European Conference on Severe Storms 2015
14–18 September 2015, Wiener Neustadt, Austria
ECSS2015-30


# Long-term variability of thunderstorms and thunderstorm precipitation in southern Poland

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The main aim of this study was to present long-term variability of thunderstorms and thunderstorm precipitation occurrence in southern Poland in the period 1951-2010. The analysis was based on meteorological measurements and observations from 15 meteorological stations. A day with thunderstorm and thunderstorm precipitation (broken down into the few ranges) became basic indices using in the paper. For the purpose of this study a thunderstorm precipitation was defined as a daily precipitation total on thunderstorm days.
The results obtained in the study reveal that almost all of the stations in the study recorded a slight increase of the average annual number of thunderstorm days in comparison to previous research periods (1949-1998 and 1949-2006). This increase was the most visible when the study period was compared to observations from 1885-2008.
Tendencies of long-term variability of number of days with thunderstorm were weak and mostly not statistically significant. However, some evidence of change typical of the entire country and regions neighbouring Poland can be detected:
• a positive tendency in the change of the number of days with a thunderstorm to the south of a line connecting the town of Suwałki and Mt. Śnieżka, which is also noticeable in western Belarus,
• downward trends of change in the number of days with a thunderstorm to the north of that line, which is confirmed by weak decrease in the Baltic countries, no change or a mild decline in Germany and a decrease in Moravia.
The frequency of thunderstorm precipitation occurrence in southern Poland is similar to the frequency identified for whole country (i.e. most of the thunderstorms were accompanied by precipitation which was not normally greater than 10.0 mm - ca. 60% of all days with a thunderstorm, and thunderstorm precipitation greater than 20.0 mm or 30.0 mm occurs on average on 3-8 days per year). Like elsewhere in Poland long-term change in the number of days with thunderstorm precipitation within a certain range displayed no clear-cut trends. The exceptions were: i) the increase of the most frequent of the precipitation ranges, i.e. 0.1–10.0 mm, recorded at few stations, ii) an increase in the range 10.1-20.0 mm at Zakopane and 20.1-30.0 mm at Opole, iii) a decrease of the top range (more than 30.0 mm) at Mt. Śnieżka.