



Detection of the Ionospheric perturbation associated to the tsunami of December 26th, 2004 with Topex and Jason-1 TEC data

P.Lognonné (1), E.Jeansou (2), R.Garcia(1), J.Artru(3), G.Occhipinti (1), F.Crespon(1,2), J.Achache (1), J.Helbert (2), G. Moreaux (2)

(1) Institut de Physique du Globe de Paris, 4 Avenue de Neptune, 94100 Saint Maur des Fossés, Paris, France (2) NOVELTIS, Parc Technologique du Canal, 2 avenue de l'Europe, 31520 Ramonville Saint Agne, France (3) Seismological Laboratory, California Institute of Technology, MC 252-21, 1200 E California Blvd, Pasadena, CA 91125, USA

We show that the ionosphere, as monitored by the dual frequency altimeter of the Jason-1 and Topex satellites, is strongly perturbed above the tsunami wave front generated by the Sumatra earthquake of December 26th, 2004. This perturbation is observed by both Topex and Jason-1, between 2h55 and 3h05 TU and leads to instabilities in the TEC estimates. A precise determination of the amplitude of the ionospheric perturbation is currently in progress. Such a perturbation is associated to the coupling between the gravity tsunami wave and atmospheric gravity waves. Due to a propagation delay of about one hour up to the ionosphere, it is observed at the vertical of the location of the tsunami after about 1hour of propagation, in contrary to the signal observed by other teams on the altimeter data just at the location of the tsunami. More precise timing will be given. Following a first positive result of an ionospheric detection after the, considerably weaker, tsunami of Peru, June, 23th, 2001 [Artru et al., 2005], this shows that ionospheric signatures of tsunamis can be detected, either with dense networks of GPS or with ionosphere sounding satellites. Real time ionospheric sounders, such as overhorizon radars, might in addition provide real-time ground based survey of the ionosphere over long ranges. A high resolution, real time monitoring from space of the Earth (from surface to ionosphere), together with ground-space systems, might therefore be considered in the future as a complement of the existing or future tsunami warning systems.