Paper ID: 55737
oral
student

IAF SPACE SYSTEMS SYMPOSIUM (D1)
Space Systems Engineering - Methods, Processes and Tools (2) (4B)

Author: Mr. Nícolas França Medeiros
Federal University of Rio Grande do Norte (UFRN), Brazil, nicolasfmedeiros@gmail.com

Prof. Giuliani Garbi
Brazilian Institute for Space Research, Brazil, giuliani.garbi@gmail.com
Mr. Manoel Jozeane Mafra de Carvalho
Instituto Nacional de Pesquisas Espaciais (INPE), Brazil, manoel.carvalho@inpe.br
Ms. Alessandra Urbano Rodrigues
National Institute for Space Research - INPE , Brazil, alessandraurbanorodrigues@gmail.com

TOWARDS EXTENDING RISK MANAGEMENT APPROACHES FOR CUBESATS SOLUTION: A CASE STUDY OF THE CONASAT PROGRAM.

Abstract

The aerospace industry has been adapting the CubeSat solution for low orbit, short duration, low budget and short planning space missions. From the first launch of a CubeSat in 2002 until the beginning of 2020, 1200 launches of these satellites were performed. One of the factors that influence this growing demand is the interest of many sectors of the industry. Despite the decrease in the number of failures over the years, in these space systems, the percentage of failure is still high. Between 2005 and 2018, only approximately 60% of CubeSats were successfully launched and operated. CubeSat missions, by definition, are considered high risk due to a number of factors, such as the use of commercial-off-the-shelf (COTS) components, which are not space-qualified and thus susceptible to the space environment. As well as the inexperience of the people involved in some of these projects is another risky factor, which often come from university initiatives, among others. These failures are usually identified when the satellite is in orbit and the operating phase is initiated and nothing more can be done. Failure risks can be minimized through well-defined risk management practices. The balance between low budget and success rate has made the cost-benefit ratio questionable. Therefore, the suggested approach to optimize this relationship is to start tailoring the risk management, based on the standards of space agencies such as the National Aeronautics and Space Administration (NASA) and the European Space Agency (ESA). This paper aims to show the risk management approaches, according to the actual state-of-the-art and the standards adopted by agencies and CubeSat developers. It is noteworthy that there are not yet many standards specifically adapted for the development of CubeSats and, therefore, this study is necessary to establish an updated review for future developers to minimize the risks inherent to these nanosatellites, thus minimizing the chances of sending them with little or no prospect of fulfilling their missions. The contribution of this work will be implemented and verified in a case study of the CONASAT-0 satellite, which is the first nanosatellite of the CONASAT program to be launched to orbit. This program is an initiative of the Northwest Regional Center of the Brazilian Institute for Space Research (CRN-INPE) to update the Brazilian Environmental Data Collection System (SBCDA). For this purpose, launching a constellation of nanosatellites into space, continuing to collect relevant environmental data in our territory.