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EARTH OBSERVATION SYMPOSIUM (B1)
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Author: Mr. Wolfgang Luck
Forest Sense, South Africa, wolfluck@mweb.co.za

NOVEL IMAGING STRATEGIES FOR A HIGH RESOLUTION GEOSTATIONARY OPTICAL SATELLITE AFRICA-GEO-SAT1

Abstract

The development of a high resolution geostationary optical imaging satellite has been proposed by Astrium France in 2009. This satellite will have the ability to acquire 13 band imagery in the visible, Near-Infra-Red, Short-Wave-Infra-Red, Middle-Infra-Red and Thermal-Infra-Red spectrum at a resolution of 25m, 25m, 75m, 150m and 300m for the various wavelength respectively and a imaging footprint of 300km. With an acquisition time of approximately 8 minutes per image, several images can be taken for the same area during the course of the day with various solar inclination angles. The oscillating orbit between 8 degrees North and South of the equator will allow to optimize acquisition angles for various applications leveraging on the advantage to acquire optical imagery during the rainy season in predominantly cloudy areas. This paper highlights applications served by this system, that can not easily be addressed by any other Earth Observation System currently in the design phase. With a biomass, surface roughness and type dependent Bi-directional Reflectance Distribution Function (BRDF), multiple acquisitions with Africa-Geo-Sat1 under different solar geometries within one day, will allow an accurate characterization of the BRDF phenomena to be used for the surface characterization not possible with other imagery and the correction of this effect on higher resolution mono-angular imagery. With the orbit optimized to follow the Inter-Tropical Convergence Zone (ITCZ) the imager will be optimized to monitor growth development within the vegetation period. With the addition of the thermal bands, evapo-transpiration can be monitored at the time of the day where critical moisture and temperature balances are reached to provide near real time information to precision agriculture services. This orbit strategy will at the same time serve fire applications for the assessment of fire behavior in the late afternoons and at night over the dry season of the African continent. Furthermore emissivity can be derived from MIR and TIR imagery acquired at night. Differences in emissivity between a after dusk and before dawn image pair can be used to infer moisture levels and biomass as well as different mineral substrates.