



Effect of cut-off processing parameter on GNSS-ZTD representativeness in extreme weather events

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A study of cut-off processing parameter effect on the representativeness of estimated GNSS tropospheric delay in occurrence of extreme weather events was performed. The analysis focuses on the impact due to GNSS observation geometry and its relationship to the type of event experienced. Data were collected by multi-constellation GNSS receivers located in the areas of interest referred to two peculiar case studies: Como Lake, affected by weather events of significant intensity and short duration (i.e. July 25th, 2021) and a sequence of events from Emilia Romagna-Veneto to Tuscany (i.e. August 18th, 2022). Characterisation of the timing and location of the event was performed using lightning from LINET network. Analyses highlight the impact of cut-off setting at different values and show how, in specific applications, an established cut-off value represents a fair trade-off between solution stability and representativeness of the studied event. Therefore, data assimilation into the Weather Research & Forecasting (WRF) Model of the estimated Zenith Total Delay (ZTD) from GNSS observations with cut-offs at 7 and 30 degrees was performed for both cases. Results show a consistent and substantial impact of the cut-off geometry on the WRF forecast at the short-term (0-6h).