Projecting Future Wave Climates for South Africa using Artificial Neural Networks

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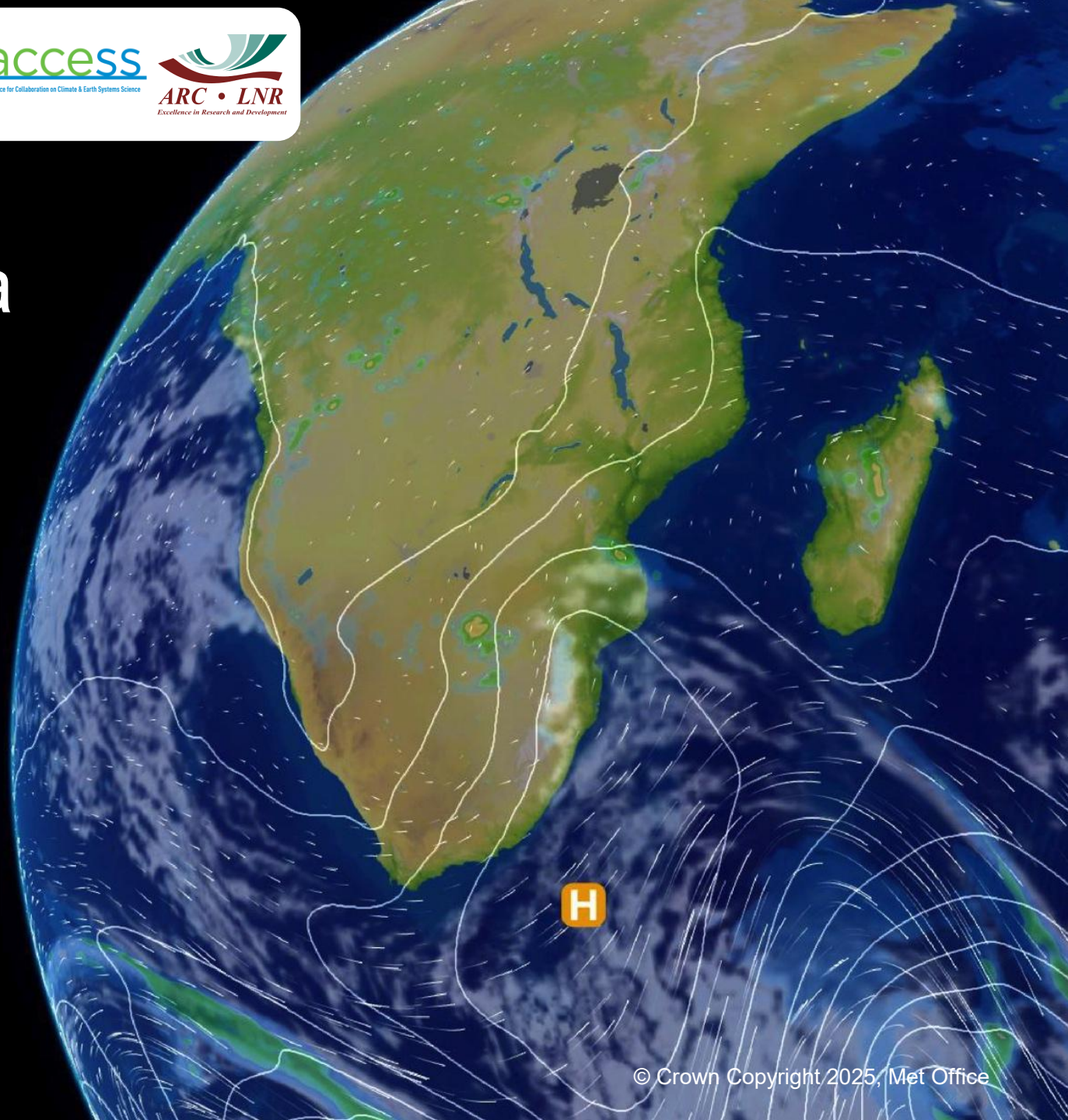

4th International Workshop on Waves, Storm Surges and Coastal Hazards

Motivation

Why:

- To support future:
  - Coastal infrastructure
  - Development
  - Offshore industries

Aim:

- Produce a wave climate dataset at a:
  - Lower computational cost
  - Higher resolution

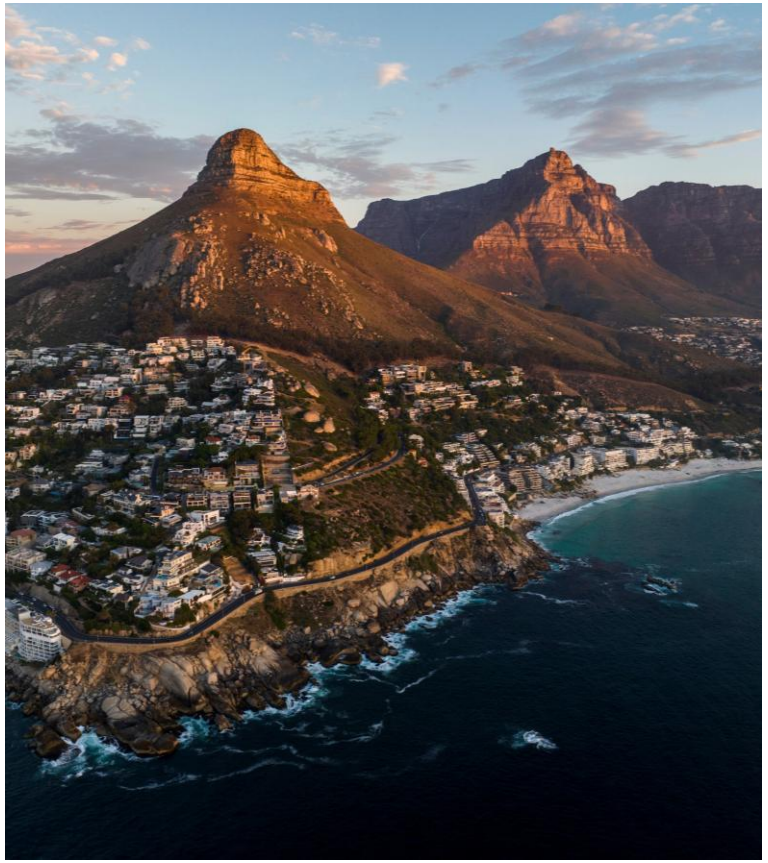

Image: M365 stock images

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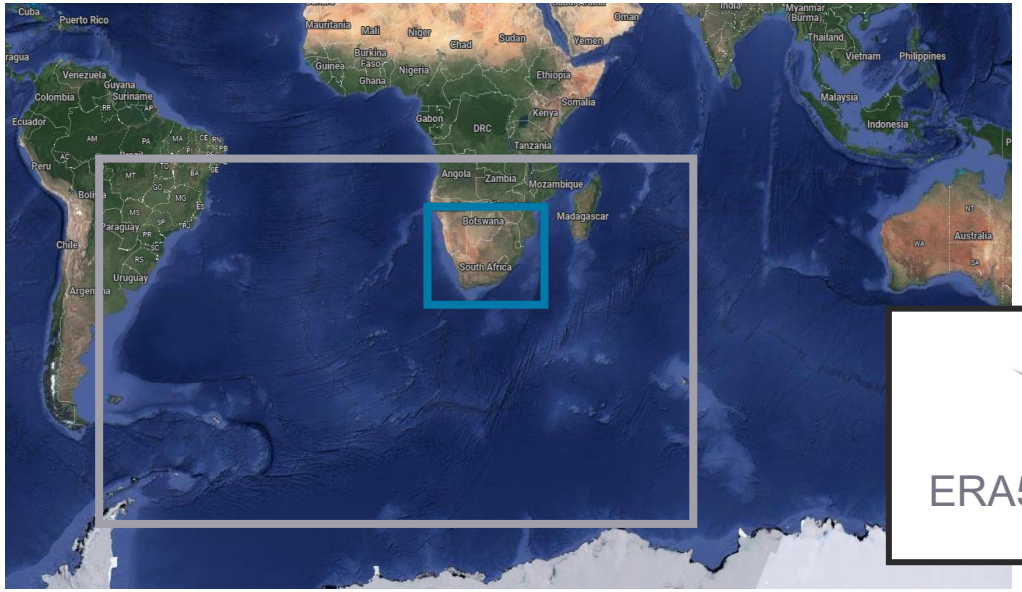


Model training

ERA5 atmospherics → ANN ← ERA5 waves

Model application

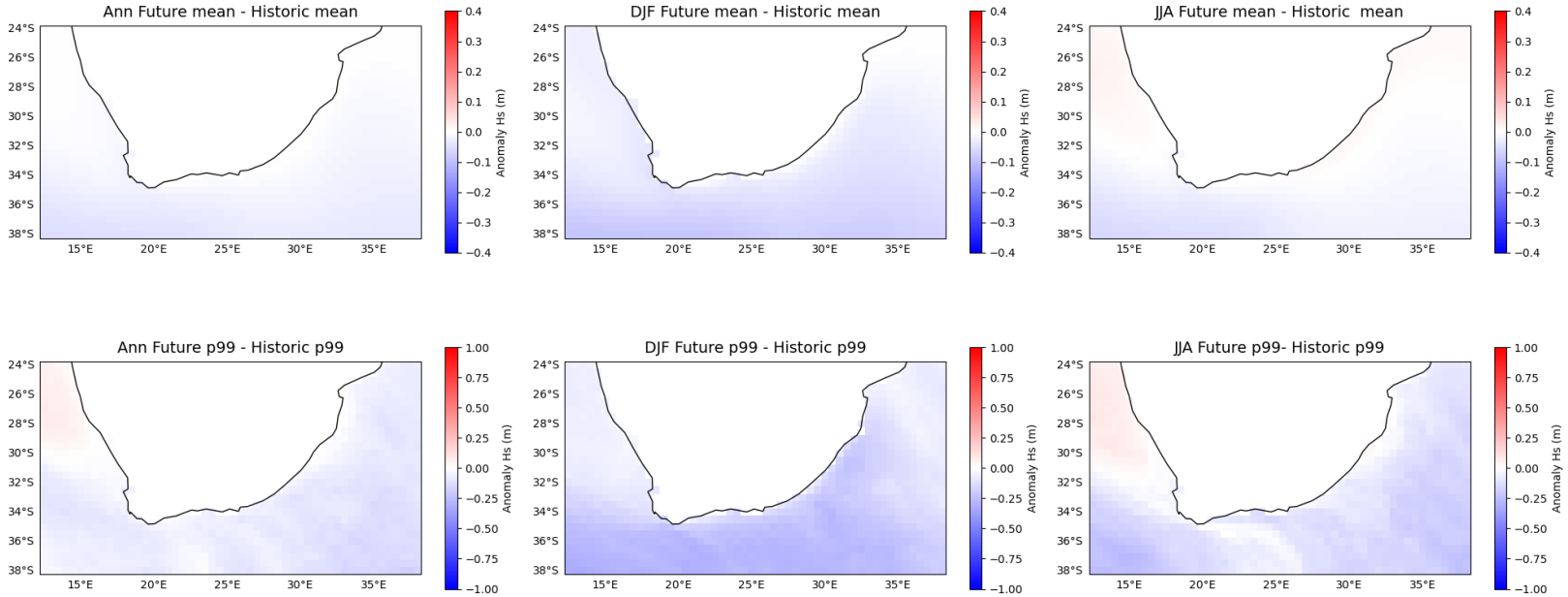
CMIP atmospherics (historic simulations) → trained ANN → waves (historic period)

CMIP atmospherics (future scenarios) → trained ANN → waves (future period)

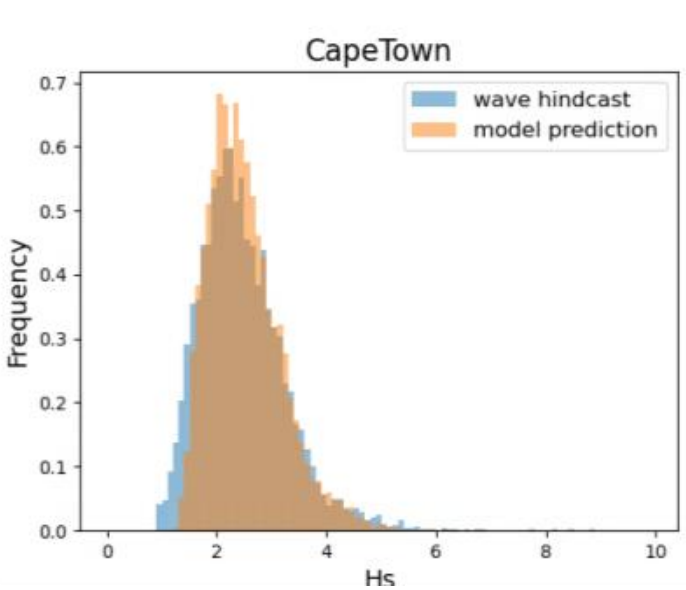
Preliminary results

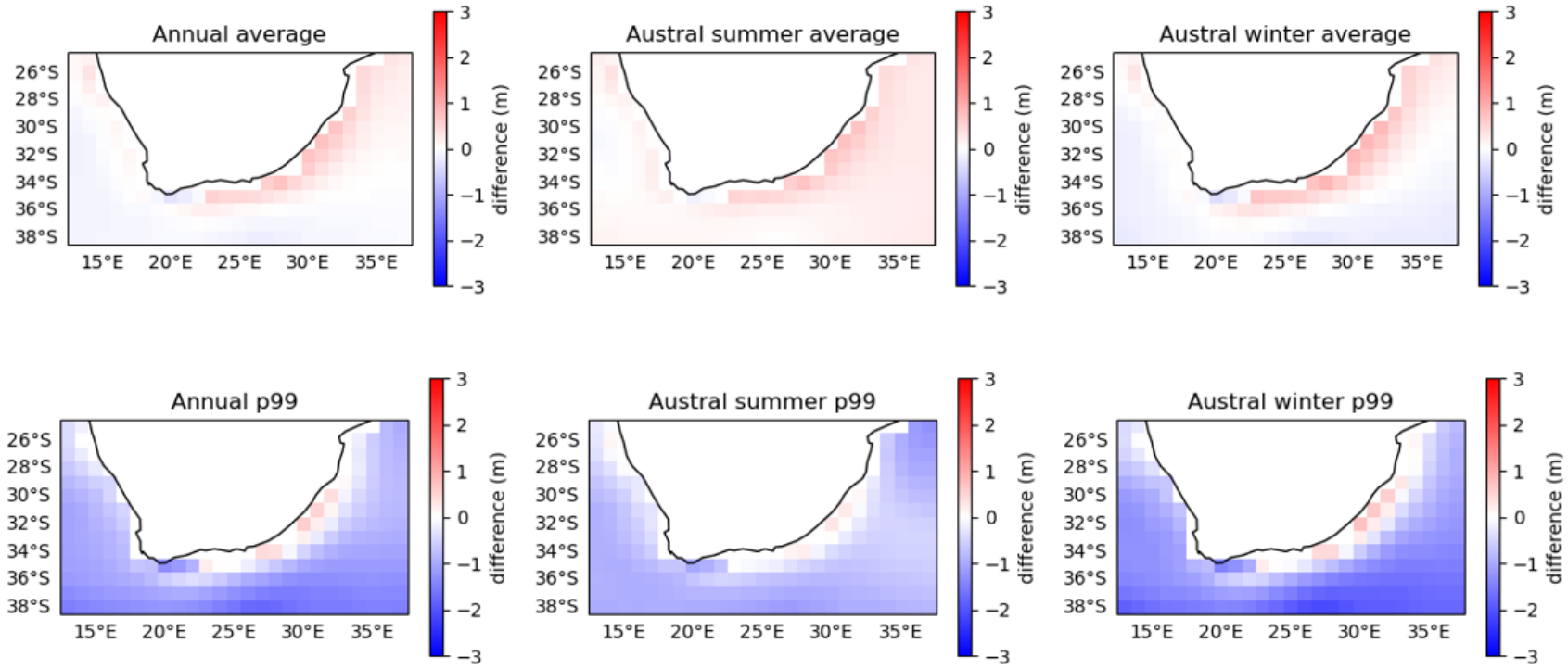
- Applied 7 CMIP ensembles to emulator
- Produce:
  - Historical simulations (1999-2005)
  - Future projections (2085-2095) under RCP8.5

Difference between Future and Historic



Validation and verification





Summary

- Trained emulator based on mean sea level pressure and wave data
- Produced future projections and historical simulations over several ensembles
- Verifying by comparing emulator outputs to lower resolution COWCLIP models

Further work:

- Potentially expand the dataset
- SA partners are retraining the emulator on local hindcast data
- Consider incorporating MSL to start exploring Extreme Water Levels

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Questions?

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