

MICROGRAVITY SCIENCES AND PROCESSES (A2)
Microgravity Processes onboard the International Space Station and Beyond (7)

Author: Mr. Angel Rodriguez
Universidad Politécnica de Madrid, Spain, arodriguez@eusoc.upm.es

Mr. Jacobo Rodriguez
Universidad Politécnica de Madrid, Spain, jrodriguez@eusoc.upm.es

Prof. Ana Laveron-Simavilla
Universidad Politécnica de Madrid, Spain, alaveron@eusoc.upm.es

Prof. Victoria Lapuerta
Universidad Politécnica de Madrid, Spain, mariavictoria.lapuerta@upm.es

RESULTS AND EXPERIENCES FROM THE SODI-IVIDIL EXPERIMENT ON THE ISS

Abstract

E-USOC is the Spanish User Support and Operations Centre, one of nine similar centers distributed at different locations in Europe. These centers perform the operations of experiments on-board the Columbus Module; the main contribution from the European Space Agency (ESA) to the International Space Station (ISS).

By the end of year 2008 E-USOC started to work on a new endeavour. This endeavour consisted of the preparation of the necessary products to operate the first of three experiments to take place on the SODI payload: the IVIDIL experiment (acronym for Influence of Vibrations on Diffusion of Liquids). SODI is a payload built by the European industry, that after being launched on 28th August 2009 by Shuttle Discovery, was mounted inside NASA's Microgravity Science GloveBox, at ESA's Columbus Module. The basic principle of SODI design is to have a modular instrument equipped with various optical diagnostics, such as Mach-Zehnder Interferometer, Particle Image Velocimetry and Near Field Scattering.

The SODI-IVIDIL experiment studies the influence of controlled vibration stimulus (slow shaking) on diffusion in liquids in the absence of convection induced by the gravity field. Researchers plan to characterize the spectral influence of g-jitter to increase the understanding of the kinetic mechanisms influencing diffusion effects in the presence of vibrations, therefore allowing for more successful science to be operated onboard ISS.

IVIDIL was installed by Frank de Winne (ESA) and Robert Thirsk (CSA) on September 23rd, 2009. E-USOC began operations on this payload on October 1st. From E-USOC, in a 16/5 basis, operators have monitored and controlled the payload. A total of 57 scientific runs were successfully performed, generating 80827 scientific images and telemetry logs for around 410 hours of experiment. On January 28th 2010, Soichi Noguchi (JAXA) deinstalled IVIDIL, successfully concluding a particularly demanding mission, where close coordination with the MSG team at NASA's POIC was needed.

The paper will present a brief summary of the principles of the IVIDIL experiment, as well as the characteristics of the SODI payload and its interfaces with the ground equipment. Also, the work done by E-USOC in terms of preparation of procedures, displays, and setting up of the ground environment will be exposed. In conclusion the outcomes of the mission will be presented as well as lessons learned.