

Hybrid downscaling of coastal dynamics



What is Hybrid Downscaling?



Why going Hybrid?



Applications



What is Hybrid Downscaling?

Expert Knowledge

Observations

Physical Modelling

Statistical and Machine Learning

Going Hybrid Isn't Simple, But It Is Necessary

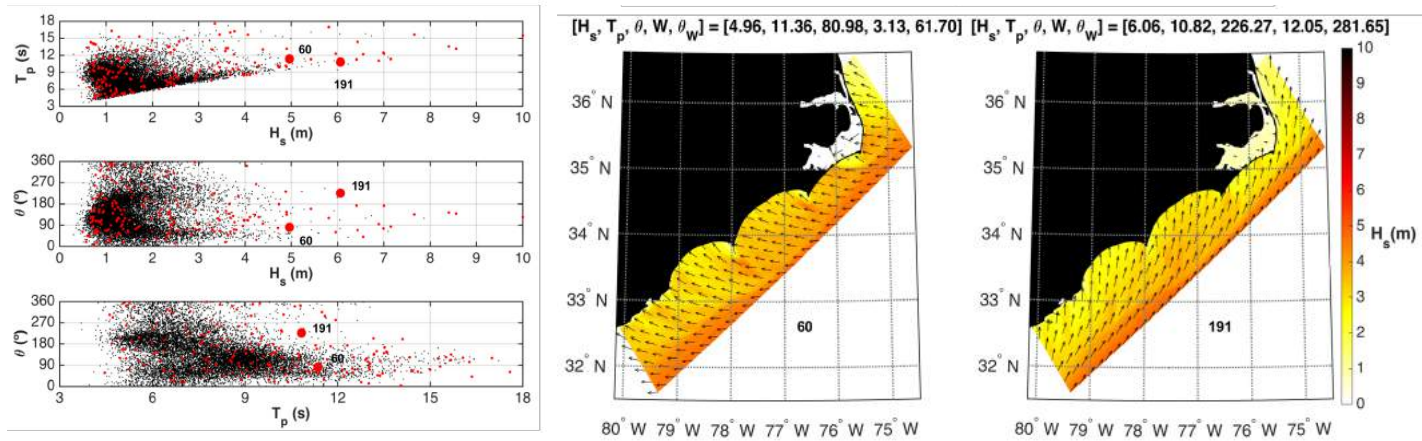
? Why going Hybrid?

Because...

- we want to unravel long-term climate change impacts,
- observations are often scarce,
- we model complex (physical) processes and networks,
- global datasets are often not representative locally,
- partitioning uncertainty/sensitivity requires of extensive analysis,
- ...



Wave Downscaling



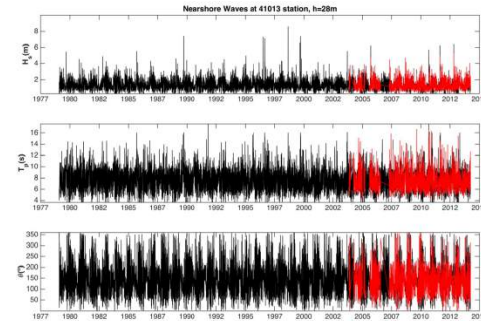
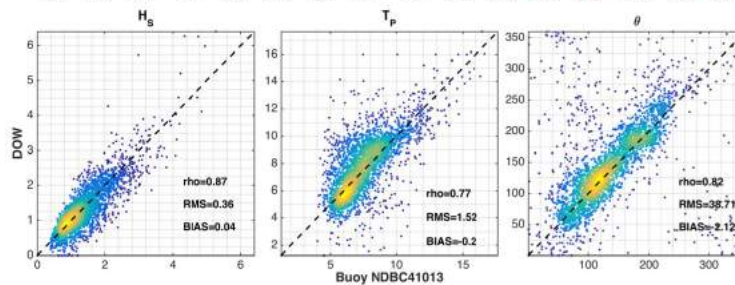
1- Selection of characteristic boundary conditions

2- Propagation of selected cases with SWAN



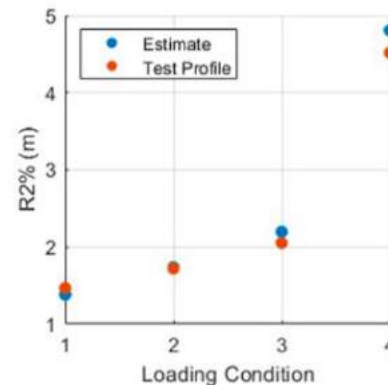
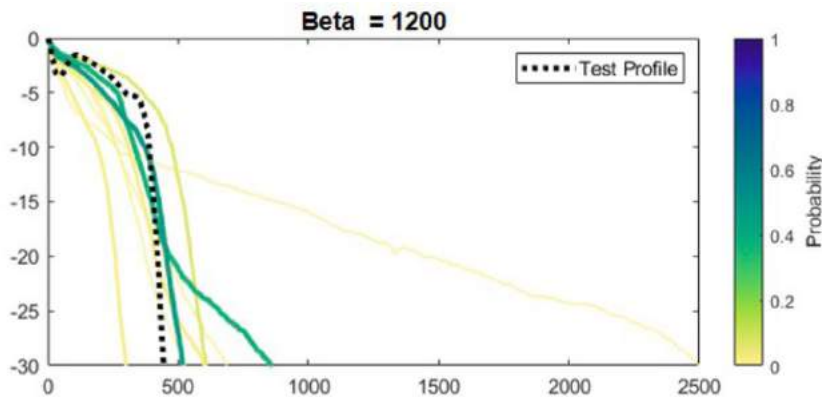
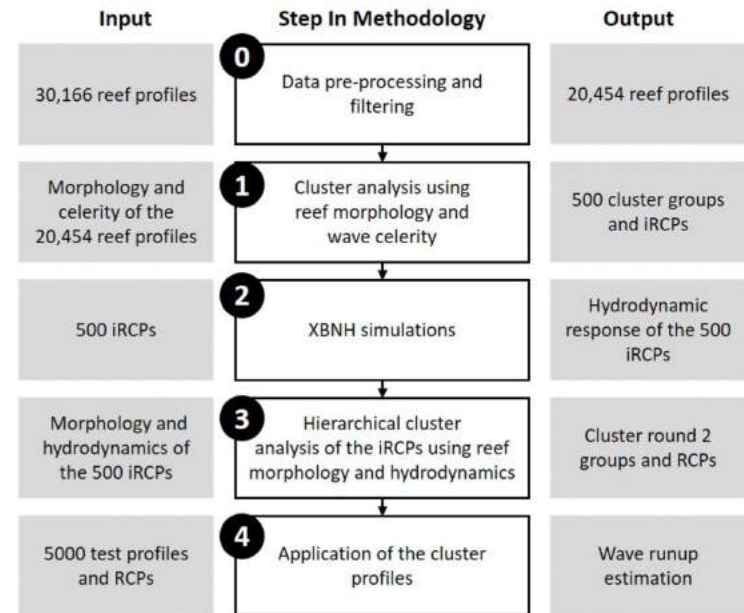
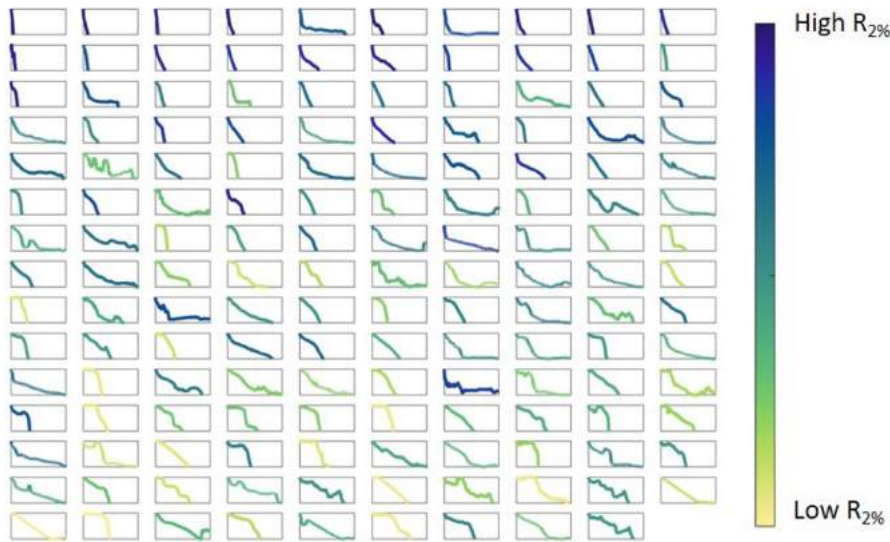
4- Validation

3- Reconstruction or probabilistic match.





Wave run-up prediction on coral reefs

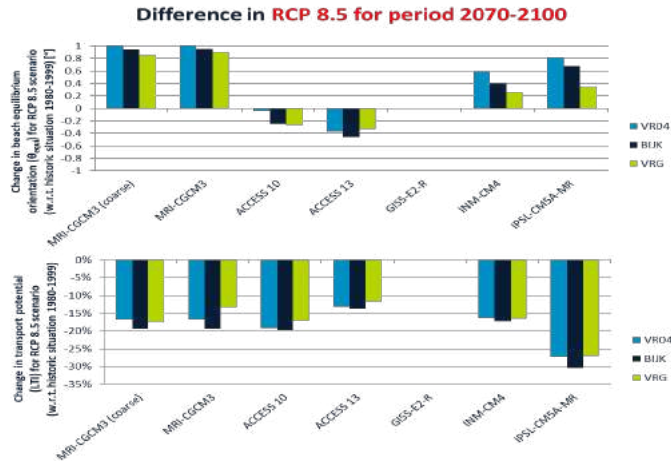


Scott et al., (2020) Front. Mar. Sci.

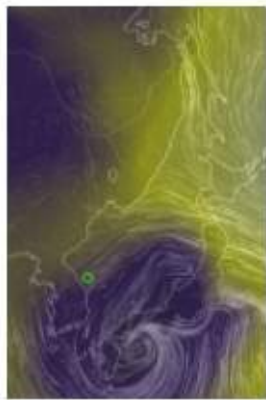
McCall et al., (2021) Coastal Dynamics conf.



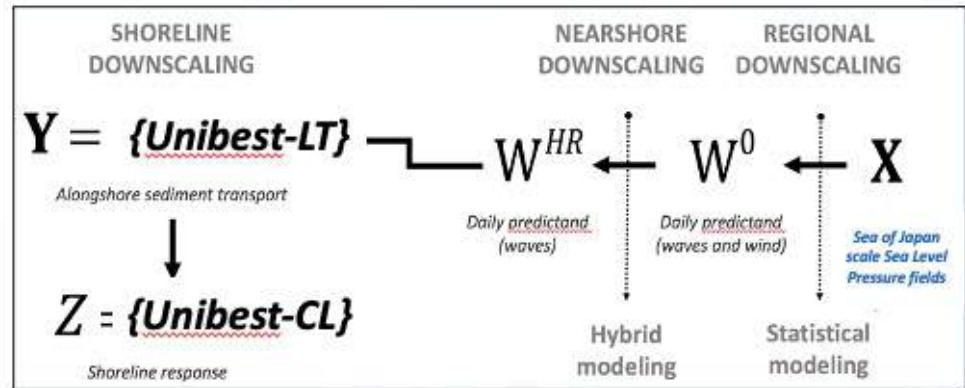
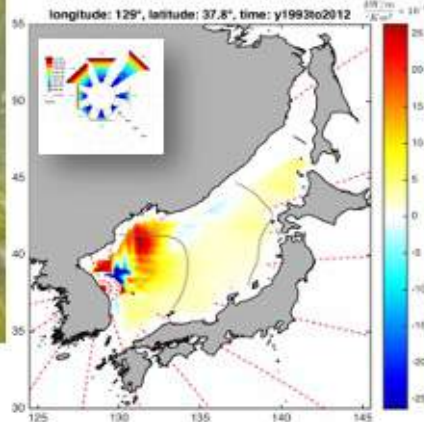
Changing Coastlines



X: Sea Level Pressure + Gradient SLP



W⁰: WAVES



EAST KOREA

SEA OF JAPAN

Deltares

Do you go Hybrid?

