

EARTH OBSERVATION SYMPOSIUM (B1)
Future Earth Observation Systems (2)

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NEW TRENDS FOR ADVANCED OPTICAL IMAGING SYSTEMS FOR EARTH OBSERVATION

Abstract

After the 5-satellites SPOT program, started in 1986, and its successor PLEIADES, planned for launch in 2012, CNES is working for the future of Earth Observation (horizon 2020) in three main directions: 1. improving revisit, from daily constellations, to Near Real Time Geostationary observation 2. enhancing the number and quality of spectral bands in HR hyperspectral imagery 3. trying to increase spatial resolution by 3, without noticeable swath reduction Those very challenging trends have led to set up an ambitious RD program based on critical technologies : HgCdTe detectors, large active mirrors, reflect array antennas, cryogenic machines, fiber optic gyros, compression algorithms, etc. Furthermore, CNES conducts pre-phase A studies of advanced systems that will meet technical challenges and ambitious scientific requirements. This paper summarizes the results obtained by now for three of them.

The “Geo- Ocean Colour Advanced Permanent Imager” (GeoOCAPI) mission combines a measurement technique and a sampling strategy that would allow breakthroughs in ocean sciences, thanks to an hourly revisit of the whole disk (coastal and open ocean) by 16 specific narrow bands. This pre-phase A designed two different architectures of mini satellites observing the disk from geosynchronous orbit: Scenario A covers the entire Earth’s oceanic area at nadir resolution of 250m, and Scenario B is dedicated to the coastal land fringe at nadir resolution of 100 m.

HYPXIM (HYPerspectral-X IMagery) is a high resolution hyperspectral mission for the study of vegetation, coastal and inland water ecosystems, geosciences, urban environment, atmosphere, and for security and defence applications. Based on sound mission technical requirements provided by a group of national experts, two mission scenarios have been thoroughly studied in pre-phase A : HYPXIM-Challenging aims at finding out the highest possible performance level achievable using a microsatellite platform, whereas the goals of HYPXIM-Performance are to reach a higher spatial resolution and to provide a TIR hyperspectral capability.

Through the INSPIRE directive, Europe wants to establish infrastructures and rules for spatial information to support UE environmental policies. Thus, the European Cartographic Institutes are willing to improve their maps, by using accurate and recent satellite images. In this context, the ARCTOS pre-phase A studies a system of optical satellites, launched near 2020, taking multispectral images in the resolution class of 20-50 cm, to cover the whole European territory at least every three years. Such images would help risks and security applications (GMES), urban development, glaciology and shoreline science themes.