights come from moonlit clouds and two meteors.

Fig.4: image obtained from the space shuttle COLUMBIA during its last mission using the MEIDEX optical package [4], the upper part shows a transient luminous event, the middle is thunderstorm lights and surface dots are city lights in Brazil and Uruguay. These two images show the difficulty of separating the different natural and anthropogenic light phenomena.

B.USOC was operating during the taxi flights ODISSEA and Cervantes where earth observation payloads were active as well as the CNES led experiment LSO [3]. These flights showed the difficulty of observing time dependent or even geolocalised earth targets. During the last COLUMBIA flight in January 2003, the MEIDEX Israeli optical package could observe a large number of targets due to the skill of the astronauts on this peculiar flight. [4]. It will be impossible for us to get such an extended support from the crew during a long duration flight. As FRC, it is thus intended to develop new procedures in agreement with ESA and the ASIM science team in order to optimise the ASIM operations

Another important role of the operation centre will be to organise timed operations at the times of coincidence with other space payloads as TARANIS and ground based networks.

Conclusions

The ASIM payload due to the diverse nature of possible targets constitutes a real exploratory payload as a lot of the phenomena observed will be inventoried systematically for the first time.

It is the duty of B.USOC to optimise the operations maximising the use of instrument flexibility so that the science teams obtain a coherent data set validated through synergies with as many ground and space observations as possible.

3. References[

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[3] Blanc, E., T. Farges, R. Roche, D. Brebion, T. Hua, A. Labarthe, V. Melnikov, Lightning and Sprites observations on board of the International Space Station,J. Geophys. Res., 109, A02306, doi:10.1029/2003JA009972, 2004.

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