

River, delta and estuary dynamics in the Metronome

Unravelling effects of imposed water and sediment conditions on long-term fluvial system development

Department: Physical Geography

Research group: Living Landscapes, in Coastal dynamics, Fluvial systems and Global change

Supervisor: Prof. dr. Maarten Kleinhans

Email address: m.g.kleinhans@uu.nl

Project description

In this project, you will contribute to conducting physical experiments that simulate entire rivers, river estuaries and deltas in the www.uu.nl/metronome in the Earth Simulation Laboratory. HIERO

The Metronome is a unique setup in the world that was successfully used to create rivers, estuaries, tidal basins and deltas. We investigate effects of sea level rise and human influence on these systems, both in the present and in the future. We address fundamental questions about the formation and dynamics of channel networks, also in response to dike constructions or disturbances such as dredging, and about equilibrium/steady state and tipping points for drowning in these systems. We share our insights with societal partners such as Rijkswaterstaat and the Dutch Delta Committee. Key in all these problems is unravelling the dynamics of sediment transport in these systems and the effects of the imposed boundary conditions.

You will conduct experiments in the Metronome with us to obtain better insights in such dynamics. The specific project will be tuned to your skillset and preferences (e.g. practical lab work, quantitative pattern analysis on our large dataset, remote sensing, contributing to open science, but also movie making or vlogging which we can use for public and policymakers). You will collect data with our scanning systems, photography and keep your trained eyeballs peeled for surprises. You will contribute to testing a new system for very accurate water level and discharge measurement at the tidal boundary, which sets sea-level and the amount of water coming into the tidal system. You will contribute to testing various ways of entering sediments into the metronome. You will contribute to testing new ways to add tectonics and subsidence (such as due to gas mining in the Wadden Sea) in the experiments. Following the experiments, you will also help in collecting and collating the experiment data. This will be done in Python, Matlab and/or GIS. Considering this, we're aiming for a job that is well-balanced between lab work and work from home. This subject is closely related to cutting-edge research themes of enthusiastic supervisors, a PhD project, MSc and BSc theses, and, as successfully done in the past, we aim for publication in a journal. Please contact me for further questions.

Job requirements

Knowledge of river- and coastal morphology and of programming (Matlab/Python) are required. You are willing to work in a well-organised manner in close communication with the supervisor and the technicians, and you are precise in data collection protocols and storage and keep in mind lab safety regulations. Some background in geology/sedimentology and/or civil/environmental engineering (dredging, constraining etc.), cooking/baking, gardening or do-it-yourself could be beneficial.