

## **The T2L2 Flight Model Calibration and Performance Determination Campaign**

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The Time Transfer by Laser Link T2L2[1],[2] experiment was accepted in mid-2005 by the French space agency CNES to fly as a passenger instrument on the ocean altimetry satellite Jason 2.

After the phases of detailed instrument specification and industrial manufacturing the T2L2 flight instrument was delivered to CNES in February 2007. After functional acceptance tests, the instrument had to undergo an exhaustive examination for calibration and in order to derive its metrological capabilities.

We report on the test facility designed for this purpose by the Observatoire de la Côte d'Azur (OCA). This test bed is capable of subjecting the flight instrument to the experimental conditions it will meet in orbit. It consists of several subsystems: an optical subsystem in order to illuminate T2L2's optics with faint laser pulses (simulating laser stations) and background illumination, an electronic subsystem including a high performance timing system[3] for reference timing and a mechanical subsystem for simulation of different angles of incidence (corresponding to the elevation of the satellite with respect to a laser station).

With this instrumentation it was possible to simulate the experimental conditions of operation of the space instrument, thus derive their impact on the metrological performances and therefore the quality of the time transfer.

Furthermore, various correction tables for instrumental settings (electronics) as well as observational parameters (incidence angles, e.g.) have been derived during the two-month test campaign.

After a short review of the instrument architecture we give a detailed description of the metrological test bed, its sub-systems and their metrological performances. We then outline the calibration and performance tests that were carried out on the T2L2 flight model.

- 1) P. Guillemot, K. Gasc, I. Petitbon, E. Samain, P. Vrancken, J. Weick, D. Albanese, F. Para, J.-M. Torre, "Time Transfer by Laser Link : The T2L2 experiment on Jason 2", Proc. 2006 IEEE International Frequency Control Symposium, p. 771-778, 2006.
- 2) P. Fridelance, E. Samain and C. Veillet, "T2L2 - Time transfer by Laser link: a new optical time transfer generation", Experimental Astronomy Vol.7 Num.3 Sept.97.
- 3) E. Samain , "An Ultra Stable Event Timer", Proceedings of the 13th International Workshop on laser ranging instrumentation, 2002.