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# Relationship between human observations of thunderstorms and PERUN lightning detection network in Poland

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## Abstract

Research presents an overview on thunderstorm occurrence in Poland and focuses mainly on the relationship between human observations of thunderstorms (SYNOP daily summaries) and instrumental lightning detection data (PERUN network) in the timeframe between 2002 and 2013. The total of 4952203 cloud-to-ground flashes (2082 days with thunderstorm) derived from the PERUN lightning database, and 12419 daily thunderstorm SYNOP reports from 44 meteorological stations (1417 days with thunderstorm) are compared. Within the use of two different computational methods we define the threshold value of the human average observational thunderstorm detection range within a meteorological station. Results indicate that the average of this value ranges from 16.9 km (Delta computational method) to 18.3 km (Threat Score computational method). Given limitations of both methods, we believe that the average of these two (17.5 km) may be the most reliable estimate that expresses how lightning are perceived by humans. Large differences in observational range values that are observed between some of the stations (e.g. from 12 km in Bielsko-Biała to 24 km in Łeba) indicate that thunderstorm measurements performed by humans are not homogeneous and prone for errors. We estimate that an average increase/decrease of observational range by approximately 1 km result in 1 additional/redundant day in the average annual number of thunderstorm days in the climatological sense. Results indicate that already existing thunderstorm climatology papers that are based on SYNOP thunderstorm reports may present presumably not entirely reliable results and overestimate or underestimate values from the real distribution.

*Keywords:* thunderstorm, SYNOP, cloud-to-ground lightning, relationship, Poland

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