Implementation of a GNSS Meteorological model to the estimation of the Haines Index

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Wildfire indexes evaluate the risk of forest fire occurrences and the dangerousness of its large and erratic propagation. In this context, the widely used Haines Index assesses the potential contribution of the atmosphere in forecasting and monitoring the behavior of the plume-dominated wildfires.

The main goal of this study is the analysis of advantages in applying the GPT2w, an empirical model originally developed for Global Navigation Satellite System (GNSS) Meteorology, to the estimation of the Haines Index. To this aim, a statistical analysis of the differences between this estimation and the real values from radiosondes was performed.

The selected area comprises a region of South America between latitudes 15º S and 35º S. This area was chosen due to the availability of the radiosonde launches required for validation during the year of study (2011).

Previously, for characterizing the expected regional performance of the Haines Index, the Climatology was developed by using data from the European Centre for Medium-Range Weather Forecast (ECMWF) reanalysis model (ERA Interim) for the period 2000-2011.

Afterwards a statistical analysis of the differences between the index estimation from the application of the GPT2w with respect to the real index values, that is: Haines index calculated from radiosonde measurements was performed. Moreover, the additional estimation of the Haines Index by using multi-level data from ERA Interim at the same control stations was also provided.

Because the GPT2w model is freely available, the analysis of the results discusses the advantages of using this approach where radiosonde launches are scarce. Likewise, strategies for improving the deficiencies of this estimate are also presented.