

MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2)  
Microgravity Sciences Onboard the International Space Station and Beyond (6)

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BRAZILIAN MICROGRAVITY PROGRAMME: IDENTIFICATION AND ANALYSIS OF OBSERVED FAILURES INTO THE LIFE CYCLE OF MICROGRAVITY EXPERIMENTS AND SUGGESTION OF PROCEDURES TO MINIMIZE THEM.

**Abstract**

As a result of the activities of Brazilian Space Agency (AEB) involving the International Space Station (ISS), in 1997 it was established the Brazilian Microgravity Program (BMP), unifying the microgravity activities of Instituto de Aeronáutica e Espaço (IAE) and the Instituto Nacional de Pesquisas Espaciais (INPE) under the central management of AEB. Basically this program intended to foment the development of microgravity experiments and to provide microgravity platforms to the experiments. Having no previous experience on develop experiments for aerospace flights, universities and research centers felt a lot of difficulties regarding not only with the design of the protoflight itself, but also with the acceptance tests for flight. In order to minimize failures, the development of the experiments was made *pari passu* being followed by near with experts of IAE and INPE. However, at the pioneers' flights, a lot of problems arose regarding the inexperience of the teams, the interface with the vehicles, the operational launching procedures, the earth ground support at the launching centers etc., creating some level of misunderstanding and confusion among IAE and investigators teams. Finally, the microgravity environment itself was responsible to play tricks to some of the pioneers' investigators once some phenomena on board could manifest in a not similar manner as the on ground. In fact, some scientific microgravity missions were done from 1999 (São Marcos Mission) to 2000 (Lençóis Maranhenses Mission) – both suborbital flights - by IAE exclusively. Actually, inside the scenario of the BMP, from 1997 until now, we have the following microgravity flights: Cumã Mission (2002)/suborbital, Centenário Mission (2006)/orbital (ISS), Cumã II Mission (2007)/suborbital and Maracati II Mission (2010)/suborbital. This article intends to identify and analyze the failures observed during the life cycle of Brazilian microgravity experiments from 1999 to 2010, verifying their root causes and proposing recommendations related to the management of aerospace projects based primarily on theory, and then on known and successful practices adopted in projects already completed. A fundamental step for the risk comprehension is to identify the sources of uncertainties and deleterious consequences, or, in other words, the risk factors. The identification of common risk factors is investigated in bibliography, by surveys and by the use of a DELPHY methodology in order to validate the factors identified as significant risk sources and their root causes, including, in addition, the point of view of some other expert managers.