



Spatial distribution of the hazardous atmospheric phenomena in Slovakia

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The hazardous atmospheric phenomena might be potentially dangerous for human activities as well as for natural environment. This paper focuses on four of these phenomena: thunderstorms, fog, hail, strong wind (strong breeze and squall over 10, 8 m/s and gale and squall over 17, 8 m/s).

An event happening between clouds themselves or clouds and ground including electric, optical and acoustic phenomena is called the thunderstorm. The data about both nearby and distant (more than 3 km away from the observer) thunderstorms were used in the processing. Thunderstorms in Slovakia occur during the whole year. Minimum occurrence is observed in winter when only rare frontal thunderstorms occur. They are typical with producing only few electric shocks. Maximum occurrence of the thunderstorms happens in the summer months when most of them occur in the afternoon (from 2 p. m. to 3 p. m.) as a result of thermal conditions leading to convection.

Hail is an atmospheric phenomenon typical with hailstones falling from clouds. Hail is a type of atmospheric precipitation consisting of ice of small spherical or irregular shape larger than 5 mm. Hail forms only in cumulonimbus clouds and frequently become accompanying phenomena of strong thunderstorms. The process of hail phenomenon takes only a few minutes, sometimes it lasts longer but it still hits only a limited area. Hail usually occurs in the warm period of the year, it is rather rare in cold period of the year. The occurrence of hail and its intensity depend on weather conditions leading to forming and development of convective clouds. That is why it happens primarily in rangy terrain or in moist areas.

Fog consists of tiny water droplets or small ice crystals scattered in the air. It lowers the horizontal visibility near ground in at least one direction to less than 1 km. The relative air humidity during a fog is high and often reaches 100%. Fog occurs in Slovakia during the whole year, primarily in autumn and winter. Exceptional locations are top parts of mountains where fogs form regularly with constant frequency during the year. Further factors contribute to fog forming in complex orographic conditions of mid-altitudes and high altitudes.

Strong wind speed was also taken as dangerous phenomena. If the wind speed at the meteorological station is higher than 10.8 m/s and this phenomena lasts at least 2 minutes it is recorded as strong breeze and if the wind speed is more than 17.2 m/s it is a gale. This terminology corresponds with the Beaufort scale for measuring the wind where strong breeze represents the 6th grade of the scale and the gale represents the 8th grade. Both strong breeze and gale occur during the whole year; strong breeze in lowlands occurs in 50 days per year and gale occurs in 3 days per year. Strong breeze in the mountains is more frequent than in lowlands so that the highest number of days with strong breeze and gale is recorded at peak meteorological stations (Chopok and Lomnický štít). The occurrence of strong breeze and gale in high altitude has a simple annual course with maximum in December (January) and minimum in August. No annual course is identified (or it is very flat) in lowlands.

Hazardous atmospheric phenomena are usually local events. Their occurrence, duration and behaviour are often influenced by local conditions, orography and also by large scale synoptic situation. Therefore, information about atmospheric phenomena from ground based stations has only a local importance. Only for annual count of the thunderstorms we constructed the isolines map. Some of the atmospheric phenomena are rare and their occurrence is hard to present by isolines in the map. That is why their occurrence was processed in the form of cartodiagrams for 18 chosen meteorological stations in the period 1965-2010. The annual variability and some spatial distribution of these phenomena are also processed in this paper.