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Examining the Eastern European extreme summer temperatures of 2023 from a long-term perspective: the role of natural variability vs. anthropogenic factors

Monica Ionita et al.

Correspondence to: Monica Ionita (monica.ionita@awi.de)

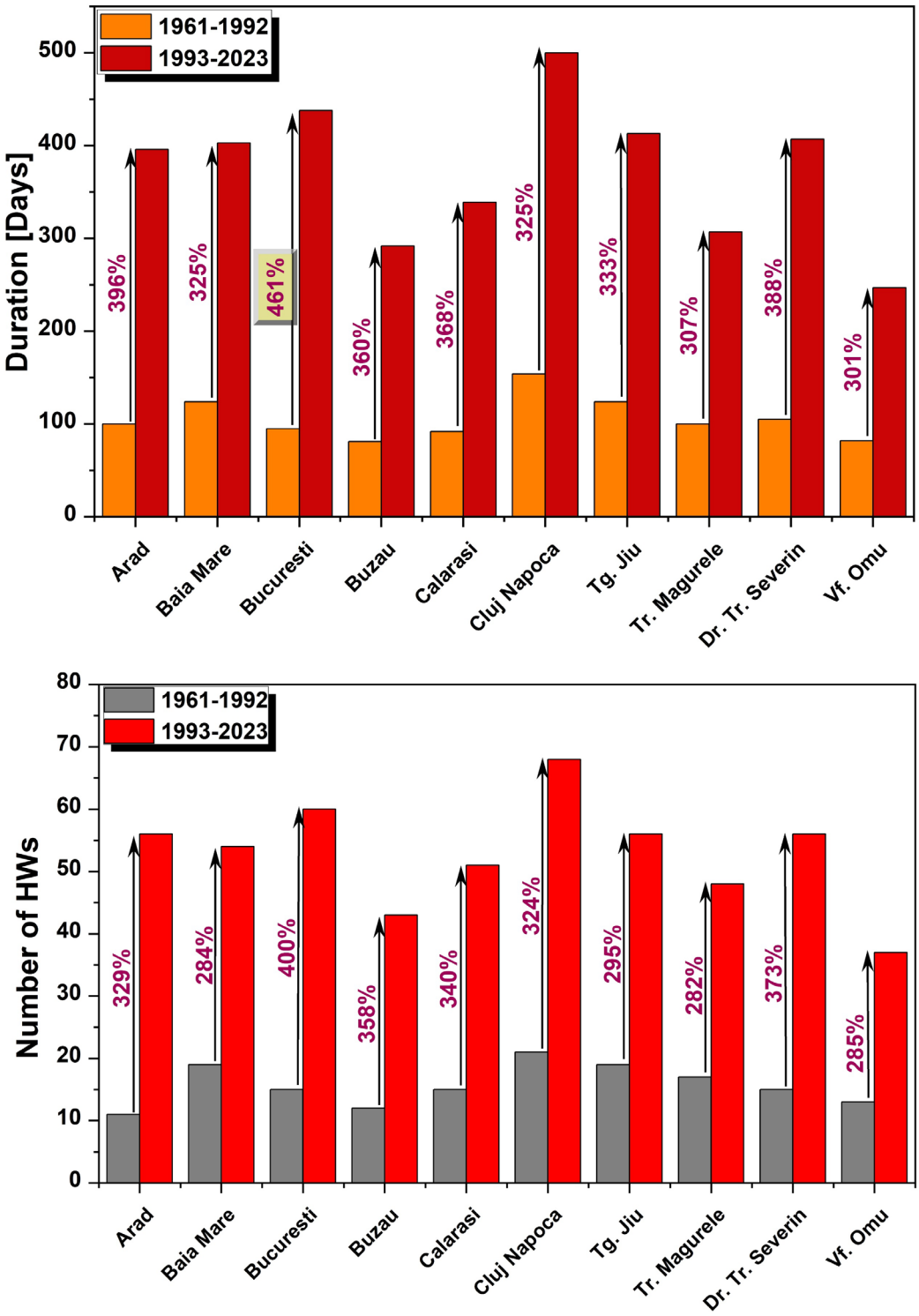

Figure S1. a) Distribution of the duration (i.e., sum of all days affected by a HW) over two periods, namely 1961 – 1992 (orange bars) and 1993 – 2023 (red bars), respectively and b) Distribution of the number of HWs (i.e., sum of all HWs) over two periods, namely 1961 – 1992 (gray bars) and 1993 – 2023 (red bars), respectively. The black arrows in a) and b) indicated the rate of change (as %) between the two analyzed periods.

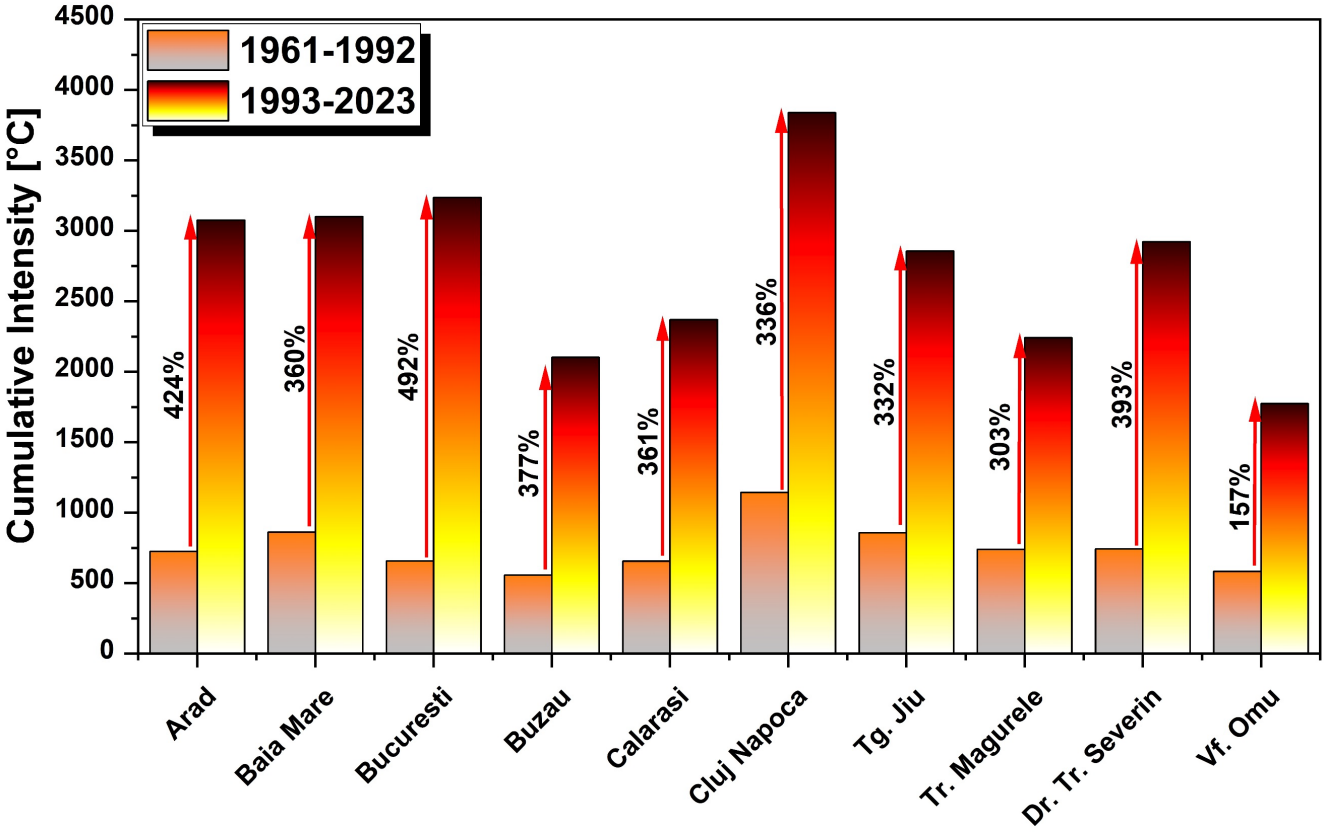

Figure S2. Distribution of the cumulative intensity (i.e., sum of daily maximum temperature anomaly over all days affected by a HW) over two periods, namely 1961 – 1992 (grey-to-orange bars) and 1993 – 2023 (yellow-to-red bars), respectively. The black arrows indicate the rate of change (as %) between the two analyzed periods. Yellow (grey) colors indicate smaller values, while red (orange) colors indicate higher values.

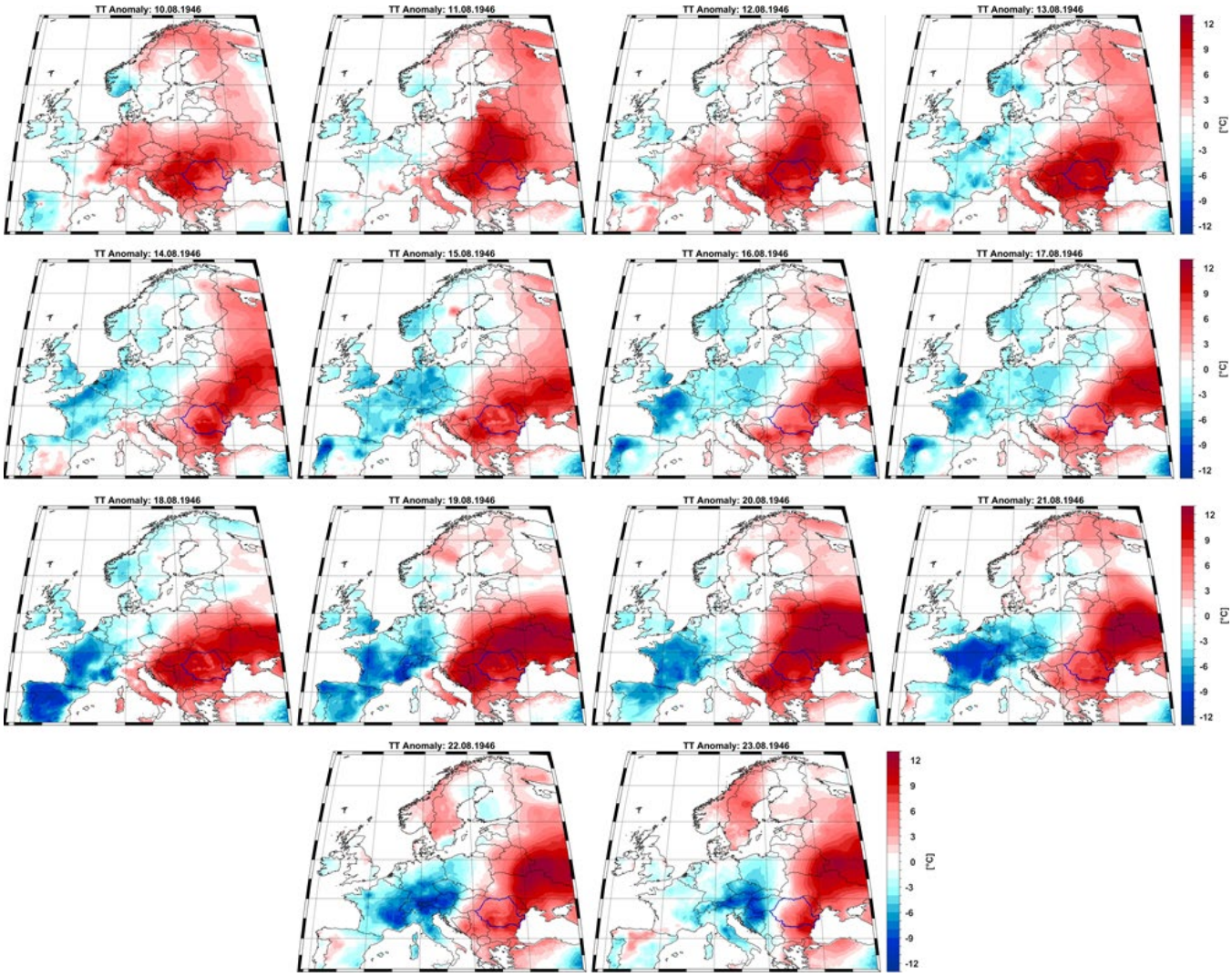

Figure S3. Spatial and temporal evolution of the daily maximum temperature anomaly over Europe over the period 10.08.1946 – 23.08.1946. The anomalies are computed relative to the climatological period 1971 – 2000.

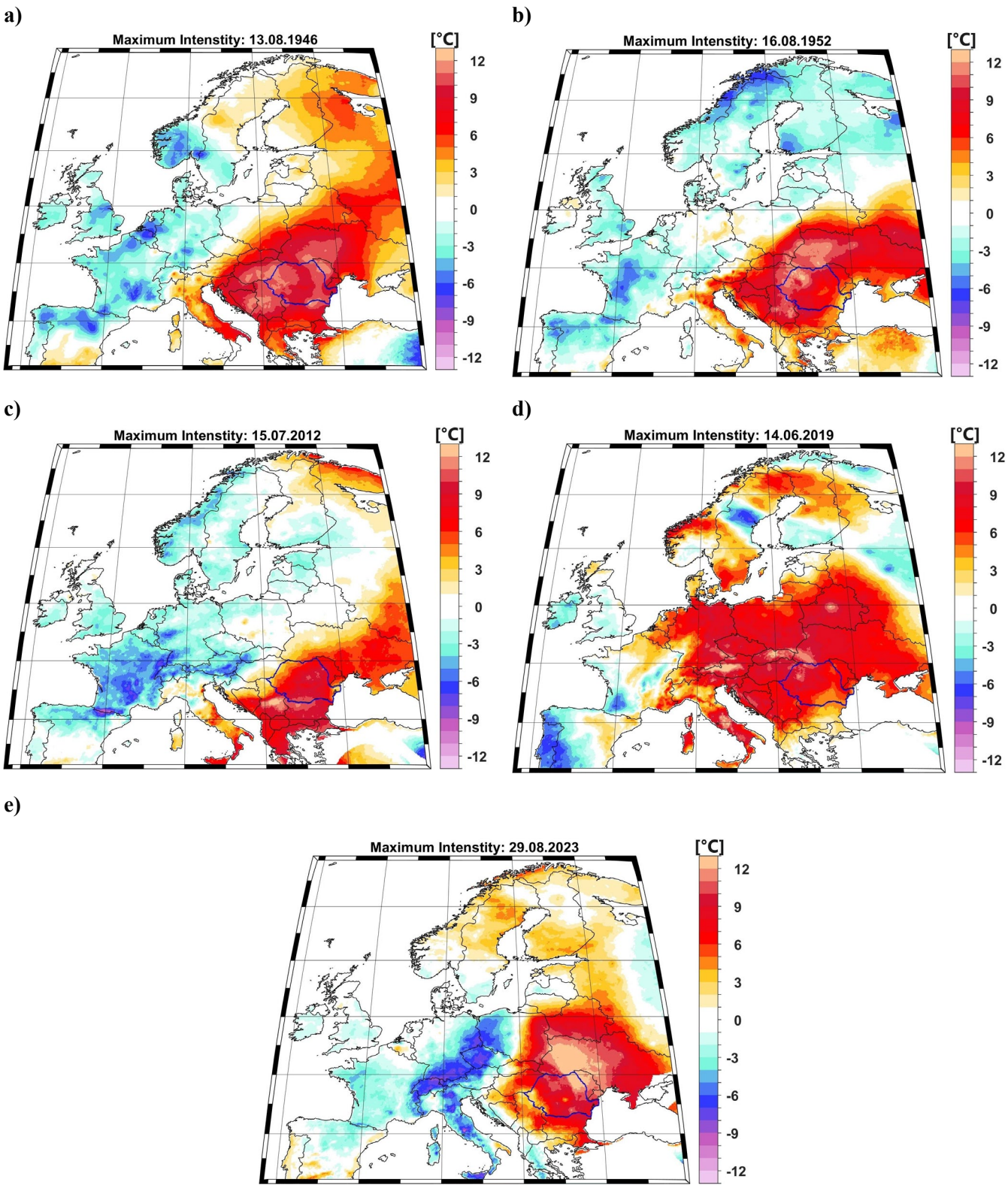

Figure S4. Daily maximum temperature anomaly on the day of the HW peak for different heatwave events: a) August 1946; c) August 1952; c) June/July 2012; d) June 2019 and e) August 2023. The anomalies are computed relative to the climatological period 1971 – 2000.

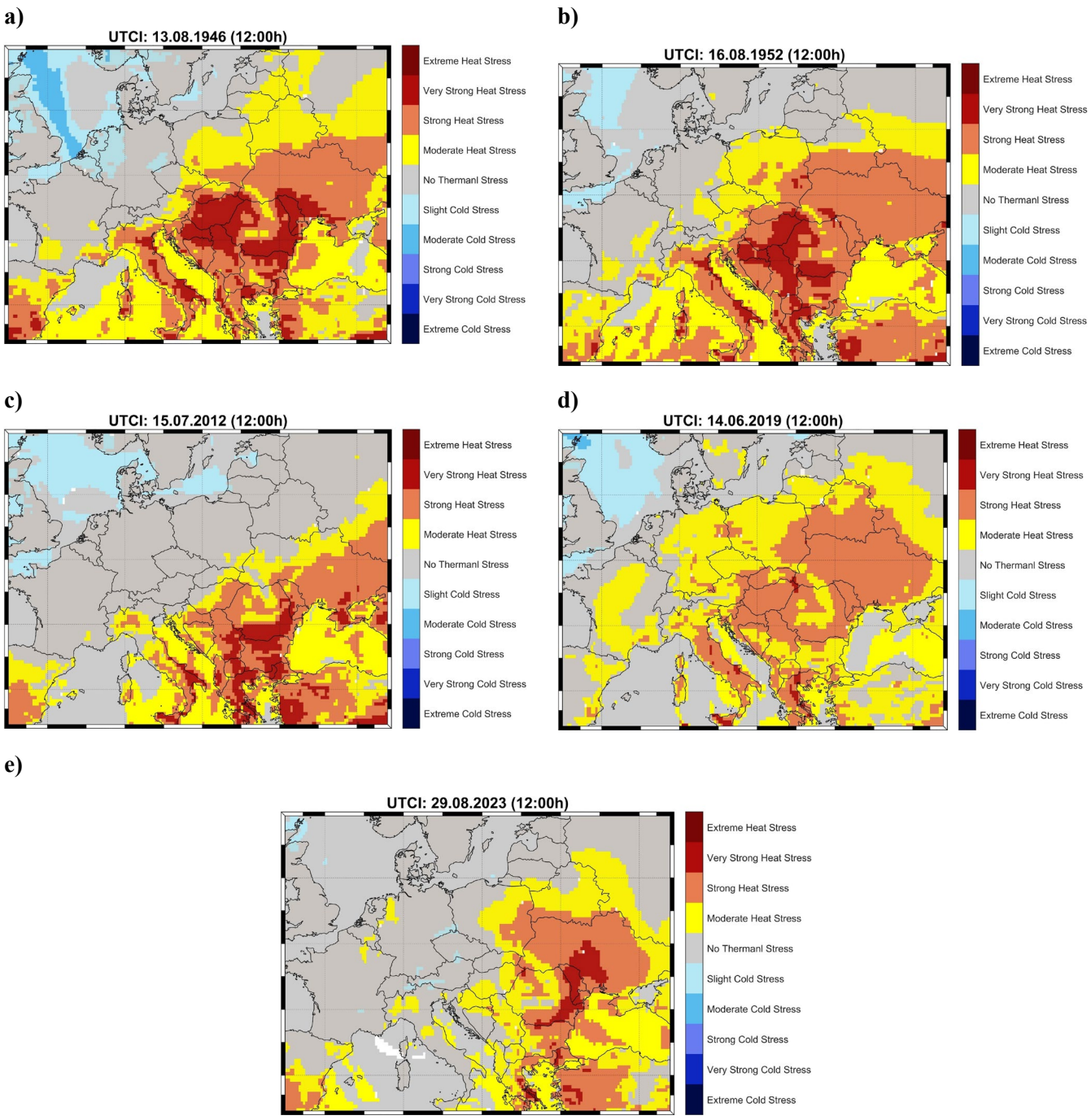

Figure S5. The value of the Universal Thermal Climate Index (UTCI) at 12:00 p.m. on the day of the HW, for different HW events: a) August 1946; c) August 1952; c) June/July 2012; d) June 2019 and e) August 2023.

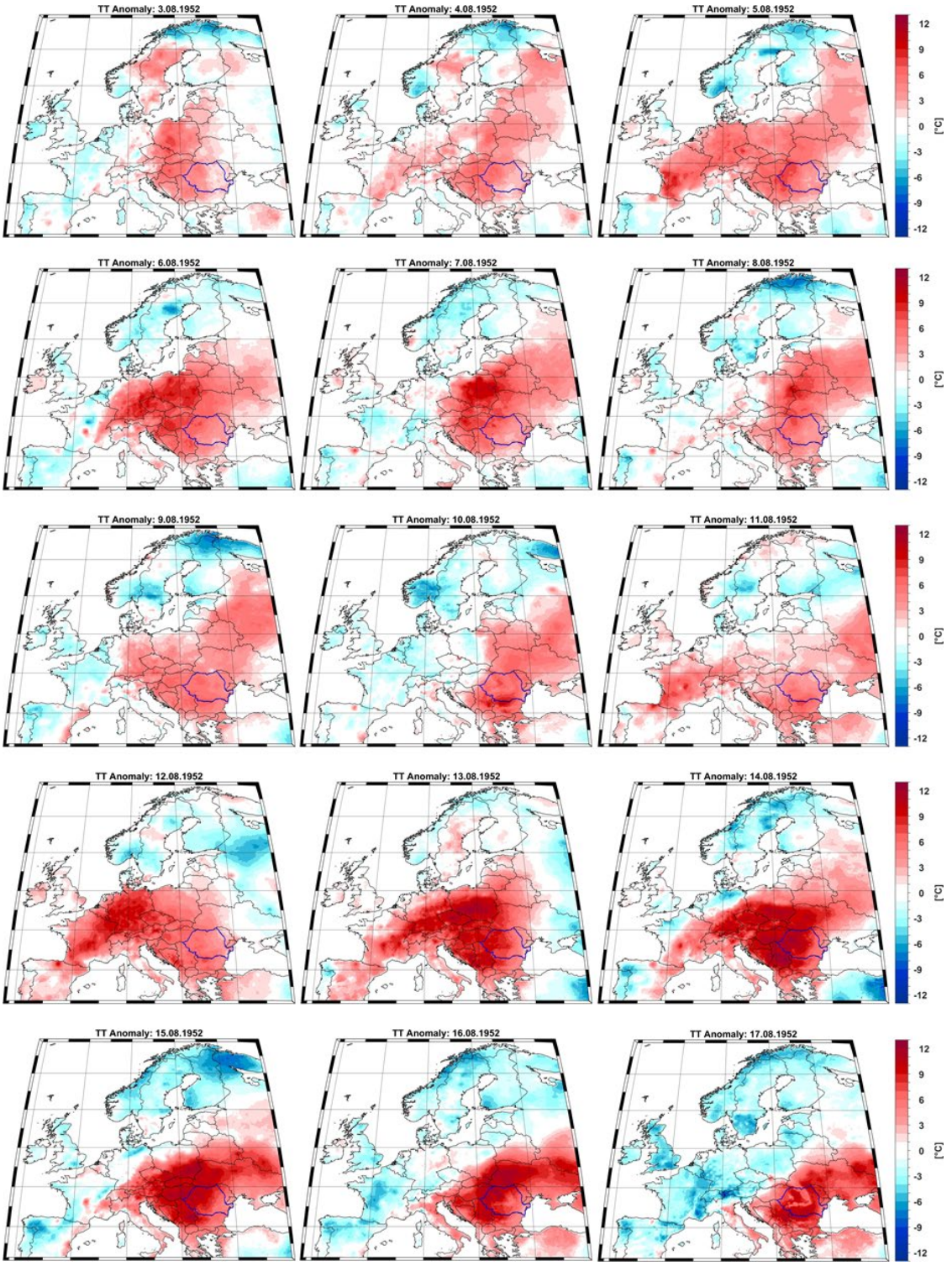

Figure S6. Spatial and temporal evolution of the daily maximum temperature anomaly over Europe over the period 3.08.1952 – 17.08.1952. The anomalies are computed relative to the climatological period 1971 – 2000.

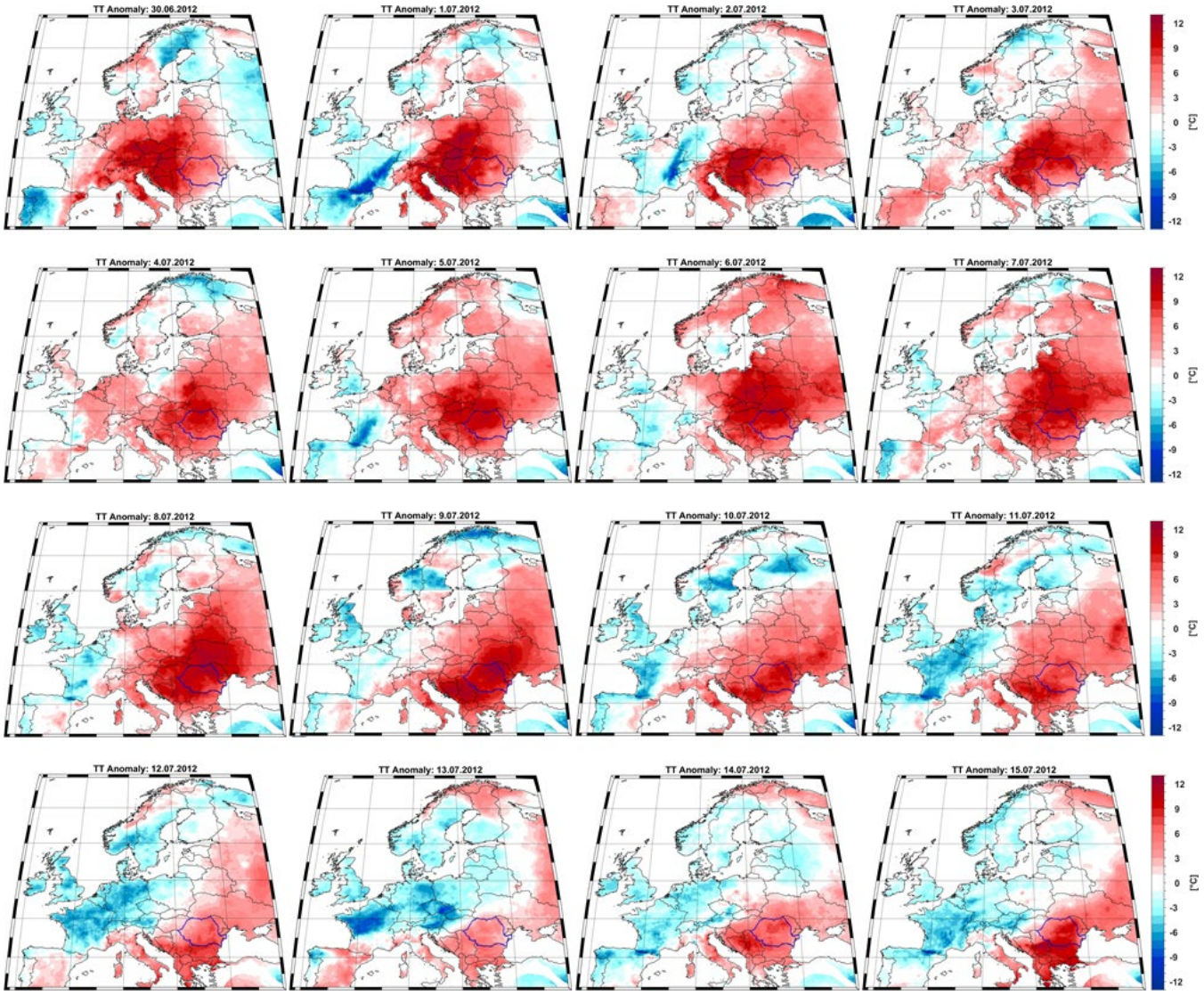

Figure S7. Spatial and temporal evolution of the daily maximum temperature anomaly over Europe over the period 30.06.2012 – 15.07.2012. The anomalies are computed relative to the climatological period 1971 – 2000.

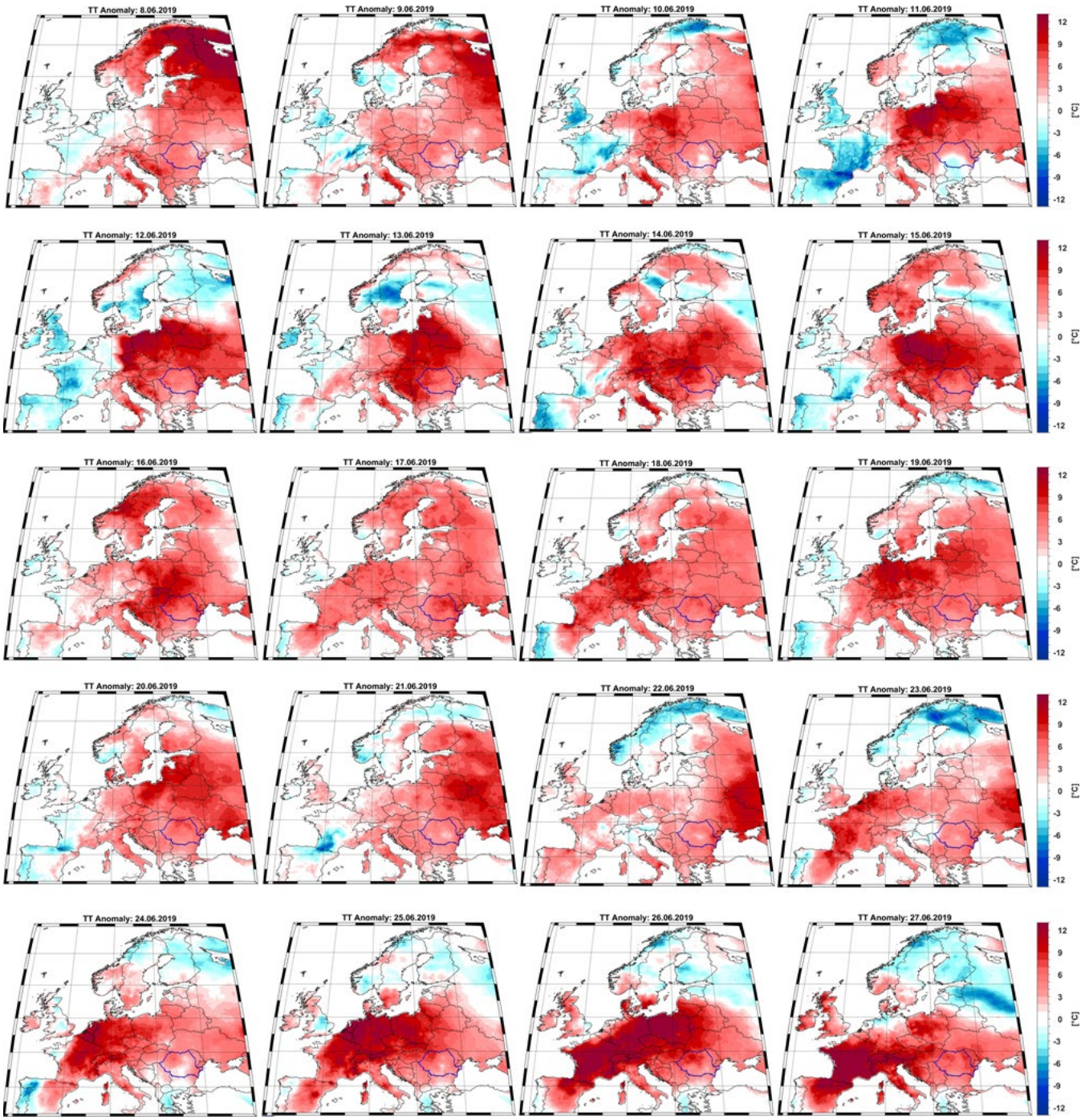

Figure S8. Spatial and temporal evolution of the daily maximum temperature anomaly over Europe over the period 12.06.2019 – 27.06.2019. The anomalies are computed relative to the climatological period 1971 – 2000.

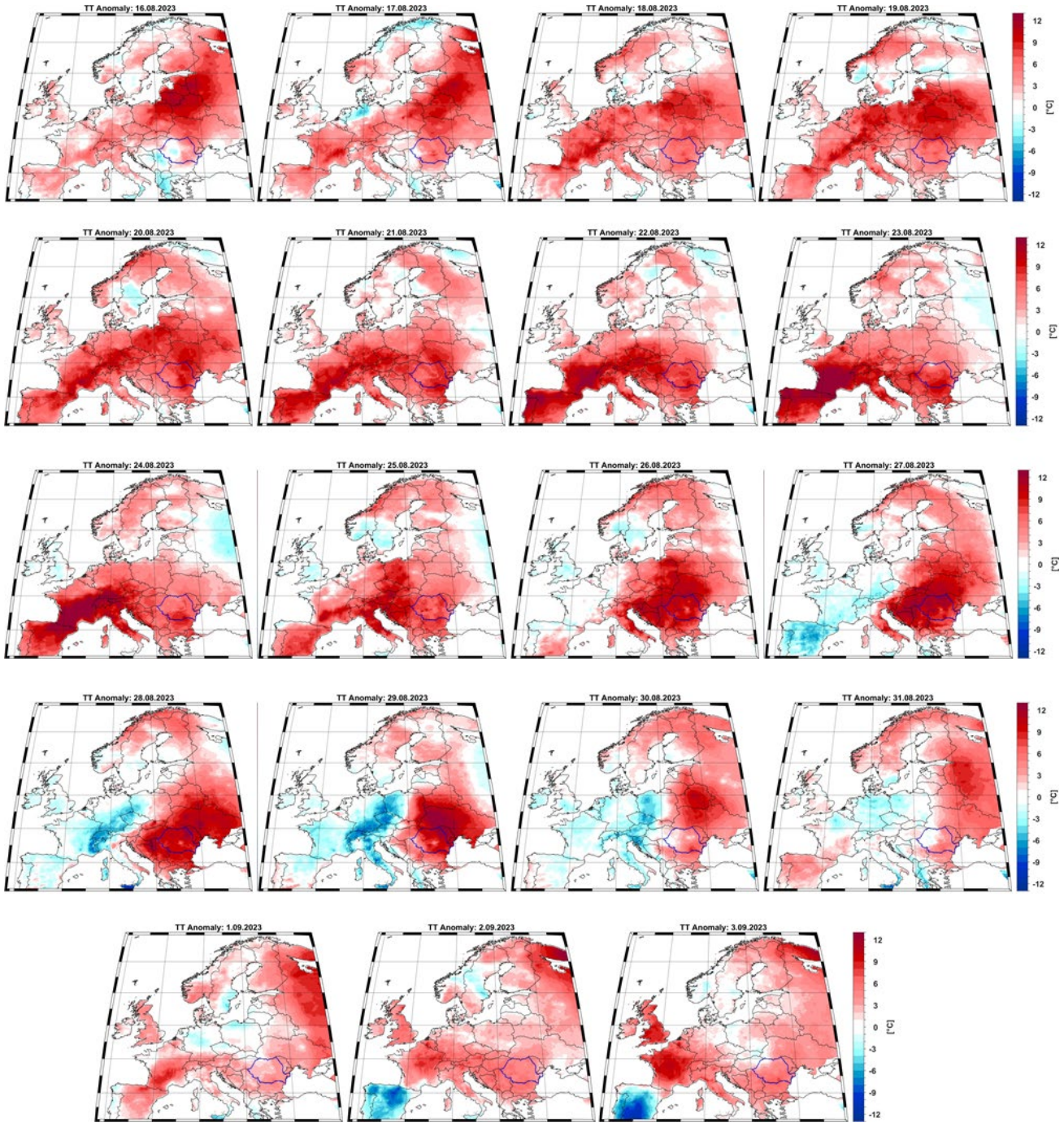

Figure S9. Spatial and temporal evolution of the daily maximum temperature anomaly over Europe over the period 16.08.2023 – 3.09.2023. The anomalies are computed relative to the climatological period 1971 – 2000.