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Author: Mr. João Pedro Polito Braga  
Federal University of São João Del-Rei, Brazil, joaopedropolito@aluno.ufsj.edu.br

Mr. Antonio Cassiano Julio Filho  
Instituto Nacional de Pesquisas Espaciais (INPE), Brazil, cassiano.filho@inpe.br

GROUND AND FLIGHT SEGMENT FOR TESTING SPACE SYSTEM INTEGRATION FOR  
STRATOSPHERIC BALLOONS

**Abstract**

Today, with the increasing number of space missions, especially those carried out by schools and universities through the launch of Cubesats, new challenges arise in relation to testing and system integration. Among these challenges, those related to the evaluation of the Cubesat mission stand out. One of the main difficulties is to fully validate the mission, since tests are usually conducted in controlled environments where it is not possible to evaluate the behavior of the satellite's communication with the ground segment, responsible for controlling the Cubesat when it is placed in orbit.

This work is the result of a partnership between the Federal University of São João del-Rei (UFSJ), Brazil and the National Institute for Space Research (INPE), Brazil, to promote and encourage the development of research in the space area, with an emphasis on developing solutions for the Ground Segment, besides as sharing knowledge about small satellites.

Thus, in this paper we will propose a solution to test Cubesats in the Earth's stratosphere, this test platform is composed of three main subsystems: the Onboard Computer, the Tracking and Telemetry System that operates at UHF frequencies, and the Power subsystem, in addition to the interface to connect the Cubesat to our platform. As a complement to this platform, which will be on board a stratospheric balloon, the system also has a ground segment capable of receiving Telemetry and sending Commands, as well as performing calculations for automatic antenna pointing to the Balloon, since it is not possible to generate two-line element sets (TLE) for this type of testing. This article will present the entire process of characterizing the TTC module, including simulations, tests, and the results obtained for system validation.