Analysing the ionospheric signals in slow to medium deformation regions from GNSS time series

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Abstract

Ionospheric activity is a main issue to be taken into account in the analysis of GNSS time series. Short and long term ionospheric events may be present in the GNSS signals which can bias the interpretation associated with observations analysis.
The detection of patterns associated with ionospheric events might be relevant in medium to slow crustal deformation regions. Some authors claim that even moderate seismic events have an associated energy release that can propagate up to the ionosphere. Analysis of the variations of the GNSS derived TEC (Total Electron Content) in areas with moderate to low tectonic activity may contribute for a better understanding of the response in terms of variation in plasma density.

In this work we present the approach to be follow by the Centre for Geospatial Research at University of Porto GNSS group to analyse data from a network of permanent GNSS stations located in the Portuguese mainland and in the Azores and Madeira islands spanning regions of low to moderate/high tectonic activity.

Very long time series (spanning several years of continuous data acquisition) analysis of the daily variations of the ionospheric signals is being performed to identify possible high to low frequency variations in the ionospheric activity

The objective is to identify short to long term ionospheric features in order to clean the GNSS time series from signals that are not of tectonic origin, and better characterise the long-term tectonic deformation.
At the same time, we seek to identify possible ionospheric signatures of tectonic events, contributing also towards a better understanding of the change in ionospheric propagation characteristics in response to moderate seismic activity.

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