IGOSat student satellite project to measure ionospheric occultations and gamma rays

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ABSTRACT

The students of the university of Paris Diderot are developing the nano satellite Ionosphere and Gamma-ray Observations SATellite (IGOSAT). It is a 3U cubesat (10x10x30 cm) with two scientific payloads. The first one is aiming at monitoring the ionosphere through radio-occultation of GPS signals. The second one will measure in-situ the flux of cosmic rays. This project is supported by the French space agency, CNES, in the framework of its educational programs. Initiated in 2013, it has already seen more than 150 students involved in the development of all the subsystem of the satellite and its ground stations.

The constrains of a small cubesat, both in terms of volume and power, will allow to activate alternatively each instruments, imposing a careful design of satellite operations. Nevertheless measurements campaigns using both instruments at the same time are also planned for a limited time. This mission will use its own telemetry ground stations. The first one in Paris university and the second in Hanoi university.

We aim at obtaining measurements of TEC for setting occultations from an altitude of 650 km to the bottom of the ionosphere. Ionospheric scintillations will also be measured. TEC data will be inverted to reconstruct the mean vertical profile of electron density in the occultation region.
We present the current status of the development of the satellite, focusing on the radio-occultation payload subsystem.

Key words: Cubesat, Radio Occultation, TEC