



Spatial analyses on seismo-ionospheric precursors observed by GIM TEC and DEMETER during the 2008 M8.0 Wenchuan earthquake

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This paper examines seismo-ionospheric precursors (SIPs) in the total electron content (TEC) of the global ionosphere map (GIM) and observations in the French satellite DEMETER (Detection of Electro-Magnetic Emissions Transmitted from Earthquake Regions) during the 12 May 2008 M8.0 Wenchuan earthquake. The temporal and spatial analyses on the GIM TEC are used to search SIPs of the Wenchuan earthquake. Meanwhile, both daytime and nighttime electron density (Ne), electron temperature (Te), ion density (Ni) and ion temperature (Ti) probed by DEMETER are investigated. A statistical analysis of the box-and-whisker method is utilized to see if the four DEMETER data sets 1-6 days before and after the earthquake are significantly different. The analysis is employed to investigate the epicenter and three reference areas along the same magnetic latitude discriminating the SIPs from global effects. Results show that the nighttime Ne and Ni (daytime Ti) over the epicenter significantly decrease (increase) 1–6 days before the earthquake. The intersections of the global distribution of the significant differences (or anomalous changes) in the nighttime Ne, the nighttime Ni, and the daytime Ti 1-6 days before and after the earthquake specifically appear over the epicenter. The spatial analyses confirm that SIPs of GIM TEC and DEMETER observations appearing 2-6 days before are related to the 2008 M8.0 Wenchuan earthquake.