

StormDemo - GNSS Storm demonstrator for Bulgaria

Team from Sofia University "KI. Ohridski"

Description of the problem

Thunder and hail storms are common severe weather phenomena during summer months in Bulgaria. They can cause large economic losses like severe damage to crops. For example, estimated insured losses from 8 July 2014 hail-storm is 120 million euro. The aim of this application is to use the synergy between Weather Research and Forecasting numerical model (WRF) and Global Navigation Satellite Systems (GNSS) to build a storm demonstrator web portal (StormDemo) in support of public weather and hail suppression services in Bulgaria.

The team from Sofia University, Department of Meteorology and Geophysics collaborates with Bulgarian Hail Suppression Agency.

Use of HPC Infrastructure

The PhysOn HPC cluster was used for the StormDemo processing. PhysOn is a heterogeneous HPC Linux cluster employed for education, scientific and industry research. It is located in the High Performance Computing Laboratory (HPCL) [1] at the Faculty of Physics, Sofia University.

The StormDemo workflow includes:

- Input data stream - GNSS orbit & clocks, WRF initial and boundary conditions.
- HPC processing - two daily simulations of WRF model on 32 cores, Sofia University GNSS Analysis Center (SUGAC) hourly processing with Bernese Processing Engine v5.2 and 30 minute latency.
- Post processing - tropospheric and WRF model products are derived and stored in Sofia University Atmospheric Data Archive (SUADA).
- Publicly accessible web portal [2] is linked to SUADA data and individual web charts represent the real time information.

Results and Future Work

A present for 9 GNSS stations in Northwest and Central Bulgaria storm warning is issued. Monthly storm threshold of Integrated Water Vapor (IWV) is computed for each station. For each individual station an event table is generated. Based on the actual IWV value a storm event indicator is displayed in the table with refresh rate 60 s.

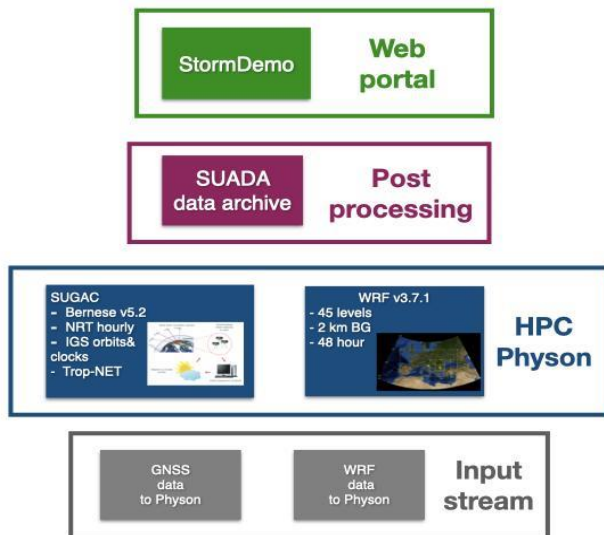


Figure 1: StormDemo workflow design.

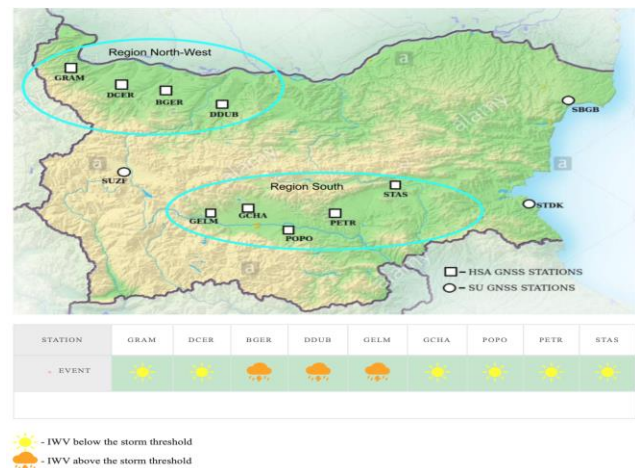


Figure 2: StormDemo web portal.

[1] <http://physon.phys.uni-sofia.bg>

[2] http://suada.phys.uni-sofia.bg/?page_id=4838