

IAF SPACE OPERATIONS SYMPOSIUM (B6)
Mission Operations, Validation, Simulation and Training (3)

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NEW OPERATIONAL CONCEPT FOR GAIA, INTEGRAL & XMM-NEWTON

Abstract

ESA's x-ray and γ -ray observatories XMM-Newton and INTEGRAL are real-time missions, launched more than 15 years ago. Both missions, originally designed for a 10 years lifetime, are still performing admirably well and without major degradation. The one billion star surveyor GAIA joined the astrophysical mission operations section in 2014, with a spacecraft architecture that is several generations ahead compared to the high energy observatories. As such GAIA owns a sufficient on-board data storage which allows daily shorter duration passes of six to eight hours to downlink the stored data on-board to ground at several megabits per second.

In 2018 the operational concept had to be changed to reduce the overall number of spacecraft controllers. In order to achieve this goal the spacecraft controller teams were merged and cross-trained on all three missions, enabling a single controller on shift to operate all three missions in parallel, supported by a new monitoring and alarming system. This new system with a set of joint mission operation rules was key to success, especially during anomalies when there is high demand for manual intervention. The existing Mission Control Systems of the legacy missions were not modified in order to minimise the operational risks, particularly during the phasing in of a highly modified system. A state of art vanilla Ground System similar to that of GAIA was instead connected to it, one for INTEGRAL and one for XMM-Newton. These additional systems - together with the GAIA Mission Control System - feed the central monitoring and alarming system with spacecraft and auxiliary data from all three missions. Due to this design, the new systems and the overall operational concept could be validated and put into operations without compromising the reliability of real-time operations. In addition, further tools were developed easing the combined mission planning process, long and short term, and to visualise on-going activities, especially useful during periods of high supervision demands due to parallel activities.

This paper presents the new operational concept for the three missions GAIA, INTEGRAL and XMM-Newton. The concept includes modified spacecraft operator training, new spacecraft operator procedures,

combined mission planning processes, parallel real-time operations and re-planning due to new targets of opportunity. The capabilities of the newly developed tools are highlighted together with future use cases. Special focus is put on the operability and robustness of the new systems including failure cases and their occurrences.