Real time GNSS storm nowcasting demonstrator for Bulgaria

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Abstract

GNSS is an established atmospheric monitoring technique delivering water vapour data in near-real time with a latency of 90 minutes for operational Numerical Weather Prediction in Europe within the EGVAP service. The advancement of GNSS processing made the quality of real-time GNSS tropospheric products well comparable to near-real time solution and in addition they can be provided in a temporal resolution of 5 minutes and low latency, suitable for severe weather nowcasting. This paper exploits the added value of high-resolution real-time GNSS tropospheric product for nowcasting of convective storm by building a demonstrator in support of public weather and hail suppression services in Bulgaria. In Bulgaria thunderstorms and hail events occur between May and September with a peak in July. The convective Storm Demonstrator (Storm Demo) is based on GNSS tropospheric products and Instability Indices to derive site specific threshold values integrated and updated in real-time on a publicly accessible geoportal. The demonstrator targets development of service centered at GNSS products for two regions with hail suppression operations namely Northwestern and Central Bulgaria. As a part of the Storm Demo real-time PPP processing is conducted with the G-Nut software for the first time in Southeast Europe for the hail suppression season May-September 2021. Evaluation of the real-time products is performed using reprocessed GNSS tropospheric products. The added value of the high temporal resolution of the GNSS tropospheric products is investigated for a storm case 24-30 August 2021.