



## **Relationship between SYNOP observations and PERUN lightning detection network in Poland for the period 2002-2013**

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Research focuses 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 in Poland. The total of 4952203 cloud-to-ground flashes within 2082 days with thunderstorm derived from the PERUN lightning database, and 12419 daily thunderstorm SYNOP reports from 44 meteorological stations that in turn gave 1417 days with thunderstorm are compared. Within the use of two different computational methods we try to define the threshold value of the human average observational thunderstorm detection range within a meteorological station. Results indicate that this value ranges from 16.9 km (Delta computational method) to 18.3 km (Threat Score computational method). Delta method base on computing a difference between number of thunderstorm days derived from lightning detection network and SYNOP reports for certain observational range thresholds (radius) within the meteorological station. Threat Score method base on using Threat Score Index computed as a relationship between lightning detection network data and SYNOP reports for certain observational range thresholds (radius) within the meteorological station. Given limitations of both methods, we believe that the average of these two from all 44 stations (17.5 km) is the most reliable estimate that expresses how thunderstorms are perceived by humans. Large differences between threshold values that are observed on some of the stations (e.g. Łeba: 24 km, Bielsko-Biała: 12 km) indicate significant differences in the performance of human thunderstorm measurements. We estimate that an average increase/decrease of observational range by approximately 1 km result in 1 additional/redundant day in average annual number of thunderstorm days in climatological sense. Results somehow prove that already existing thunderstorm climatology papers that base on SYNOP thunderstorm reports, may present (due to inhomogeneity in the performance of thunderstorm measurements on particular stations) not entirely reliable results, and can overestimate or underestimate values from real distribution.