



## **Combination of instability thermodynamic indices and integrated water vapor as new tool in the forecasting a thunderstorms development over Bulgaria**

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This study is undertaken within the trans-national project “BalkanMed real time severe weather service (BeRTISS)”. Bulgaria is a country with high frequency of thunderstorms from April to September. The important moment in thunderstorm forecasting is the early and precise determination of convection initialization and development. In the last decade GNSS derived Integrated water vapor (IWV) became an established observation technique in weather forecasting. Our previous study shows that: 1) the IWV increased before the lightning events over Sofia and 2) IWV threshold values for different months were obtained. In order to increase the forecasting skill of thunderstorm development the goal of this study is to use the synergy between IWV and different instability thermodynamic indexes. This investigation is based on summer days with thunderstorms and non-thunderstorms days developed over the Sofia in Bulgaria in the 2010 - 2015 period. Information about thunderstorms event was extracted from SYNOP observations. IWV are from the IGS GNSS station in Sofia. The studied thermodynamic indices as CAPE, SWEAT, LI, KI, TTI were computed from radiosonde data of Sofia station at 12 UTC. For the period 2010-2015, statistical regression methods are applied to identify predictors that contribute skill in thunderstorm forecasting. The obtained predictors are tested for 20 independent thunderstorm cases, developed over Sofia in 2017 and 2018. The results of this study will be used to improve the weather forecast in the warm/convective season and will be included in the Bulgarian Integrated NowCAsting tool (BINCA) developed within BeRTISS project.