

SEISMO-IONOSPHERIC GPS TEC ANOMALIES OBSERVED BEFORE THE 12 MAY 2008 Mw 7.9 WENCHUAN EARTHQUAKE

J. Y. TIGER, LIU^{1,2}, Y. I. Chen³, K. I. Oyama¹, K. Hattori⁴, and C. H. Lin⁵

¹Institute of Space Science, National Central University, Taiwan

²Center for Space and Remote Sensing Research, National Central University, Taiwan
e-mail: jyliu@jupiter.ss.ncu.edu.tw

³Institute of Statistics, National Central University, Taiwan

⁴Graduate School of Science and Technology, Chiba University, Japan

⁵Institute of Space, Astrophysical and Plasma Sciences, National Cheng Kung University, Tainan, Taiwan

The global ionospheric map (GIM) is used to observe variations in the total electron content (TEC) of the global positioning system (GPS) associated with 35 $M \geq 6.0$ earthquakes occurred in China during a 10-year period of 1 May 1998-30 April 2008. The statistical results indicate that the GPS TEC above the epicenter often pronouncedly decreases on day 3-5 before 17 $M \geq 6.3$ earthquakes. The GPS TEC of the GIM and electron density profiles probed by six micro satellites of FORMOSAT3/COSMIC (F3/C) are further employed to simultaneously observe seismo-ionospheric anomalies during an Mw 7.9 earthquake near Wenchuan, China on 12 May 2008. It is found that GPS TEC above the forthcoming epicenter anomalously decrease in the afternoon period of day 6 to 4 and in the late evening period of day 3 before the earthquake, but enhance in the afternoon of day 3 before the earthquake. The spatial distributions of the anomalous and extreme reductions and enhancements indicate that the earthquake preparation area is about 1650km and 2850km from the epicenter in the latitudinal and longitudinal directions, respectively. The F3/C results further show that the ionospheric F2-peak electron density NmF2 and height hmF2 significantly decreases approximately 40% and descends about 50-80km, respectively, when the GPS TEC anomalously reduces.

Seismo-ionospheric anomalies, Atmosphere-ionosphere coupling

J. Y. Tiger Liu, Institute of Space Science, National Central University, Chung-Li, Taiwan, tel: +886 3 4227151-65763, fax: +886 3 4224394, e-mail: jyliu@jupiter.ss.ncu.edu.tw