

Detection of acoustic and gravity waves generated by the Sumatra-Andaman Earthquake using GPS-TEC data

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Several types of atmospheric waves were observed to be generated after the strong Earthquake. Some of them perturbed the ionosphere and GPS can detect the perturbations of total electron content (TEC). It was found that TEC perturbations associated with the Sumatra earthquake on 26 December 2004 would have been generated by two modes of the atmospheric waves, the acoustic mode and the gravity mode. The quasi-periodic TEC variations of four minutes period were detected of about two hours after the Sumatra earthquake. They could be generated by the atmospheric wave of the acoustic mode because their periods were lower than the cut off period of the wave in acoustic mode of about five minutes. They were detected by only three GPS stations whose distances from the epicenter were less than 1,200 km on the northeastern side, SAMP station in the northern Sumatra and PHKT and BNKK stations in Thailand. No clear four minutes quasi-periodic TEC variations were observed in the region of India (DGAR, IISC and HYDE), the Coco Island (COCO), Australia (KARR, YARR and YAR2), the Philippines (PIMO and KAYT) and also the northern part of Thailand (SIS2 and CHMI). The other type of TEC perturbations after the earthquake was the fifteen minutes period perturbations. They could be generated by the atmospheric wave of the gravity mode because their periods were longer than the cut off period of the wave in the acoustic mode. They propagated for long distances more than 1,200 km away from the epicenter. They were observed in the northeastern direction of the epicenter, KUNM of China, CHMI, SIS2, BNKK, and PHKT of Thailand, SAMP of Indonesia, They were not observed in India (IISC and HYDE) where is in the northwestern direction of the epicenter. The differences between the characteristics of both TEC perturbations will be discussed in the presentation.