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Satellite images applications made by using automated procedures

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The effective exploitation of the increasing number of Earth Observation (EO) satellite images presently available requests the development of automatic processing procedures. The present paper is devoted to illustrate some 'real-time' monitoring applications of remote sensing satellite images. The applications have been developed at the Earth Observation Satellite Images Applications Lab (EOSIAL). The EOSIAL Lab of the University of Rome 'La Sapienza' is dedicated to develop innovative application through the use of optical remote sensing data (multi- and hyper-spectral) and SAR, integrated with GIS analysis. The areas of interest include: the monitoring of fires, monitoring of volcanic eruptions, the study of oil spills, monitoring of agricultural areas and precision agriculture, the development of applications related to safety issues (borders permeability, monitoring of refugee camps) and disaster management (dust storm, damage assessment, early warning, etc.). The automated procedures developed at the Lab involve the use of geostationary and polar orbit satellites sensor at low, medium and high spatial resolution. In particular, some applications concerning the early detection and monitoring of forest fires based on geostationary satellite (MSG/SEVIRI); the generation of fire hazard maps based on polar orbit satellites; the continuous monitoring of areas impacted by dust storm and the periodic update of agricultural area maps for developing countries.

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High-intensity long-duration continuous AE activity (HILDCAA) events and "Killer Electrons" in Earth's outer radiation belt

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High-intensity long-duration continuous AE activity (HILDCAA) events have been shown to be associated mostly with high-speed solar wind streams (HSSs). These geo-effective events, by definition have peak AE intensities >1,000 nT and continue for more than 2 days when AE values do not drop below 200 nT for more than 2 h at a time. The events are caused by the southward component of interplanetary Alfvén waves embedded within the HSSs. Recent studies show that HILDCAA events are associated with generation of relativistic (MeV) electron acceleration in the Earth's outer radiation belt. The relativistic electrons are known as "killer electrons" for their hazardous effects to orbiting spacecraft. In the present talk, we will present a detailed study on the geomagnetic characteristics and interplanetary causes of the HILDCAA events as well as the solar cycle and seasonal dependences of the events. It will be shown that the ground-based AE observations during HILDCAAs may potentially be used to predict by >1 day advance the acceleration of radiation belt relativistic electrons at geosynchronous orbit. Relativistic electron acceleration and decay timescales will be provided for wave-particle investigators to attempt to match their models to empirically derived values.

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