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Event Clustering approach for FFA

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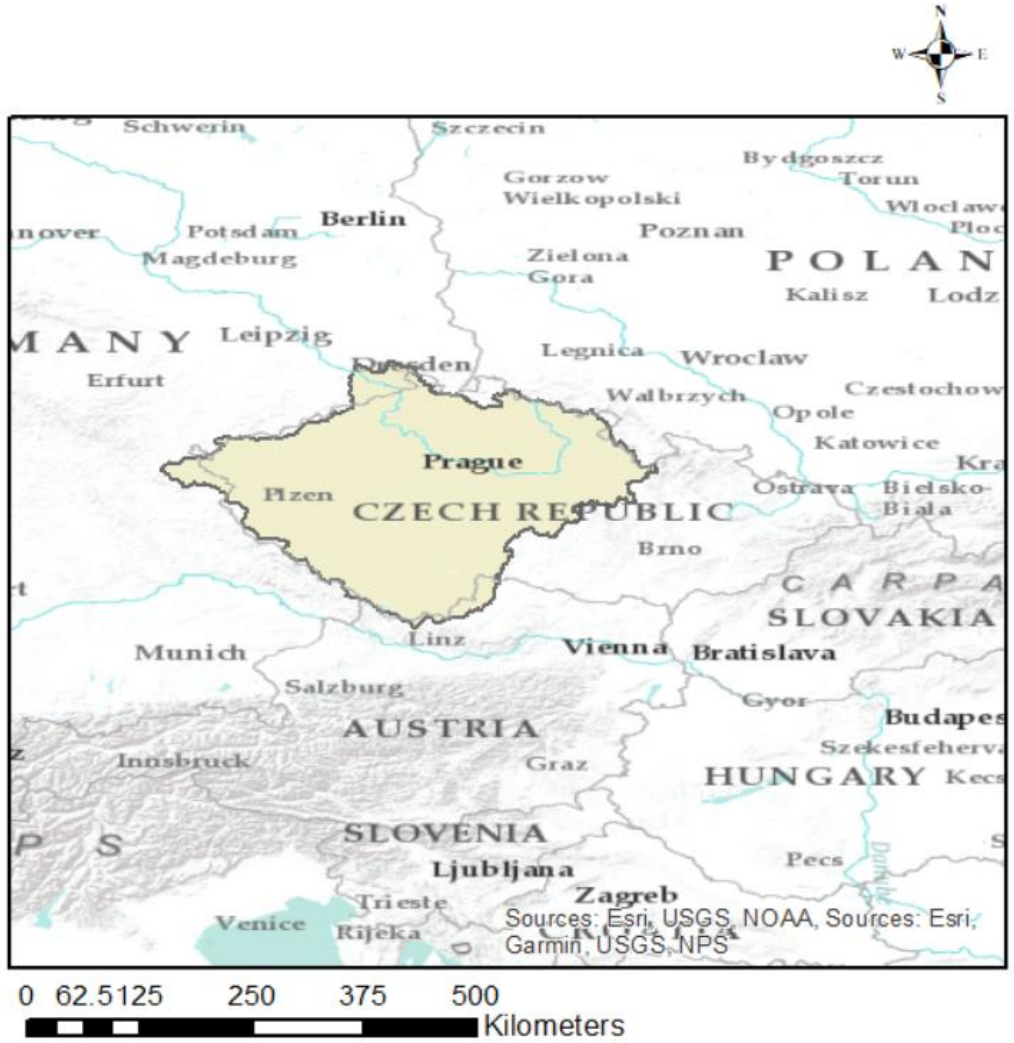
Co-PREPARE

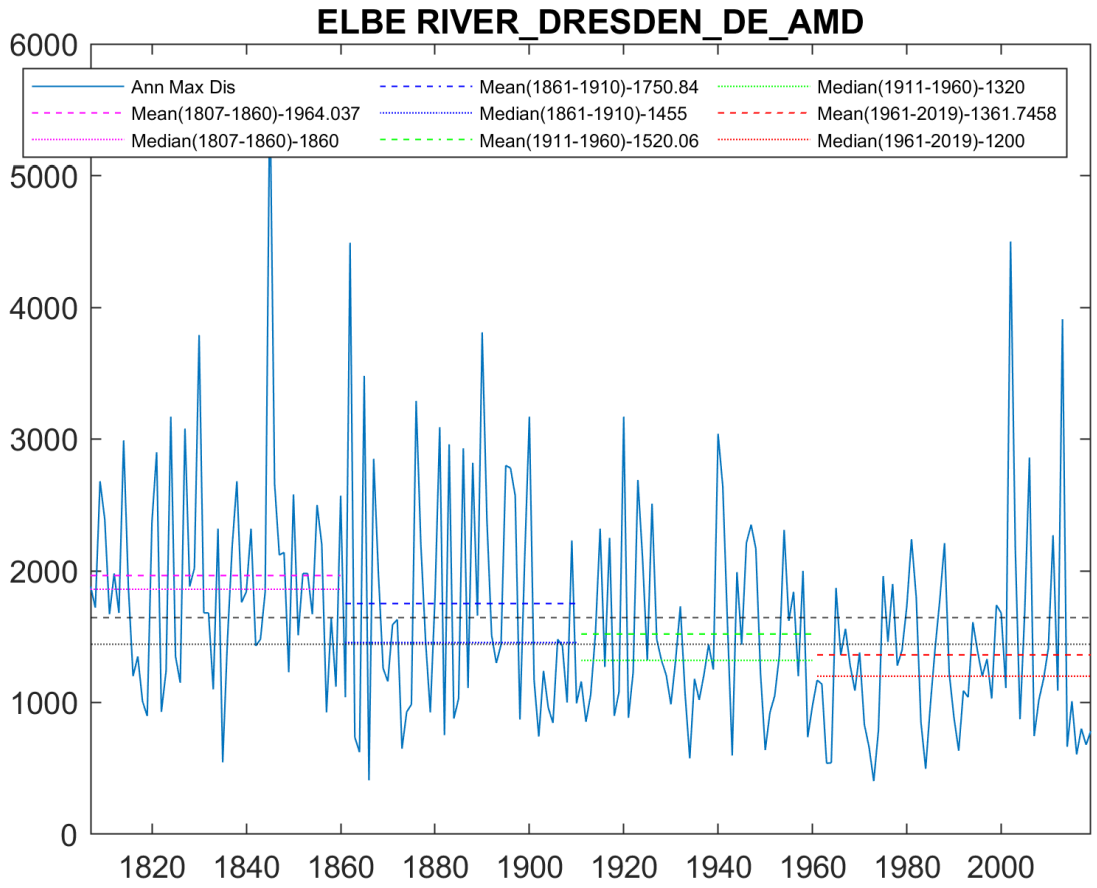
Flood return value could be used by:

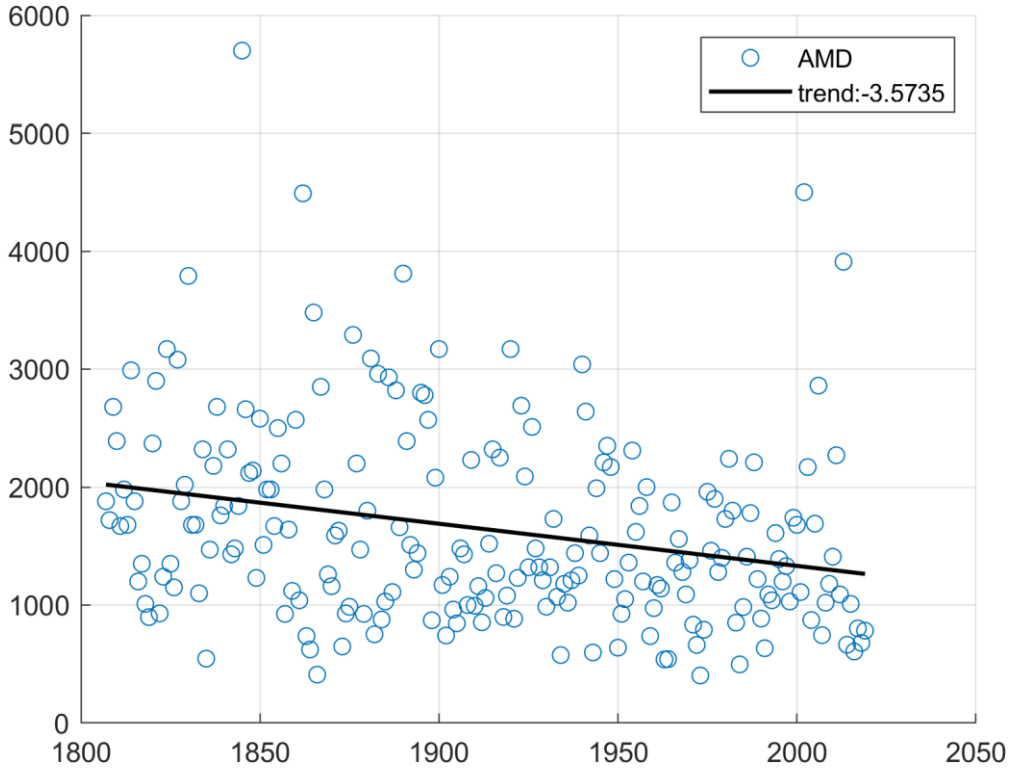
- Design engineers – water storage and flood preventing structures
- Decision-makers – necessary preparedness

- Traditional - iid assumption – future need not to follow the past
- GRDC daily streamflow data – Dresden, Elbe

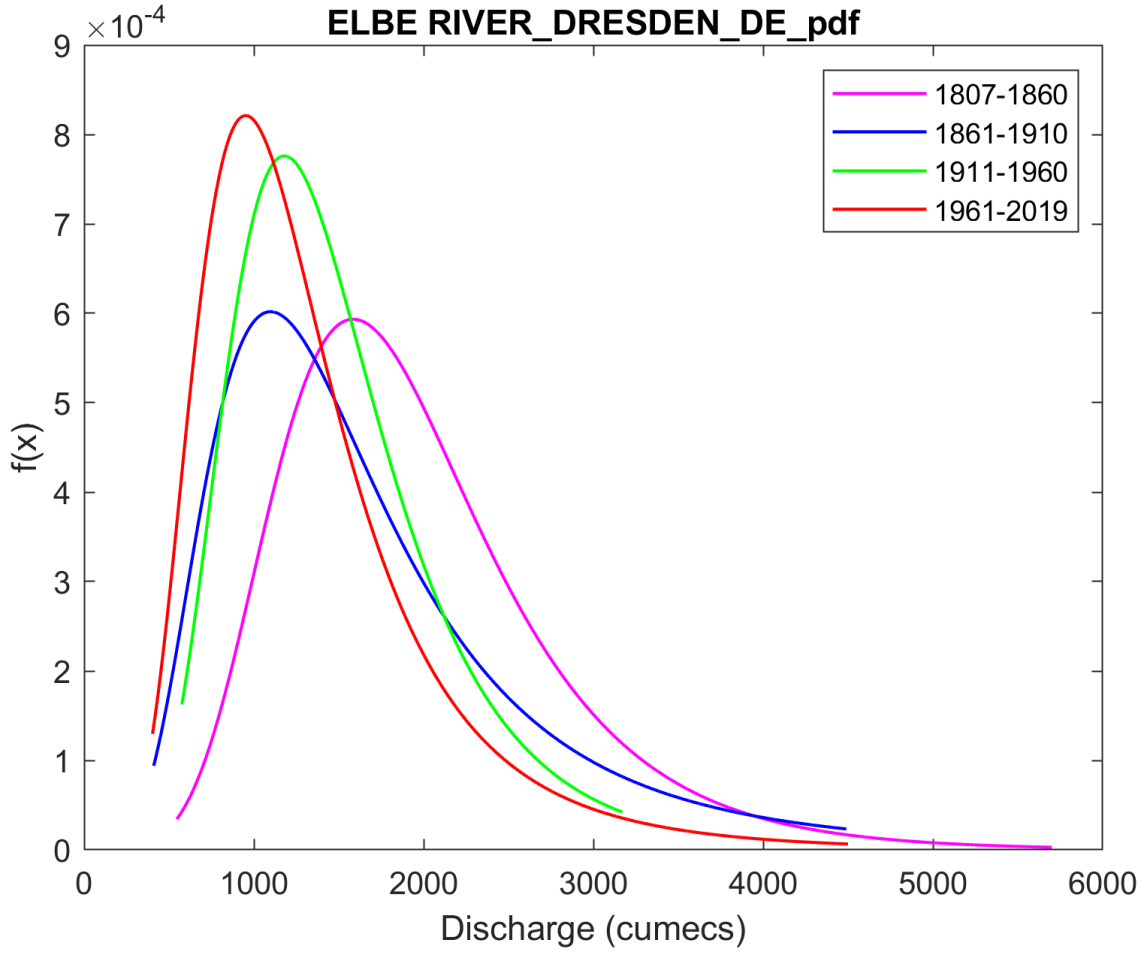


- Decreasing trend in AMD



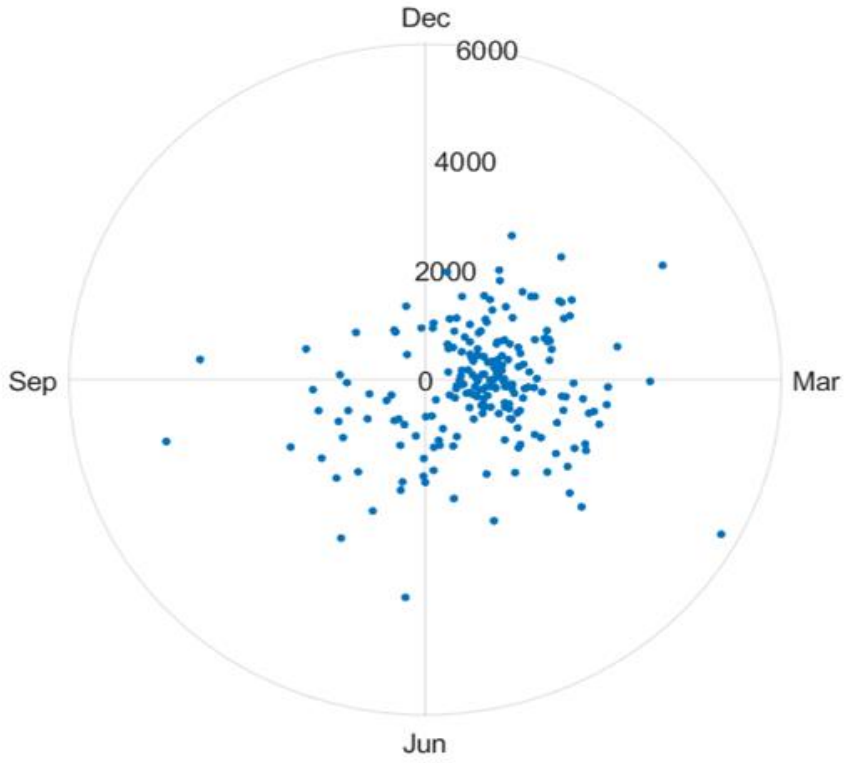


- Right shift in the location parameter value

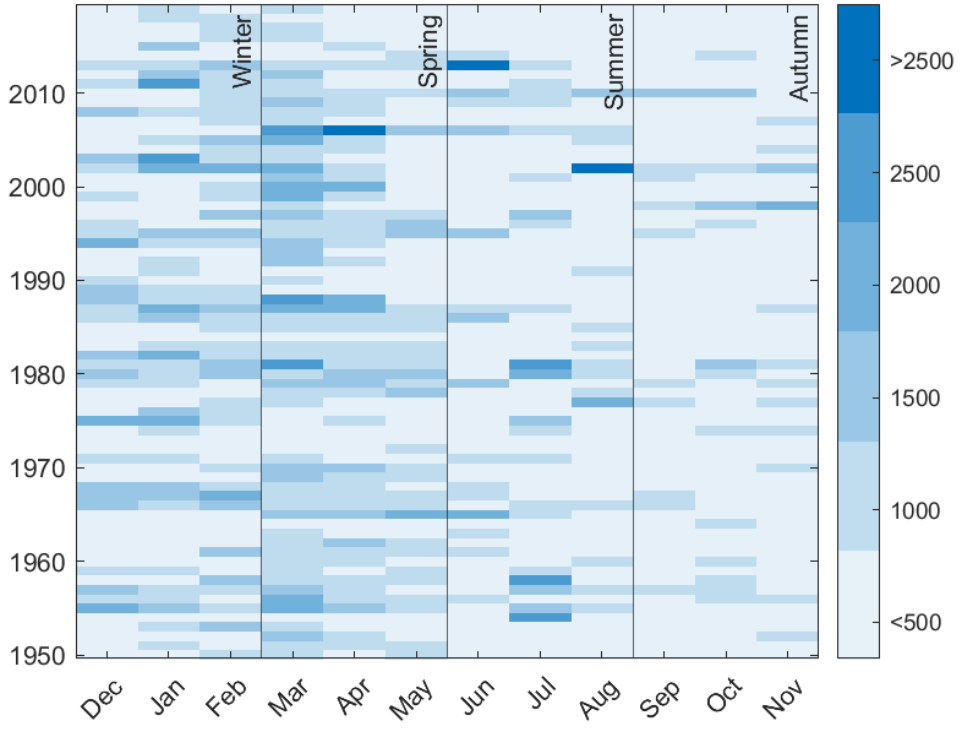


- Process-based approach
- Events triggered by multiple drivers
- Disastrous and non-disastrous floods

Burn seasonality plot for AMD



Monthly maximum discharge

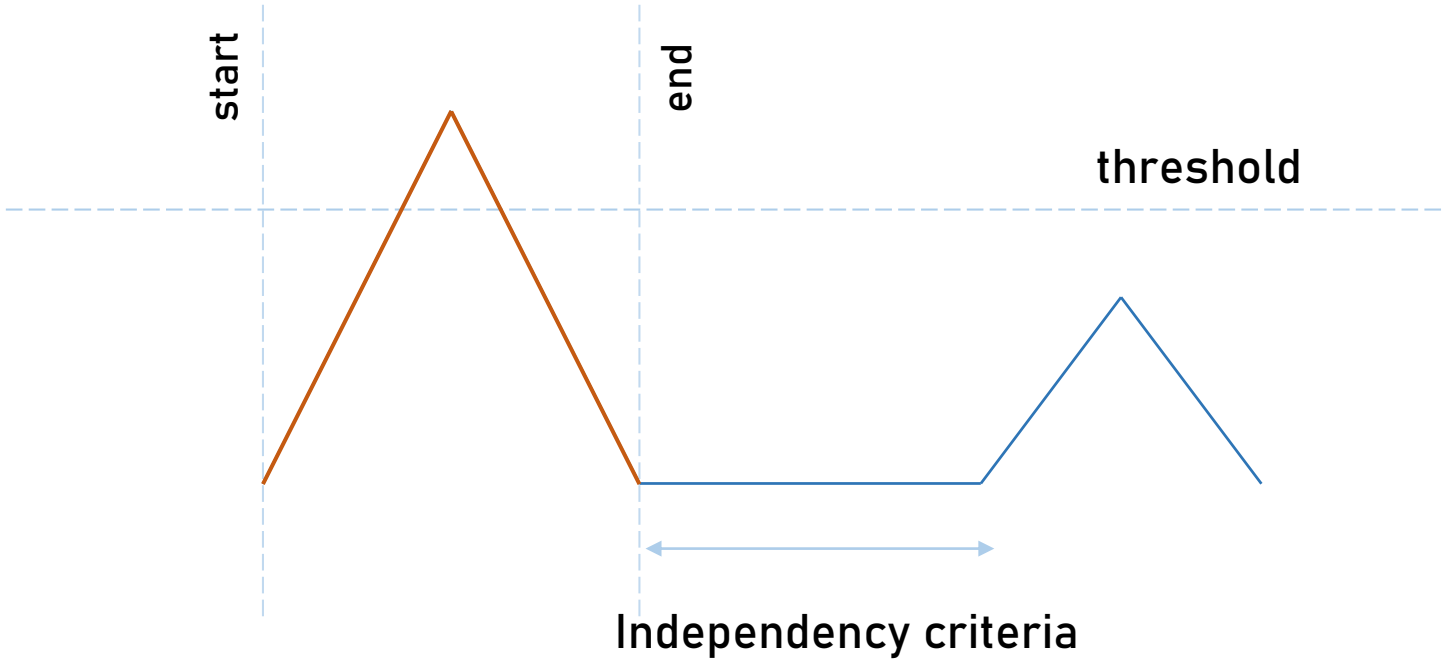


Clustering?

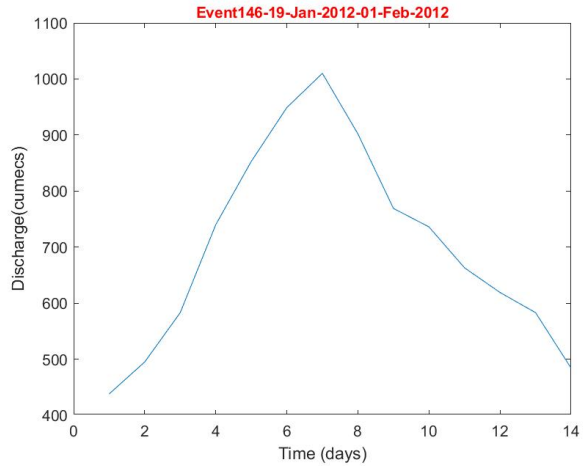
- Flood hydrograph – water input + storage + transfer*
- Entire time series or hydrograph features – clustering?
- Can we exploit this to classify its causative process?

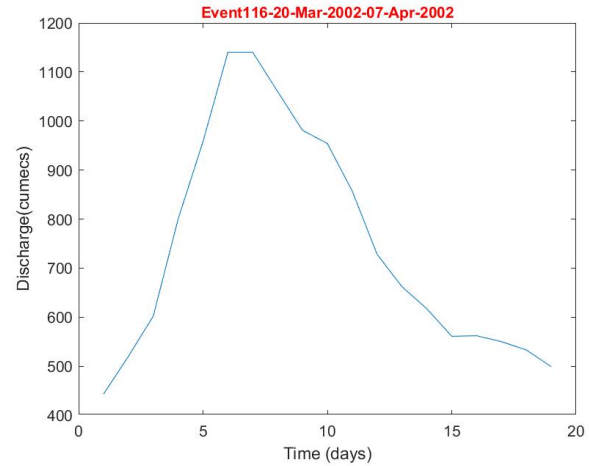
*Hannah et al., 2000
Brunner et al., 2018

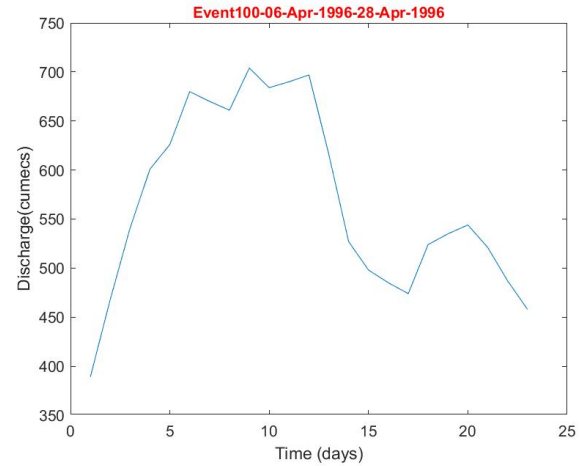
1. Event Separation

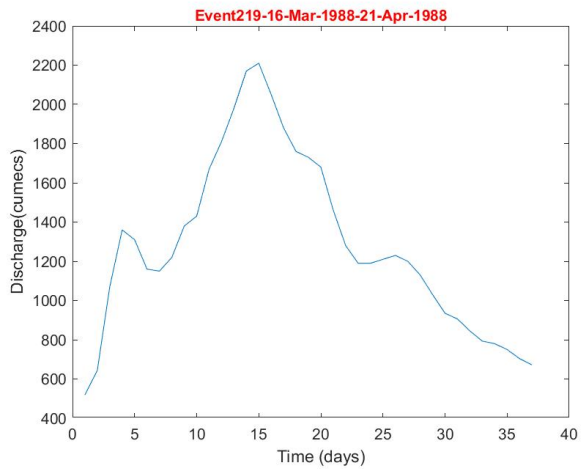


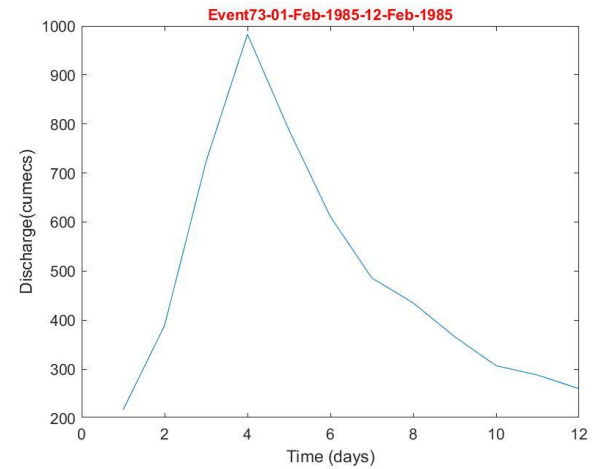
Fischer et al., 2021

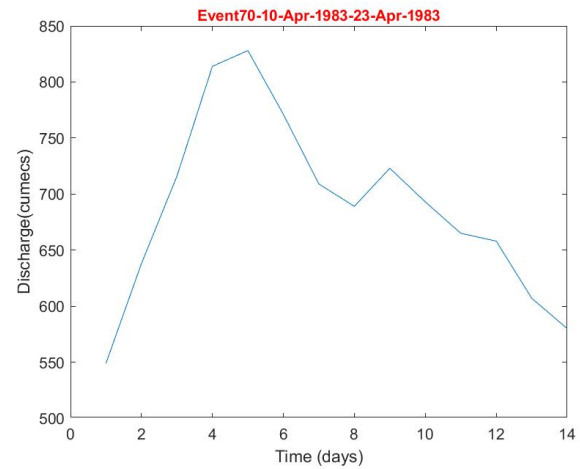

Event146-19-Jan-2012-01-Feb-2012
Discharge(cumecs)
Time (days)


Event116-20-Mar-2002-07-Apr-2002
Discharge(cumecs)
Time (days)


Event100-06-Apr-1996-28-Apr-1996
Discharge(cumecs)
Time (days)

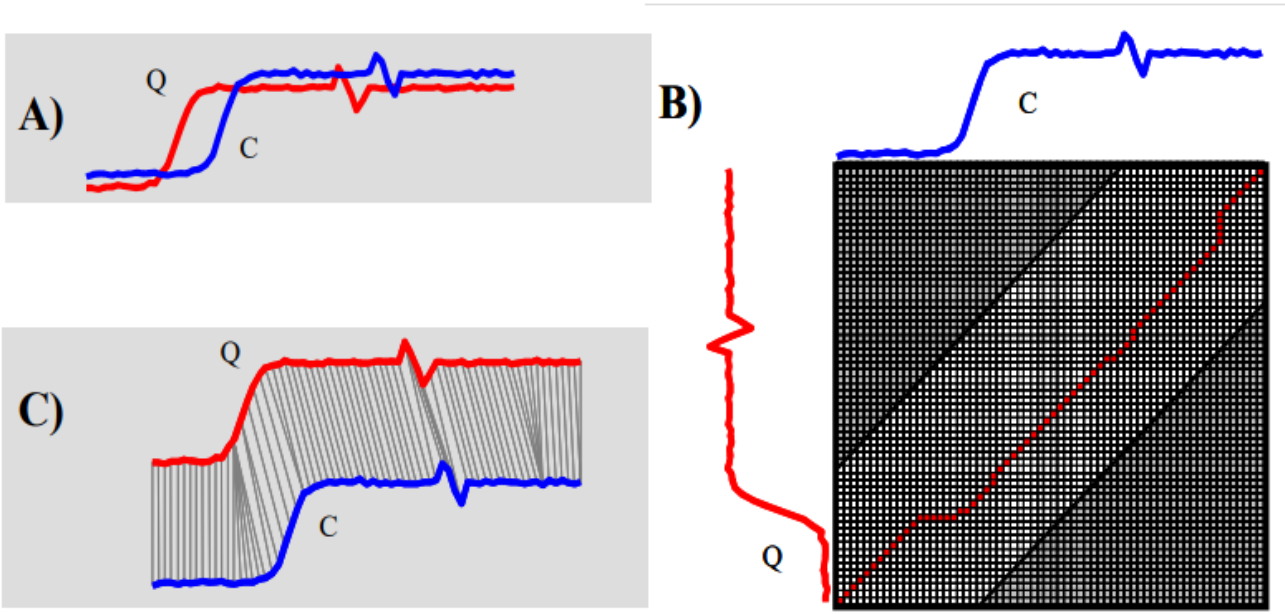

Event219-16-Mar-1988-21-Apr-1988
Discharge(cumecs)
Time (days)


Event73-01-Feb-1985-12-Feb-1985
Discharge(cumecs)
Time (days)

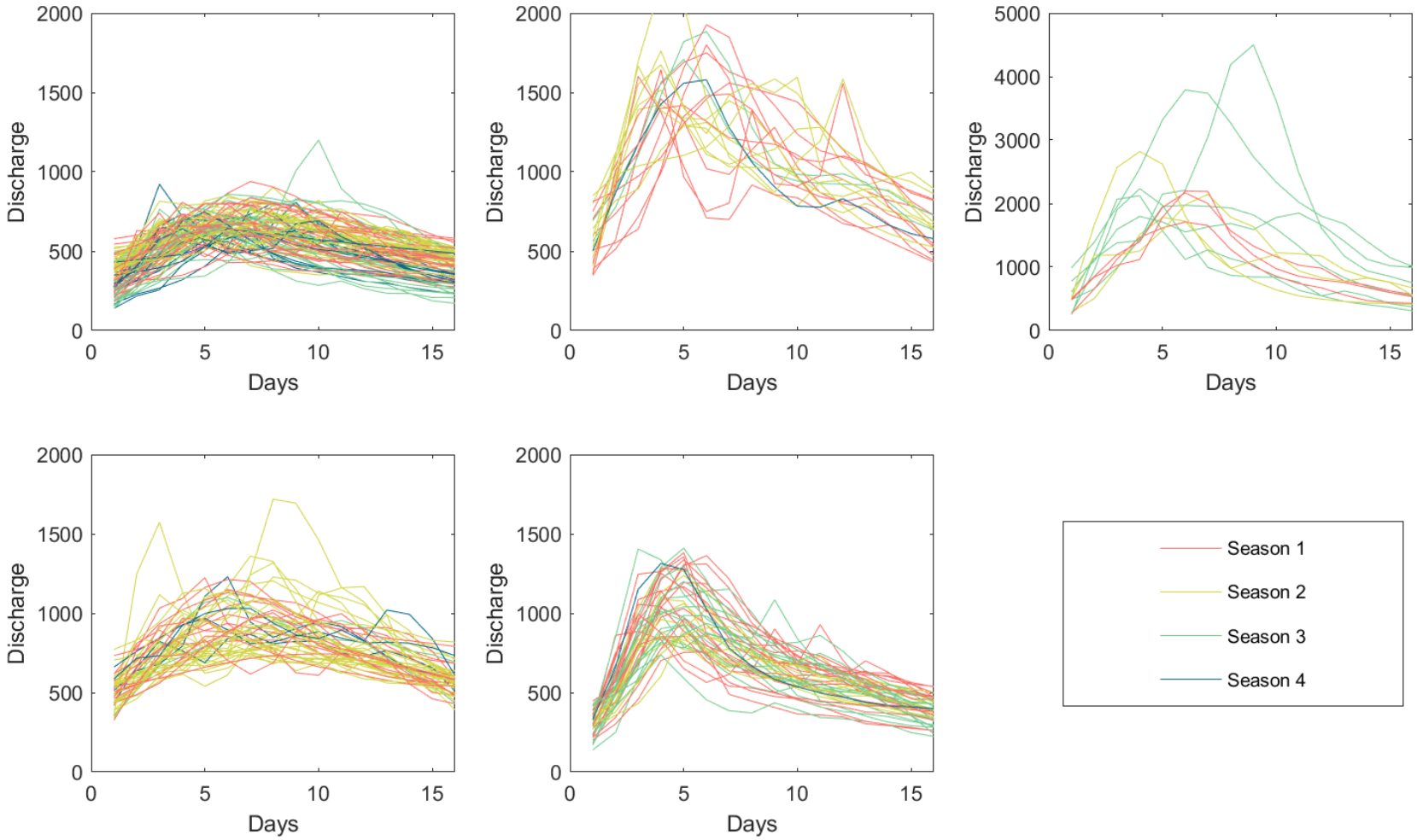

Event70-10-Apr-1983-23-Apr-1983
Discharge(cumecs)
Time (days)

2. Event Clustering

- Dynamic Time Warping – compare time series of different lengths
- Optimal warping path based on constraints

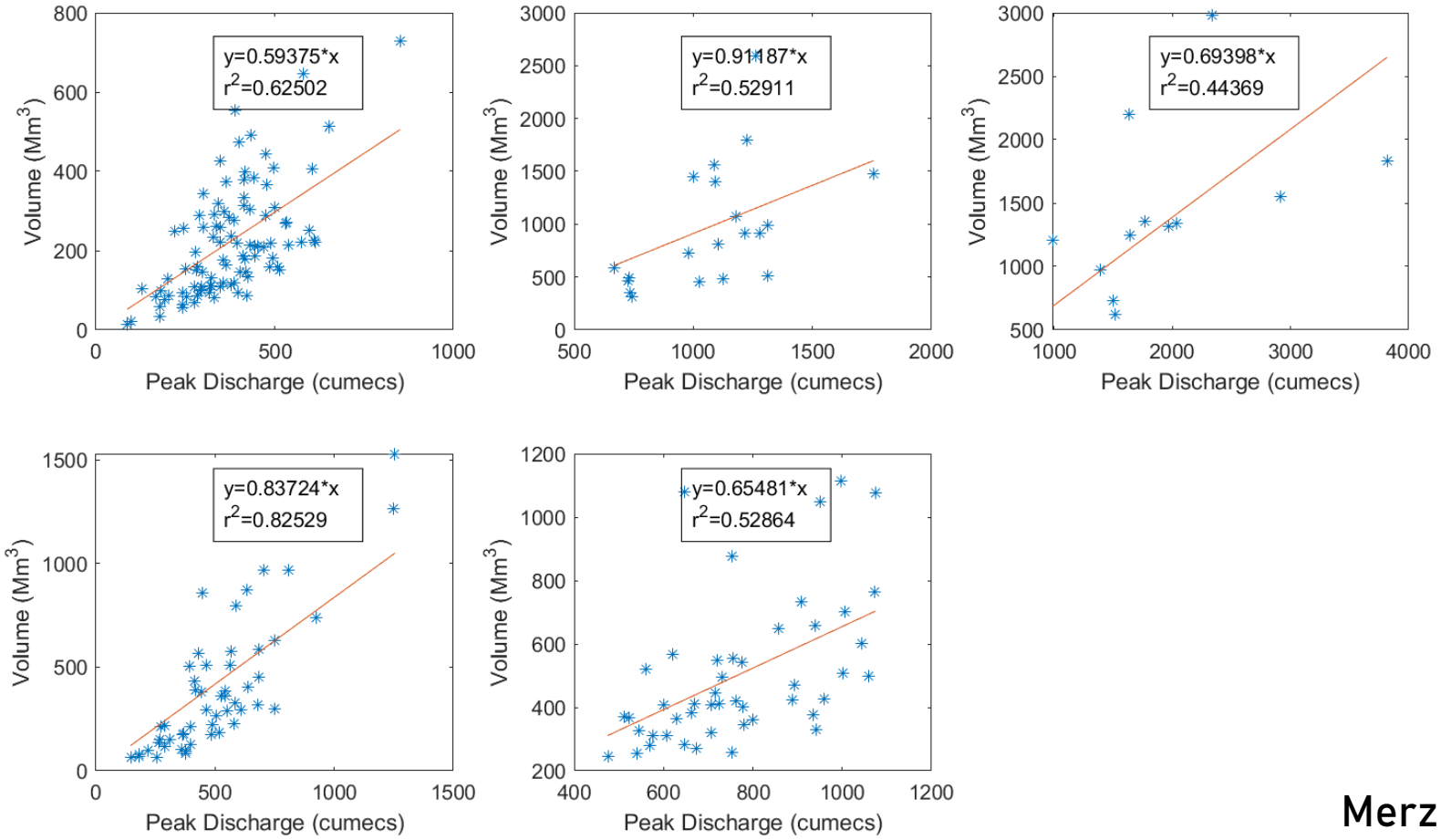


Ratanamahatana & Keogh, 2004



Clusters related to drivers?

Timescale = Flood volume/Flood peak



Merz & Bloschl, 2003
Gaal et al., 2012
Fischer et al.,2016

Future Work

- To explore more on the process behind the clusters
- To ensure the robustness

Caveats

- Storage component could modify the signals
- Window size and seed of DTW may affect the clustering ability

References

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Thank you

Questions &
Suggestions?

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