**Relevant courses**
We strongly recommend that you have taken the following courses to undertake this project:

- Data Analysis.
- Time series.
- Environmental statistics.
- Flexible regression.

## 39.4 Average daily river flows in Scotland

**Data available**
The file `River_flows.csv` includes the average daily flows of 64 Scottish rivers between 01/01/1989 and 31/12/2015, for a total of 640575 observations together with covariates that may affect the response. The data is publicly available from the National River Flow Archive. A description of the data can be found at https://nrfa.ceh.ac.uk. The dataset `ustemp.csv` includes the variables:

- `ID`:ID of the station;
- `Date`: date of the flow recording;
- `Flow`: average daily flow;
- `Station`: name of the river;
- `Latitude`: latitude of the station;
- `Longitude`: longitude of the station;
- `Easting`: easting of the station;
- `Westing`: westing of the station;
- `Catchment.Area`: catchment area of the measured river;
- `Max.Altitude`: max altitude of the measured river;

but others could be added if needed. Information about the data can also be found in

- Franco-Villoria, Maria, Marian Scott, and Trevor Hoey. Spatiotemporal modeling of hydrological return levels: A quantile regression approach. Environmetrics 30.2 (2019): e2522.

**Question(s) of interest**
The main questions of interest are:

- Do average daily flows in Scotland vary over space?
- Do average daily flows in Scotland vary over time?
- Are the covariates effective to predict average flows?

**Relevant courses**
We strongly recommend that you have taken the following courses to undertake this project:

- Data Analysis.
- Time series.
- Environmental statistics.
- Flexible regression.