**Keith Shotton**

[k.shotton1@newcastle.ac.uk](mailto:k.shotton1@newcastle.ac.uk)

A person wearing glasses

Description automatically generated with medium confidenceMy interests lie in developing a better understanding of precipitation patterns in mountain regions. More than one billion people depend on water from mountains; climate change impacts mean that patterns of precipitation, snow and glacier melt and refreezing are changing, affecting available water resources and flood and drought management. Precipitation, both rainfall and snowfall, is key to understanding mountain hydrology and my project aims to produce datasets that can be used by for future water management planning.

We have a relatively poor understanding of spatio-temporal precipitation patterns in mountain regions. Gauge networks are sparse and traditional methods of interpolating between point measurements yield inadequate precipitation fields for ungauged and poorly gauged catchments. My project will involve stochastic reconstruction, using an inverse hydrological modelling approach, combined with a random mixing method in a Monte Carlo framework, to generate multiple realisations of precipitation fields. Ensemble simulations will be run, using hydrological model outputs to iterate precipitation inputs. Previous research has used point rainfall data, observed streamflow hydrographs or radar estimates to tightly constrain the inverse modelling process. In this project I aim to innovate by loosely constraining over entire precipitation fields using a wider range of datasets, such as: precipitation estimates and snow cover from satellites, meteorological reanalyses and gauge observations, with uncertainties from observations being factored into simulations.

**Supervisors**

Dr Elizabeth Lewis, Newcastle University

Dr David Pritchard, Newcastle University

Dr Nick Rutter, Northumbria University