IAF EARTH OBSERVATION SYMPOSIUM (B1)
International Cooperation in Earth Observation Missions (1)

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AN ATMOSPHERIC SENSOR PAYLOAD FOR THE INDONESIAN RX-320 SOUNDING ROCKET

Abstract

In 2015, the National Institute of Aeronautics and Space of the Republic of Indonesia (LAPAN) and Technische Universität Berlin (TU Berlin), Chair of Space Technology, teamed up to start a 4-years educational program on atmospheric science aboard sounding rockets. Since 2008, the LAPAN Rocket Technology Center develops sounding rockets with increasing capacity to once provide launch capability to low Earth orbit, while the Center of Atmospheric Science and Technology of LAPAN at the same time develops technology for the research on environment and maritime atmosphere and disaster early warning systems. The idea behind the current project is to join activities to develop an atmospheric sensor payload compatible to the RX-320 sounding rocket. TU Berlin Chair of Astronautic was chosen as engineering partner for capacity building and supervision.

During the project, an atmospheric sensor payload, the payload compartment and nose cone, and a separation and recovery system is developed. The system is tested against environmental and launch loads and finally launched aboard the RX-320 rocket at LAPAN's launch site at Pameungpeuk in southern Java, Indonesia. The measuring instrumentation of the payload include meteorological sensors to measure pressure, temperature and humidity, as well as gas sensors for the determination of carbon-dioxide, ozone and nitrogen dioxide content of the environmental air. Additionally, the platform provides acceleration, rotation and magnetic field measurements, GPS positioning and precise determination of wind speed and wind direction. The payload is separated from the rocket at approximately 42km altitude and descends on a parachute for 95 minutes until touch-down in the safety corridor south of the Javanese coastline. Mission operations includes life telemetry downlink using redundant communication links in the 900 MHz and 2.4 GHz ISM bands (ITU region 3) and real-time data display at a designated control room at the launch site.

The paper describes the mission scenario as well as selected technical solutions for payload structure, power supply, onboard computing and telemetry, and the meteorologic and gas sensor suite developed for the atmospheric sensor payload. The benefits of international cooperation in the field of space system engineering and lessons learned are highlighted.