



3D Modelling of ionospheric tsunami signature induced by the 2004 Sumatra event

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Tsunami detection with ionospheric sounding has been proposed in the late 70's and early 80's as possible tsunami warning systems. The total electron content (TEC) perturbation observed by the dual frequency altimeters Jason-1 and Topex/Poseidon and by GPS stations in the Indian ocean during the Sumatra tsunami (26th December, 2004) as well as the TEC perturbations detected by Japanese GPS network (GEONET) during Peru tsunami (23th June, 2001) confirm the existence of these ionospheric signals. Nevertheless, travelling ionospheric disturbances (TIDs) are permanently excited in the ionosphere and can induce a similar ionospheric signature of tsunami-coupled travelling disturbances. To assess the signal to noise of possible ionospheric warning system and their detection threshold, we present here a 3D modelling of gravity waves induced by realistic tsunami in a non-isothermal atmosphere, and the response of the ionospheric plasma to the consequent neutral motion. The purpose of this work is to reproduce the TEC perturbations observed during the Sumatra tsunami. This is, in our knowledge, the first time that the ionospheric signature of tsunami wave has been modelled with a good agreement with data. The calibration of the forward problem allow us then to study the sensitivity of different ionospheric sounding systems, in terms of tsunami warning tools.