Study of tunder and hail storms in Bulgaria using GNSS water vapour products

Stefan Georgiev (1), Tsvetelina Dimitrova (1), and Guergana Guerova (2)

(1) Hail Suppression Agency, Sofia, Bulgaria (georgiev_stefan@abv.bg), (2) Physics Faculty, Sofia University, Sofia, Bulgaria (guerova@phys.uni-sofia.bg)

This study is undertaken within the trans-national project "BalkanMed real time severe weather service (BeRTISS)". Thunder and hail storms are frequent events from April to September over Bulgaria. Water vapor variation and distribution largely affect the formation and development of the thunder and hail storms. Investigation of the water vapor field related to these storms is important for the understanding and early warning of lightening and hail. Several studies have shown that there is a relationship between Precipitable Water Vapor (PWV) derived from Global Navigation Satellite System (GNSS) and hail or lightning activity. PWV characteristics are investigated for summer days with hail and thunder storms over the Sofia district in Bulgaria for the 2010-2015 period. Information about thunderstorms event is extracted from SYNOP telegrams. Radar data, obtained by S-band radar of the Hail Suppression Agency, are used as additional information. Lightning data including the observed time and location in latitude and longitude of cloud to ground (CG) strokes, peak current for 11 days are taken from the LINET network. frequency distribution of the time lag between the time with maximum CG stroke and the maximum of PWV are analyzed. The analysis show distinct diurnal variation of PWV averaged on the active thunder and hail storm days during the summer months. The PWV increments on the active thunderstorm days are compared to the days with no convection. This study is a basis for analyzing PWV and hail and thunder storms from the Bulgarian GNSS network deployed within the BeRTISS project.