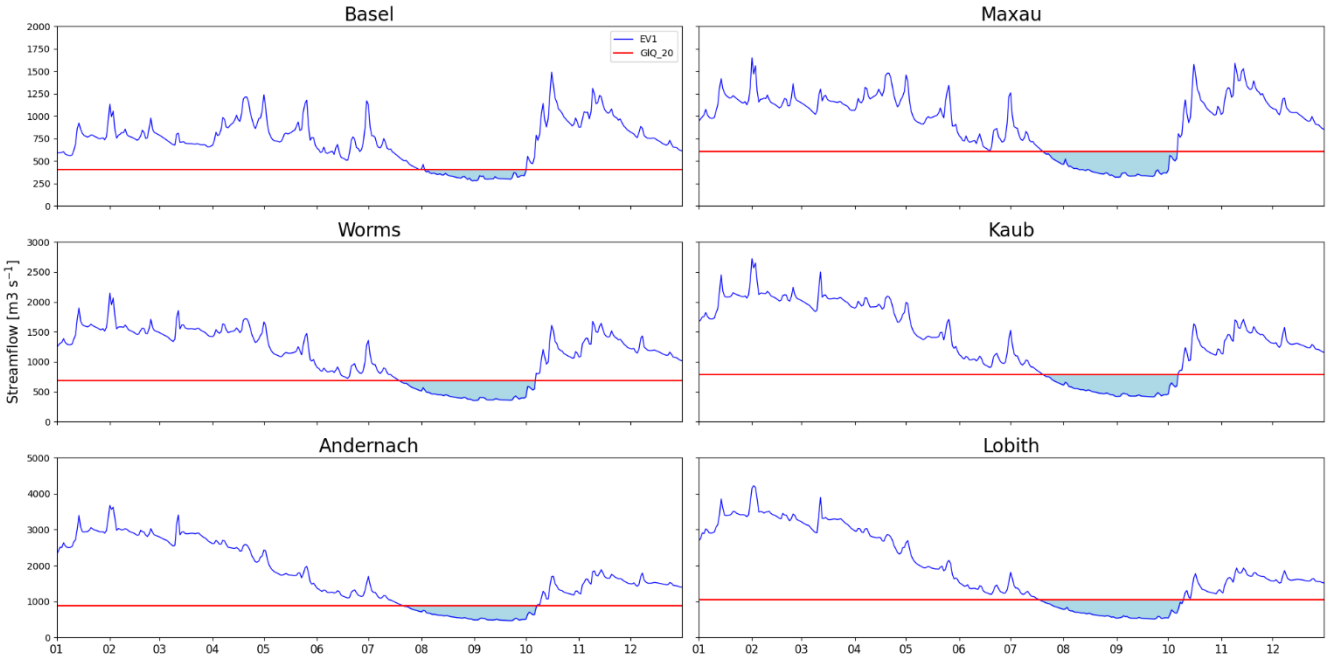

Fig S1. Daily hydrographs at the gauges in the waterway of the Rhine River of the EV1 (blue line), in comparison with the navigation threshold GlQ20 (red).

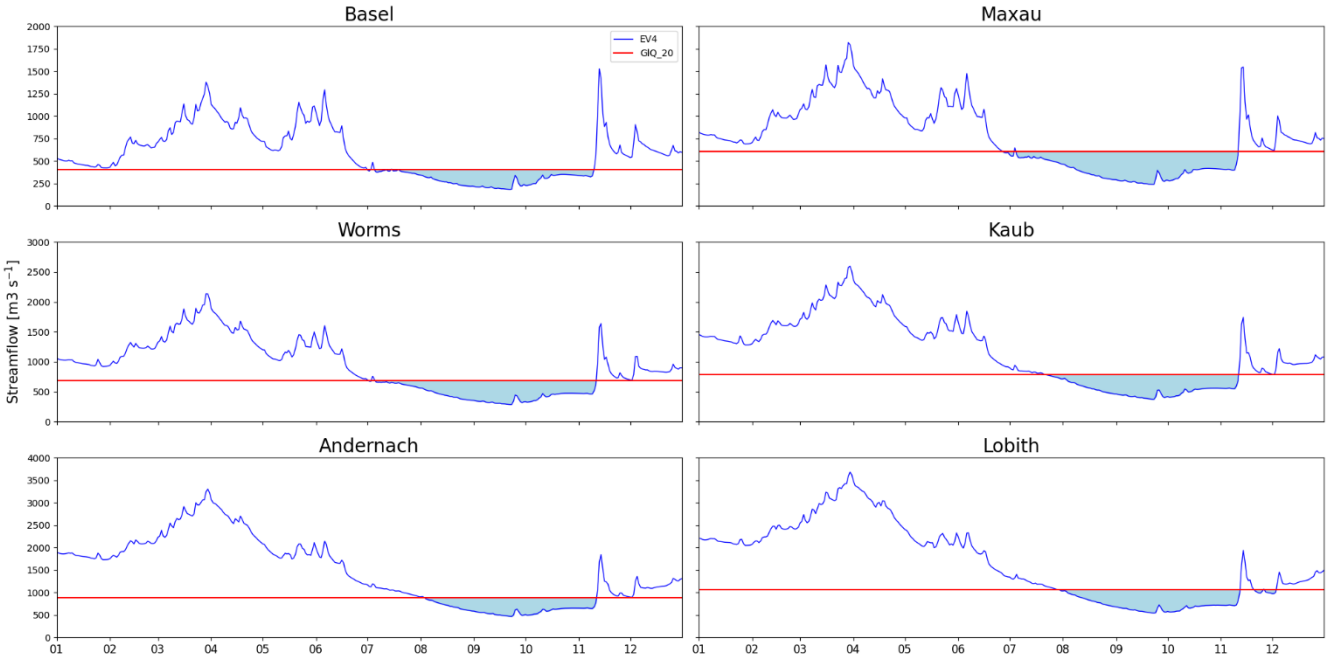

Fig S2. Daily hydrographs at the gauges in the waterway of the Rhine River of the EV4 (blue line), in comparison with the navigation threshold GlQ20 (red).

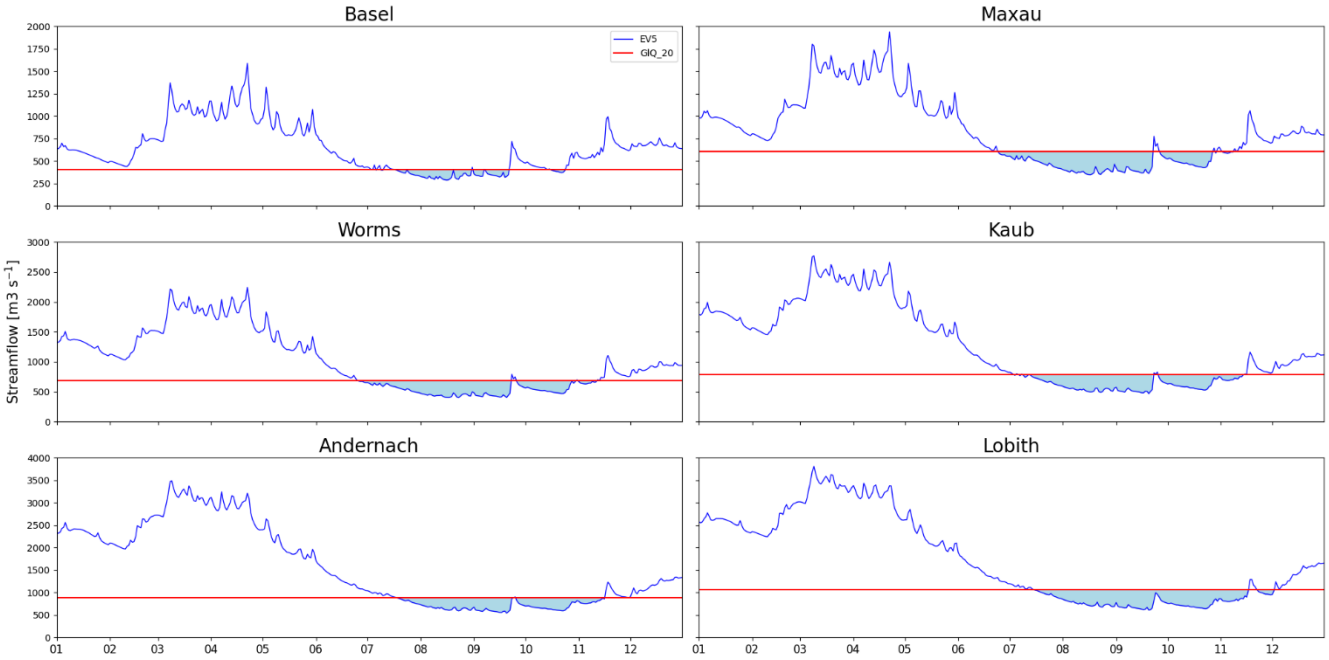

Fig S3. Daily hydrographs at the gauges in the waterway of the Rhine River of the EV5 (blue line), in comparison with the navigation threshold GlQ20 (red).

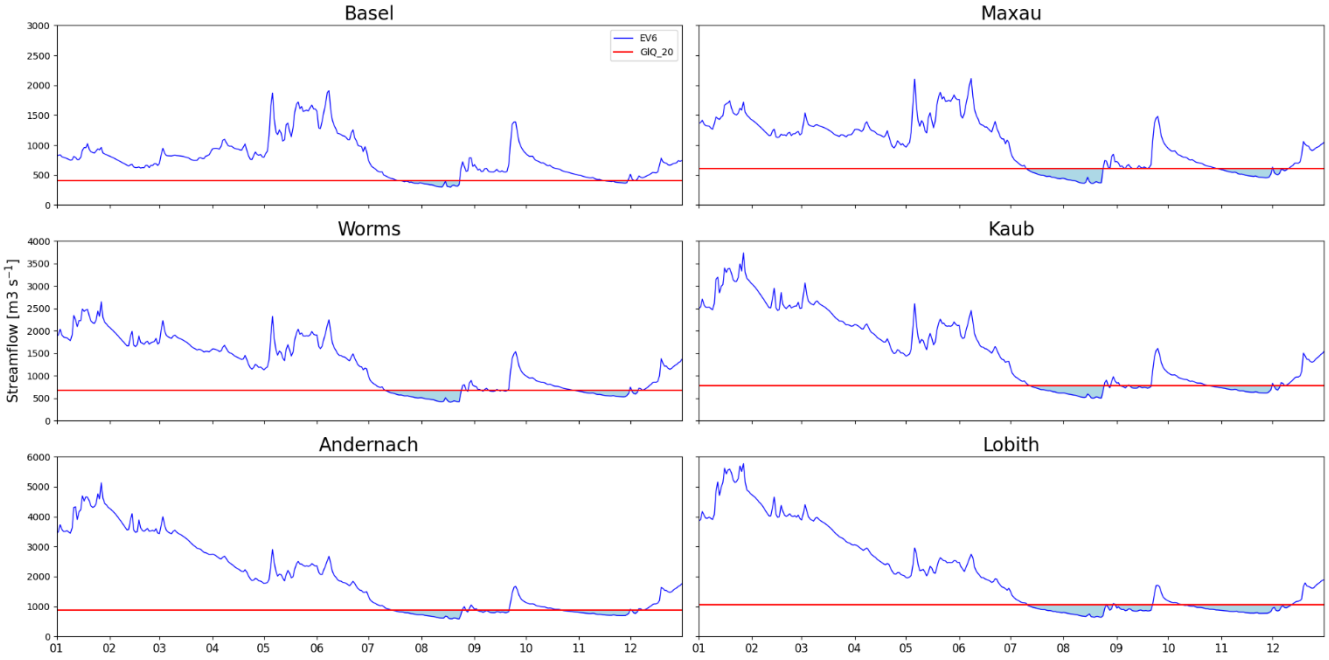

Fig S4. Daily hydrographs at the gauges in the waterway of the Rhine River of the EV6 (blue line), in comparison with the navigation threshold GlQ20 (red).

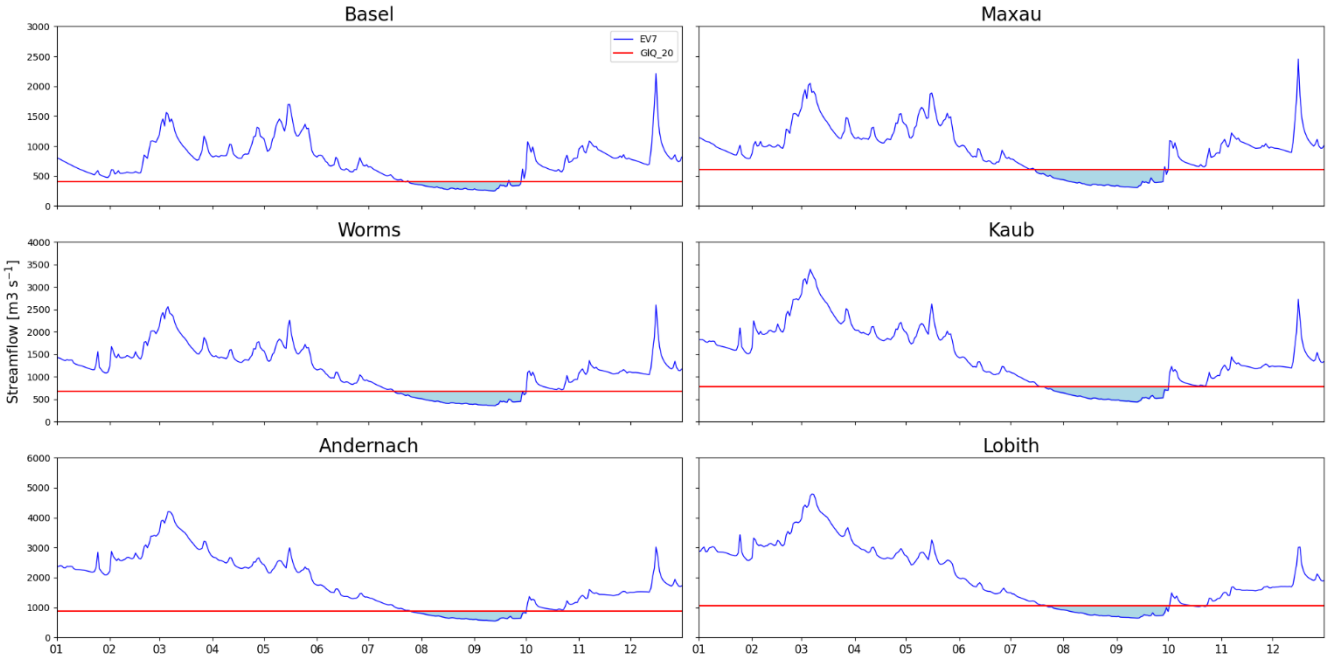

Fig S5. Daily hydrographs at the gauges in the waterway of the Rhine River of the EV7 (blue line), in comparison with the navigation threshold GlQ20 (red).

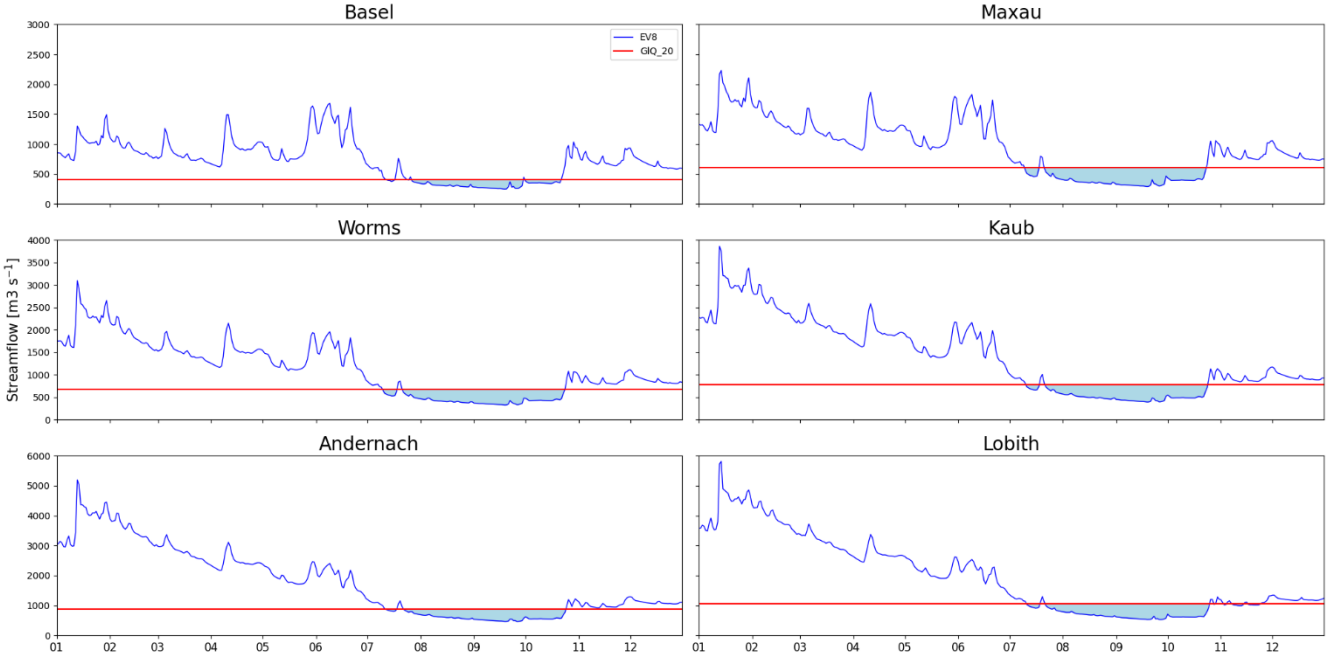

Fig S6. Daily hydrographs at the gauges in the waterway of the Rhine River of the EV8 (blue line), in comparison with the navigation threshold GlQ20 (red).

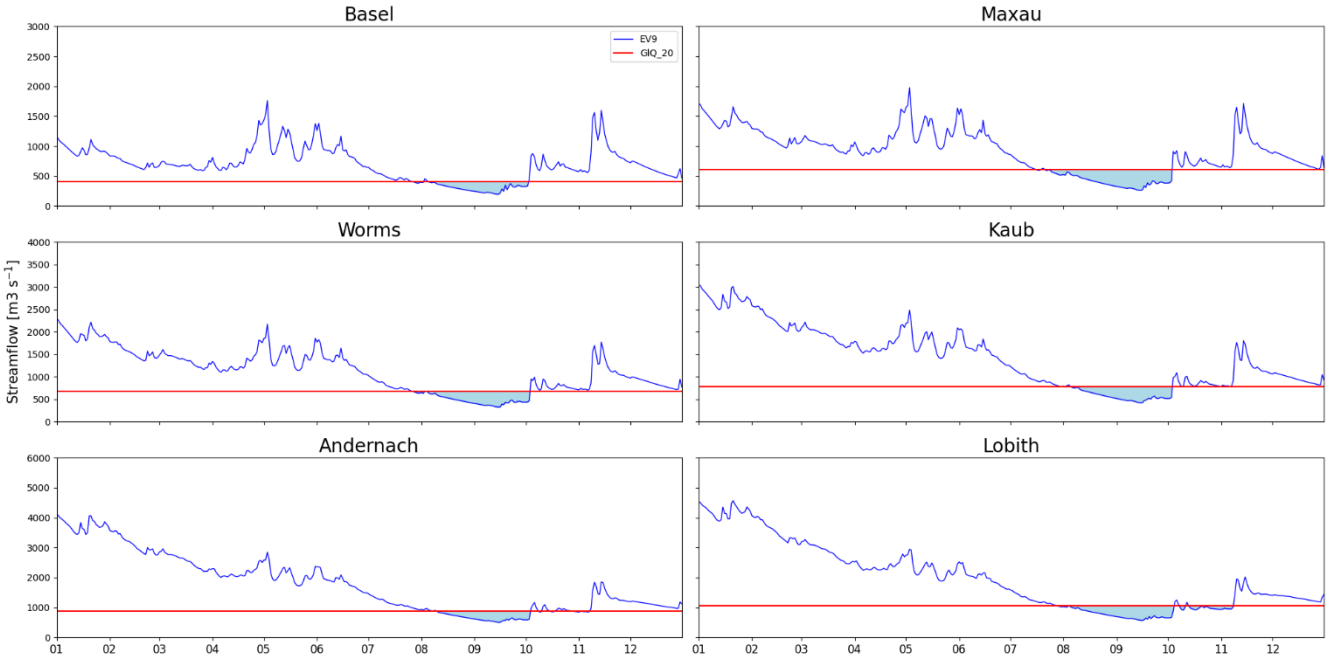

Fig S7. Daily hydrographs at the gauges in the waterway of the Rhine River of the EV9 (blue line), in comparison with the navigation threshold GlQ20 (red).

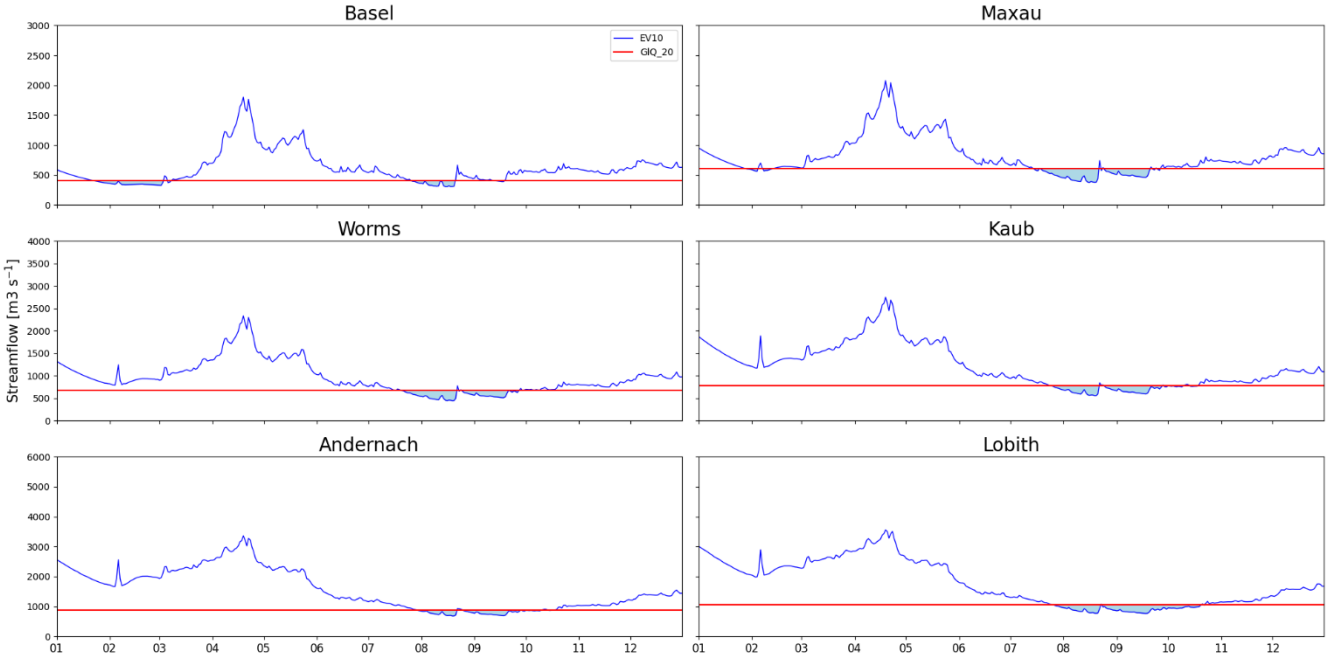

Fig S8. Daily hydrographs at the gauges in the waterway of the Rhine River of the EV10 (blue line), in comparison with the navigation threshold GlQ20 (red).

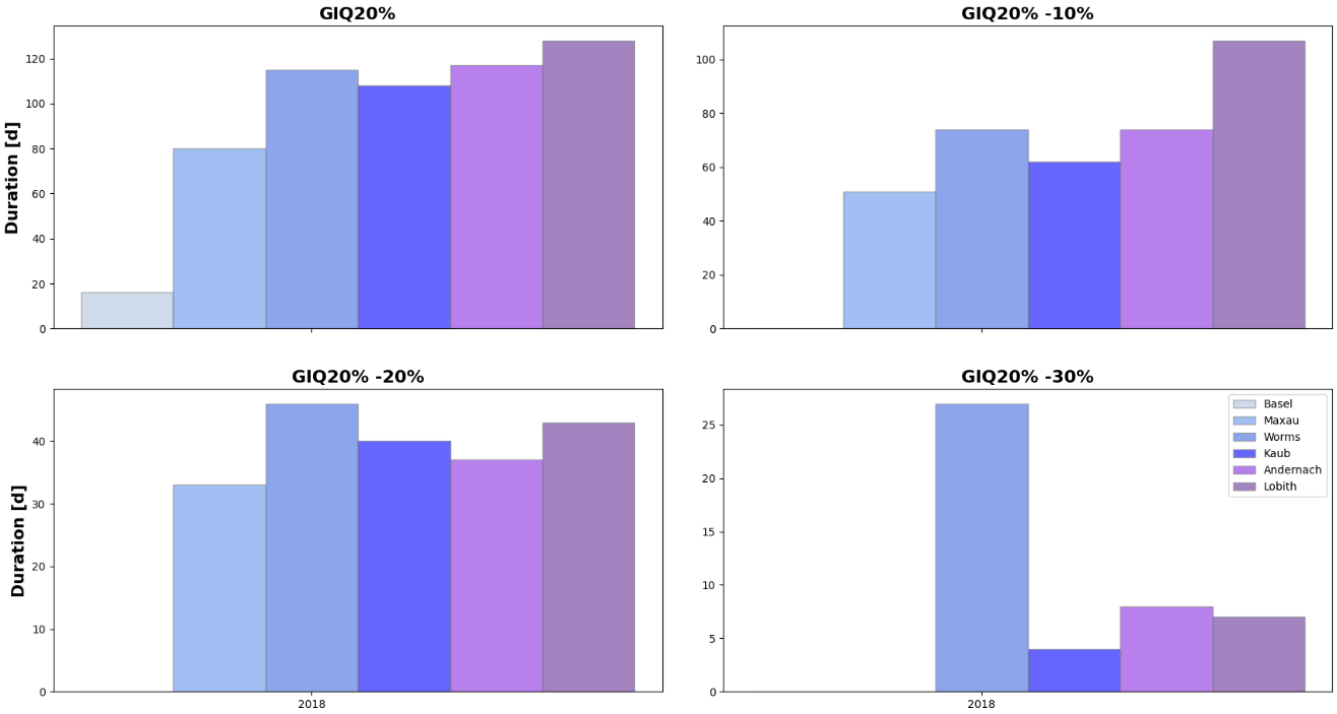

Fig S9. Number of days below the thresholds GlQ20, GlQ20 -10%, GlQ20 -20%, and GlQ20 -30% for each gauge of the event 2018.

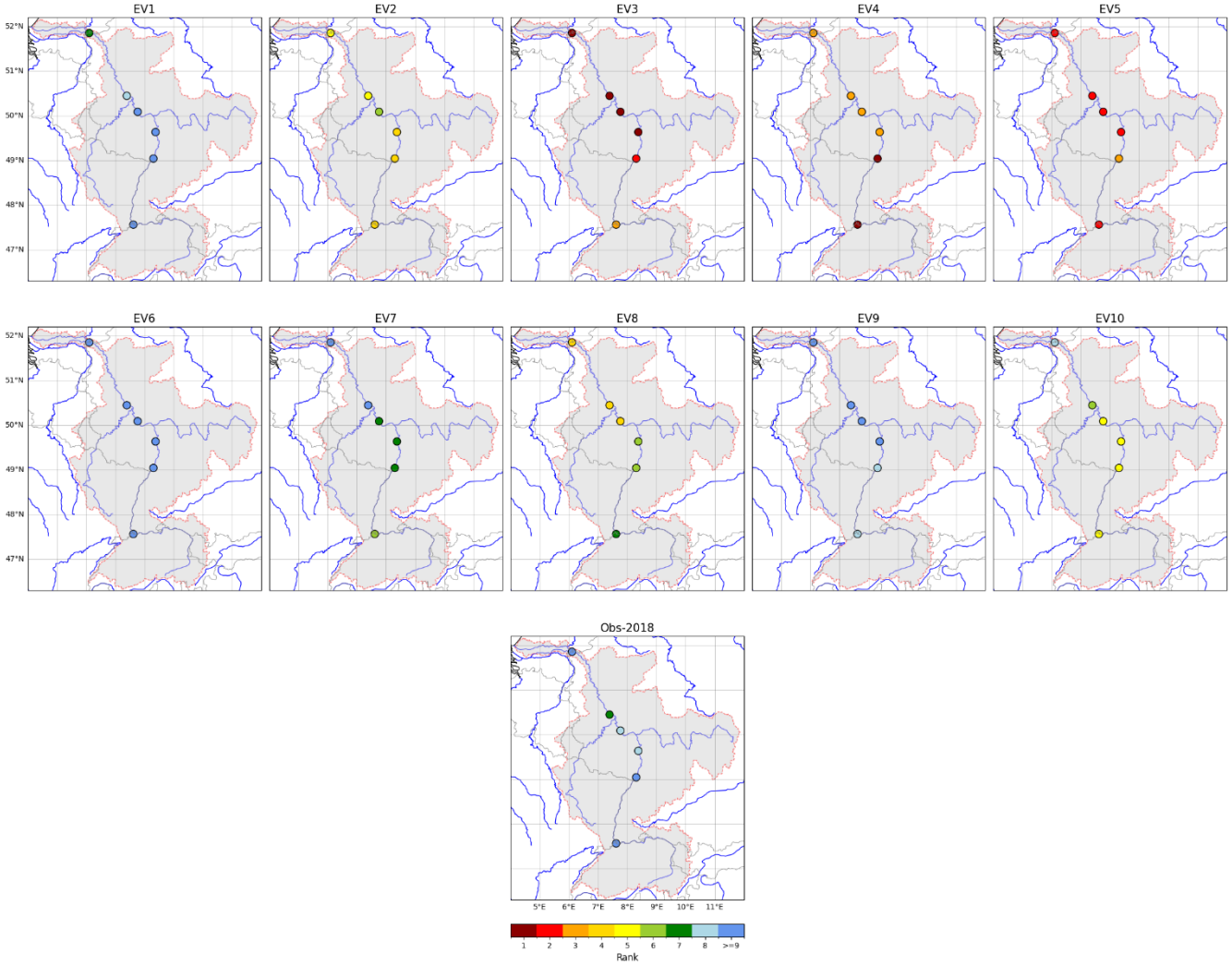

Fig S10. Spatial distribution of the 10 most extreme modeled hydrological drought events identified using LAERTES-EU block 4 dataset and the observed year 2018, ranked against historical discharge observations from 1970 to 2018. Each panel shows the event specific ranking across hydrological gauges (locations detailed in Fig. 1), with colors indicating drought severity ranks. Higher ranks (in red) correspond to the more extreme conditions.

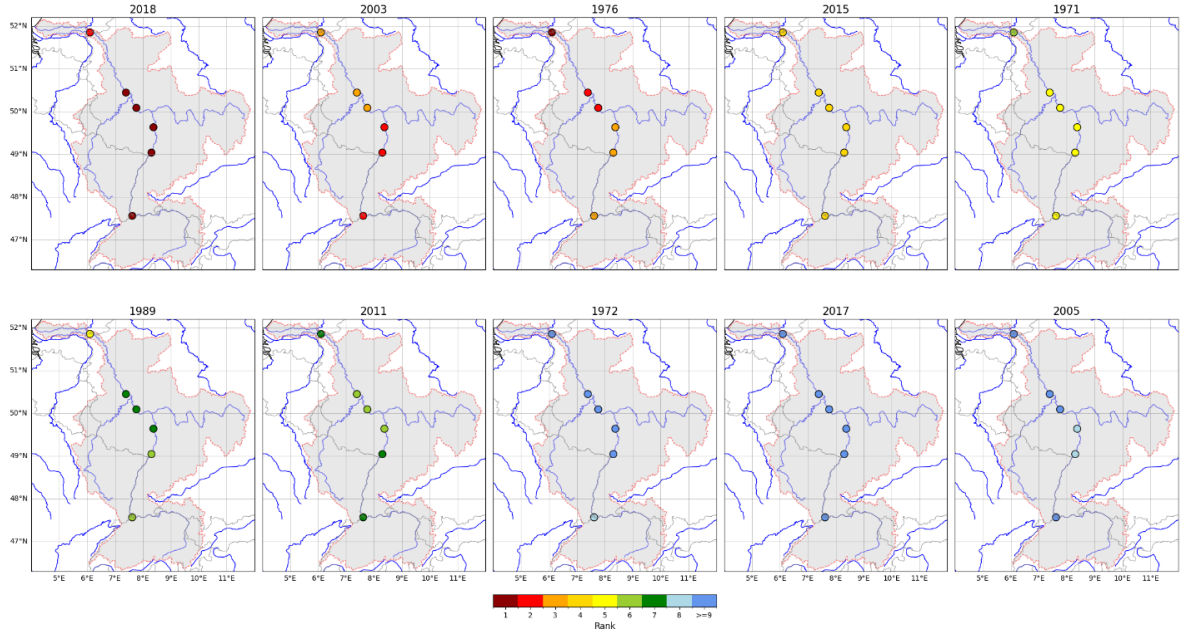

Fig S11. Spatial distribution of the 10 most extreme observed hydrological drought events from 1970 to 2018. Each panel shows the event specific ranking across hydrological gauges (locations detailed in Fig. 1), with colors indicating drought severity ranks. Higher ranks (in red) correspond to the more extreme conditions.

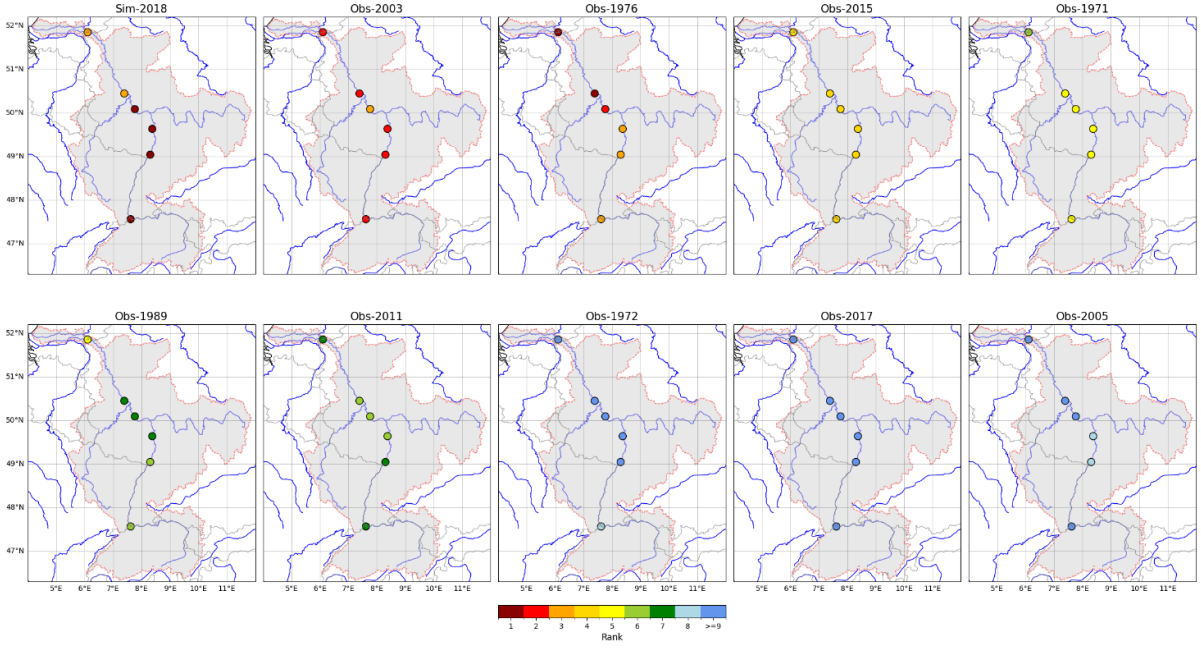

Fig S12. Spatial distribution of the most extreme observed hydrological drought events and the simulated year 2018, ranked against historical discharge observations from 1970 to 2018. Each panel shows the event specific ranking across hydrological gauges (locations detailed in Fig. 1), with colors indicating drought severity ranks. Higher ranks (in red) correspond to the more extreme conditions.

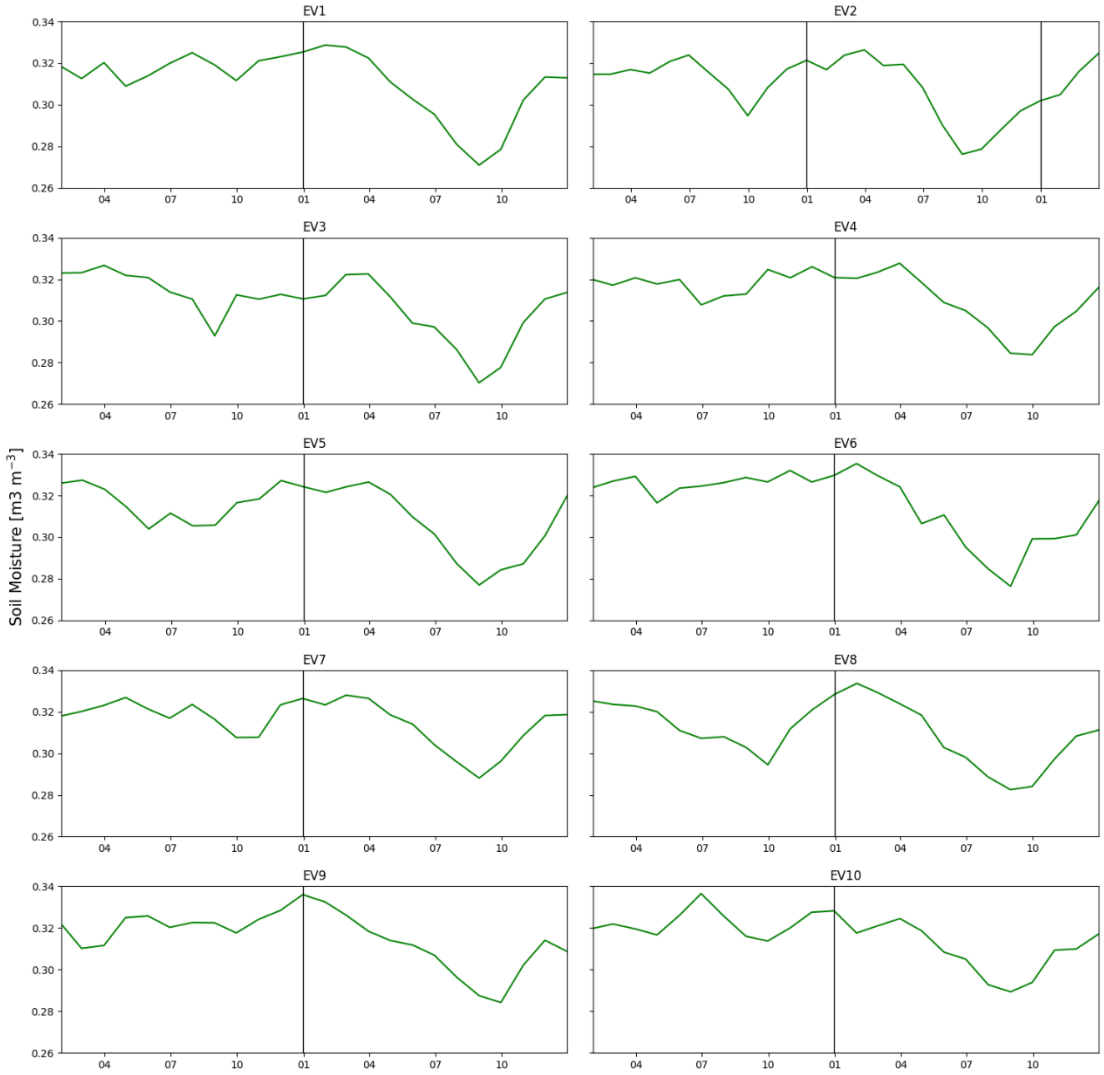

Fig S13. Monthly soil moisture content for the entire run period of the selected extreme years in LAERTES-EU. Horizontal black lines represent the end of the calendar year.