Hydro-JULES

Project 1- Understanding the influence of the North Atlantic on European river flows

Supervisors: *Amulya Chevuturi, Wilson Chan, and Eugene Magee*

The CANARI project aims to understand the influence of the North Atlantic's large-scale atmospheric and oceanic circulation on UK weather and climate. Recent research within this project has revealed that specific North Atlantic sea-surface temperature (SST) patterns impact the UK weather, with effects observable at extended lead times. This influence can result in dry conditions and, in extreme cases, droughts in the UK, evidenced by reduced rainfall and river flow. Original study demonstrates that these SST patterns strongly correlate with elevated temperatures and reduced rainfall in Europe, with a lag of a few months. However, it is crucial to quantify this influence on European river flow patterns. This objective is important in understanding the changes in European river flows and proactively predicting such alterations to implement effective mitigation measures amid potential drought scenarios. Reference Hydrometric Networks' (RHNs) can be used for this objective by providing data from locations with minimal human impact, through the ROBIN project.

Within this framework, the HydroJULES studentship program presents a project aimed at comprehending the impact of distinct North Atlantic SST patterns on European riverflows, utilizing pan-European river flow data from the ROBIN RHNs. This project will have collaborations and expertise from scientists from NOC, Southampton and NCAS, Reading. The output from this project will inform future applications of drought forecasting systems across Europe.

- The aims of this project are to:
- Calculate correlations between North Atlantic SST pattern indices and European river flows at varying time lags
- Create visualisation maps representing the relationship between the North Atlantic SST indices and European river flows
- Understand the teleconnections pathways linking North Atlantic Oceanic changes to European river flow variability
- The successful candidate for this project should possess:
- Strong numeracy/statistical skills and effective oral and written communication abilities. Proficiency in the Python/R programming language is essential

In addition:

- Candidates should either hold or be actively pursuing an undergraduate degree in earth/environmental sciences or a related scientific discipline.
- Some experience using Linux operating system and high-performance computing (HPC) would be beneficial, but not mandatory, as training will be provided as needed.
- During this project, the student will gain an understanding of hydro-meteorology, advanced computing methods, python programming and a flavour of academic research.