Supplementary Material S1: Study area

Table S1. General characteristics of selected rivers in the western Ukrainian parts of the Danube and Dniester catchments

№	Basin	River	Catchment area, [km^2]		Length, km		Average slope, ‰
			general	within Ukraine	general	within Ukraine	
1	Danube	Tisza	157186	12 810	966	201	1,2
2		Prut	27540	9327	967	299	1,9
3		Siret	47600	2070	513	100	4,4
4	Dniester	Dniester	72100	53961	1362	925	0,6

Supplementary Material S2: Time series of summer precipitation in the target region (2000-2022)

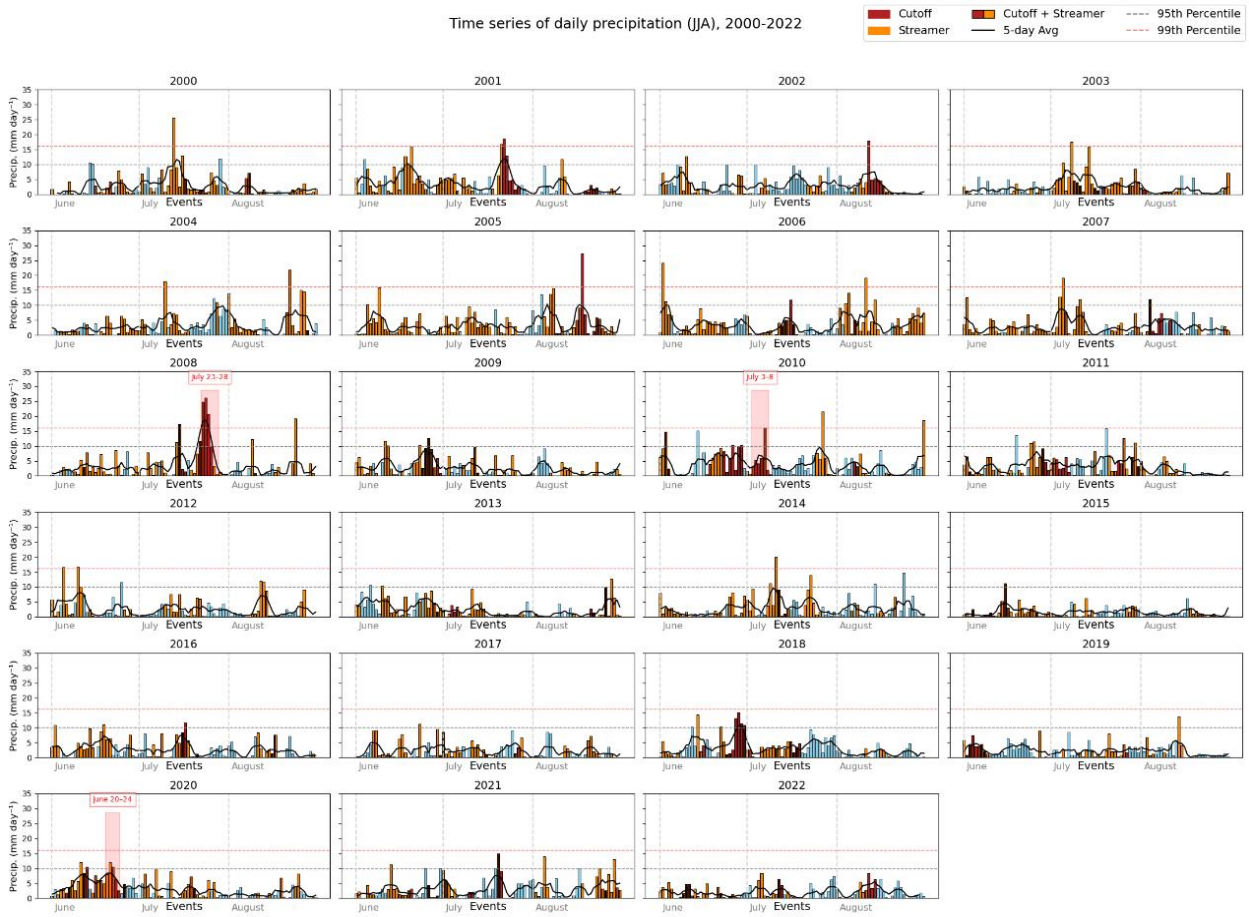

Figure S1. Summer time series from 2000 to 2022 of daily precipitation and different PV structures over the target region (40^0-55^0 N, 15^0-35^0 E). The data are color-coded to distinguish between precipitation related to cutoffs (red), streamers (orange), combined cutoff/streamer occurrences (red/orange), and precipitation events non-related to PV structures (blue). The black solid line shows a five-day rolling average, and the grey and pink dashed lines are the 95th and 99th percentiles of precipitation, respectively. The three case studies discussed in the paper in 2008, 2010 and 2020 are marked with a pink band.

Supplementary Material S3: Observed precipitation

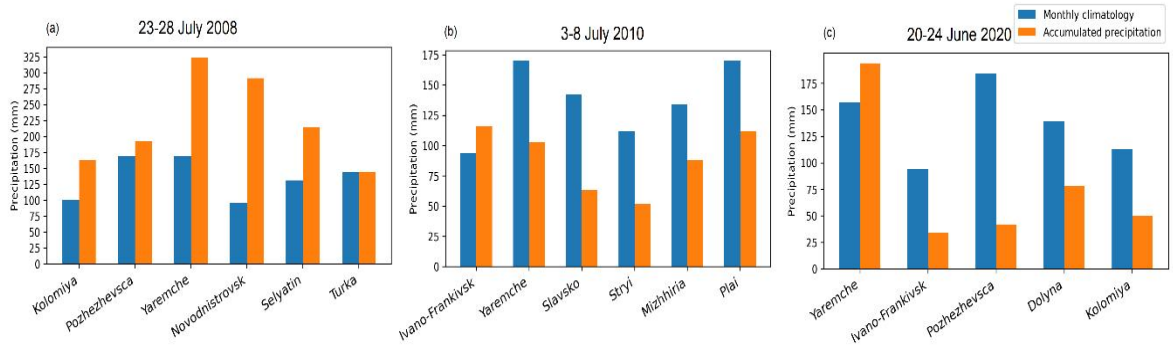

Figure S2. Comparison of observed accumulated precipitation during the flood events (orange) and the monthly climatological precipitation (blue) at 6 stations in western Ukraine.

Supplementary Material S4: Synoptic and PV analysis

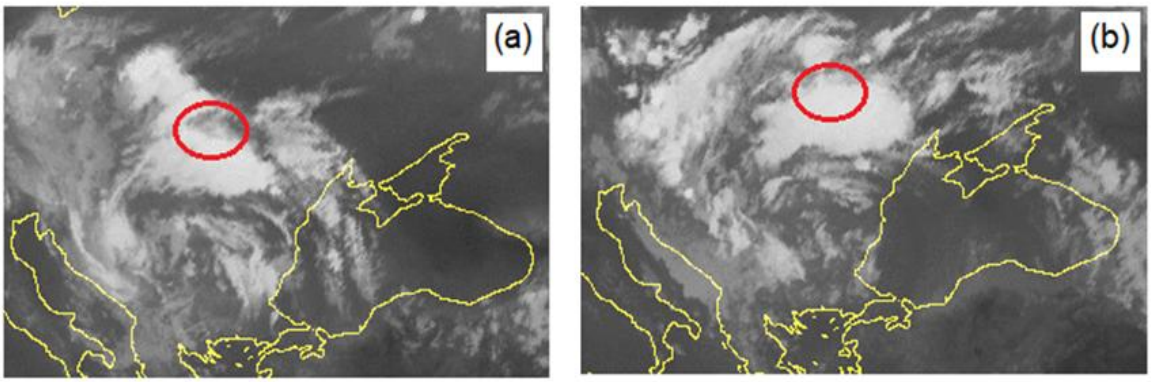

Figure S3. MET IR satellite imagery zoomed over Eastern Europe: a) at 1800UTC on 24 July 2008, b) at 1800UTC on 25 July 2008. The red circle highlights the region affected by the flood. (https://www.berliner-wetterkarte.de/archiv/)

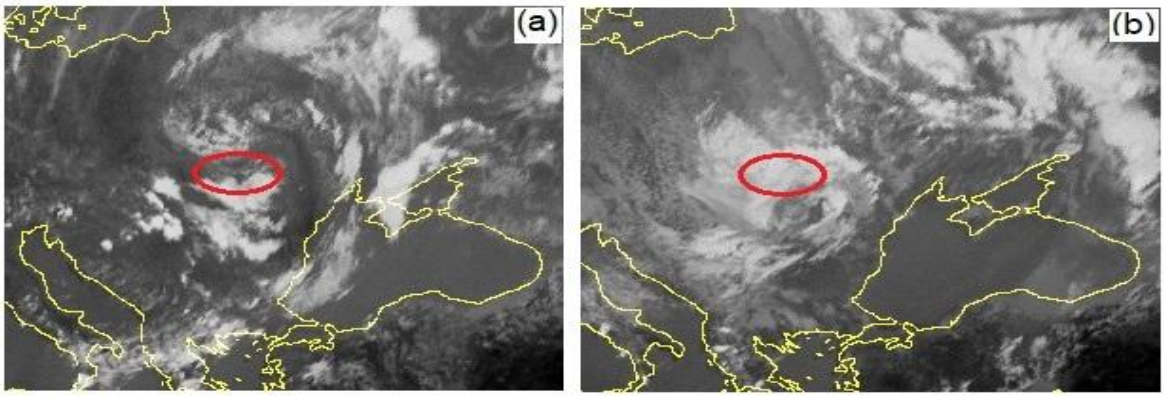

Figure S4. MET IR satellite imagery zoomed over Eastern Europe: a) at 1200 UTC on 03 July 2010, b) at 1200 UTC on 07 July 2010. The red circle highlights the region affected by the flood. (https://www.berliner-wetterkarte.de/archiv/)

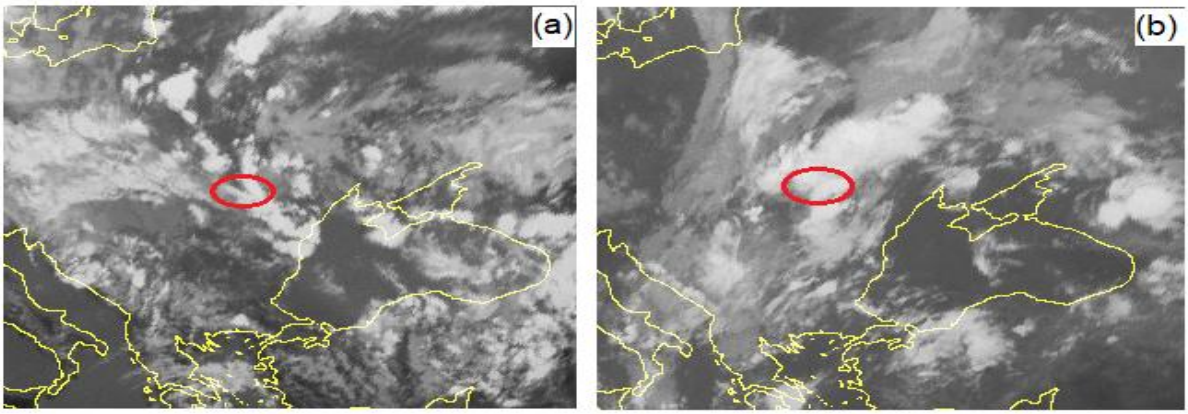

Figure S5. MET IR satellite imagery zoomed over Eastern Europe: a) at 1200 UTC on 20 June 2020, b) at 1800 UTC on 22 June 2020. The red circle highlights the region affected by the flood. (https://www.berliner-wetterkarte.de/archiv/)