

Tailoring Mission Operations and Command Assurance to TOPEX/POSEIDON

Mona M. Witkowski

Sara Hyman

Kristin J. Bruno

Linda L. Welz

Jet Propulsion Laboratory

California Institute of Technology

4800 Oak Grove Drive, Mail Stop 264-331

Pasadena, CA 91109

Phone:(818)354-6145, Fax:(818)393-1173

E-Mail:TGSMWIT@TGSC.SPAN.NASA.GOV

Mission Operations and Command Assurance (MO&CA), at the Jet Propulsion Laboratory (JPL), provides a system level function to Flight Projects in an effort to improve the operational reliability during Mission Operations. The MO&CA teams at JPL occupy a unique position, whereby they report to both the Project Management and the Systems Assurance Division of the Office of Engineering and Review. This allows MO&CA to not only function as an integral part of the Flight Team, but also as an objective interface between the individual Flight Teams and Project Management. This system level view allows MO&CA to cross operational boundaries to enhance communication and facilitate problem solving within the Project.

Pre-launch, MO&CA utilizes "lessons learned" to provide early detection and correction of process and procedural deficiencies, focusing on the elimination of rework and reduction of overall development cost. During Mission Operations, MO&CA's primary effort focuses directly on reducing the probability of radiating incorrect commands to the spacecraft. In order to reduce the risk of inflight procedural and command related errors, MO&CA concentrates on techniques for continuous process improvement.

The MO&CA effort at JPL draws on a direct transfer of knowledge and lessons learned to contain risk and prevent errors, rather than try to avoid them. This direct transfer of knowledge has proven invaluable to the TOPEX/POSEIDON Project, where the MO&CA Team has evolved into an objective, yet integral part of the Flight Team. The TOPEX/POSEIDON Mission is inherently different from other "flagship" Projects at JPL, as it launched directly into a high activity, "encounter" phase of operations, rather than an extended cruise phase. MO&CA had to be tailored to meet the high activity needs of TOPEX/POSEIDON, while providing flexibility and containing risk associated with the high amount of realtime command activity.

The TOPEX MO&CA effort was established approximately nine months prior to launch, to develop the realtime command process and provide a system level approach to uplink activity. As an extensive amount of commanding would be done in realtime, MO&CA established a Realtime Command Library which identified and validated command files for "on-the-shelf" use, most important of which were a complete set of contingency commands. By establishing a group of "on-the-shelf" commands, TOPEX/POSEIDON was able to respond quickly to early operational anomalies.

MO&CA has built quality into Mission Operations at JPL, enhancing the Flight Team's ability to operate more efficiently and effectively in the dynamic space flight operations environment. This paper describes how MO&CA was tailored to meet the concurrent engineering needs of TOPEX/POSEIDON and how the project has benefited from continuous process improvement.

The MO&CA effort, described in this abstract, was carried out by the Jet Propulsion Laboratory, California Institute of Technology, under contract with the National Aeronautics and Space Administration.