Operational ocean modelling within South Africa; a downscaling approach

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Rational

Operational ocean modelling in South Africa is a developing field, however, existing infrastructure and collaborations provides an opportunity for rapid development. .
The Sustainable Ocean Modelling Initiative: a South AfricaN Approach (SOMISANA) looks to use existing infrastructures to rapidly develop operational ocean modelling systems.

Downscaling

Downscaling from freely available global models allows for the developed of high resolution coastal models that are relatively light computationally
An evaluation of global models was done to select best possible forcing for different areas of interest:
Russo, Cristina & Veitch, Jennifer & Carr, Matthew & Fearon, Giles & Whittle, Christo. (2022). An Intercomparison of Global Reanalysis Products for Southern Africa's Major Oceanographic Features. Frontiers in Marine Science. 9. 837906. 10.3389/fmars.2022.837906.
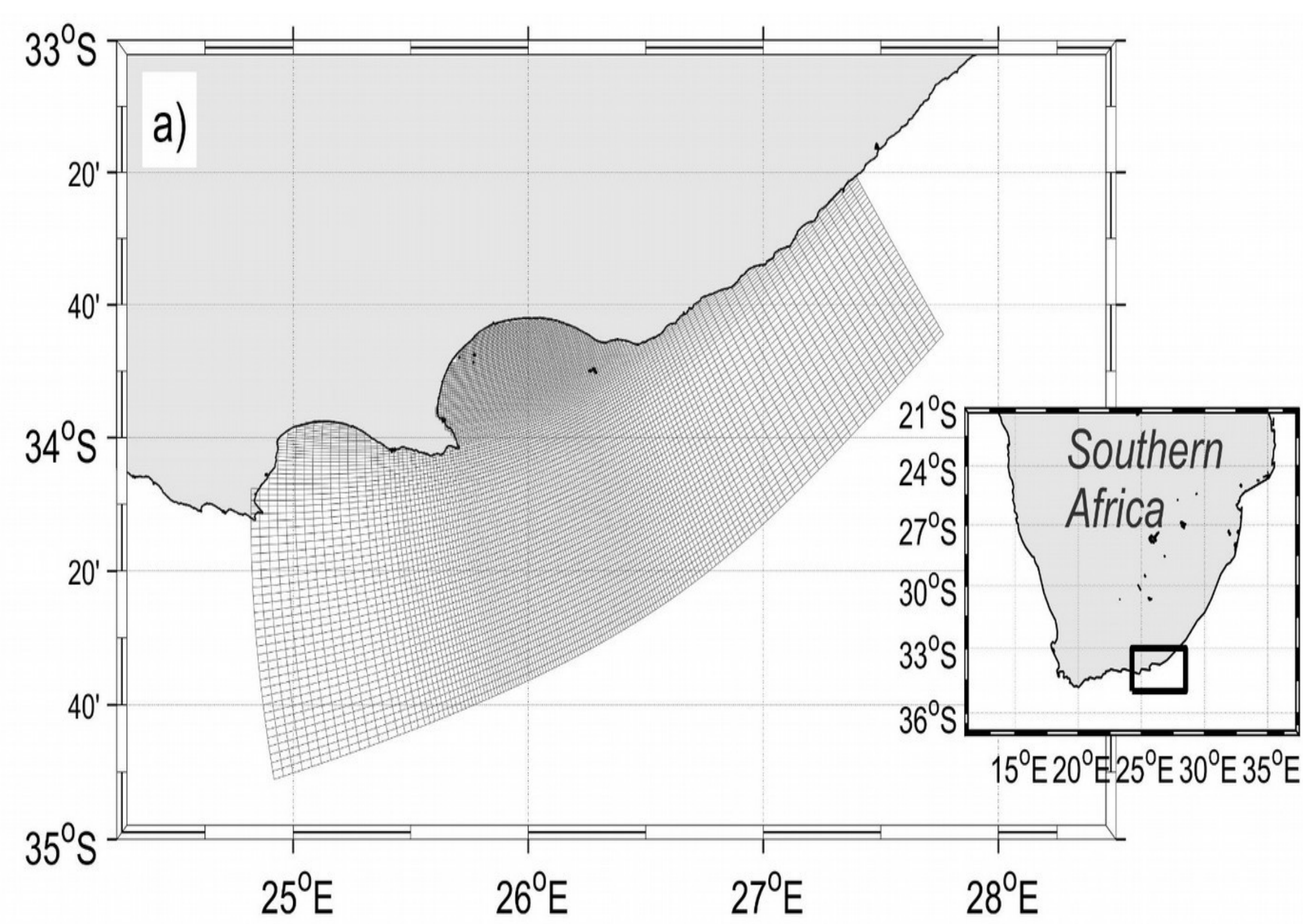
Work-flow

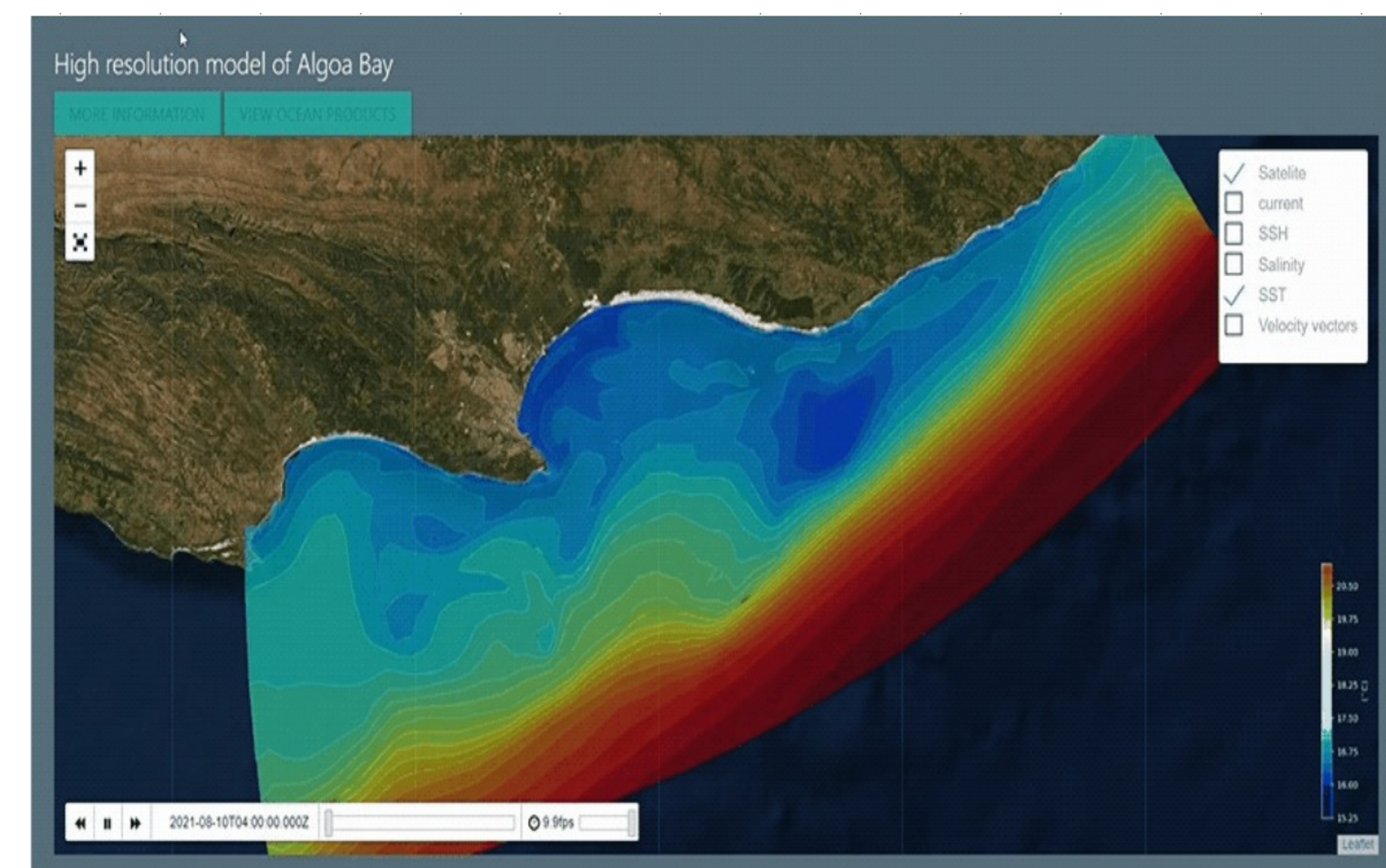| Create downscaled hindcast	Evaluation of the hindcast	Adapt the hindcast to run in forecast	Run forecasts operationally	Disseminate the forecast

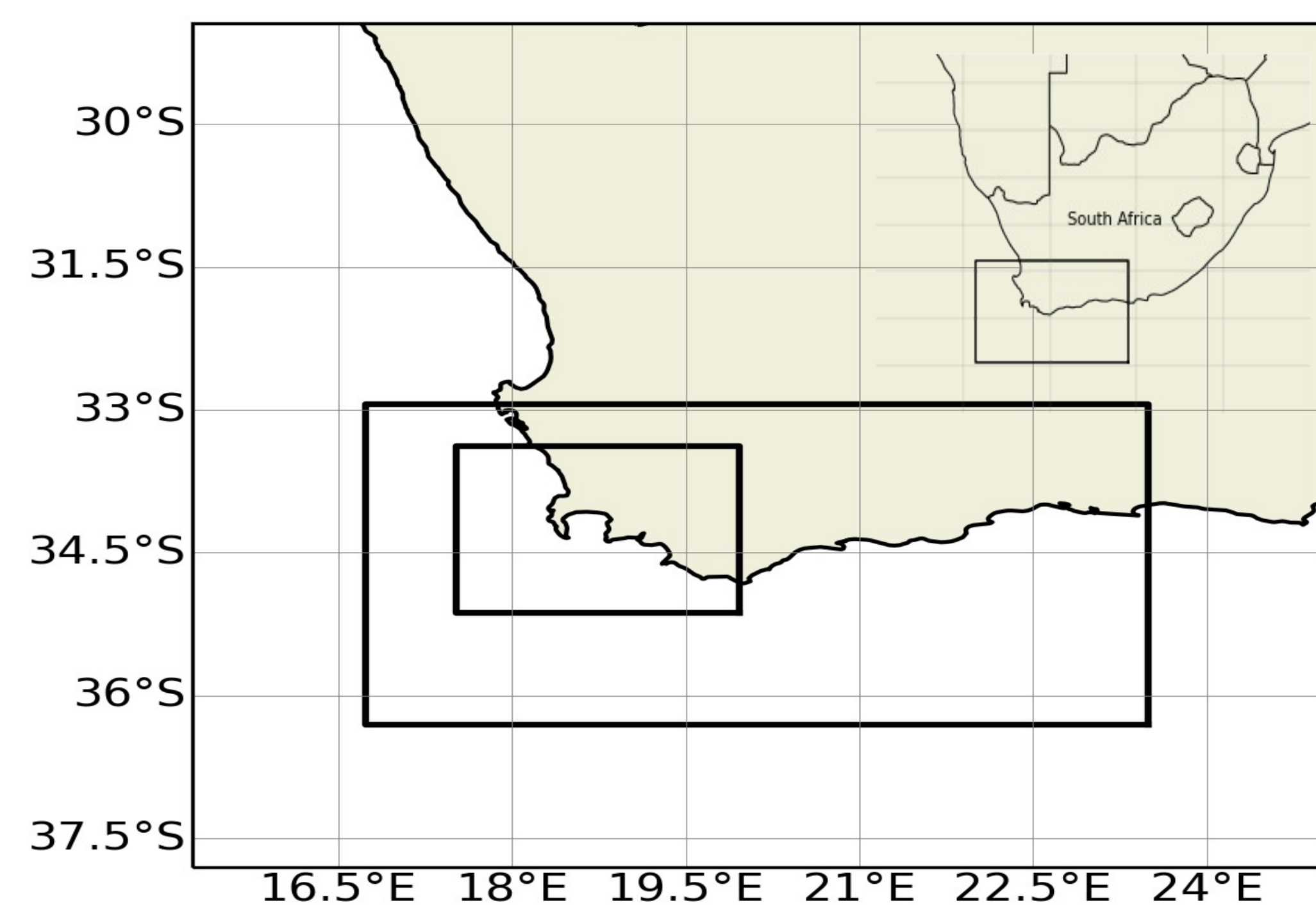## Algoa Bay Forecast Model

-CROCO model
-Curvilinear grid
-3km to 500m horizontal resolution
-Boundary forcing from GLORYS
-Atmospheric forcing from GFS
-Currently running operationally on a test platform


South Cape Coast Forecast Model

-CROCO model
-Regular, nested grid
-9km parent and 3km child domain
-Boundary forcing from GLORYS
-Atmospheric forcing from GFS
-Showed to out perform both the global model and merged satellite products in the upwelling region

SCC_model and Cape Point/CSIR in situ SST climatology
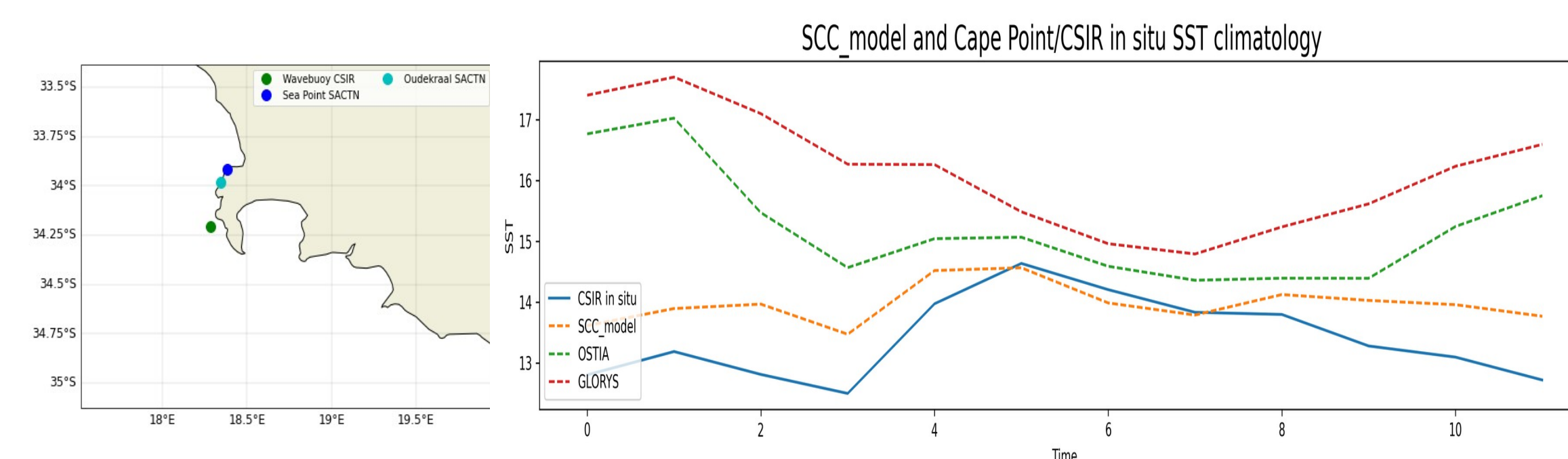
correlation(r)	SCC_model	OSTIA	GLORYS
CSIR wave-buoy	0.70	0.41	0.30
Oudekraal	0.51	0.44	0.39
Kommetjie	0.60	0.29	0.47

Value added products
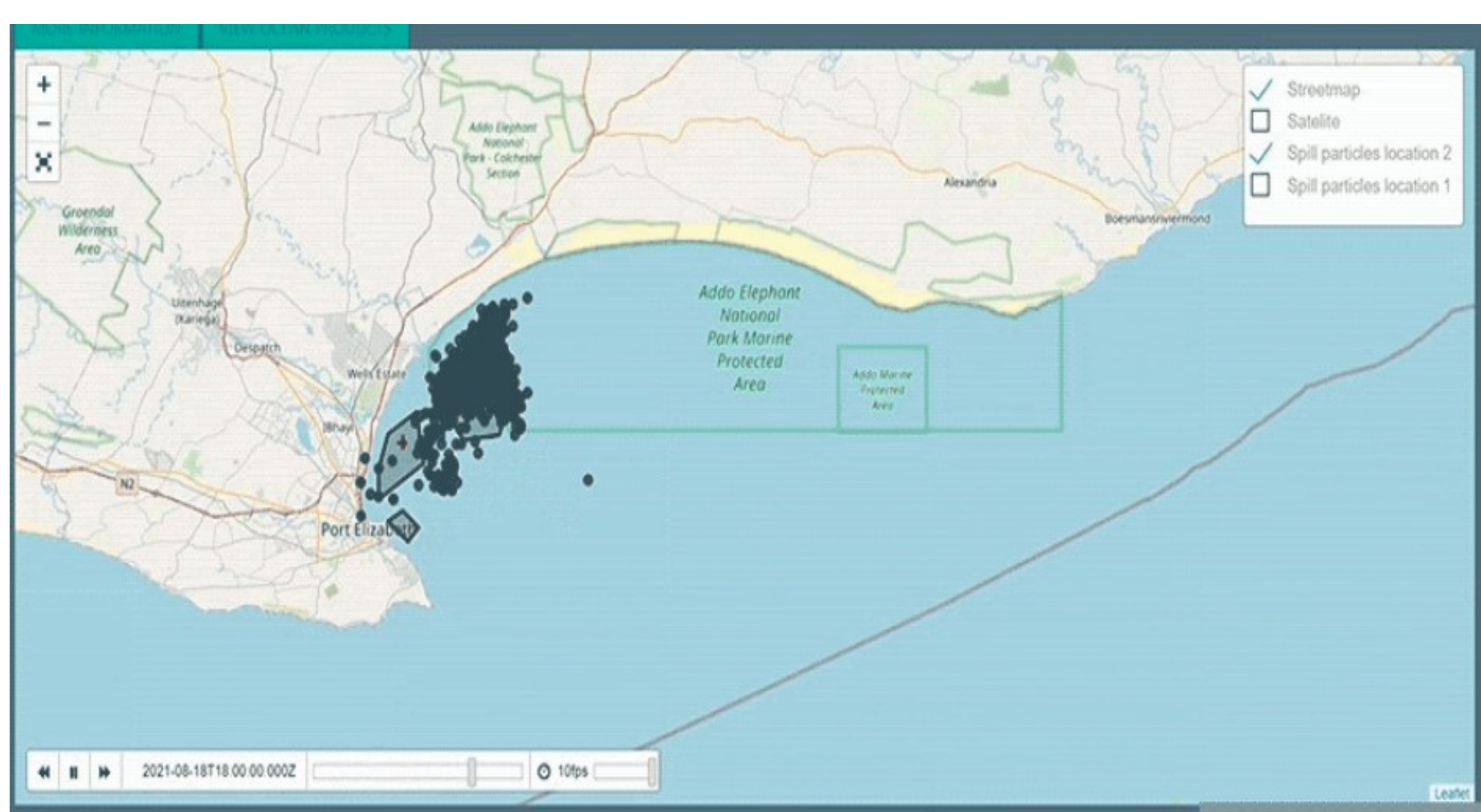
-Off-line particle tracking is used to simulate hypothetical oil spills
-Run daily from two bunkering sites forecasting potential spills
-Marine heat wave (MHW) tracker has been developed from remotely sensed SST
-MHW tracking will be applied on the forecast models
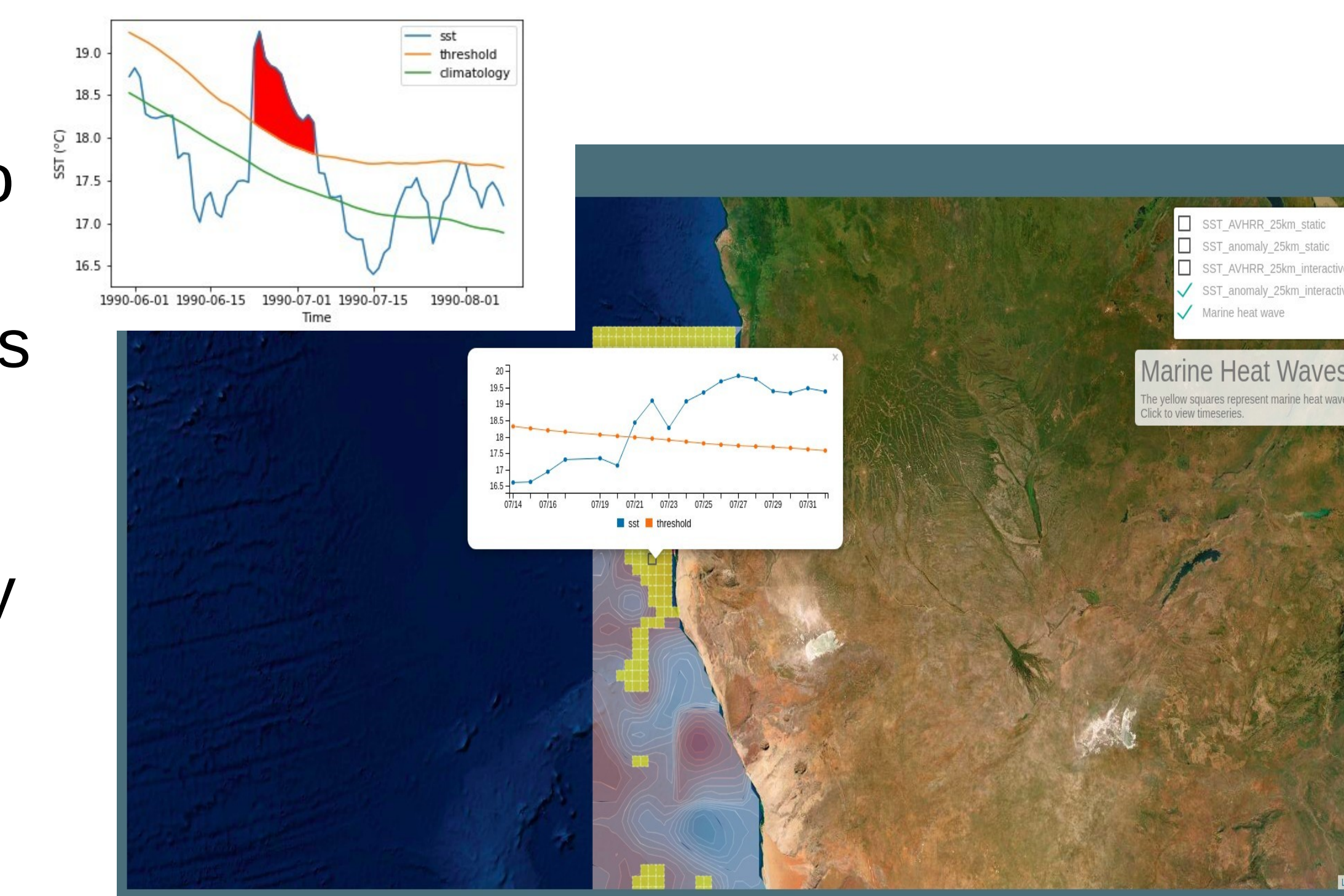
Moving forward

-Increase the resolution of the atmospheric forcing, collaboration needed with nation weather institute.
-Integration of the model output with real time, in situ measures for an integrated observing system
-Increase the impact of the forecast models through engagement with stakeholders both public and private
-Build human capacity for model improvements and assimilation

Email and contacts

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