Science Missions and Payloads Specifications of Philippines' First Earth-Observation Microsatellite: Diwata

Kaye Kristine Vergel[1]; Benjamin Jonah Magallon[1]; Yukihiro Takahashi[1]; Tetsuro Ishida[2]; Gay Jane Perez[3]; Mark Edwin Tupas[3]; Joel Marciano[3]
[1] Cosmosciences, Hokkaido Univ.; [2] Polar Science, SOKENDAI; [3] UP Diliman

The Philippines through the Department of Science and Technology (DOST) funded the program, Development of Philippine Scientific Earth Observation Microsatellite (PHL-MICROSAT). The program aims to build, launch and effectively utilize the Philippines' first microsatellite for multi-spectral, high precision earth observation. It is a collaboration between professors, scientists and engineers from the University of the Philippines, the Advanced Science and Technology Institute of the Department of Science and Technology (DOST-ASTI), and two Japanese universities, Tohoku and Hokkaido University.

The first microsatellite, Diwata, will be launched in 2016 from the International Space Station with an expected altitude of 400 km. It is expected to pass four times a day with an average of 6 minutes per pass. Diwata features target pointing capability which will allow off-nadir acquisition of images.It will carry three scientific and one engineering payload. The High Precision Telescope (HPT) which will have a GSD of 3m at 400 km altitude is equipped with 4 CCDs for each red, green, blue and near infrared region. The HPT, due to its high resolution of 3m will be used in monitoring the extent of damages from natural disasters such as storms. Images from the HPT will be useful in disaster management and resource allocation. The Space-borne Multispectral Imager (SMI) with Liquid Crystal Tunable Filter (LCTF) which will have a GSD of 80m at 400 km and has 2 CCDs for both visible (420-700 nm) and near infrared (650-1050 nm) regions with a 13 nm interval. It will be used in monitoring changes in vegetation and estimating the phytoplankton biomass of the Philippine oceans. The Wide Field Camera (WFC) with a panchromatic CCD with a field of view of 180^ox134^o; and a GSD of 7km will be used in observing cloud patterns and distribution as well as weather disturbances such as tropical storms. And lastly the Middle Field Camera (MFC) which is an engineering payload with a colored CCD and an expected GSD of 185m will help in the calibration of the attitude determination algorithm. It will assist in locating the images captured by the HPT and SMI.

In order to know the feasibility of our mission objectives, we simulated the pass of the microsatellite over the Philippines for a specific period of time. Using this simulation, we were able to obtain the frequency of image acquisition of a target location. From our findings, Diwata will be able to provide the Philippines with robust and efficient near real-time status of the country's environment which will enhance its response to calamity and disaster management and will improve land-use and aquatic resource assessment and monitoring.