

Thesis title

Data-driven analysis of Arctic rivers discharge: trend and teleconnections

Short description

Runoff from Arctic rivers has a direct influence on the dynamics occurring in the Arctic Ocean, producing significant effects not only at the local and regional scales, but also at a global scale. Despite of the Arctic rivers' key role, the knowledge of their dynamics and of the main factors that influence their behaviour are not fully understood and represent a hot topic in the current scientific literature. These researches mainly apply classical statistical analysis and make use of linear models ^(1,2), which are quite useful to spot the general trends characterizing the process but are probably unable to capture many details that indeed could improve our understanding of the system.

The aim of this thesis is the analysis of existing drought indexes for assessing their ability in detecting drought events at the pan-European scale. The student is expected to carry out the following activities

1. Review of the existing literature on the topic and exploration of the available datasets
2. Data-driven trend detection analysis of the Arctic rivers' discharges
3. Analysis of the correlation with the climate fluctuations indexes (e.g., ENSO and NAO) by means of machine-learning based feature selection techniques (such as the iterative input selection algorithm)

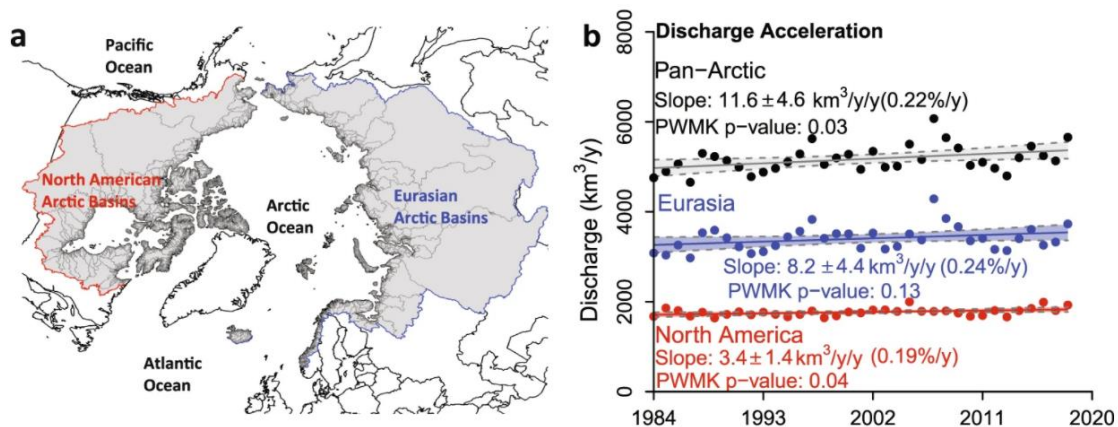


Fig: Changes in total water export from the Arctic rivers ⁽¹⁾.

Relevant courses and knowledge: Natural Resources Management

Number of Students: 1 or 2

Requisites: The student should be comfortable with data analysis and machine learning tools. Proficient coding skills in at least one of Matlab and Python are mandatory.

References

- (1) Feng, D., Gleason, C. J., Lin, P., Yang, X., Pan, M., & Ishitsuka, Y. (2021). Recent changes to Arctic river discharge. *Nature Communications*, 12(1), 1-9.
- (2) Ahmed, R., Prowse, T., Dibike, Y., Bonsal, B., & O'Neil, H. (2020). Recent trends in freshwater influx to the Arctic Ocean from four major arctic-draining rivers. *Water*, 12(4), 1189.