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Mega-heatwaves in Europe 1960-2017

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Heat waves are observed to have risen in frequency and magnitude at the end of XX and beginning of the XXI century. Those phenomena cause increased number of deaths, especially among elderly population, adverse health effects, damages to the ecosystems, losses in agriculture, economy, transportation and insurances. Extremely severe heatwaves are called 'mega-heatwaves'. Several methods of defining heatwaves and mega-heatwaves are discussed, together with different heatwave classification systems. Here, heatwaves are defined as at least three consecutive days with maximum daily temperature exceeding 95 percentile values from period 1971-2000. Mega-heatwaves are defined, when during heatwaves sum of excess of maximum temperature above 95 percentile value is at least 50°C. Although mega-heatwaves are defined based on maximum temperature, also the mean and minimum temperature values are included in the assessment of the mega-heatwave severity. The data (maximum, average and minimum daily temperatures) were obtained from ECA&D project (www.ecad.eu) for 281 European stations (1960-2017). The stations were selected in such way to have at least 95% of the data from the analyzed period and to cover Europe as equally as possible. The most severe mega-heatwaves have occurred in 2010 and 1972 in Russia, in 2003, 1976 and 1983 in Western Europe, in 1994 and 2015 in Central Europe and in 2015 and 1972 in Northern Europe. Mega-heatwave classification system is presented, in which (depending on the excess values) 6 types of events are distinguished: 1st from 51 to 100°C temperature excess, 2nd (101-150°C), 3rd (151-200°C), 4th (201-250°C), 5th (251-300°C) and 6th – above 300°C excess.