Changing flood generation processes across European catchments

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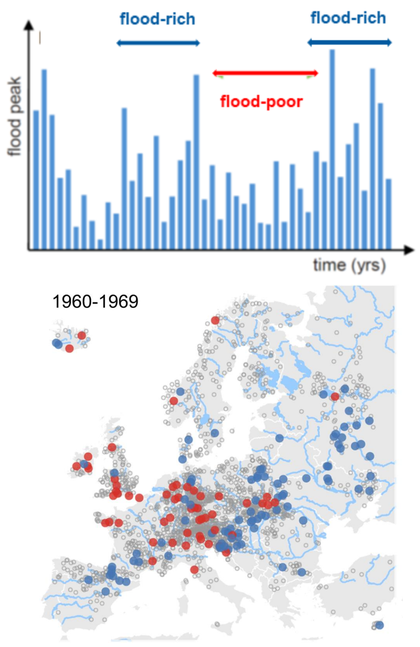
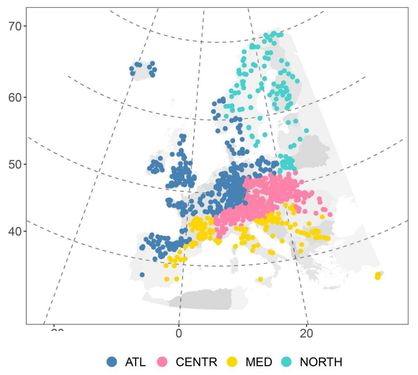
Motivation

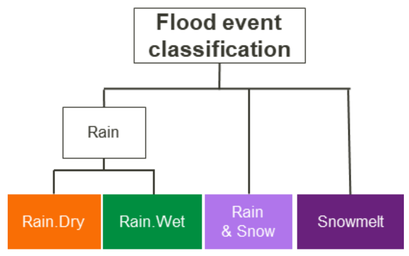
- Flood time series often show the presence of **anomalies**[4]
- Anomalies **cluster in space** indicating their regional nature[4]
- **Regional processes** responsible for their occurrence are still not clear
- The effect of **changing flood generation processes** on the occurrence of regional flood anomalies is still unknown



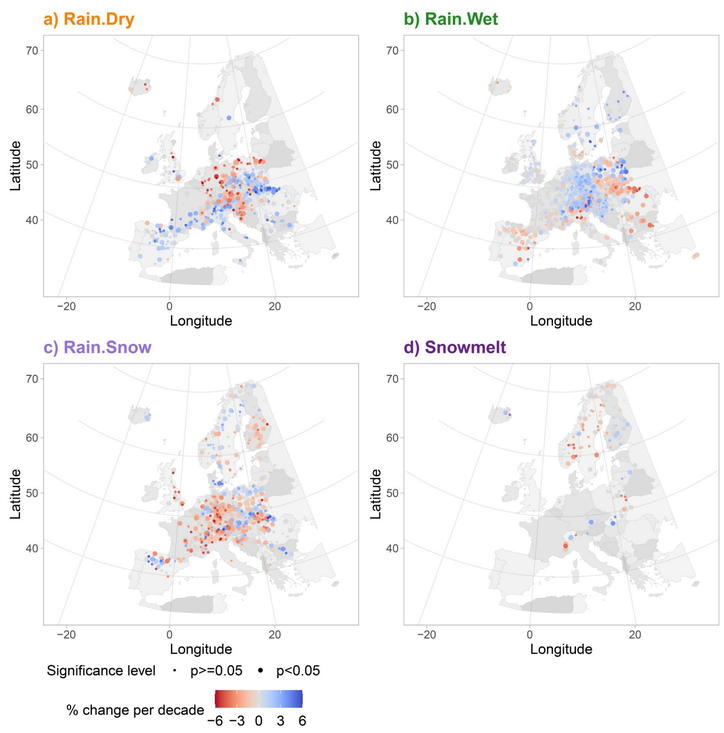
Data and classification

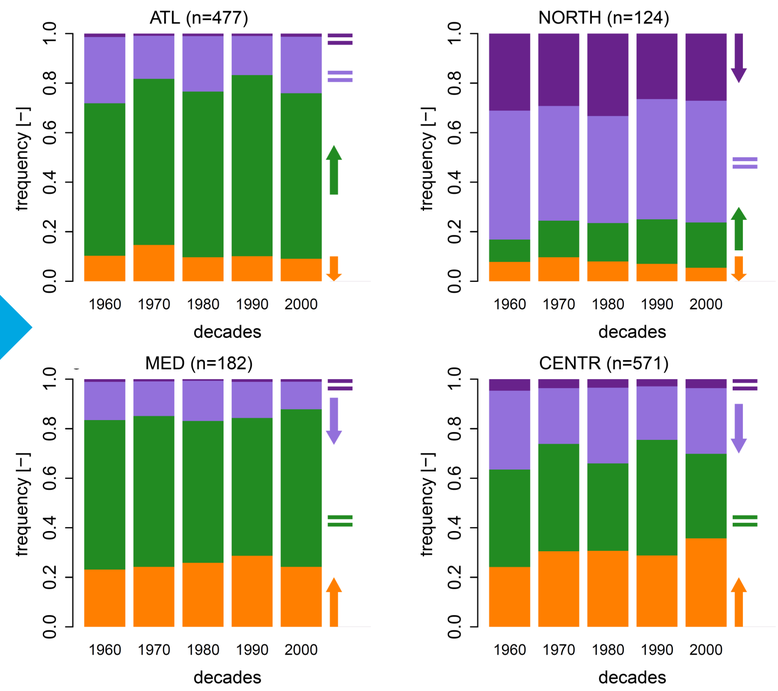
- Date and Qmax of 1415 European catchments (med size 380 km²) for 1960-2010[1]
- Start and end date of events corresponding to the observed flood peak extracted from the mHM simulations[2]
- Event classification[3] using P and T from downscaled E-OBS and snowmelt simulated by the mHM[2]
- Flood-rich (FR) and flood-poor (FP) periods using Scan statistics[4]





Flood generation processes



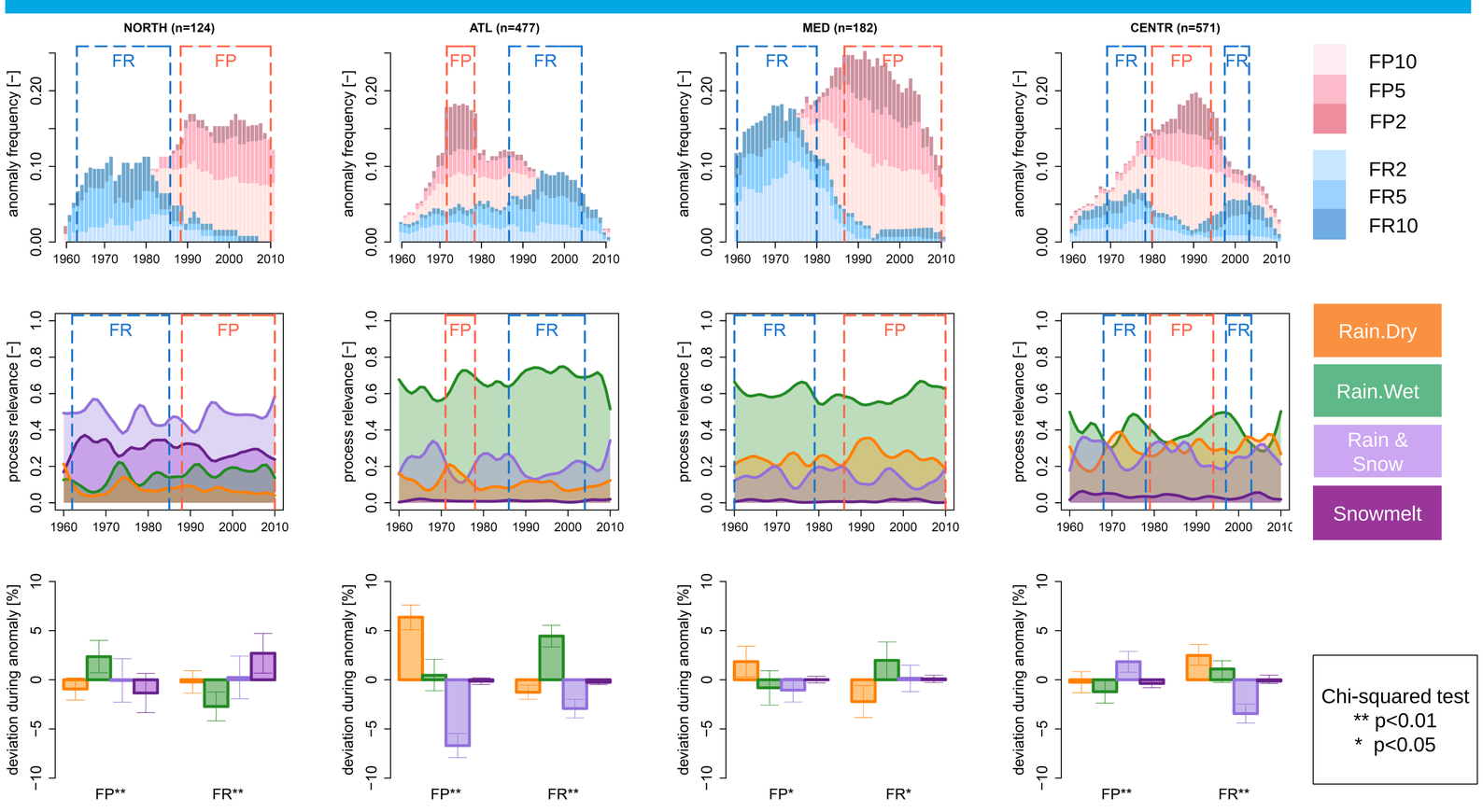


- Catchment-wise Sen's slope and MK tests for detecting changes in the frequency of flood generation processes
- **Regional aggregation:** dominant trend direction

downward upward

inconclusive

Link to the flood anomalies



Summary

- Regionally coherent **changes in the frequency of flood generation processes** are detected
- The compositions of **flood generation processes during opposing flood anomalies** have clear and pronounced differences
- The ongoing changes in the relevance of flood generation processes suggest that the **current regional flood anomalies might further persist**

[1] Blöschl et al. 2017. Changing climate shifts timing of European floods. Science [2] EDgE project: edge.climate.copernicus.eu
[3] Tarasova et al. 2020. A Process-Based Framework to Characterize and Classify Runoff Events: The Event Typology of Germany. WRR
[4] Lun et al. 2020. Detecting Flood-Rich and Flood-Poor Periods in Annual Peak Discharges Across Europe. WRR