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# Surveying the Natural Hazards from Space and the Earth's Electromagnetic Environment

**D.Ouzounov(**1,4), S.Pulinets(2), M.Parrot, (3), G.Cervone(4), S.Habib (5), F.Policelli(5), P.Taylor(6)

(1) NASA GSFC/SSAI Greenbelt Rd, Greenbelt, MD 20171, United States (ouzounov@core2.gsfc.nasa.gov/ Fax +301-614-6522), (2) Institute of Geophysics, UNAM, Ciudad Universitaria, D.F., Mexico City 04510, Mexico, (3) LPCE/CNRS, 3A, Avenue de la Recherche, Orléans 45071, France, (4) George Mason University/CEOSR, 4400 University Drive, Fairfax, VA 22030, United States, (5) NASA Goddard Space Flight Center, MS 610, Greenbelt Rd, Greenbelt, MD 20771, United States, (6) NASA Goddard Space Flight Center, MS 698, Greenbelt Rd, Greenbelt, MD 20771, United States

Previous studies have shown that there were some electromagnetic effects in the ionosphere caused by the major natural hazard activities such as volcanoes eruption, major earthquake events, and hurricanes. Goal of this work is demonstrate that DEMETER (Detection of Electro-Magnetic Emissions Transmitted from Earthquake Regions)- the existing surveyor of EM Earth environment, could be a part of multi-sensor system for natural hazard studies. Mutisensor Sensor Web System (MSWS) consists of a portable and widely applicable technology we apply to advance the knowledge and practical use of remote sensing for Natural hazard applications and to maximize the use and sharing of satellite observations. We use the DEMETER ionospheric plasma measurements, which include particle detector, ion spectrometer and Langmuir, probe. The physical link between natural hazard events and ionospheric plasma disturbances been provided by the model of Lithosphere-Atmosphere-Ionosphere coupling (LAIC). Hurricanes, earthquakes and volcanoes development is accompanied by intensified vertical transport of charged aerosols in the lower part of atmosphere. These processes lead to generation of external electric current in the perturbed region of the atmosphere and modification of DC electric field distribution in the ionosphere-atmosphere electric circuit. DEMETER includes DC range in the electrical range and the effects also can be

verified by simultaneous measurements of other electromagnetic and plasma effects sensible to growth of DC electric field. The current MSWS system is a sensor web of existing satellite sensors (MODIS, GOES, METEOSAT, POES, and DEMETER) and ground observations and provides continuous monitoring over specific high-risk areas. The significance of our satellite based multi-sensor approach was defined through analyzing recent (2004-2007) worldwide major earthquakes, strongest hurricanes (over Northern America) and major volcano eruptions. This joint approach provides an opportunity for a comprehensive study of Earth electromagnetic environment, and can be used to understand the relationship between the lithospheric/ atmospheric processes and ionosphere variability.