Abstract submission form for the 10th ISPMSRS (March 12-14, 2007, Davos, CH)

The VENµS mission: Earth Observation with High Spatial and Temporal Resolution Capabilities

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Remote sensing systems

Recent initiative of the Israeli Space Agency (ISA) and the French space agency (CNES) is aimed at developing, manufacturing, and operating a new Earth observing satellite called 'Vegetation and Environment monitoring on a New Micro-Satellite' (VENµS). The satellite is planned to be launched in 2009, and the scientific mission should last at least two years.

The general mission objectives are the provision of data for scientific studies dealing with the monitoring, analysis, and modeling of land surface functioning under the influences of environmental factors as well as human activities. The VENµS scientific mission is also aimed at demonstrating the relevance of superspectral, high spatial resolution observations combined with frequent revisit capabilities in the framework of the European GMES Program.

In order to implement these goals, the mission will acquire frequent, high resolution, multi-spectral images of sites of interest all around the world. The satellite will fly in a near polar sun-synchronous orbit at 720 km height. The whole system will be able to be tilted up to 30 degree along and across track. This configuration will result in a 2-days revisit time, 27 km swath, a camera resolution of 5.3 m, and the capability to observe any site under a constant view angle. The system will cross the equator at around 10:30 AM.

The satellite will carry a super-spectral camera characterized by 12 narrow spectral bands ranging from 415 nm to 910 nm. The band setting was designed to characterize vegetation status, including through red-edge bands, and to estimate the aerosol optical depth and the water vapour content of the atmosphere for accurate atmospheric corrections. The spectral band setting could also prove useful for coastal areas and inland waters studies. The satellite will also carry a Technological Payload – the Israeli Hall Effect Thruster (IHET)- to validate its performance and for orbit keeping.

The data will be acquired over existing or planned experimental sites. All data for a given site will be acquired with the same observation angle in order to minimize directional effects. The baseline product for these selected sites is time composite images of geometrically registered surface reflectances at 10 m resolution. Strong efforts are devoted to provide high quality data, both in term of radiometry (e.g. SNR around 100), geometry (e.g. multitemporal registration better than 3 m), and atmospheric corrections.