



Heat Waves in Romania. Regional Features and Changes

Adina-Eliza CROITORU

Babeş-Bolyai University, Faculty of Geography, Romania
croitoru@geografie.ubbcluj.ro



1. CONTEXT AND AIM

1.1. Context

Climate changes have currently become one of the major social, economic and environmental threats. Moreover, it is considered that extreme temperatures will be some of the most affected climatic parameters while Europe emerges as an especially responsive area to temperature rise, particularly during the warm season (Giorgi, 2004). One expression of global warming is the noticeable increase in the occurrence of heat waves (HWs) (Easterling et al., 2000; Frich et al., 2002; Schär et al., 2014).

1.2. Aim

The main aims of this study are :

- to present the spatio-temporal distribution and changes that occurred in HWs in Romania over a 53-year period;
- to identify the most vulnerable areas in Romania to this type of extreme events.

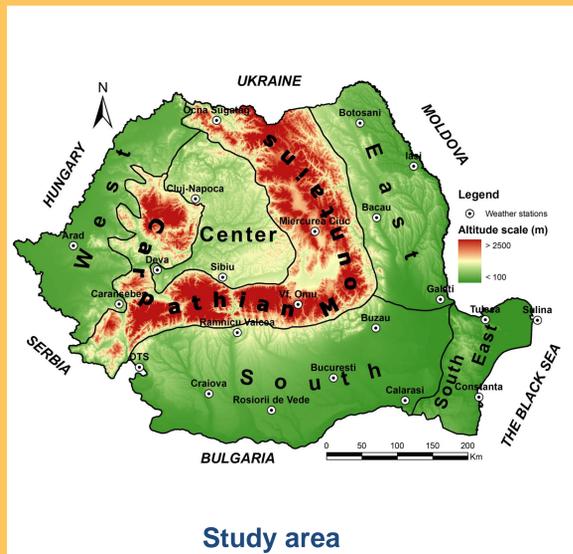
2. MATERIALS AND METHODS

2.1. Study area

Romania is located in South-eastern Europe, in a temperate climate area. The topography of the country is very diverse, from flat plain to high mountains. The altitude ranges between 0 and more than 2500 m. Geographically, the study area extends on more than 4° of latitude (between 43°40' and 48°11') and on more than 10° on longitude (between 20°18'E and 29°41'E) and thus, different climatic regimes are specific over the considered area (Fig. 1).

2.2. Data used

The identification of HWs in Romania was made considering the maximum daily temperature data series recorded in 22 weather stations, covering a 53-year period: 1961-2013.



2.3. Methods

3.2.1. Thresholds for HWs detection:

Intensity : the 95th percentile of daily maximum air temperature;

Duration : minimum three consecutive days with maximum air temperature at least equal or higher to the 95th percentile of the day.

3.2.2. Heat waves parameters:

• **HWs number (HWsN)**: the number of HWs that occur in a given time interval;

• **HWs day frequency (HWsDF)**: the number of days under HW conditions in a given time interval (the annual number and the total number over the entire 53-year period);

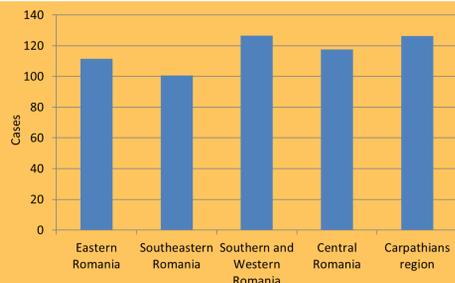
• **HWs mean duration (HWsMD)**: the average number of days under HW conditions per event in a given time period;

• **HWs maximum duration (HWsMxD)**: the maximum number of days under HW conditions per event over the considered period.

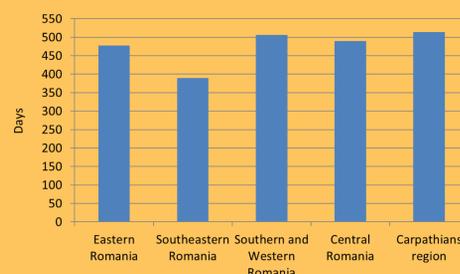
3.2.3. Trend detection

- Mann-Kendall test and Sen's slope;
- **MAKESENS** template.

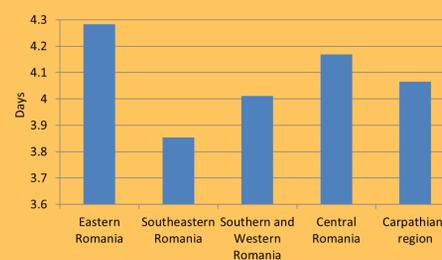
3. RESULTS



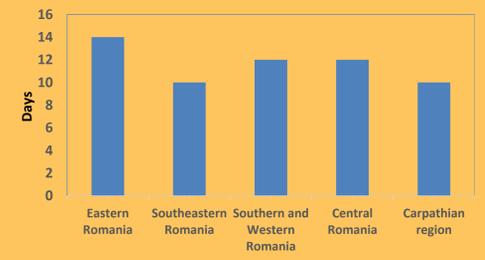
Mean regional HWsN



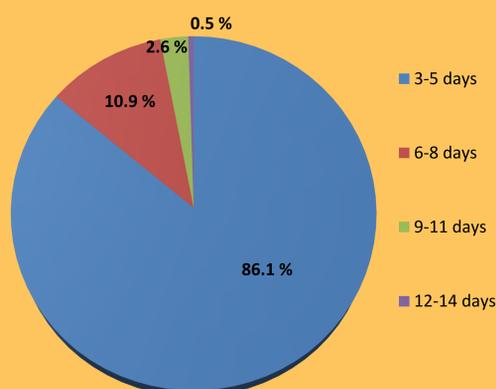
Mean regional HWsDF



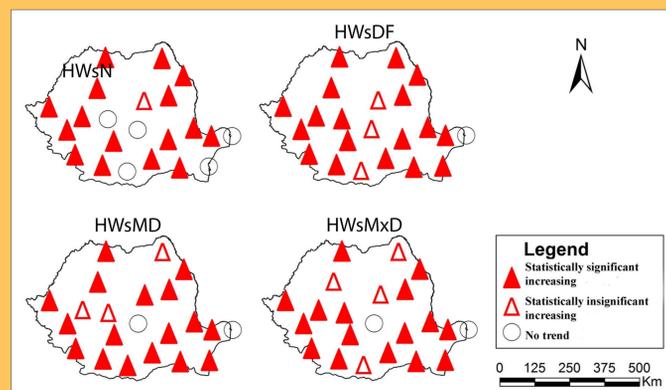
Mean regional HWsMD



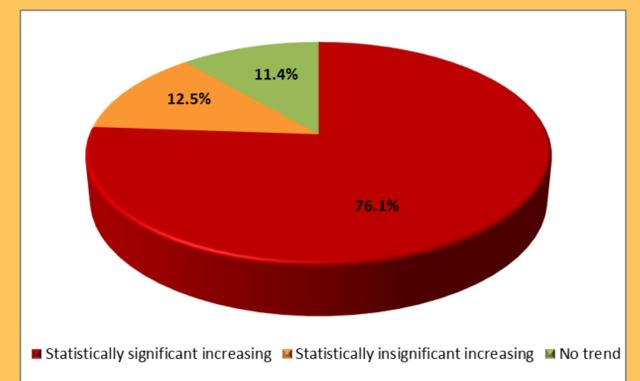
Mean regional HWsMxD



HWs frequency by duration



Changes in heat waves parameters over the period 1961-2013



Frequency of trend types for all HWs parameters

4. CONCLUSIONS

- The most and the longest heat waves occurred in the Southern and Western Romania;
- The less and the shortest heat waves were recorded in the Southeast of the country;
- The most locations recorded increasing trends for all heat waves parameters;
- More than 75 % of the trends detected are statistically significant increasing.

ACKNOWLEDGEMENTS

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