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Article

The 100-Year Series of Weather-Related Fatalities in the Czech Republic: Interactions of Climate, Environment, and Society

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Abstract: The paper investigates weather-related fatalities over the territory of the Czech Republic in the 100-year period from 1921 to 2020. The unique database, created from documentary evidence (particularly newspapers), includes, for each deadly event, information about the weather event, the fatality itself, and related circumstances. A total of 2729 fatalities were detected during the 100-year period and were associated with various weather categories including frost (38%), convective storms (19%), floods (17%), fog (11%), snow and glaze ice (8%), windstorms (5%), and other inclement weather (2%). A detailed analysis was performed for each individual category. Fatalities occurred throughout the country, with a main maximum in winter (January) and a secondary maximum in summer (July), corresponding to the occurrence of extreme weather. Deaths were mainly interpreted as direct, caused by freezing to death/hypothermia or drowning, and occurred in the afternoon and at night in open countryside or on rivers and water bodies. Males outnumbered females, and adults outnumbered children and the elderly. Hazardous behavior was more frequent than non-hazardous behavior among victims. The information on fatalities and the structure of their characteristics strongly reflects historical milestones of the country, political and socioeconomic changes, as well as changes in lifestyle. Although important weather effects were observed on the deadliest events, the character of the data did not allow for clear evidence of the effects of long-term climate variability.

Keywords: weather-related fatality; fatality characteristics; documentary data; flood; windstorm; convective storm; snow; glaze ice; frost; fog; inclement weather; Czech Republic

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1. Introduction

Meteorological and hydrological extremes cause great material damage and high numbers of associated injuries and fatalities worldwide every year. In Europe, the period from 1970 to 2019 experienced 1672 disastrous events, with economic damage calculated at US$476.5 billion, attributed particularly to floods (38% and 36%, respectively) and storms (32% and 44%, respectively). Whereas the number of related fatalities achieved 9953 in the three decades between 1970 and 1999, in the two following decades, it rose to 82,919 and 66,566 fatalities, respectively, with an absolutely dominant role of heat waves [1]. For the Czech Republic, the recorded 1619 weather-related fatalities in 1961–2020 represent a lower estimate [2]. According to the European Severe Weather Database (ESWD), selected weather extremes in Central Europe (avalanche, severe wind, tornado, lightning, heavy rain) have been responsible for 799 fatalities in 2010–2020 [3].

Fatalities related to extreme weather are a frequent topic of research, covering different time periods (usually a few decades) and scales (from local over regional to global). Particularly high attention has been devoted to flood fatalities (e.g., [4–8]), sometimes together with landslides (e.g., [9–11]), based on different databases, such as the Euro-Mediterranean database—FFEM-DB [12,13] or the pan-European database—HANZE [14]. Many papers have also dealt with fatalities related to heat waves (e.g., [15–18]), cold waves (e.g., [19]) or both (e.g., [20,21]). Fatalities during convective storms were analyzed with respect to lightning strikes (e.g., [22–25]) or tornadoes (e.g., [26]). Even daily mortality in connection with drought has also been analyzed [27].

Regarding the Czech Republic, the highest attention has been given not only to heat-wave fatalities (e.g., [28–31]), but also to cold-wave fatalities (e.g., [32,33]). Brázdil et al. [34] evaluated the potential of documentary evidence for studying fatalities of hydrological and meteorological events. The systematic collection of weather-related fatalities was reflected in their analysis for the periods of 2000–2019 [35] and 1961–2020 [2]. Vehicle accidents accompanied by severe weather for the period of 1979–2020 were also investigated separately [36]. Czech flood-related fatalities from 1980 became part of the FFEM-DB [5,13].

The aim of the recent paper is to present a unique 100-year chronology (1921–2020 CE) of weather-related fatalities in the Czech Republic, explaining their spatiotemporal variability and the features/circumstances of related deadly events, taking into account weather/climatic, environmental, and socio-political situations that strongly influence not only the occurrence of these deadly events but also the communication of information about them.

2. Materials and Methods

2.1. Data

2.1.1. The Czech Republic

The Czech Republic (further as CR) was formed on 1 January 1993 following the split of Czechoslovakia into the Czech and Slovak republics. It is located in Central Europe, covering an area of 78,866 km^2. Historically, its territory consisted of Bohemia in the western part and Moravia and southern Silesia in the eastern part (Figure 1a). The territory comprises various geographic units, from lowlands to mountains (Figure 1b), with an average altitude of 390 m a.s.l. (with an altitudinal range from 115 to 1603 m). The mean areal air temperature is 7.6 °C, and the total precipitation is 677 mm (for the period 1921–2020). In the long-term context, in addition to large interannual and interdecadal variability, temperatures have experienced a statistically significant increasing (warming) linear trend (0.21 °C/10 years, $p < 0.01$), whereas precipitation totals have shown a non-significant decreasing trend (−2.2 mm/10 years) (Figure 1c). Based on the Köppen climatic classification, most of the CR belongs to the category of temperate broadleaf deciduous forest (Cfb), whereas the remaining parts are attributed to a boreal climate, particularly Dfb and less Dfc [37].

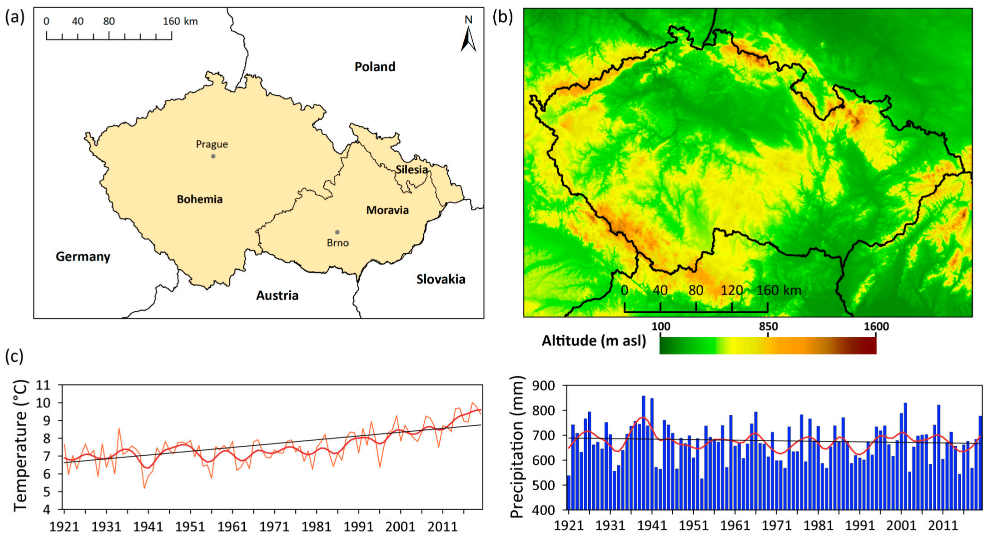

Figure 1. *Cont.*

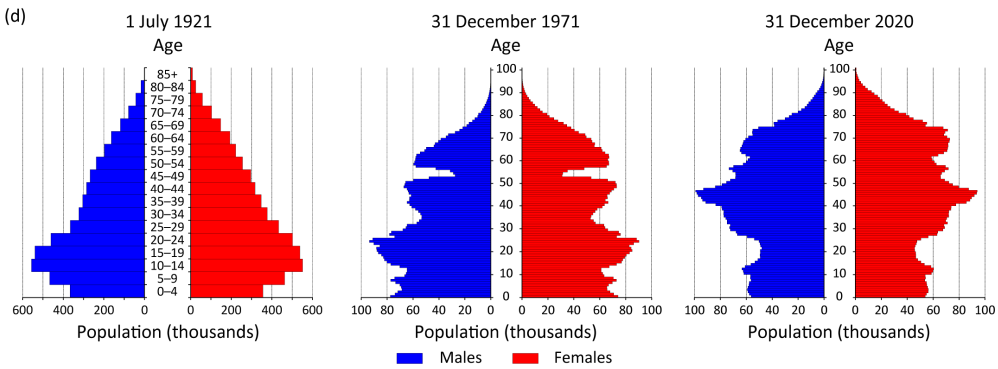

Figure 1. Basic information about the Czech Republic: (**a**) location in Central Europe and historical parts; (**b**) physical-geographic map; (**c**) fluctuations and linear trends in mean areal annual temperatures and precipitation totals in 1921–2020 smoothed by 10-year Gaussian filter (data in [38], extended); (**d**) age pyramids for 1 July 1921, 31 December 1971, and 31 December 2020 (data from [39]).

The number of inhabitants in the CR slightly decreased between 1921 and 1971 (from 9,966,856 to 9,830,602), and then grew until 2020 (10,701,777). The proportion of females decreased from 52.1% to 50.7%. The age proportion was characterized by an aging population (Figure 1d), with the proportion in the 65 years and older category growing from 6.2% in 1921 to 20.2% in 2020, whereas the proportion in the child category (0–14 years) decreased from 27.8% in 1921 to 16.0% in 2020. The proportion of adults (15–64 years) remained relatively stable (66.0%, 66.6%, and 63.8%, respectively). There was also a growing proportion of city dwellers, who comprised 73.1% of the population in 2020 [39].

2.1.2. Fatality Data

Different types of documentary evidence can be used to extract data on fatalities attributed to severe weather, represented particularly by:

(i) Newspapers and magazines

Weather-related fatality reports for the 1921–2020 period were systematically collected from three long-term printed newspapers: *Lidové noviny* 1921–1950, *Rudé právo (Právo)* 1945–2020, and *Svobodné slovo* 1954–1997 (Figure 2). Based on digitized versions of other newspapers, they were non-systematically complemented by reports from *Venkov* and *Národní listy* before 1945 and by *Lidová demokracie*, *Rovnost*, and other local newspapers after 1946. The printed version of *Právo* and its internet archives Novinky.cz were systematically excerpted based on the online monitoring method according to selected keywords for 1991–2020. Since 1998, the additional newspaper internet archive iDNES.cz was also systematically investigated. For example, *Rudé právo* [40] reported a fatal event from 12 February 1975: "*Two boys drowned in the water reservoir at Větřní, the Český Krumlov district* [for the location of places see Figure A1 in Appendix A]. *Nine-year-old Ludvík and his brother, two years younger, rode a bicycle on the ice, which collapsed under them*". During the continuing frosty weather from the beginning of 2010, the newspaper *Právo* [41] reported two fatalities in Prague: "*Police drove out yesterday* [24 January] *at around noon to Makovská street in Prague 6-Řepy, where there was a dead man. "Around one hour later we went to the other* [man], *who was found also dead in the area of a former kindergarten in Radlická street at* [Prague-] *Jinonice", said the police spokesperson Eva Miklíková. From investigations so far it is most probable that they were homeless, and according to the preliminary doctor's report, they died of hypothermia*".

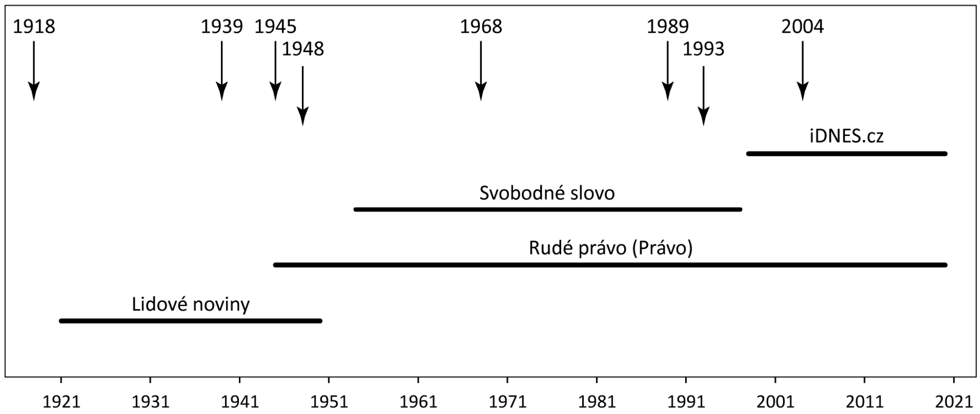

Figure 2. Temporal coverage of basic newspapers used and major historical and socio-political events in the Czech Republic: 1918—establishment of Czechoslovakia, 1939–1945—the Second World War, 1948—communist coup, 1968—"Prague spring", 1989—"velvet revolution", 1993—the Czech Republic establishment, 2004—EU membership.

(ii) Narrative sources

After 1918, keeping chronicles of villages and towns became a broad praxis in Czechoslovakia. In the annual description of the life in a particular settlement, notes about the loss of lives related to severe weather appeared. For example, the memorial book of Karlovice (north Bohemia) reported torrential rain on the night of 29 May 1941 and subsequent flash floods in the broader surroundings that a woman at Loučky and a lieutenant of the governmental army at Turnov drowned during the rescuing work [42]. The chronicle of Radotín (central Moravia) described a tragic event from 15 August 1962 [43]: "*On 15th August in the late afternoon, seven children were bathing in a small pond at Radvanice not far from Přerov. After the sudden onset of a thunderstorm, they looked for shelter and found it in a nearby unfinished waterwork object of the local cooperative farm. Around 1900* [CET—Central European Time], *a lightning strike hit this object, and six children, four boys, and two girls were killed. Only one boy with severe burns survived*".

(iii) Climatological records

In some cases, sheets of climatological observations at the standard meteorological stations of the Czech Hydrometeorological Institute may contain short notes of observers or clippings from newspapers concerning fatalities during observed weather events. For example, the observer at the Polička station (east Bohemia) added on 6 September 1934 that a lightning strike killed the farmer Andrlík at Nedvězí during the raking of hay [44]. The climatological sheet of the Nový Jičín station (the northeast of the CR) reported a thunderstorm with 60.4 mm of precipitation, flash floods in the region, great damage, and two drowning people on 18 August 1958 [45].

(iv) Parliamentary proposals

The Czechoslovak digital parliament library [46] contains proposals from some deputies of the parliament on sets of measures to help people who have been affected by natural disasters (e.g., flash floods). However, fatalities reported there were expressed rather generally, and more detailed information has to be searched elsewhere (e.g., in newspapers). As an example of detailed information, a proposal connected with damaging cloudburst and flash flood on 9 May 1927 in the Třebíč region (southwest Moravia) reported three casualties [47]: " . . . *A torrent of water a meter deep swept away the family of the cooper Štancl when they were returning from the fields; Štancl's wife Antonie and their two small children, aged three and a half and five and a half, were drowned. Their corpses were washed away by the rapid torrent and found only on the morning of the subsequent day* [10 May]".

(v) Professional papers and reports

Information about weather-related fatalities may occur in special reports devoted to extreme events or in professional papers investigating some particular problems. To such papers can be attributed, for example, the study by Polách and Gába [48], who described in detail the history of (flash) floods in the regions of Šumperk and Jeseník in north Moravia, giving also particular attention to their damaging consequences, including fatalities. For example, they mentioned the death of a father and his son in Šumperk-Temenice (north Moravia) on 13 July 1984: they tried to take out a car from a flooded garage after a torrential rain but were killed in the water by electric current from a damaged cable.

(vi) Memorials

Memorials were created to remember particular events and their victims. They usually contain basic information about the event and its date, names of affected people, and also the year of their birth. Frequent are, for example, "memorials of mountain victims" with the list of related fatalities with brief information on how they died (e.g., for the Krkonoše Mts. [49] or for the Jeseníky Mts. [50]) or memorials devoted to the deaths of individual people by lightning strike, flood, freezing to death, aircraft crashes, and other causes. For example, an inscription on the memorial at Třemošná-Záluží (west Bohemia) explains death during a thunderstorm [51]: "*Let this stone remember them who will come after us that on 22 June 1959, between 1500 and 1600* [CET] *in the afternoon, Šustrová Emilie, Marková Anežka, Čechurová Růžena,* [and] *Pešková Jarmila were tragically killed by lightning during a sudden and sharp* [thunder]*storm at this place. Honor to their memory!*" A short description of a particular memorial can be expanded by more detailed chronicles or newspaper reports, as is the case for many such memorials in the region of the Jizerské hory Mts. in North Bohemia [52].

(vii) Internet sources

Great attention on the internet has been devoted to aircraft crashes. In very detailed records of such events involving military or civilian airplanes, based on the results of investigation commission reports, it is possible to distinguish the role of inclement weather patterns in these accidents. This type of information in the CR has been systematically documented since 1918 [53,54]. A similar type of information is available for train accidents [55].

2.2. Methods

2.2.1. Types of Severe Weather

Each deadly event is the result of a combination of different effects and circumstances that ultimately lead to the loss of human life. The course of the weather or the occurrence of some severe weather phenomena, which do not necessarily have characteristics of extremes in the statistical sense, may be one of the driving or contributing factors resulting in deaths. Since we are dealing with fatalities that can be attributed in some way to (severe) weather, the variety of weather circumstances of such fatalities is divided into the following weather categories:

(i) Flood

Fatalities attributed to floods usually occur when people are drowned and swept away by strong water torrents or killed in collapsed buildings or objects. Two types of floods are taken into account. The first type includes floods arising from single-day or multi-day rainfall (rainy floods), sudden melts of deep snow cover (snow floods), and a combination of snow-melt and rainfall, sometimes even accompanied by ice jams on rivers (mixed floods) on larger rivers. The onset of flood-waves in these cases can start relatively slowly, and high-water levels have a longer duration. The second type are flash floods, which have a sudden onset and shorter duration and follow cloudbursts or torrential rain in any area, usually occurring on smaller water streams but not necessarily joining with them.

(ii) Windstorm

Fatalities in this category are associated with strong winds or wind gusts that cause trees or branches to fall, walls to collapse, or buildings or other objects to collapse. Meteorologically, they are associated with windstorms that originate as a result of existing large horizontal pressure gradients. Their duration ranges from a few hours to several days.

(iii) Convective storm

The development of cumulonimbus clouds is associated with several severe phenomena, particularly lightning, strong winds (such as squalls, tornadoes, or downbursts), hailstorms, or downpours. Fatalities attributed to this category are divided into those caused by lightning strikes, strong winds (same deadly reasons as mentioned in point (ii)), and thunderstorms in general (if corresponding effects were not specified in sufficient detail).

(iv) Snow and glaze ice

This category includes fatalities associated with a large amount of snow or the occurrence of glaze ice. Related fatalities in this category are divided into snow-related deaths (e.g., death during the cleaning of streets and roads, removing snow from roofs, accidents while sledding), avalanche-related deaths in mountain regions, and deaths caused by falls on slippery ground due to glaze ice.

(v) Frost

Fatalities in this category are related either to cold spells with severe frosts, when people are freezing to death or dying of hypothermia during the night spent outside buildings or resulting from activities undertaken on insufficiently frozen water bodies (such as ice skating, sliding on ice, or walking across it), with victims subsequently drowning after breaking through the ice.

(vi) Fog

Fatalities in this category are related to situations with significantly decreased visibility caused by water droplets or snow particles in the air. This concerns airplane crashes, particularly during landing in fog or flight in low clouds when pilots lose spatial orientation. Deadly train accidents in dense fog also fall into this category.

(vii) Other inclement weather

This category includes less frequently occurring fatalities that occurred in situations not attributable to any of the preceding six categories, where the reason for deaths related to hot weather (heatwaves), landslides, rime, rain events, or during inclement weather without closer specification.

2.2.2. Database of Fatalities

The Czech database of weather-related fatalities follows the concept presented by Petrucci et al. [5,12] and maintains the same structure with slight changes. This database has been used in two previous papers [2,34] and includes the following information:

(i) date of the fatal accident or event;
(ii) locality (i.e., the place of the fatal accident or event);
(iii) type of weather category (see Section 2.2.1);
(iv) time (hour) of the day when the fatal accident or event occurred (morning 0400–0800 CET, forenoon 0800–1200 CET, afternoon 1200–1800 CET, evening 1800–2200 CET, night 2200–0400 CET);
(v) name of the casualty;
(vi) gender of the casualty (male, female);
(vii) age of the casualty (exact age in years or estimated age: child 0–15 years, adult 16–65 years, elderly 66 years and older);
(viii) cause of death (drowning, falling tree/branch, traffic (vehicle/plane/train) accident, underlying health reason, freezing to death/hypothermia, lightning strike, other reason);

(ix) place of death (river/lake/reservoir/bank, within a building, road, open space in a built-up area, countryside, other places);
(x) type of death (direct—deaths caused by weather phenomena, e.g., drowning due to water torrent or collapse of a building; indirect—deaths during activity related to weather phenomena, e.g., health collapse during saving activities);
(xi) behavior of the casualty or culprit of a deadly event (non-hazardous, hazardous);
(xii) source of information.

Not all data in the above points (i)–(xi) were available or clearly interpretable for each fatality. In such cases, the related information was taken as "unknown".

2.2.3. Statistical Analysis

The database of weather-related fatalities in the CR for the 1921–2020 period was used for all analyses done in this paper. Figures presenting long-term fluctuations in annual frequencies of fatalities, their annual variations, spatial distribution, and selected characteristics that explain basic circumstances joined with fatality events according to Section 2.2.2 were prepared for every particular weather category and all weather categories together. Long-term fluctuations in annual frequencies of fatalities were not complemented by calculations of linear trends, which would be misleading with respect to the temporal distribution of data (see Section 4.1 for more details).

For the 100-year series of temperature and precipitation in Figure 1c, their fluctuations were smoothed by a 10-year Gaussian filter and complemented by linear trends. The non-parametric Theil–Sen method, which is more robust to outliers in time series, was used to estimate parameters of linear trends [56,57]. The significance of linear trends was evaluated by applying the non-parametric Mann–Kendall test [58,59].

3. Results

3.1. Fatalities in Individual Weather Categories

3.1.1. Floods

A total of 471 people died during floods in the CR between 1921 and 2020, of which 194 fatalities (41.2%) were attributed to flash floods. The deadliest event was a rainy flood in early July 1997 in Moravia and Silesia [60], which claimed 61 direct and indirect fatalities (63 fatalities for the entire year of 1997) (Figure 3a). The most tragic flash flood was on 9 June 1970 at Šardice in southern Moravia, where a lignite mine collapsed due to a water torrent, resulting in 34 fatalities ([34]; 52 fatalities for the entire year of 1970). Of several important floods that occurred after 2000, the August 2002 flood in Bohemia [61] claimed 17 fatalities (a total of 22 fatalities in 2002), whereas in other flood years of 2009, 2010, and 2013 [62–64], the number of deaths gradually achieved 16, 19, and 18 fatalities, respectively. In ten other years of the 100-year series, the annual death toll was ≥10 fatalities, but in 32 years, no fatalities were recorded. In terms of annual variations, the highest numbers of fatalities occurred in July (28.0% with dominance of floods) and in June (27.6% with dominance of flash floods) (Figure 3b). The spatial distribution of flood fatalities shows, as expected, their concentration around larger rivers, as well as around small water streams (Figure 3c). In the context of the entire country, the fatality region in the northeastern part of the CR is particularly well expressed, as well as other similar regions in South Moravia. Drowning (80.3%), as expected, was identified as the most frequent reason for death, but only 62.0% of fatalities were attributed to the place category "river/lake/reservoir/bank" (14.6% died within collapsing buildings) (Figure 3d,f). Fatalities from floods were mainly direct victims (89.0%) (Figure 3e). Whereas for nearly half of the fatalities the part of the day was not specified, for 22.3% of them, it was in the afternoon (Figure 3g). In other fatality categories, distributions were males 68.2% to females 24.6%, adults 47.8% to children 18.7% and elderly 11.0%, and non-hazardous behavior of victims 49.5% to hazardous 36.1% (Figure 3h–j).

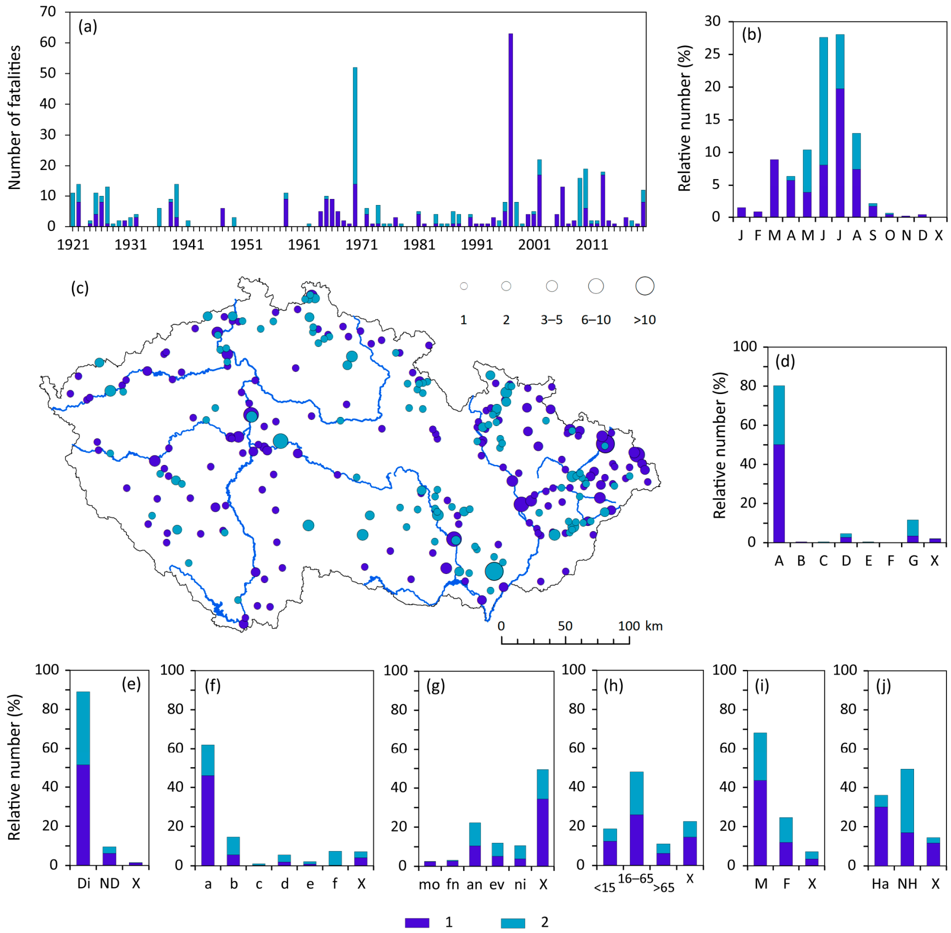

Figure 3. Characteristics of flood-related fatalities in the Czech Republic during the 1921–2020 period (1—flood, 2—flash flood): (**a**) long-term fluctuation; (**b**) annual variation (J—January, F—February, . . . , D—December); (**c**) spatial distribution (15 fatalities lack exact locations); (**d**) cause of death; (**e**) type of fatality; (**f**) place of death; (**g**) part of the day; (**h**) age (years); (**i**) gender; (**j**) behavior. Symbols and abbreviations: A—drowning, B—tree/branch fall, C—traffic (vehicle/plane/train) accident, D—underlying health reason, E—freezing to death/hypothermia, F—lightning strike, G—other reason; Di—direct death, ND—non-direct death; a—river/lake/reservoir/bank, b—within a building, c—road, d—open space in built-up area, e—open countryside, f—other place; mo—morning, fn—forenoon, an—afternoon, ev—evening, ni—night; M—males, F—females; Ha—hazardous behavior, NH—non-hazardous behavior; X—unknown.

3.1.2. Windstorms

A 100-year chronology of deaths associated with windstorms includes 128 fatalities. Whereas one-third of all years had only one or two fatalities, five or more occurred in only eight years (Figure 4a). As for significantly damaging windstorms that affected Central Europe, six fatalities were attributed to the Kyrill storm on 18–19 January 2007 [65] and four to the Herwart storm on 29 October 2017 [66]. The annual variation shows two maxima of fatalities: the primary maximum in March (14.1%), slightly higher than in February (13.3%), and the secondary maximum in November (12.5%), slightly higher than in October (10.9%) (Figure 4b). As for the spatial distribution of windstorm-related fatalities, a rather random distribution of them across the country is characteristic, with some concentration of higher casualties in Prague and its surroundings and, to a lesser extent, also in Brno and its surroundings (Figure 4c). The majority of fatalities (82.0%) were classified as "direct" victims (Figure 4e). People died especially due to falling trees or branches (39.8%), but fatalities in traffic accidents or due to other reasons were also common (21.9% each) (Figure 4d). The place of deaths was mainly open spaces in built-up areas (28.9%) or in open countryside (27.3%), followed by roads (18.8%) (Figure 4f). One-third of deadly events occurred in the afternoon (34.4%), but for a higher proportion of fatalities (44.5%), the part of the day was not specified (Figure 4g). In other categories of fatalities, males predominated (80.5%, females 17.2%), as did adults (61.7%, but 24.2% unknown), and their behavior was mostly non-hazardous (73.4%, hazardous 23.4%) (Figure 4h–j).

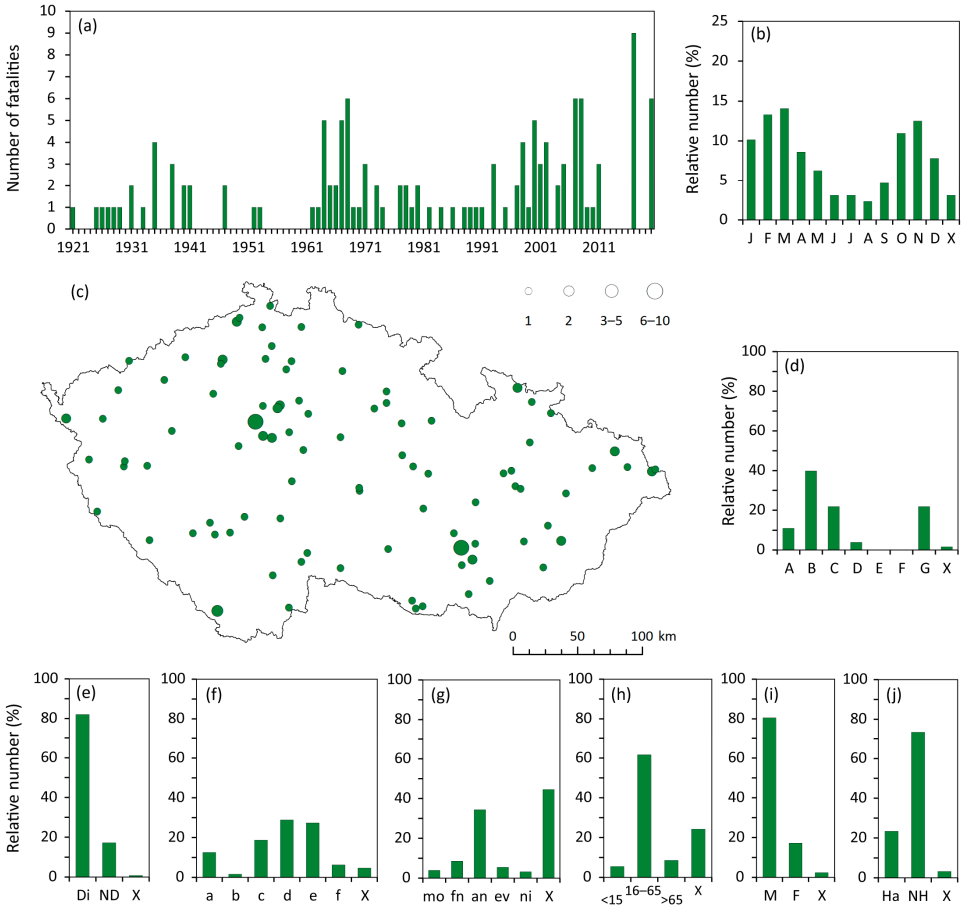

Figure 4. Characteristics of windstorm-related fatalities in the Czech Republic during the 1921–2020 period: (**a**) long-term fluctuation; (**b**) annual variation; (**c**) spatial distribution (four fatalities lack exact locations); (**d**) cause of death; (**e**) type of fatality; (**f**) place of death; (**g**) part of the day; (**h**) age; (**i**) gender; (**j**) behavior. For symbols and abbreviations see Figure 3.

3.1.3. Convective Storms

A total of 530 fatalities occurred during the 1921–2020 period, associated with convective storms. These fatalities were divided into 371 (70.0%) due to lightning, 108 (20.4%) due to strong winds, and the remaining 51 (9.6%) during thunderstorms without further specification. Most fatalities occurred between 1921–1939 (287 fatalities, i.e., 54.2%) and 1962–1972 (84 fatalities, i.e., 15.8%) (Figure 5a). The highest number of fatalities, 48, was recorded in 1929, primarily connected with an extremely damaging convective storm with extreme winds on 4 July [67]. There were 32 fatalities in 1925 and ≥20 fatalities in 1927, 1928, 1930, and 1937. A total of 31.1% of fatalities occurred in July, followed by June (24.3%), May (19.6%), and August (17.5%). In these four months combined, 92.5% of fatalities took place (Figure 5b). The spatial distribution of convective storm-related fatalities does not show any systematic features, and appears rather random, despite the existence of some small areas where no deaths were recorded (Figure 5c). "Direct" deaths comprised 84.3% of all fatalities (Figure 5e). The dominant proportion of lightning-related fatalities was reflected in 68.9% of fatalities due to lightning strikes, in open countryside (46.8%) or open spaces within built-up areas (17.9%), and occurring particularly in the afternoon (26.0%, but for 51.9% of fatalities, the time was unknown) (Figure 5d,f,g). Male fatalities were more than double those of females (63.6% compared to 30.0%), and adults represented the most affected category (41.9%), despite a high proportion of unknown cases (46.0%) (Figure 5h,i). A total of 57.7% of fatalities were attributed to non-hazardous behavior (26.0% hazardous) (Figure 5j).

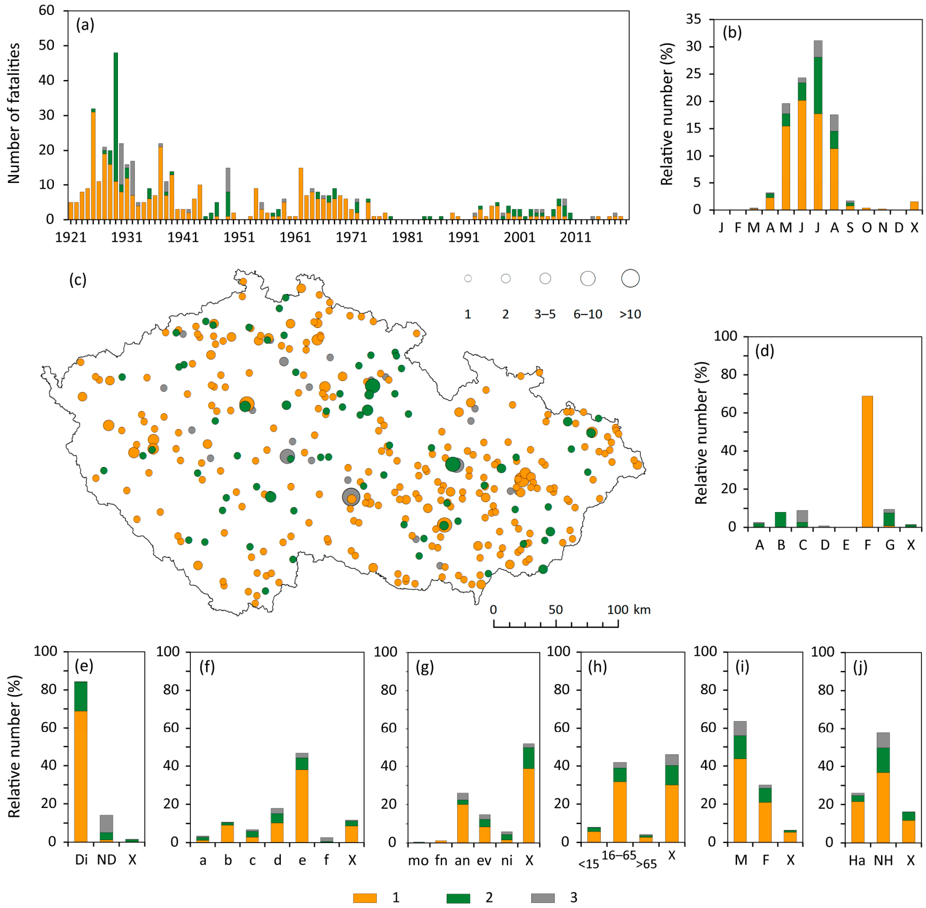

Figure 5. Characteristics of fatalities related to convective storms (1—lightning strike, 2—strong wind, 3—during a thunderstorm) in the Czech Republic during the 1921–2020 period: (**a**) long-term fluctuation; (**b**) annual variation; (**c**) spatial distribution (42 fatalities lack exact locations); (**d**) cause of death; (**e**) type of fatality; (**f**) place of death; (**g**) part of the day; (**h**) age; (**i**) gender; (**j**) behavior. For symbols and abbreviations see Figure 3.

3.1.4. Snow and Glaze Ice

In the period of 1921 to 2020, there were 213 fatalities associated with this category, with 140 fatalities due to snow (65.7%), 41 fatalities due to glaze ice (19.3%), and 32 fatalities due to avalanches (15.0%). A maximum of 31 fatalities was recorded in 1945 (two air crashes in snowstorms [53,54]), despite the end of the Second World War and a general drop in the number of reports in newspapers that year (Figure 6a). In the remaining years, 12 people died in 1929, 9 in 1962 and 2006, and only 1 or 2 fatalities were recorded in 46 years. The annual distribution shows a clear dominance of the months December through March (92.5% combined), with the maximum in January (32.9%), followed by February (31.9%) (Figure 6b). The spatial distribution of fatalities shows a rather irregular pattern, with increased numbers of casualties in the northwestern and northern Bohemia regions. Other clusters are apparent in eastern Bohemia and central Moravia (Figure 6c). As for avalanche-related fatalities, they were limited exclusively to the Krkonoše Mts. in northern Bohemia, the Jeseníky Mts. in the northern part, and the Moravskoslezské Beskydy Mts. in the northeastern part of Moravia and Silesia. Fatalities attributed to snow and glaze ice were characterized by a higher proportion of indirect deaths (62.4% indirect to 37.6% direct) and comparable hazardous and non-hazardous behavior (50.2% hazardous to 48.4% non-hazardous) (Figure 6e,j). The cause of death was mainly due to other reasons (57.3%), followed by traffic accidents (29.6%) (Figure 6d). People died mainly in open countryside (52.1%), but also in open spaces in built-up areas (18.3%) (Figure 6f). Despite comparable proportions of fatalities in the afternoon and at night (16.0% and 17.4%, respectively), the time of day was not specified for 44.6% of fatalities (Figure 6g). A total of 77.0% of fatalities were male, whereas 18.8% were female (Figure 6h). The number of adult fatalities was comparable to unknown (39.4% to 38.0%), but a relatively high proportion of child deaths occurred (16.9%) (Figure 6i).

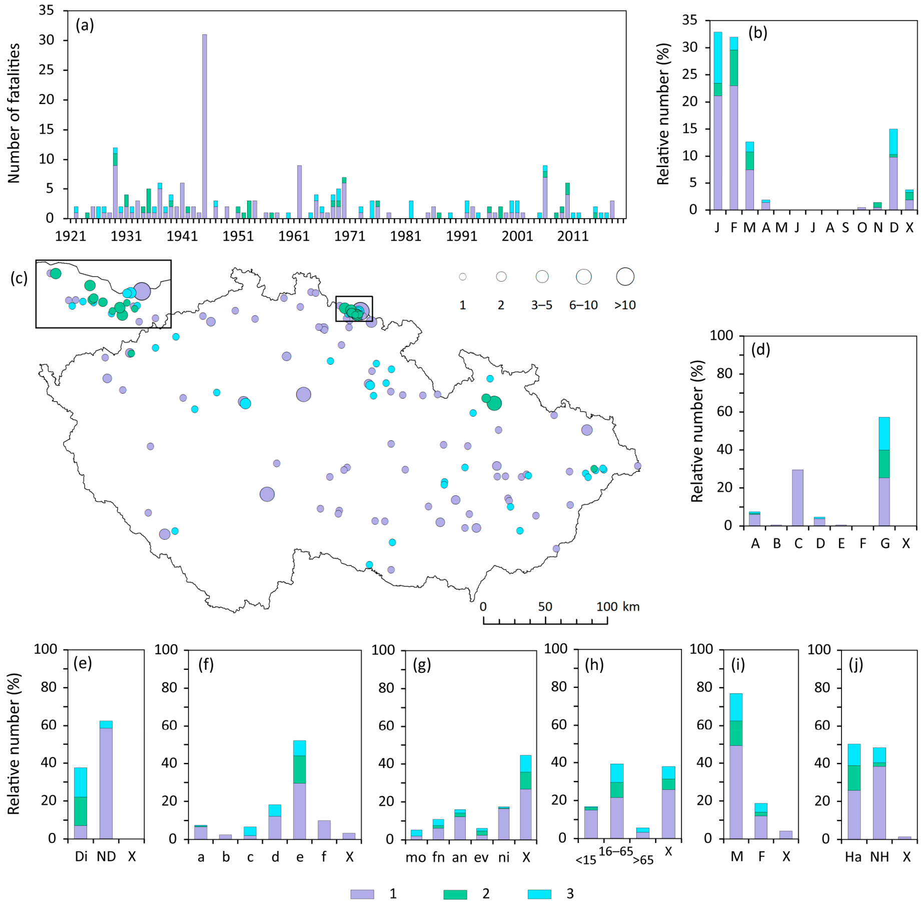

Figure 6. Characteristics of fatalities related to snow and glaze ice (1—snow, 2—avalanche, 3—glaze of ice) in the Czech Republic during the 1921–2020 period: (**a**) long-term fluctuation; (**b**) annual variation; (**c**) spatial distribution (four fatalities lack exact locations); (**d**) cause of death; (**e**) type of fatality; (**f**) place of death; (**g**) part of the day; (**h**) age; (**i**) gender; (**j**) behavior. For symbols and abbreviations see Figure 3.

3.1.5. Frosts

A total of 1031 fatalities in the 1921–2020 period were associated with the frost category, of which 758 fatalities (73.5%) were attributed to cold spells and 273 fatalities (26.5%) to accidents on ice. The maximum of 63 fatalities was recorded in 2010, followed by 44 in 2012 and 43 in 1929 (as a result of the coldest winter of 1928/29 in the past century—e.g., [34,68]) (Figure 7a). The annual distribution shows the highest proportion of fatalities in January (30.8%), followed by February (25.2%) and December (25.0%), i.e., 81.0% combined (Figure 7b). Frost-related fatalities densely cover the entire country with some spots in and around large towns and cities (e.g., Prague, Plzeň, Brno, Olomouc, or Ostrava) (Figure 7c). However, for some relatively larger areas in western and south-east central Bohemia, as well as in a belt located easterly of the Jeseníky Mts., no such fatalities were found. Nearly all frost fatalities (99.1%) were interpreted as "direct" (Figure 7e). The cause of death in this category has been split between freezing to death/hypothermia (72.8%) and drowning (26.6%) during breaking of ice with people on water bodies (Figure 7d). Nearly equal proportions of fatalities were attributed to three places of death: open spaces in built-up areas (29.1%), open countryside (28.3%), and river/lake/reservoir/bank (28.1%) (Figure 7f). A quarter of frost fatalities occurred during the night (25.3%), but the majority of them were not attributed to any part of the day (60.1%) (Figure 7g). In other fatality characteristics, males prevailed compared to females (78.8% to 17.1%) as well as adults (46.3%, but 24.6% in the child category) (Figure 7h,i). Hazardous behavior of fatalities was dominant compared to non-hazardous fatalities (73.0% to 10.7%) (Figure 7j).

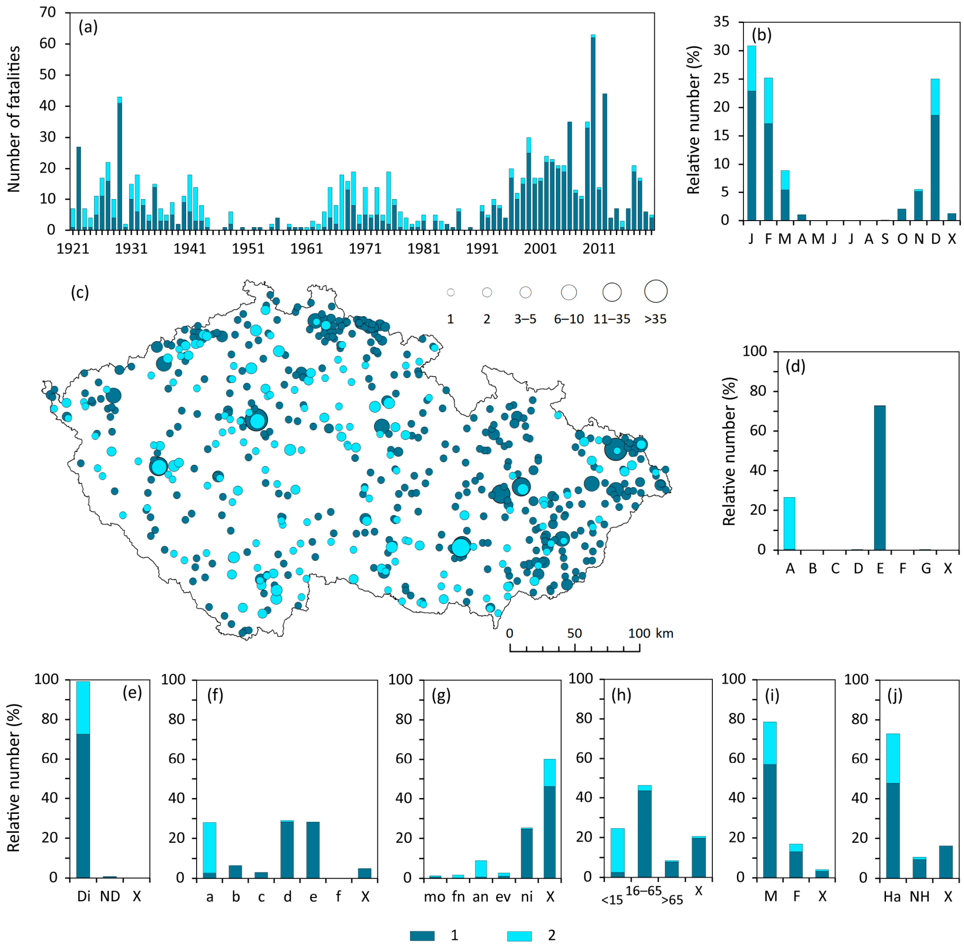

Figure 7. Characteristics of frost-related fatalities (1—cold spell, 2—ice) in the Czech Republic during the 1921–2020 period: (**a**) long-term fluctuation; (**b**) annual variation; (**c**) spatial distribution (19 fatalities lack exact locations); (**d**) cause of death; (**e**) type of fatality; (**f**) place of death; (**g**) part of the day; (**h**) age; (**i**) gender; (**j**) behavior. For symbols and abbreviations see Figure 3.

3.1.6. Fog

A total of 293 fatalities were associated with very poor visibility, i.e., included under fog. This category was represented particularly by deaths during air crashes, involving both military and civilian aircraft. This was connected with a loss of pilot orientation due to poor visibility in dense fog or low clouds, causing uncontrollable aircraft to crash into the ground. The deadliest crash happened on 30 October 1975, at 09:20 CET, when a Yugoslavian McDonnell Douglas DC-9 airplane, preparing to land during fog at the Prague-Ruzyně airport, crashed into the ground in a cottage colony above the River Vltava valley in Prague-Suchdol (Figure 8a). The crash claimed 79 lives and caused 41 injuries among airplane passengers, mostly Czech tourists returning from holiday, and additionally, an older woman in the cottage colony [69]. Following the 1975 event, two other years, 1945 and 1962, each had 16 fatalities. In 1945, this included eight fatalities of two Soviet military planes, which crashed on 18 July in dense fog while flying to Moscow for a military parade [54]. Another Czech aircraft crashed on 14 December when eight men died (ibid.). In 1962, 13 people died and 29 were seriously injured when an Il-14M airplane, operated by Czechoslovak airlines and flying on 10 October from Košice (Slovakia) to Prague, crashed around 10:00 CET in dense fog on a hill (280 m a.s.l.), 6 km before the intermediate landing at Brno airport [70].

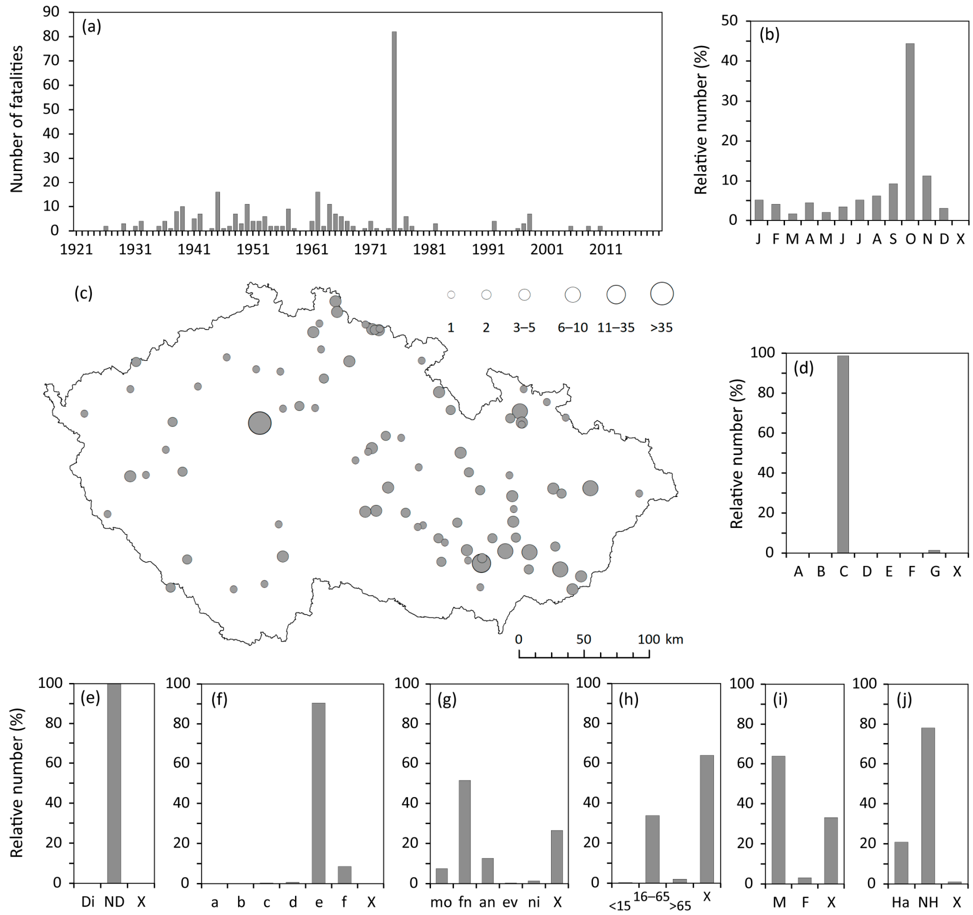

Figure 8. Characteristics of fog-related fatalities in the Czech Republic during the 1921–2020 period: (**a**) long-term fluctuation; (**b**) annual variation; (**c**) spatial distribution; (**d**) cause of death; (**e**) type of fatality; (**f**) place of death; (**g**) part of the day; (**h**) age; (**i**) gender; (**j**) behavior. For symbols and abbreviations see Figure 3.

The above-mentioned major crashes, along with other similar events, influence all other characteristics of fatalities, with a high proportion of unknown cases. In the annual distribution (Figure 8b), proportions of fatalities in autumn months, with the most frequent occurrence of fog during the year, were the highest: October 44.4%, November 11.3%, and September 9.2%. Spatial distribution of fatalities indicates rather places of aircraft crashes close to airports in Prague or Brno (here particularly places located south-easterly from the town) (Figure 8c). The highest proportions of fatalities in other characteristics consist of indirect deaths (100.0%), aircraft and train crashes (98.6%), open countryside (90.4%), forenoon (51.5%), males (63.8%, but 33.1% unknown), adults (33.8%, but 63.8% unknown), and non-hazardous behavior (78.2%) (Figure 8d–j).

3.1.7. Other Inclement Weather

This category includes fatalities that could not be assigned to any of the preceding six weather categories. It includes 63 fatalities attributed to hot weather (41.3%), inclement weather without specification (23.8%), landslides (11.1%), and rime (9.5%). The remaining portion of 14.3% fatalities includes accidents on wet ground during downpour or heavy rain. Fatalities attributed to hot weather appeared particularly after 2000, with a maximum of nine fatalities in June–July 2006. Inclement weather was often reported in the case of airplane accidents. For example, on 30 November 1952, a military airplane transported the print matrix of the communist newspaper *Rudé právo* from Prague to Brno. As the airplane of Czechoslovak airlines did not fly due to bad weather, the military plane crashed into a hill at 20:59 CET during landing, and all five men onboard died [54,71]. Three boys died in a tent on 5 July 1969, at Sivice (easterly from Brno), when a part of a slope with a brick wall collapsed in the morning (after strong rain) [72–74].

3.2. Synthesis of Weather-Related Fatalities

A total of 2729 fatalities associated with severe weather were found in the 1921–2020 period in the CR. The highest annual numbers in this 100-year chronology reflect the deadliest events mentioned already in the individual weather categories: 110 fatalities in 1929, 106 in 1975, 95 in 2010, 86 in 1997, and 72 in 1970 (Figure 9a). Based on individual decades, the highest numbers were recorded in 2001–2010 (450 fatalities, i.e., 16.5%) and 1921–1930 (434, i.e., 15.9%), the lowest in 1951–1960 (106, i.e., 3.9%) and 1981–1990 (73, i.e., 2.7%). Fatality proportions according to individual weather categories were as follows: frosts 37.8%, convective storms 19.4%, floods 17.3%, fog 10.7%, snow and glaze ice 7.8%, windstorms 4.7%, and other inclement weather 2.3%. The annual variation of fatalities shows two maxima: the main maximum in January with 15.5% (winter 40.2%) and the secondary in July with 12.2% (summer 29.3%) (Figure 9b). Spatial distribution of fatalities shows their dense distribution over the country with the higher coverage particularly in the eastern part of the CR, as well as in northwestern, northern, and central Bohemia (Figure 9c). Deaths were interpreted as direct for 77.0% of fatalities and as indirect for 22.4% (Figure 9e). Freezing to death/hypothermia (27.6%) and drowning (25.5%) were the most frequent reasons, followed by traffic accidents (16.3%) and lightning strikes (13.4%) (Figure 9d). People died particularly in open countryside (36.1%), followed by categories river/lake/reservoir/bank (23.2%) and open spaces in built-up areas (19.0%) (Figure 9f). The critical parts of the day were in the afternoon (16.9%) and night (14.3%), but for half of the fatalities (50.9%), corresponding information was missing (Figure 9g). Males accounted for 72.3% of all fatalities, whereas females accounted for 19.4% (Figure 9i). Adults had the highest proportion according to age with 44.7%, but for 32.1% of fatalities, this information remained unknown; more than double the number of deaths occurred in the child category compared to the elderly (16.0% to 7.2%) (Figure 9h). Hazardous behavior in deadly events was higher than non-hazardous behavior (46.9% to 40.7%) (Figure 9j).

Figure 9c characterizes the distribution of fatalities across the territory of the CR according to individual places, whereas Figure 10 shows a summarized distribution of their numbers for the 77 existing districts. The highest number of 244 fatalities (8.9% of all of them) was recorded in the capital, Prague, which has the highest concentration of people (1.335 million in 2020). A lower number of casualties occurred in other large towns (with a population of over 100,000 inhabitants): Ostrava had 74 fatalities (2.7%), Brno had 71 fatalities (2.6%), but when combined with the adjacent Brno-venkov district, there were 141 fatalities (5.2%), and Plzeň had 35 fatalities (1.3%). As for other districts, the Trutnov district in northeast Bohemia recorded the second-highest number of casualties, with 125 (4.6%) fatalities recorded, particularly deaths in the Krkonoše Mts. A greater part of the Bohemian districts had fewer than 20 fatalities. In general, seven other districts in the eastern CR, along with the Brno region and Ostrava, experienced higher numbers of fatalities (more than 50), whereas in Bohemia, it was only the Liberec district in north Bohemia that had a similar number of fatalities (56).

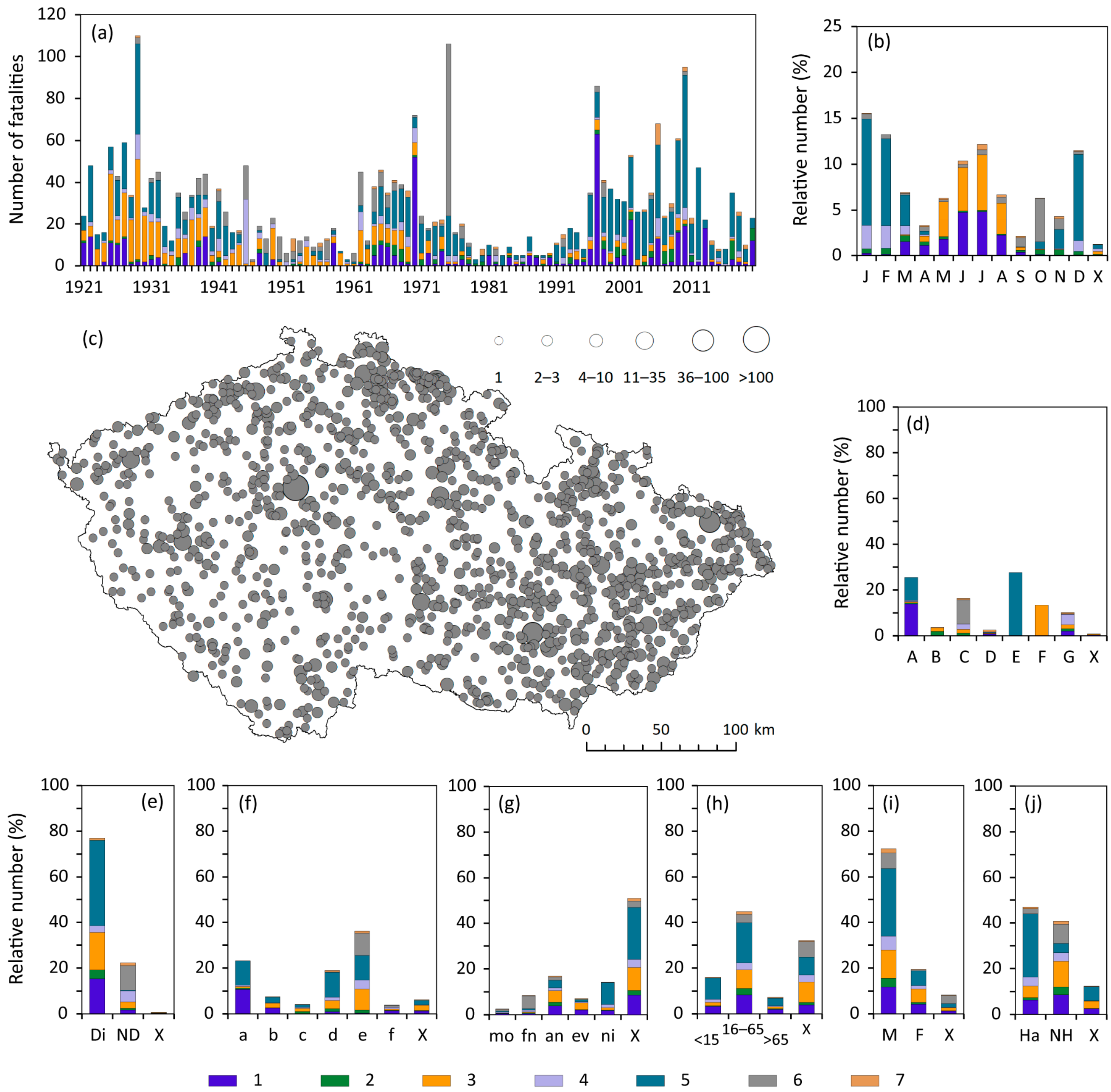

Figure 9. Characteristics of weather-related fatalities (1—flood, 2—windstorm, 3—convective storm, 4—snow and glaze ice, 5—frost, 6—fog, 7—other inclement weather) in the Czech Republic during the 1921–2020 period: (**a**) long-term fluctuation; (**b**) annual variation; (**c**) spatial distribution (88 fatalities lack exact locations); (**d**) cause of death; (**e**) type of fatality; (**f**) place of death; (**g**) part of the day; (**h**) age; (**i**) gender; (**j**) behavior. For symbols and abbreviations see Figure 3.

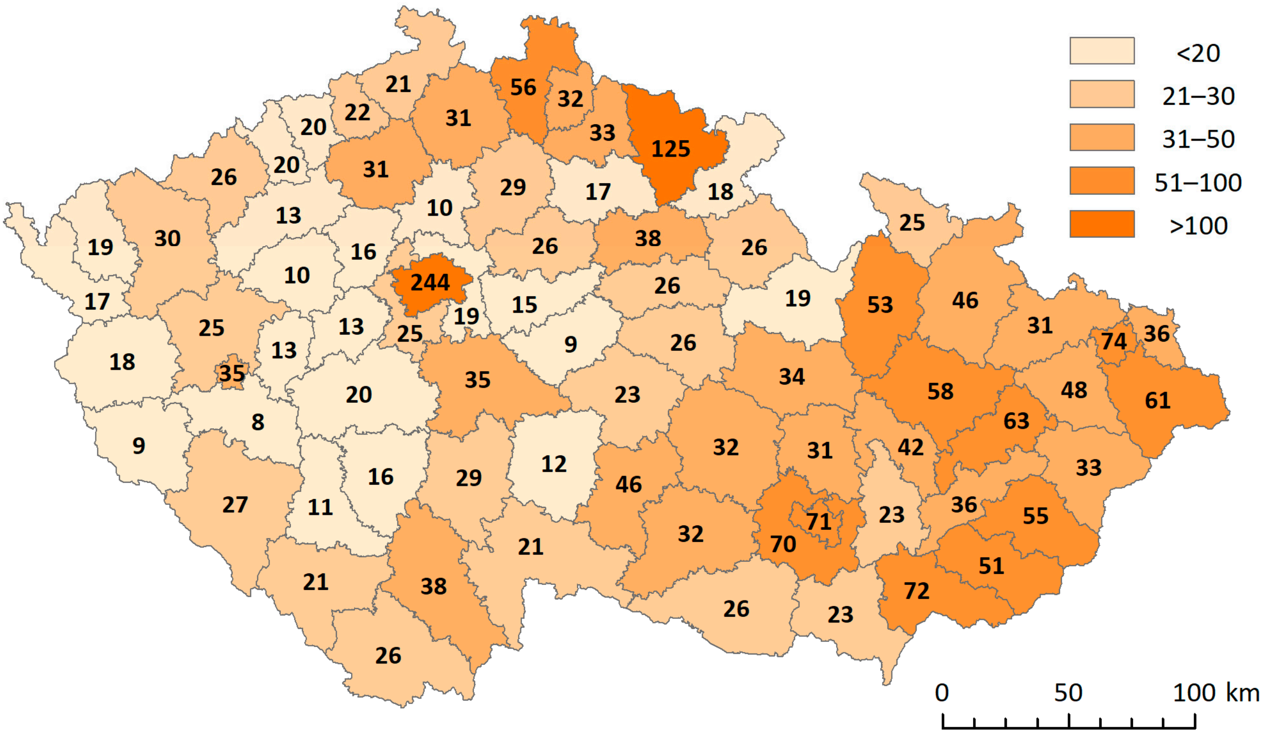

Figure 10. Distribution of weather-related fatalities for the individual districts of the Czech Republic during the period of 1921–2020, expressed in colored intervals and numbers of fatalities.

4. Discussion

4.1. Data Uncertainty

Information on weather-related fatalities from newspapers is often used as the main source of data to create corresponding fatality datasets (e.g., [9,75–80]). Regarding the CR, information on 2435 fatalities (i.e., 89.2% of all of them) comes from this particular source. Despite systematic extractions of reports from three basic newspapers covering long time intervals (*Rudé právo/Právo* for 76 years, *Svobodné slovo* for 44 years, and *Lidové noviny* for 30 years) and their complementing by many other newspapers extracted for several months, the whole year, or a couple of years (see Section 2.1.2, point (i)), fatality reports have been strongly influenced by many other factors, particularly with political, societal, and economic changes in the country.

After the establishment of Czechoslovakia in 1918 (see Figure 2), the media flourished in a democratic society, and information on weather phenomena and related fatalities or injuries received ample attention. Surprisingly, a relatively high level of local information in Czech written media (e.g., *Lidové noviny* or *Venkov*) remained even after the full occupation of Czechoslovakia by Nazis in 1939 (borderland areas, "Sudetenland", were occupied after the signing of the Munich Agreement on 29 September 1938), as well as during the Second World War until 1944. The last year of the war, 1945, was characterized by close war operations, which caused disruptions in newspaper publishing and information flow. After the liberation of Czechoslovakia, some communist newspaper (e.g., *Rudé právo*, *Rovnost*), prohibited during Nazis occupation have been again issued, but some newspapers produced during occupation were stopped and some new ones appeared, which were published for a few years or longer (e.g., *Lidová demokracie*, *Svobodné slovo*). The post-war years in newspapers were particularly focused on dealing with the far-reaching consequences of the war. This democratic development and media freedom were interrupted by the communist coup in 1948 when the country became a part of the Soviet bloc. Newspapers, strongly influenced by communist ideology, "building of socialism" and "cold war" between East and West, reported rather larger weather extremes, but paid less attention to deadly events during these extremes or describing their circumstances. This trend continued until the early 1960s. The political liberalization afterwards, culminating in the “Prague Spring” in 1968 (which was stopped by Soviet occupation), brought positive changes to the reporting of weather-related injuries and fatalities, but in the late 1970s and 1980s, these reports became less frequent again. The return to a democratic society after the “Velvet Revolution” in 1989 and the establishment of the CR in 1993 were reflected with some delay in an increase in regional or local reports of weather events and their fatalities and injuries. The described facts and circumstances were reflected in three periods that were relatively well-covered by the data analyzed, namely 1921–1944, 1962–1977, and 1996–2020, whereas the years in between, i.e., 1945–1961 and 1978–1995, suffered from a lack of weather-related fatality reports. This uneven temporal information coverage explains why our unique 100-year long fatality chronology is not suitable for the study of any long-term trends.

In addition to the historical milestones and subsequent changes, the media market itself and internal changes in newspapers may have played an important role in reporting weather-related fatalities. Changes in the space devoted to certain kinds of information, the perceived interest of target readers, the political orientation of the newspaper, the reduction in regional editorial staff, different quantities of space given to regional and countrywide reporting, advertising space, competition in reporting, reader fatigue, availability of regional/local news taken from other bodies (e.g., police, press agencies, state and regional administration), etc., could all have had an impact.

Despite the unique character of our 100-year database of weather-related fatalities, it represents a lower estimate of the real numbers. Spatial and temporal non-homogeneity in available data is a typical feature of most analyses based on documentary data (e.g., [34]). For example, the lower number of fatalities in Bohemia compared to Moravia and Silesia in Figure 10 could be partly related to the availability of local newspaper issues. The problem of data non-homogeneity is not solved by other “official” databases such as the Czech Statistical Office (CSO), which, besides its short length (since 1994), is influenced by the subjective evaluation of causes of death by doctors and contains only limited information about fatality characteristics (for a comparison of our and CSO databases in the 2000–2019 period, see [35]).

4.2. Broader Context

The results of the recent article reflect the progress achieved in the study of weather-related fatalities in the past few years. Whereas the first study by Brázdil et al. [34] presented very preliminary results with only 269 fatalities (including vehicle accidents) during the period of 1981–2018 and some methodological considerations related to the use of documentary evidence, the subsequent study for 2000–2019 [35] reported 601 fatalities (excluding vehicle accidents). The extension of our dataset to a 60-year period [2] focused on comparing two “normal” periods, 1961–1990 and 1991–2020, which are typically used in climatology and reported 657 and 962 fatalities, respectively (a total of 1619 fatalities). The recent paper is based on a unique 100-year chronology for the period of 1921–2020, adding 1074 new fatalities before 1961 (part of the fatalities reported in *Lidové noviny* were extracted based on [81,82]) and 36 new fatalities after 1960 (i.e., 40.7% of all fatalities in the 100-year period). Apart from flood fatalities (e.g., [6,8]), there are not many papers analyzing such a broad scale of weather-related fatalities in this long-term context and detailed internal structure (e.g., [83]) as our study.

Section 4.1 demonstrated how past historical milestones, subsequent political changes, and newspaper “politics” could have influenced the availability of weather-related fatality data. However, the frequency and structure of fatalities also reflect other socio-economic changes and changes in lifestyle. During the 100-year period analyzed, there was an important change in the proportion of people working in agriculture, i.e., people who were more frequently exposed to the outdoors and an open landscape; their numbers continuously and strongly declined from the past to the present. In 1930, their number was 2.316 million, but in 1946, it was 1.588 million, in 1961, 0.832 million, in 1981, 0.578

million, in 2001 only 156 thousand, and finally, in 2021, 133 thousand ([84], complemented). The proportion of women decreased between 1930 and 2021 from approximately 59% to 35%. These facts are well reflected in the number of fatalities due to lightning strikes. Of 371 such fatalities, 33.2% of them were recorded in 1921–1930, 22.9% in 1931–1940, and after two clearly underestimated decades, 18.1% in 1961–1970. In the five decades after 1970 until 2020, only 12.9% of all such fatalities were recorded. No doubt, the clear decreasing tendency in these fatalities is also due to the increased use of lightning conductors, vast improvements in medical services, an increase in the availability of immediate emergency help with rapid transport to hospitals, and a broader public awareness of how to behave during a thunderstorm [23,34]. Similarly, well-expressed decreasing lightning-related fatalities were documented, for example, also for the UK [22], Switzerland [83], Western Europe [85], or Romania [25].

Despite the decreasing severity of winter temperature and snow patterns in the CR from 1961 [86], fatalities attributed to cold spells, i.e., due to freezing to death or hypothermia, surprisingly significantly increased after 1990. The following three decades experienced 63.7% of all 758 such fatalities during the past 100 years. This increase can be explained by the important increase in the homeless population after the "Velvet Revolution" in the CR, whereas before 1990, such people were very rare. Despite some possibilities to spend nights with heavy frosts in some special facilities, many homeless people prefer to spend the night outside, often with heavy alcohol consumption. The opposite situation characterizes higher proportions of deaths by drowning during different activities provided on not enough frozen water bodies with a subsequent breaking of ice: from 273 such fatalities, 40.7% of them died in 1921–1950, and 41.4% in 1961–1980. A very high proportion of 83.5% belongs to the child category (0–15 years), which—compared to recent decades—was related to more frequent children's activities outdoors in the past, often without any supervision from parents. It also reflects changes in age pyramids in Figure 1d, demonstrating significantly decreasing proportions of children from 27.8% in 1921 to 16.0% in 2020. However, the results for the CR differ from those obtained for ten countries over the Northern Hemisphere, for which Sharma et al. [87] found increased drownings in ice-covered regions in warmer winters.

Finding stronger relationships between weather-related fatalities and long-term climate variability is more complicated. Although there has been a significant increase in maximum temperatures and frequency of heat waves [88,89], which is well reflected in growing numbers of heat-wave-related fatalities (e.g., [1,18]), the relationship with other weather-related fatalities is not as conclusive.

Of the 277 flood fatalities detected, 48.8% were recorded only between 1996 and 2013. Although 22.7% of these fatalities were a consequence of the July 1997 flood event [60] by itself, the period from 1997 to 2010 in the CR was generally evaluated as flood-rich, compared to relatively flood-poor years from 1966 to 1992 [90]. The years from 1996 to 2013 in the CR are within the 1990–2016 period, which Blöschl et al. [91] identified among the ten most flood-rich periods in Western and Central Europe in the context of the past 500 years. Despite regional variations of none, increasing, or decreasing trends in flood-related fatalities in past decades (e.g., [4,5,92,93], Paprotny et al. [94] reported an increase in annually inundated area and in the number of persons affected for 37 European countries (HANZE database) since 1870, but a substantial decrease in flood fatalities. Similarly, Franzke and Torelló i Sentelles [95] found a significant downward flood fatality trend for Europe in 1960–2019, but an upward trend for worldwide aggregated data.

Regarding fatalities from flash floods in the CR, besides the deadliest year of 1970 (38 fatalities, i.e., 19.6% of all flash flood fatalities), 33.0% of such fatalities occurred in 1921–1940 and 22.7% in 2001–2020. These values show that the past two decades did not experience any particular increase in fatalities related to flash floods in the context of the 100-year series. Terti et al. [96], analyzing 1075 fatalities from flash floods across the United States in 1996–2012, found no clear trend in such events and associated fatalities. Ahmadalipour and Moradkhani [97], extending that period until 2017 with 1399 fatalities across the contiguous United States, mentioned only that the number of flash flood fatalities did not decrease in the past decades. Vinet et al. [98], analyzing French departments prone to Mediterranean flash floods in 1980–2020, pointed out a decreased mean toll of flood events but an increase in the number of deadly events. Similarly, Diakakis et al. [8], investigating 132 flash floods with ≥10 fatalities in 13 countries over the eastern Mediterranean during 1882–2021, found a statistically significant increase in the number of fatalities.

Although 26 fatalities related to hot weather or heat-waves appeared in our database (see Section 3.1.7), such information occurred in newspapers only sporadically. These fatalities have to be derived from another type of data (namely medical data of deaths due to cardiovascular problems) than those we used to create our database. From the many papers dealing with heat-waves in the CR, some quantitative fatality data can be derived. For example, Urban et al. [31], analyzing mortality attributed to heat in Prague during 1982–2019, found the following numbers of excess deaths for the individual decades: 61 fatalities per year in 1982–1989, 43 in 1990–1999, 53 in 2000–2009, and nearly 90 in 2010–2019, while the highest annual value with 271 excess deaths was achieved in 2015. These numbers are significantly exceeding the numbers of fatalities attributed to other weather phenomena in the entire CR as presented in our study.

Despite some specific characteristics of fatalities in the CR for the individual weather categories, some general features can be summarized from their synthesis in Section 3.2. The main maximum appears in the winter months, and the secondary maximum appears in the summer months, which is connected to the climatology of decisive weather extremes. Deaths were interpreted mainly as direct, caused particularly by freezing to death/hypothermia or drowning, happening in the afternoon and night in an open countryside or on rivers and in water bodies. Males prevailed over females, and adults over the categories of children and elderly people. Hazardous behavior of victims or culprits of deadly events was more frequent than non-hazardous behavior. Similar features in fatality characteristics can be found in many similar studies in other countries or regions (e.g., [7,10,12,83,99]). On the other hand, some regionally specific features not typical for fatalities in the CR can appear, such as an important proportion of vehicle fatalities during floods, as documented, for example, for Greece [100], Portugal and Greece [92], Spain [101], or the United States [93].

The fatality database used in the recent paper did not include fatalities during vehicle accidents that occurred during inclement weather conditions (divided into seven categories: fog, onset of rain and light rain, rain, snow and snowfall, glaze of ice and rime, gusty wind, and other inclement weather) which have been analyzed in the earlier studies [2,35,36] and create another database. The exceptions were only a few cases when either the accident took place in a flood or flooded area (e.g., driving in flowing water on the road or accident of a rescue car on the way to flooded area) or was connected with strong winds or thunderstorms (e.g., accidents caused by sudden strong wind gust or crash to a tree uprooted by strong wind on the road). Moreover, compared to the previous study by Brázdil et al. [2], which pointed out 1834 fatalities of vehicle accidents in the CR for the 1961–2020 period connected with any inclement weather, only 60 new such fatalities were found for 1921–1960, which represents a deep underestimation of their real value, particularly before 1961, even though the number of cars and types of roads used was smaller than in the following decades. If any vehicle accidents were mentioned in the extracted newspapers (particularly for any persons considered as "important"), accompanying weather patterns were usually only sporadically reported. For this reason, we skipped this type of analysis for the whole 100-year period. Concerning the reported 60 fatalities before 1961, more than two-thirds of them were attributed to the categories snow and snowfall (35.0%) and fog (33.3%); for glaze of ice, it was 16.7%, and for wet road and rain, it was 15.0%.

5. Conclusions

The analysis of the 100-year chronology (1921–2020) of fatalities attributed to severe weather in the CR allows us to summarize the main results as follows:

(i) The database of weather-related fatalities in the past 100 years was created from different documentary sources, particularly newspapers. By covering a long period and a broad scope of severe weather events, it is a unique dataset in the national and European scales. Despite representing a lower estimate of the real numbers of such fatalities, this database is suitable for the study of spatiotemporal variability of weather-related fatalities, as well as their different special characteristics and features.
(ii) Historical milestones, political and socioeconomic developments, as well as changes in media, significantly influenced the availability of fatality reports related to extreme weather in newspapers. As a result, fatality data are highly underestimated in 1945–1961 and 1978–1995, which makes it difficult to analyze long-term trends and compare them with trends in selected climatological variables.
(iii) An annual average of 27.3 weather-related fatalities per year was attributed to the following weather categories: frosts—cold spells and ice on water bodies (38%); convective storms—lightning strike, strong wind, thunderstorm (19%); floods—including flash floods (17%); fog with bad visibility (11%); snow, avalanches, and glaze ice (8%); windstorms (5%); and other inclement weather not attributable to any preceding categories (2%).
(iv) Despite some differences among individual weather categories, the prevailing characteristics/features of all fatalities were as follows: direct deaths; fatalities mainly caused by freezing to death/hypothermia or drowning, happening in the afternoon and night in an open countryside or on rivers and water bodies; particularly dominant male and adult fatalities; hazardous behavior of victims (or culprits of deadly events) more frequently than non-hazardous.
(v) Detailed knowledge of weather-related fatalities with respect to their spatiotemporal occurrence, structure, and characteristics, with almost half of them classified as hazardous behavior of victims (or culprits of deadly events), offers the possibility to learn from this fatality data to apply appropriate risk communication and contribute to potentially decreasing fatalities (injuries) during extreme weather events.
(vi) Further research on weather-related fatalities in the CR would require their comparison with other official public sources as demographic yearbooks (despite their more generalized data), extension of the period analyzed back to 19th century and the study of fatalities in their broad climatological, environmental, and socioeconomic context in contrast to recent climate change.

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Data Availability Statement: Fatality data from authors database can be made available by the authors upon request.

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Appendix A

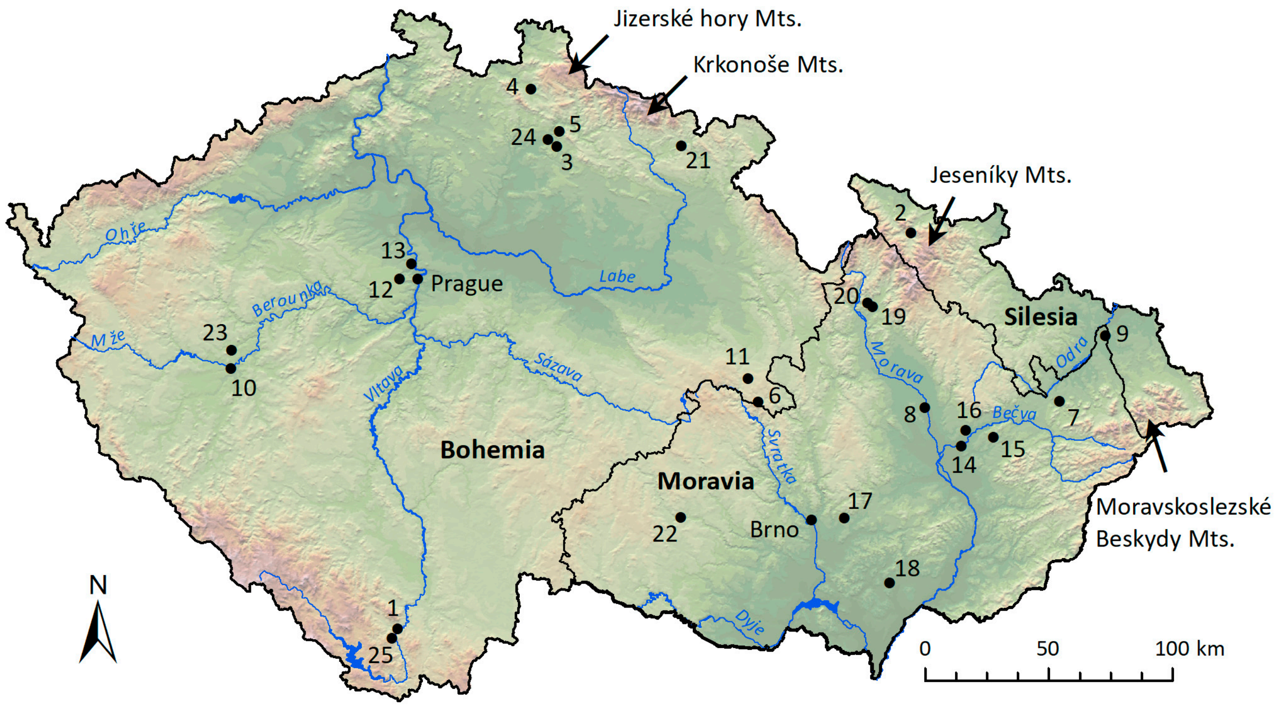

Figure A1. Location of places reported in this study (1—Český Krumlov; 2—Jeseník; 3—Karlovice; 4—Liberec; 5—Loučky; 6—Nedvězí; 7—Nový Jičín; 8—Olomouc; 9—Ostrava; 10—Plzeň; 11—Polička; 12—Prague-Ruzyně; 13—Prague-Suchdol; 14—Přerov; 15—Radotín; 16—Radvanice; 17—Sivice; 18—Šardice; 19—Šumperk; 20—Šumperk-Temenice; 21—Trutnov; 22—Třebíč; 23—Třemošná-Záluží; 24—Turnov; 25—Větřní).

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