Fog case study with GNSS tropospheric products, Sofia Stability Index and WRF model

Anastassia Stoycheva (1), Guergana Guerova (2), and Keranka Vassileva (3)

(1) National Institute of Meteorology and Hydrology, Sofia, Bulgaria, (2) Sofia University, Department of Meteorology and Geophysics, Sofia, Bulgaria (guerova@phys.uni-sofia.bg), (3) National Institute of Geophysics, Geodesy and Geography, Sofia, Bulgaria

In this work we study fog episode, with duration 10 days in January 2014, using surface synoptic observations, vertically integrated Water Vapour (WV) derived from Global Navigation Satellite Systems (GNSS), Sofia Stability Index and simulations with the Weather research and Forecasting (WRF) model. Sofia Stability Index (SSI) is computed using surface observation at 600 and 2300 m asl. SSI shows high value during the time with lower than 1 km visibility i.e. fog and lower values when the visibility is above 1 km. The index gives additional information about the development and the dissipation of inversion layer, which is of particular interest during the long duration fog events. Comparison of observed SSI and WRF derived SSI-W shows that the model tends to underestimate the values. This is linked to poorly resolved WRF temperature inversion layer development during the fog. The diurnal cycle of WV is studied using the GNSS observations at two elevations 600 and 1120 m asl. The low temporal variability of WV is indicative for fog. Advection of humid air mass can be tracked in GNSS-WV time series at both 600 m and 1120 m.