

# Statistical analysis performed with the DEMETER satellite in relation with seismic activity

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## Abstract

The low altitude satellite DEMETER was in operation during more than 6 years from June 2004 until December 2010. Its main scientific objective was to establish if there are ionospheric perturbations prior to earthquakes. Its scientific payload allowed the measurements of waves at various frequencies and of plasma parameters at the satellite altitude.

During the lifetime of DEMETER, many ionospheric perturbations have been observed in relation with earthquakes and more than 120 papers have been published until now (see the list in

[https://demeter.cnes.fr/en/DEMETER/A\\_publications.htm](https://demeter.cnes.fr/en/DEMETER/A_publications.htm)).

However one has to keep in mind that all these ionospheric parameters also display variations in absence of seismic activity since the mid-latitude and equatorial ionosphere is affected by a number of other sources of perturbations and primarily by solar activity. Then only a statistical study with many events can show the general behaviour of such ionospheric perturbations and will help us to define a signature of ionospheric perturbations prior to earthquakes. In contrast to ground experiments, satellite experiments cover most seismic zones of the Earth, and statistical studies become meaningful because of the much larger number of recorded events.

The aim of this review paper is to present the main results of several statistical analyses performed with the complete sets of various ionospheric parameters recorded during the mission. They indicate that the ionosphere is perturbed above the epicenters a few days before the earthquakes mainly during night time. At the end the problem of EQ prediction is discussed.