Climate change continues to have escalating effects worldwide. Multiple solutions are needed, one of which is carbon dioxide removal (CDR), where CO$_2$ is removed directly from the atmosphere.

One approach to CDR is ocean alkalinity enhancement (OAE), whereby finely ground alkaline minerals are added to the ocean, increasing pH and total alkalinity and enhancing the ocean's ability to draw down CO$_2$ from the air. This effect also helps counter ocean acidification, a phenomenon problematic to marine biodiversity and biogeochemistry.

Here a similar process is investigated but using rivers or fjords settings instead of the coasts. Rivers are proposed to be used as conveyors of finely crushed olivine (10-30 μm) mixed in river water. The goal is for the river to have higher alkalinity and pH before entering the chosen ocean region.

In this work, a closed mesoscale laboratory flume is used to study the feasibility of treating three different conditions, river, fjord, or saltwater, with finely crushed olivine, for alksalisation and CO$_2$ absorption.

During the experiments, we examined weathering of olivine (details on physical and chemical composition and mineralogy needed) in flowing freshwater, brackish water, and saltwater with a flow rate of 1.25 - 1.4 m$^3$/s and the solids-to-liquid ratio of 0.00015 kg. Preliminary results indicate that freshwater is an optimal candidate as a conveyor. Furthermore, using rivers as one of the long-term solutions as an output of alkaline and pH-rich water to targeted regions is suitable.