

## **Ionospheric gravity waves observed using radio occultation: climatology and detection of tsunami-driven event**

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### **ABSTRACT**

During an occultation event, the communication ray-path between the two satellites crosses the layers of the ionosphere mostly vertically. The vertical scan of the ionosphere is much faster than the upward propagation of gravity waves, allowing to detect these waves analyzing the small fluctuations of TEC along the line of sight between the two satellites.

We analyse the characteristics of the wave signals that can be observed in the occultation data of FORMOSAT3/COSMIC satellites during the whole month of March 2011. This time-period included two minor magnetic storm (minimum Dst -88 and -83), the latter of them occurring on the same day as the great Tohoku earthquake and tsunami. We highlight the response of the ionosphere to all these events in terms of waves activity observed by radio-occultation.

We also present an analysis of the possibilities of detection of tsunami-driven gravity waves using radio-occultation sounding of the ionosphere. The lack of control of the observational geometry limits strongly the probability of detection of this kind of waves, but the increasing number of GNSS constellations and the increasing number of missions providing radio-occultation data make this technique useful for understanding and constraining the coupling between the ground-ocean and the upper atmosphere.

**Key words:** Ionospheric Radio Occultation, Gravity waves, Tsunami.