Geophysical Research Abstracts
Vol. 20, EGU2018-8004, 2018
EGU General Assembly 2018

simulating extreme sea levels through machine learning reveals the origin of extreme sea levels world-wide

Hessel Winsemius (1,2), Anaïs Couasnon (1), Alba Cid Carrera (3), Thomas Wahl (4), Sanne Muis (1), Dirk Eilander (1,2), Philip Ward (1,2)

(1) Vrije Universiteit, Institute for Environmental Studies, Amsterdam, The Netherlands (hessel.winsemius@vu.nl), (2) Deltares, Inland Water Systems, Delft, Netherlands, (3) University of South Florida, Tampa, United States, (4) University of Central Florida, Orlando, United States

Near-coast extreme sea levels can cause flooding and severe socio-economic impacts. At a given location, these water levels are a function of weather conditions and characteristics of the coastline and its bathymetry. To simulate water levels, physical models may be used that are schematized by bathymetry and forced by weather data. At global scale, such models are computationally expensive and do not directly provide understanding of the origin and scale of weather systems leading to the extreme water level and how a changing climate may influence the probabilities of these conditions. To extend time series to statistically robust lengths and improve understanding of the location-specific weather systems leading to extreme water levels, data mechanistic models may be an important avenue.
Within this presentation we explore several strategies to simulate continuous and extreme water levels with regression-type models, whilst exploring where the crucial information content comes from. Different unsupervised, or semi-supervised selection methods for reanalysis-based predictors are explored, using window averages of predictors over different windows on and around the forecast location. Different window sizes and location offsets are used. We used the complete global GESLA database to train our models on. We have applied the strategies on both ERA-Interim and the new ERA5 reanalysis of ECMWF to investigate the possible influence of higher spatio-temporal resolution on prediction skill.