GPS Detection of ionospheric Perturbations Before Some Major Earthquakes

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Earlier, many workers have reported precursory seismo-ionospheric effects on the basis of ground and satellite based observations [1-2]. Many experimental facts about variation of ionospheric *E* and *F*-layer parameters associated with earthquakes have been discussed [2]. Ionosondes have been the most popular instrument probing the ionospheric electron density for more than seven decades. Currently networks of thousands of ground-based GPS receivers are used to continuously monitor the ionospheric total electron content (TEC). Recently, scientists have found perturbations in GPS derived TEC few days prior to some strong earthquakes [3-4]. In the present study dual frequency GPS signals have been used to analyze the ionospheric perturbations in GPS derived TEC at various Indian stations due to some major recent earthquakes (M > 5.0) during the year 2009. A 15 days running median of the TEC and associated inter quartile range (IQR), upper bound (UB) and lower bound (LB) [3] are utilized as a reference for identifying abnormal signals during all major earthquakes (M > 5.0). The results show anomalous depletions and enhancements in the TEC. These pre-earthquake ionospheric anomalies appear within 6 days prior to earthquakes. A possible mechanism responsible for ionospheric anomalies due to earthquakes is discussed.

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Keywords: GPS, ionospheric perturbation, TEC, Earthquake precursors, Seismo-electromagnetic

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