

SMALL SATELLITE MISSIONS SYMPOSIUM (B4)
Space Systems and Architectures Featuring Cross-Platform Compatibility (7)

Author: Mrs. Helen Basil
Indian Space Research Organization (ISRO), India, helen_basil@yahoo.co.in

Mr. RATNAKARA RAO PURUSHOTHAMA
Indian Space Research Organization (ISRO), India, pratnakararao@gmail.com

Mr. PANICKER VK SIVARAMA
Indian Space Research Organization (ISRO), India, vkspanicker@hotmail.com

Mr. PALANI S
Indian Space Research Organization (ISRO), India, s-palani@vssc.gov.in

ISRO'S RESPONSIVE SOUNDING ROCKET SYSTEM DEPLOYED FOR INVESTIGATION OF
ANNULAR ECLIPSE EFFECTS

Abstract

The longest annular solar Eclipse of the millennium passed close to the southern tip of India on 15th Jan 2010 at 07:44 UT (IST 13:14:00 PM). Launching of eleven Rohini Series sounding rockets with multiple scientific payloads by the Indian Space Research Organisation (ISRO) under the program Sooryagrahan 2010, provided a unique opportunity for the scientists to investigate the eclipse induced effects on the upper atmosphere. The uniqueness of the eclipse was its long duration of 11 minutes and 8sec and noontime occurrence, providing the scientist ample duration for experiments with sudden cut off of incoming peak solar radiation as the sun is at its zenith.. The various instruments onboard the rockets launched on pre eclipse day, eclipse day and post eclipse days from the two space ports of India- TERLS Range and SHAR Range, collected through in-situ measurements voluminous data where ballooning and radars cannot reach.

The launching of the sounding rockets were scheduled on eclipse in such a way as to collect relevant data at different altitudes using rockets of three configuration before, during and after the annular solar eclipse. Sounding rockets carry out low cost suborbital flights with short lead time. The ascent of the vehicle in a direct vertical profile makes it an excellent platform for space research, best suited for atmospheric studies and gathers data on transient events such as eclipses. This was the first ever ISRO effort to realize a Responsive Space Transportation (RST) system for a record 11 flights during a short period from two space ports with 6flights per day, of which 5 flights per day within 3hrs 40 minutes from .TERLS with a minimum 2minutes gap between flights. Responsive Space Transportation System here refers to the ability to develop, assemble, launch, and place payloads into operation rapidly. This paper focuses on how the existing space capabilities of ISRO's sounding rockets adapted to meet responsiveness of the scientific payload needs, rather than by rapidly deploying new or additional space capabilities. Further, it also briefly addresses the various aspects of a Responsive Space Transportation System and system engineering approaches required for such a system. Matching up the current and emerging technologies for a responsive system is a critical first step toward improving the nation's space-based capabilities in a manner the nation can afford.