Hail climatology and lightning jump climatology along northeastern Adriatic region with accompanying weather types

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General awareness and overall interest for hailstorms and hail properties in Europe increased significantly in the last several decades and resulted in the numerous papers including climatology of hail on local or national scale. Still, they differed in spatial scales, considered different time periods, investigation methods or hailstone diameters and used different types of hail measurements. Data mostly varied between station measurements, collected hail reports, radar estimates and more recently satellite assessments or some combined methods. Despite that, the knowledge about the hail characteristics is still disproportionate along Europe. One such example is Croatia for which exists the long history of hail suppression activities in the lowland part. Contrary to that, little is known about hail characteristics along the coastal areas despite the fact that in Croatia hail is estimated to be the second biggest cause of material losses related to severe weather.

Therefore, as a contribution to European wide hail climatology we computed hail climatology and analyzed annual and diurnal patterns in northeastern (NE) Adriatic region. The analysis is followed by objectively derived weather type selection from ERA-INTERIM database. Our results are based on roughly 60 years and 34 station measurements providing relatively high spatial resolution (approx. 20 km distance between stations on average). Since NE Adriatic region is composed of lowlands over west coast, hills and valleys in central part and mountains to the east and north-east, our hail analysis offers somewhat unique insight in hail behavior on smaller scales. Preliminary results suggested significant year to year variations, summer dominance of hail, around 30% of hail in winter period with strong spatial variability.

Aside of standard approaches of station data processing we show, for the first time, promising attempts to represent hail climatology based on the lightning jump data. Until now, lightning jump was successfully used as a proxy for severe weather in nowcasting and severe storm classification. Now, with a slight modification of computation algorithm for lightning jump, different approach to lightning data and help of station measurement we expand the usage of lightning jump to obtain the climatological maps with relatively high spatial resolution (less than 10 km) of the estimated hail frequency.