

SUMMER AND TROPICAL DAYS IN SLOVAKIA

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INTRODUCTION

The average temperatures in Europe this summer were the highest on record. The extreme heat also led to increased drought risks. August 2022 was generally much drier than average in much of western and parts of east Europe. In fact, many parts of Europe have seen below average precipitation for several years in a row now. The summer of 2022 was the warmest in Slovakia since at least 1931 with a temperature deviation of +3.1 °C from the average of 1931-1960, +3.6 °C from 1951 - 1980, +3.7 °C from 1961-1990, +2.6 °C from 1981 - 2010, or +1.9 °C from 1991 - 2020. Individual months were quite warm. June was the third warmest with a deviation of +2.3 °C from the temperature values of 1991 - 2020, next month July was seventh with a deviation of +1.3 °C and August as third with a deviation of +2.0 °C at least since 1931. If we were to compare with previous periods, the deviations would be even more significant in positive numbers. Drought has threatened much of Europe - the summer of 2022 is likely to be the "worst in 500 years", according to a recent assessment by the European Commission's Joint Research Centre. Since both drought and long periods with high temperatures affect people, their activities and crops, we decided to process periods of consecutive summer and tropical days.

DATA SOURCE/ DEFINITION/METHODS

The data comes from the KMIS database and the information is from the relevant literature and previous processing. Characteristic days in this article and in climate sense are defined as days with a predefined extreme temperature limit during the day. Definitions and limits:

Summer day is defined as a day when maximum air temperature ≥ 25 °C,
Tropical day is defined as a day when maximum air temperature ≥ 30 °C,
Periods are defined as the number of consecutive days with a predefined air temperature (characteristic day) for meteorological station.

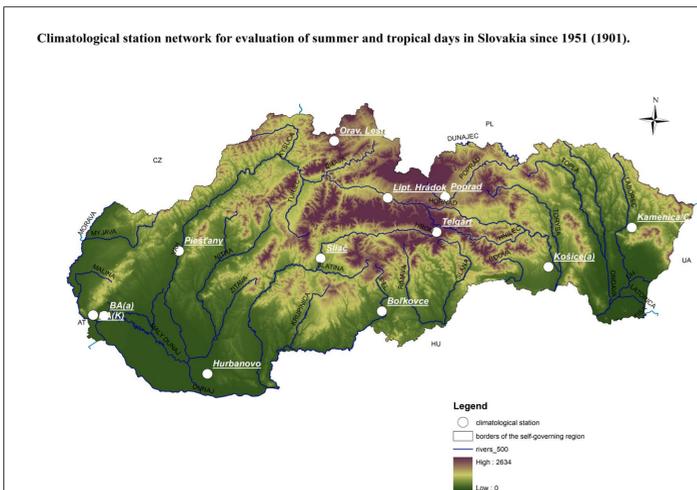


Fig. 1 Station network for evaluation of summer and tropical days in Slovakia since 1951 (1991).

RESULTS

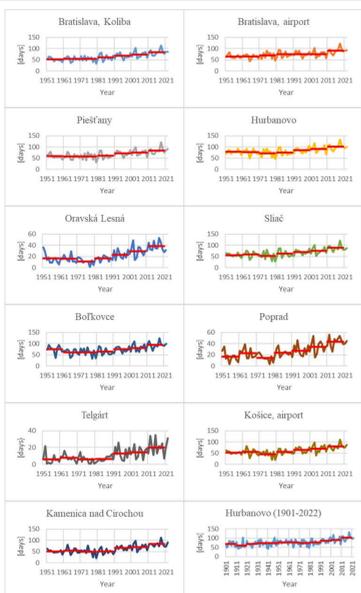


Fig. 2 Time series of summer days and decade averages.

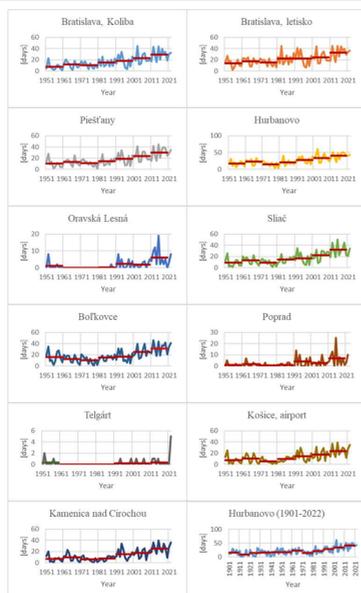


Fig. 3 Time series of tropical days and decade averages.

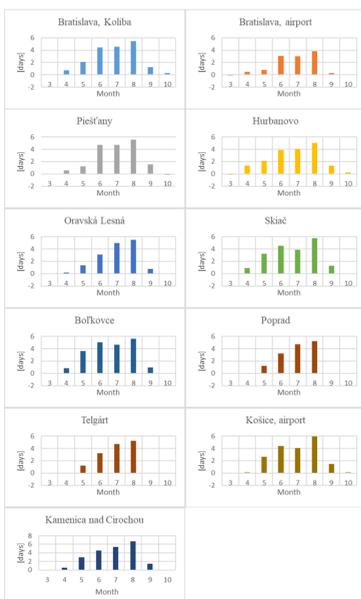


Fig. 4 Normal values comparison of summer days.

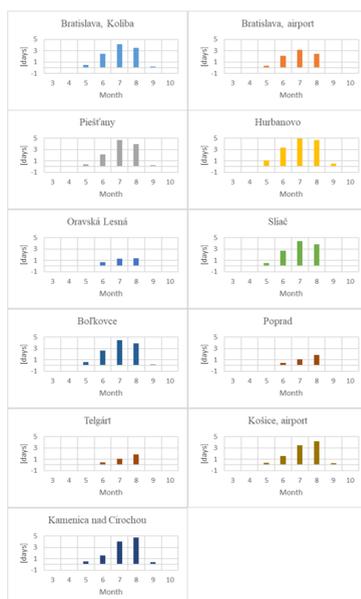


Fig. 5 Normal values comparison of tropical days.

Table 1. Consecutive summer and tropical days and added statistics (1951-2022).

| Ind. | Station name | Char. day | Max period [days] | From | To | First occurrence | Last occurrence | First in records | Last in records |
|-------|-----------------|-----------|-------------------|-----------|-----------|------------------|-----------------|------------------|-----------------|
| 11813 | Bratislava (K) | SD | 34 | 11.7.1994 | 13.8.1994 | 15.5.1994 | 26.9.1994 | 7.4.2011 | 24.10.2019 |
| | | TD | 18 | 22.7.1994 | 8.8.1994 | 26.6.1994 | 17.8.1994 | 29.4.2012 | 22.9.2003 |
| 11816 | Bratislava, (a) | SD | 34 | 18.6.1976 | 21.7.1976 | 4.4.1976 | 13.10.1976 | 24.3.1977 | 24.10.2019 |
| | | TD | 19 | 21.7.1994 | 8.8.1994 | 19.6.1994 | 12.9.1994 | 29.4.2012 | 22.9.2003 |
| 11826 | Piešťany | SD | 34 | 11.7.1994 | 13.8.1994 | 30.4.1994 | 26.9.1994 | 7.4.2011 | 24.10.2019 |
| | | TD | 19 | 21.7.1994 | 8.8.1994 | 27.6.1994 | 10.8.1994 | 30.4.2012 | 22.9.2003 |
| 11858 | Hurbanovo | SD | 47 | 16.7.1992 | 31.8.1992 | 25.4.1992 | 28.9.1992 | 21.3.1974 | 31.10.2001 |
| | | TD | 19 | 21.7.1994 | 8.8.1994 | 19.6.1994 | 2.9.1994 | 24.4.1968 | 30.9.1991 |
| 11868 | Orav. Lesná | SD | 18 | 22.7.1994 | 8.8.1994 | 18.5.1994 | 2.9.1994 | 28.4.2012 | 15.10.2000 |
| | | TD | 8 | 6.8.2015 | 13.8.2015 | 5.7.2015 | 1.9.2015 | 7.6.1998 | 1.9.2015 |
| 11874 | Lipt. Hrádok | SD | 24 | 17.7.2013 | 9.8.2013 | 26.4.2013 | 8.9.2013 | 21.4.2018 | 25.10.2019 |
| | | TD | 10 | 25.7.1994 | 3.8.1994 | 27.6.1994 | 6.8.1994 | 8.5.2003 | 1.9.2015 |
| 11903 | Sliac | SD | 46 | 17.7.1992 | 31.8.1992 | 26.4.1992 | 12.9.1992 | 3.4.2017 | 18.10.1953 |
| | | TD | 16 | 22.7.1994 | 6.8.1994 | 27.6.1994 | 8.8.1994 | 30.4.2012 | 19.9.1961 |
| 11927 | Boľkovec | SD | 51 | 15.6.2021 | 4.8.2021 | 1.4.2021 | 28.9.2021 | 21.3.1974 | 11.10.1995 |
| | | TD | 18 | 22.7.1994 | 8.8.1994 | 26.6.1994 | 14.9.1994 | 30.4.2012 | 19.9.1961 |
| 11934 | Poprad | SD | 19 | 21.7.1994 | 8.8.1994 | 17.5.1994 | 14.9.1994 | 21.4.2018 | 24.10.2019 |
| | | TD | 10 | 6.8.2015 | 15.8.2015 | 5.7.2015 | 1.9.2015 | 8.5.2003 | 1.9.2015 |
| 11938 | Telgárt | SD | 17 | 23.7.1994 | 8.8.1994 | 26.6.1994 | 11.8.1994 | 1.5.2012 | 19.9.1961 |
| | | TD | - | - | - | - | - | - | - |
| 11968 | Košice (L) | SD | 38 | 19.7.2018 | 25.8.2018 | 12.4.2018 | 13.10.2018 | 22.3.1974 | 19.10.1961 |
| | | TD | 18 | 22.7.1994 | 8.8.1994 | 27.6.1994 | 14.9.1994 | 1.5.2012 | 18.9.2015 |
| 11993 | Kamenica /C | SD | 37 | 20.7.2018 | 25.8.2018 | 12.4.2018 | 21.9.2018 | 6.4.1968 | 20.10.1961 |
| | | TD | 22 | 21.7.1994 | 11.8.1994 | 18.5.1994 | 14.9.1994 | 1.5.2012 | 18.9.2015 |

Legend:

Ind. – international station number
SD – summer day and TD – tropical day
Bratislava (K) - Bratislava, Koliba
Bratislava, (a) - Bratislava, airport
Orav. Lesná - Oravská Lesná
Lipt. Hrádok - Liptovský Hrádok
Košice (a) - Košice, airport
Kamenica /C - Kamenica nad Cirochou

HURBANOVO (1901-

NUMBER OF SUMMER and TROPICAL DAYS and LONGEST PERIODS (consecutive days)

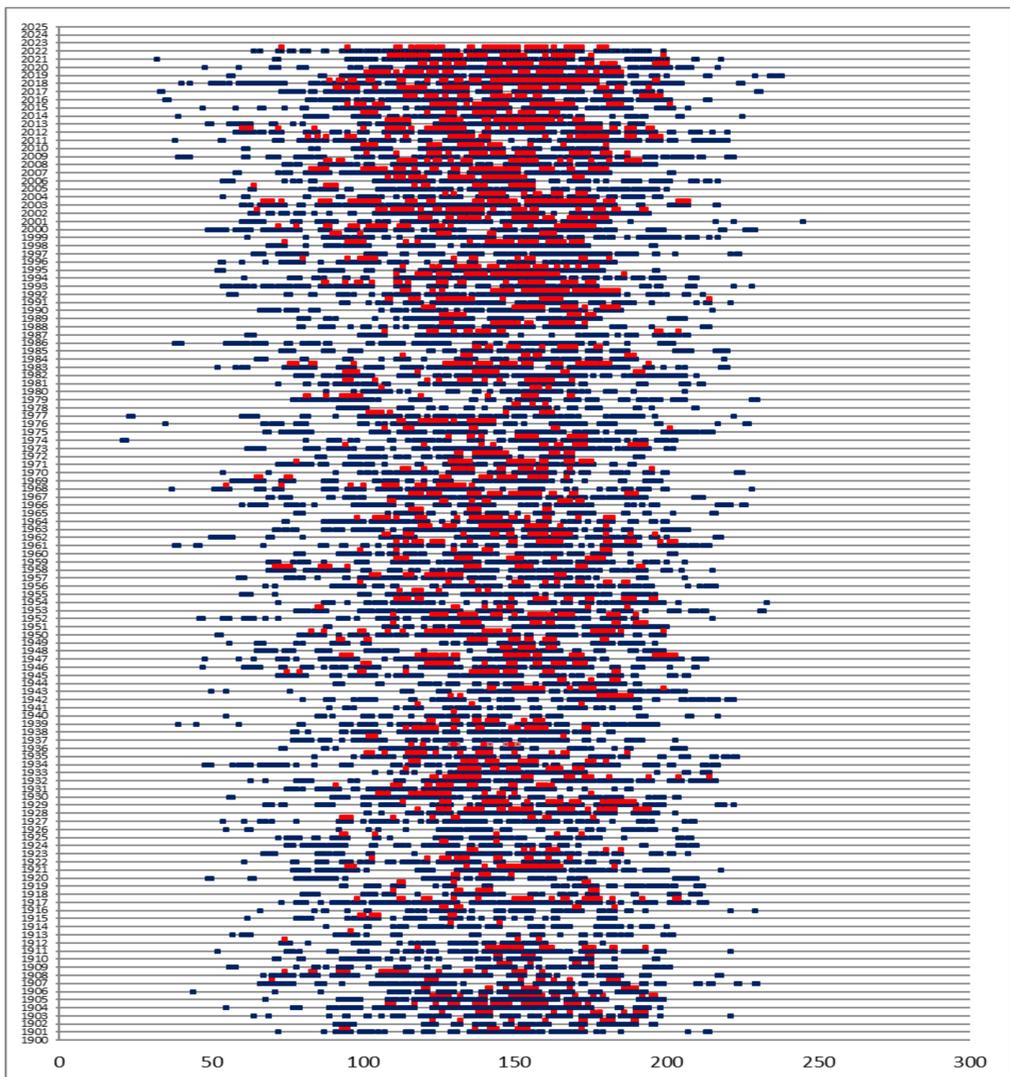


Fig. 6 Summer and tropical days (consecutive days) at Hurbanovo (1901-2022).

CONCLUSIONS

In the article, we mainly focused on expressing the trend in the number of summer and tropical days. We pointed out the differences between individual decades. We compared values from normal periods, classified as periods for determining climate change in 30 years. We found the longest periods of consecutive days (summer and tropical). We documented the statistics for when they occurred (first and last summer and tropical day). We found the historically first, last day of occurrence of a summer and tropical day at selected meteorological stations. The results can be used by farmers, foresters, tourism as well as for the general awareness of the population about climate change in the conditions of Slovakia.

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