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Joint Analysis of Satellite and Ground Based EM Signals Connected with Major Earthquake Activities

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Ground and space observations have shown that there were precursory electromagnetic signals associated with several recent earthquakes. Goal of this work is to merge and analyze these multi-sensor satellite and ground data to search for pre-, co- and post-seismic signals. Our approach is based on data fusion of satellite thermal infrared observations from Aqua, GOES, POES and space plasma parameters variations from DEMETER, simultaneously with ground based multi parameter continuous measurements of GPS/TEC, ion concentration, radon, atmospheric electrical field and magnetic array data from Japan (Yogatake station, Chiba Univ) and Taiwan. We used existing satellite sensors and ground observations and linked them together with the Lithosphere-Atmosphere-Ionosphere Coupling (LAIC) model. This model describes a physical coupling between the boundary layer of atmosphere and the ionosphere with the observed ground and space data prior to some major earthquakes. Our first results show that simultaneous satellite and ground measurements, using the integrated web, could provide a global scale monitoring of pre-earthquake signals by combining the information from multiple sensor sources. The significance of joined satellite and ground based EM precursors search was defined by analyzing most recent major

earthquakes (M_5 , $H < 50\text{km}$) in Japan and Taiwan during 2005-2007.