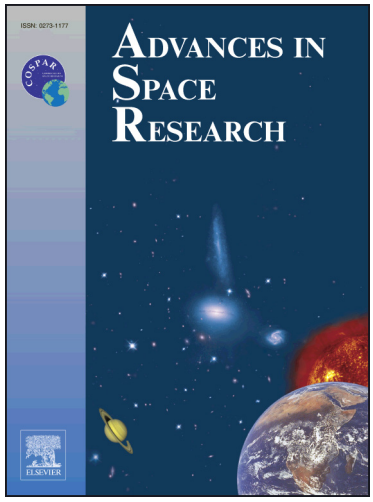

Doris system and integrity survey

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DORIS SYSTEM AND INTEGRITY SURVEY

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ABSTRACT :

DORIS, as other techniques for space geodesy (SLR, VLBI, GPS) has regularly progressed to meet the ever increasing needs of the scientific community in oceanography, geodesy or geophysics.

Over the past 10 years, a particular emphasis has been placed on integrity monitoring of the system, which has contributed to the enhancement of the overall availability and quality of DORIS data products. A high level of monitoring is now provided by a centralized control of the whole system, including the global network of beacons and the onboard instruments, which perform a constant end-to-end survey. At first signs of any unusual behavior, a dedicated team is activated with well-established tools to investigate, to anticipate and to contain the impact of any potential failures. The procedure has increased the availability of DORIS beacons to 90%.

The core topic of this article is to demonstrate that DORIS has implemented a high-level integrity control of its data.

Embedded in the DORIS receiver, DIODE (DORIS Immediate Orbit Determination) is a Real-Time On-Board Orbit Determination software. Its accuracy has also been dramatically improved when compared to Precise Orbit Ephemeris (P.O.E.), down to 2.7 cm RMS on Jason-2, 3.0 cm on Saral and 3.3 cm on CryoSat-2. Specific quality indices were derived from the DIODE-based Kalman filters and are used to monitor network and system performance. This paper covers the definition of these indices and how the reliability and the reactiveness to incidents or anomalies of the system are improved.

From these indices, we have provided detailed diagnostic information about the DORIS system, which is available in real-time, on-board each DORIS satellite. Using these capabilities, we have developed real-time functions that give an immediate diagnosis of the status of key components in the DORIS system. The near-real time navigation system was improved and can distinguish and handle both satellite events and beacon anomalies.

The next missions to use DORIS will be Jason-3 and Sentinel-3, and then Jason-CS and SWOT (Surface Water and Ocean Topography). The real-time information on satellite positions should be better than 2.5 centimeters RMS on the radial component. Science products will benefit from this improvement in DORIS's performance and data integrity.

KEYWORDS

System Integrity, Real-Time Orbits, DORIS, on-board navigation, DIODE, Precise Orbit Determination.