OPERA
OCEAN PREDICTION ENHANCEMENT IN REGIONS OF AFRICA

Dr. Jennifer Veitch

SOMISANA Team lead

SAEON – South African Environmental Observation Network

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Ocean Prediction UN DECADE COLLABORATIVE CENTRE

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

MERCATOR OCEAN INTERNATIONAL

Institution

Name of Institution: SAEON

Department/Service: SOMISANA, Egagasini

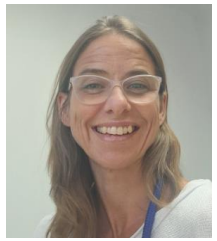
Ministry in charge (if applicable):

National Research Foundation,

Department of Science, Technology and Innovation

Website: https://www.saeon.ac.za/

Country: South Africa



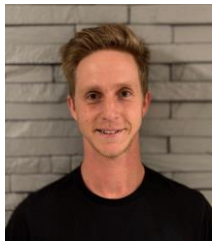
Jennifer Veitch
Team lead

Nkululeko Memela
Modeller

Giles Fearon
Senior Modeller

Laura Braby
Postdoc

Aphiwe Mtetandaba
Product Developer



Gustav Rautenbach
Modeller

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Description of ocean forecasting system

- Name of the system: South African Coastal Forecasting System (SACOFS)
- Type of system: Ocean State Forecasts (temp, salinity, currents, SSH)
- Start of operation of the system: 2020
- System website (if available): https://somisana.ac.za/
- Describe your data sharing policy: All outputs are freely available

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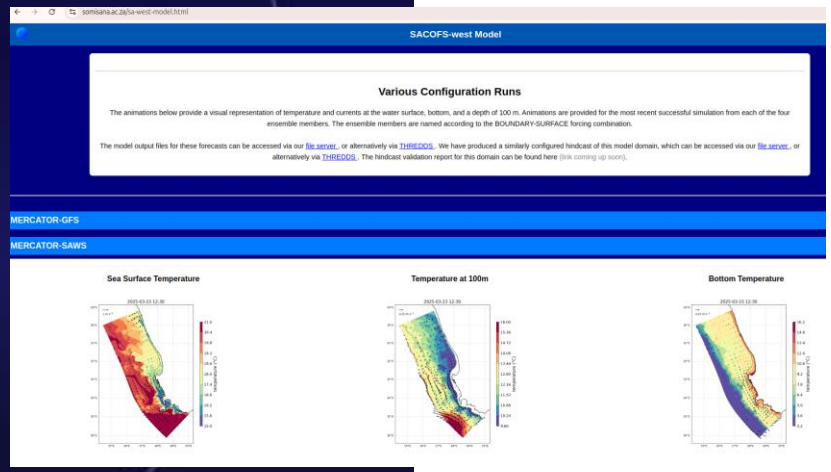

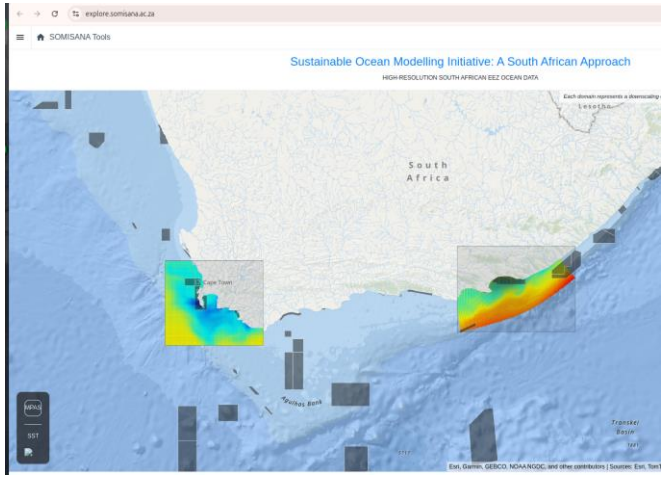

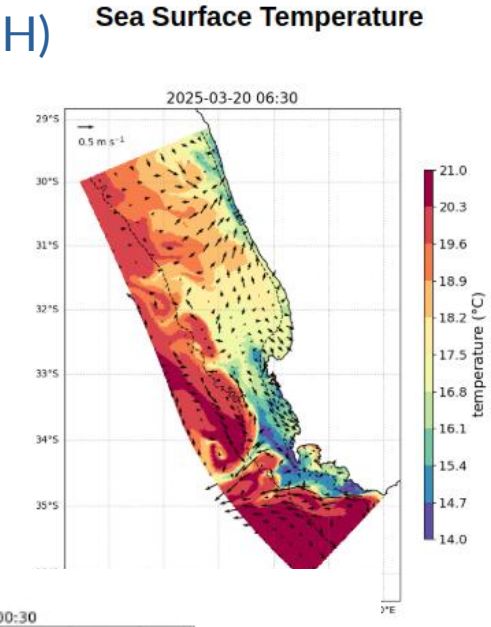

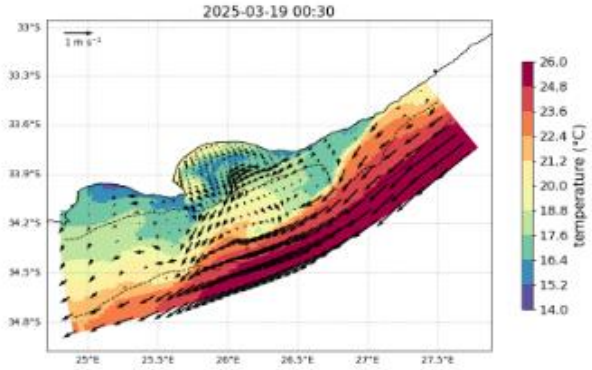

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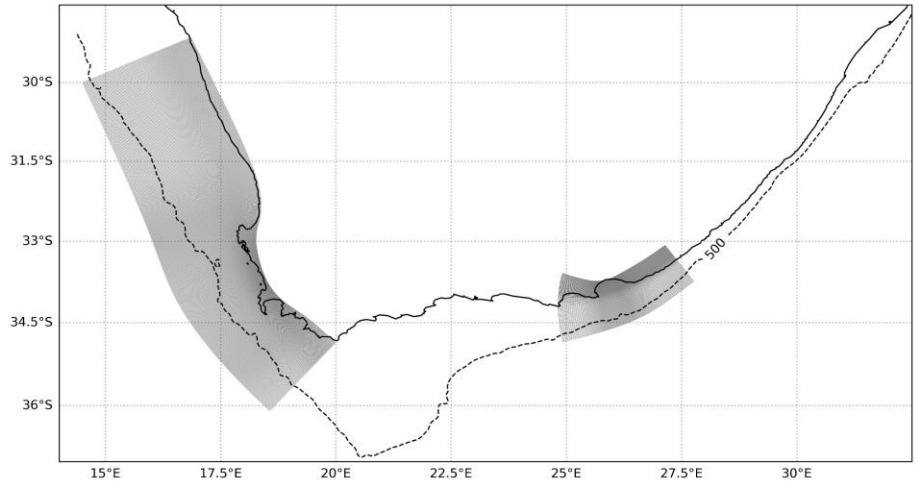
Technical description

- Model employed: The Coastal and Regional Ocean Community Model (CROCO)
- Resolution:
  - ~500 m to 3 km for the SE domain (see right)
  - ~1 km to 3 km for the W domain
- Forcings:

  Ensemble Approach for both domains with the following members:
  - CMEMS and GFS
  - CMEMS and SAWS
  - HYCOM and GFS
  - HYCOM and SAWS
- Forecast horizon: 5 days

Coastal and Regional Ocean COmmunity model configuration

CROCO
Coastal and Regional Ocean COmmunity model



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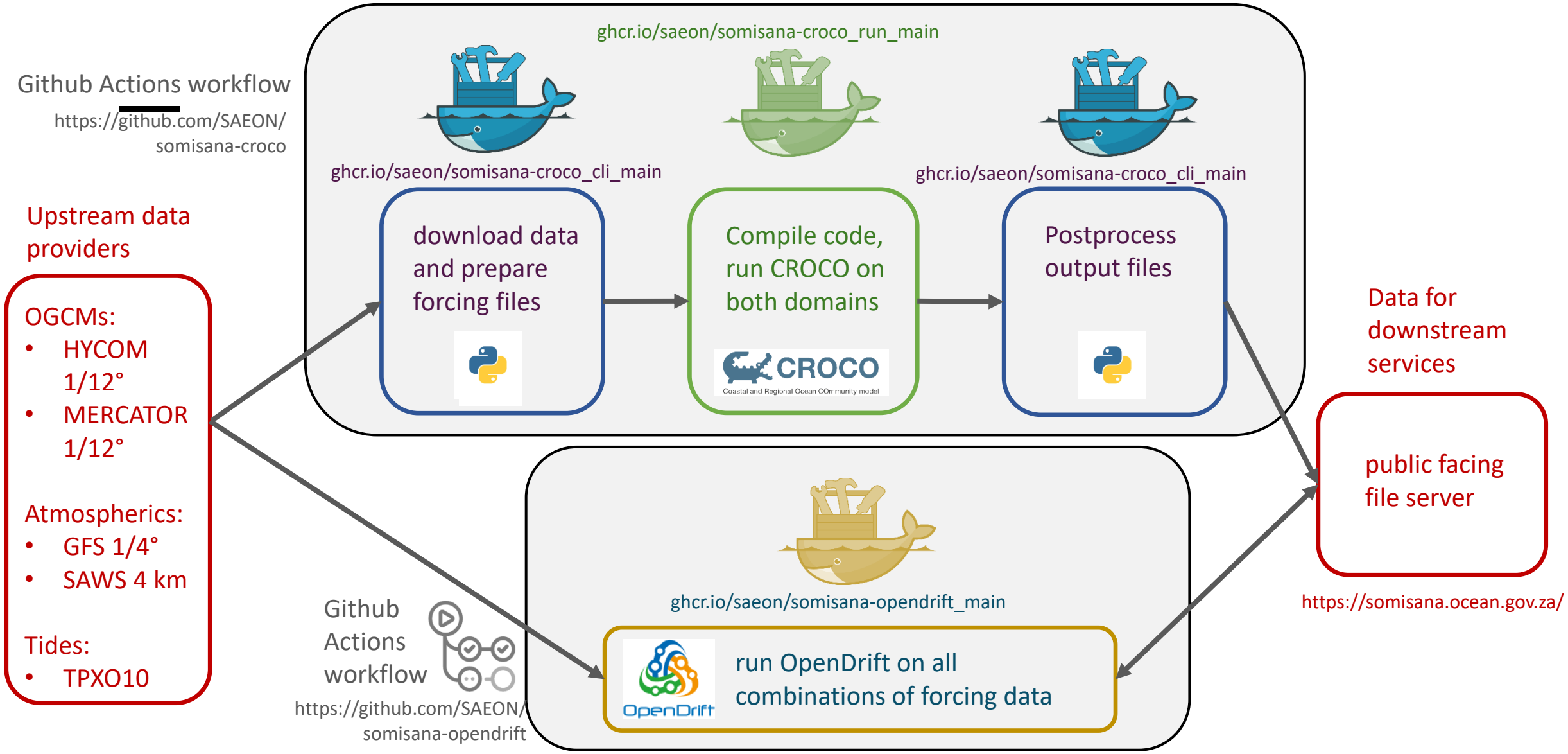
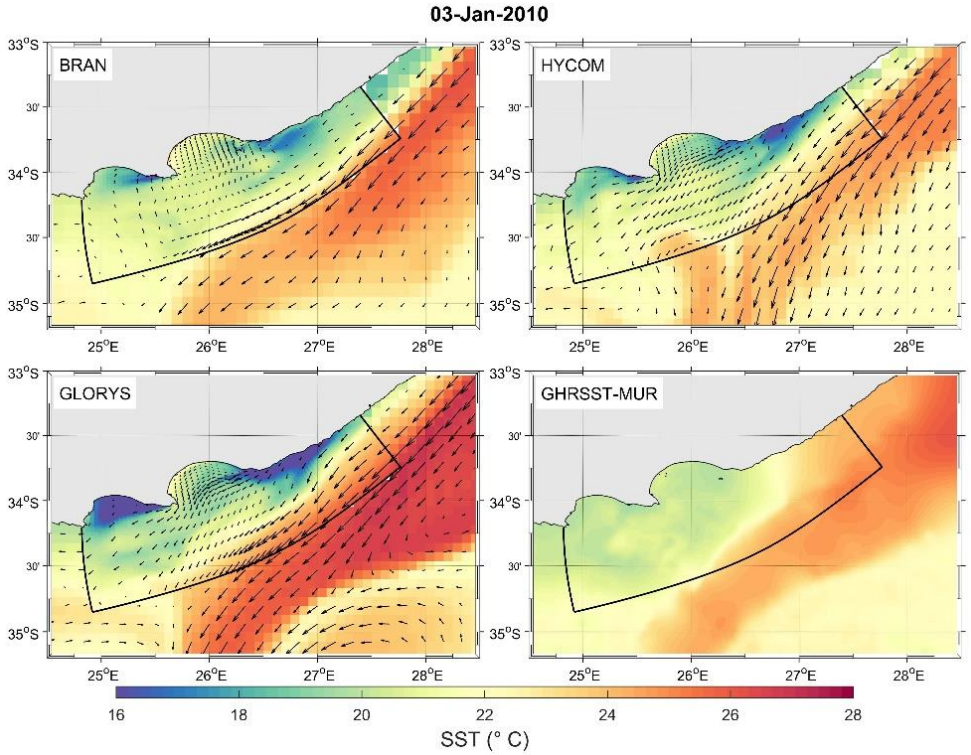
System results



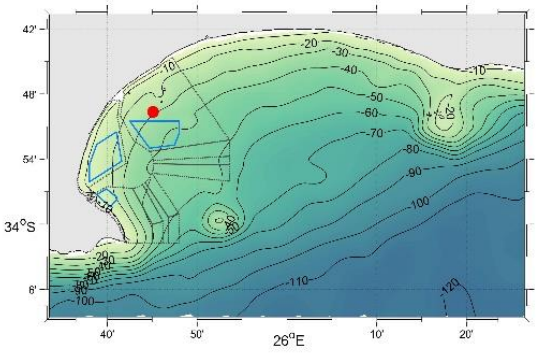
System results

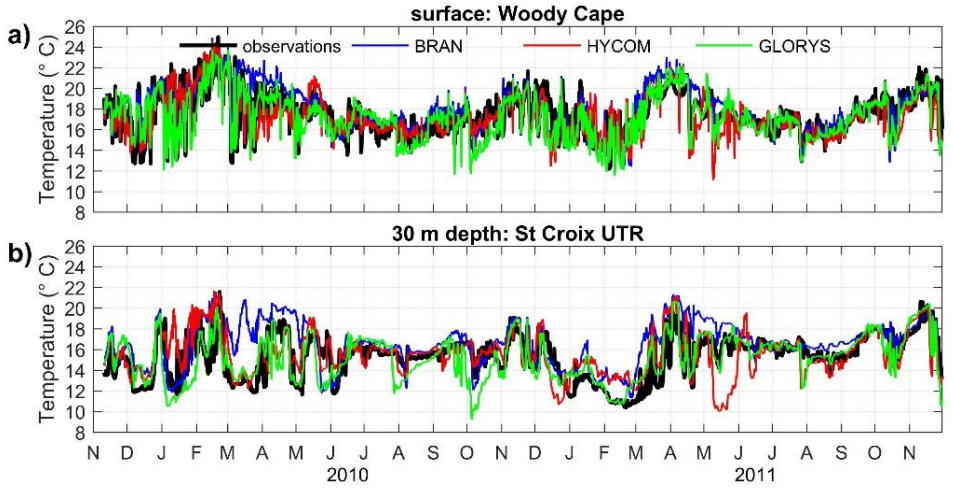
- Hindcasts using three different boundary forcings:
  - HYCOM
  - GLORYS
  - BRAN

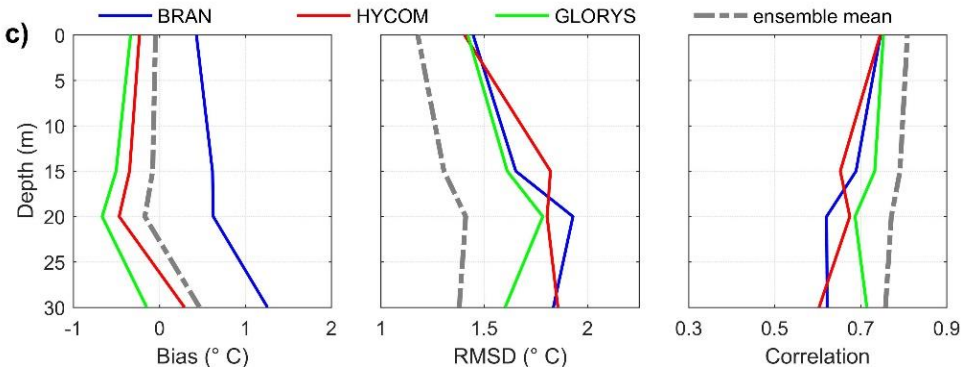


Algoa Bay domain hindcast: Evaluation of temperature

3 member ensemble mean outperforms any individual run







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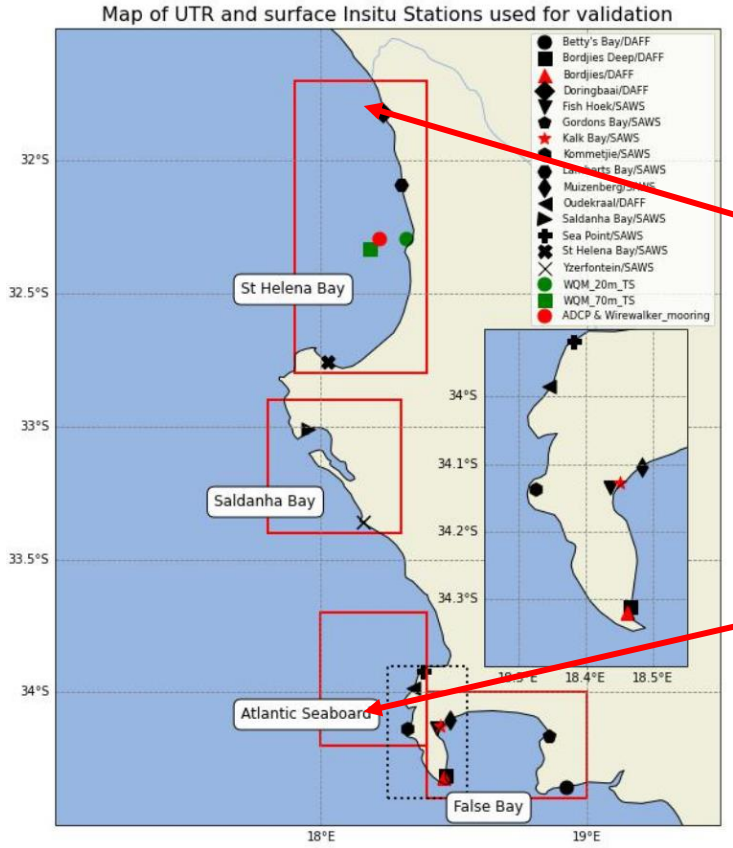
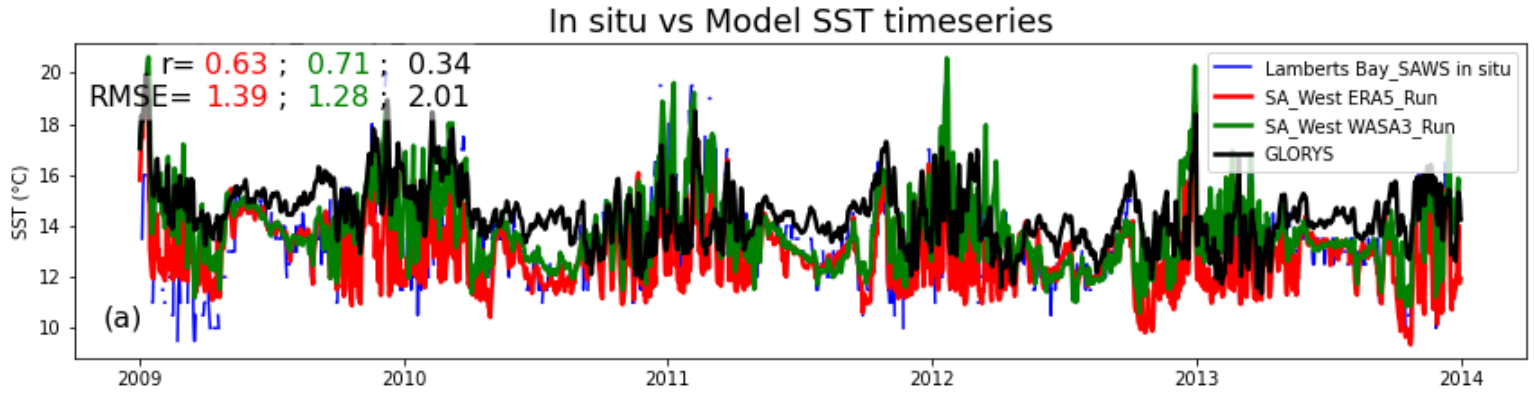
Description of System validation

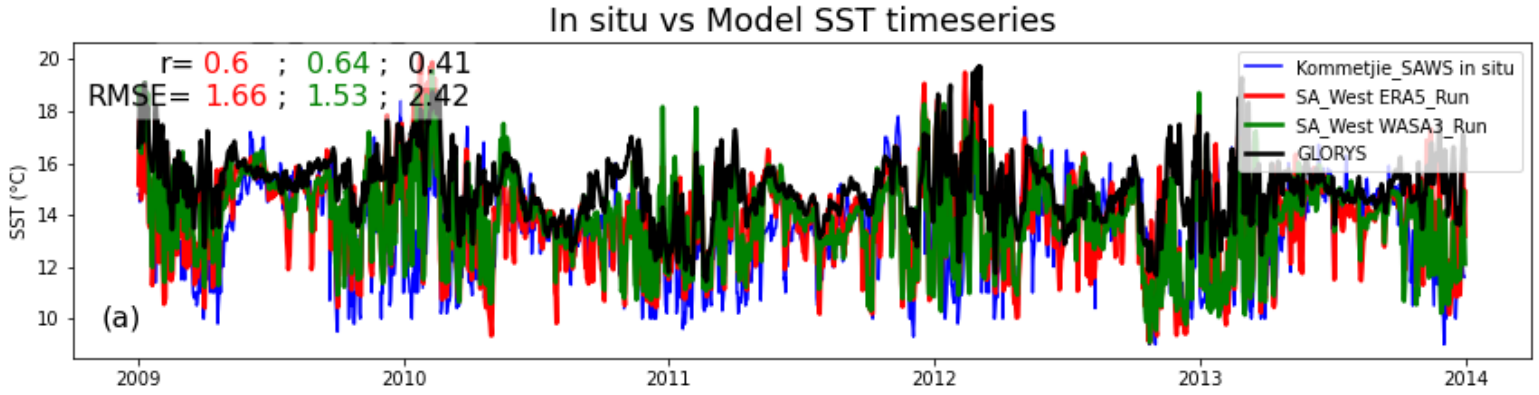
- Boundaries: GLORYS
- Surface: ERA5 and WRF 3km



West coast domain: Evaluation of temperature

Downscaled solution outperforms the global solution





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Description of system validation

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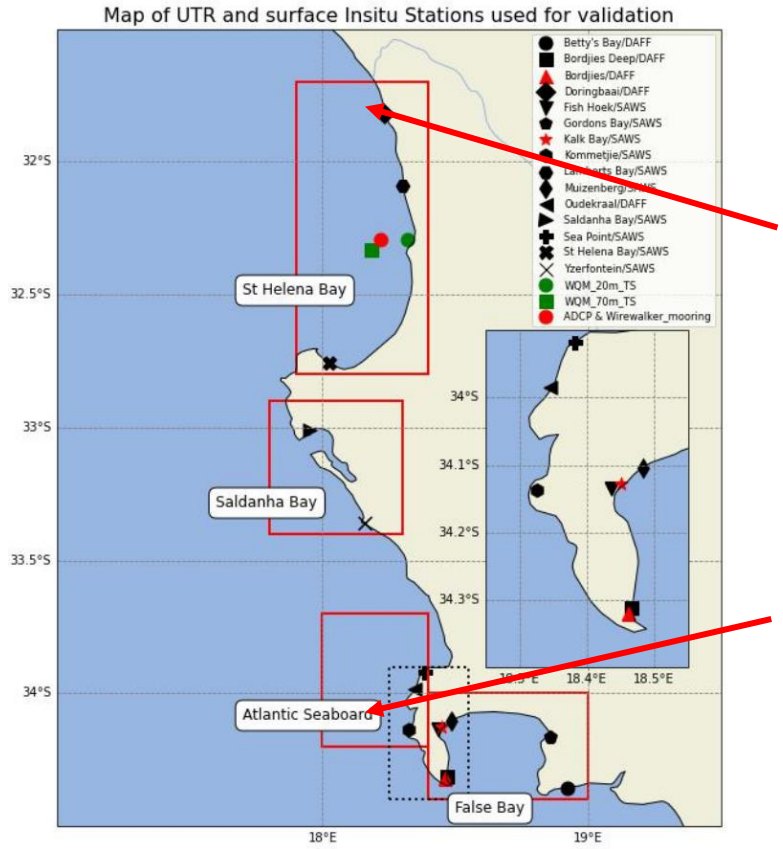
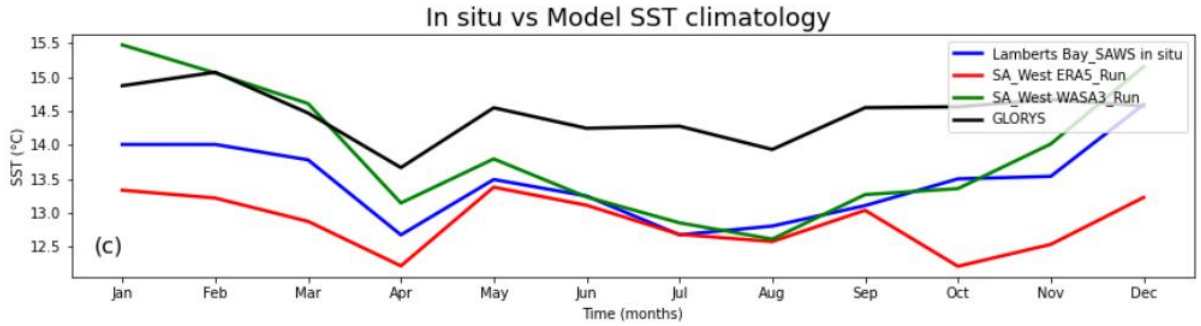
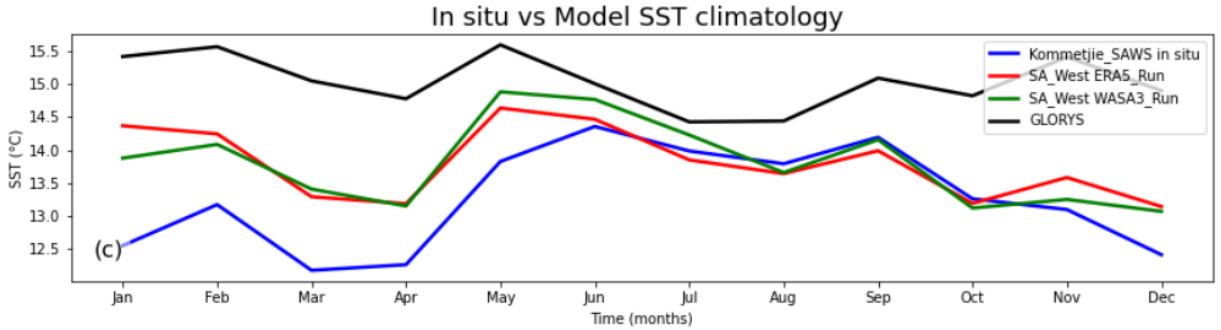


Downscaled solution outperforms the global solution





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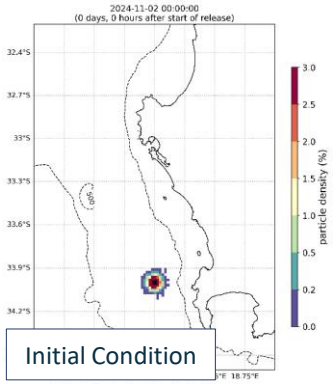
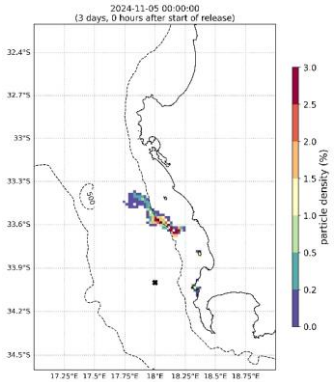
Applications and examples

Operational particle tracking

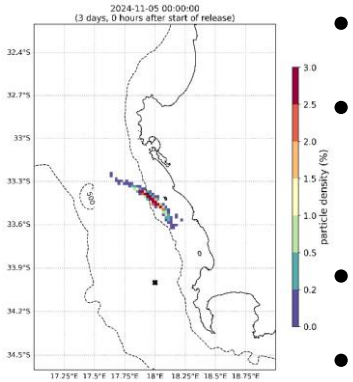
- OceanDrift
- OpenOil
- Leeway



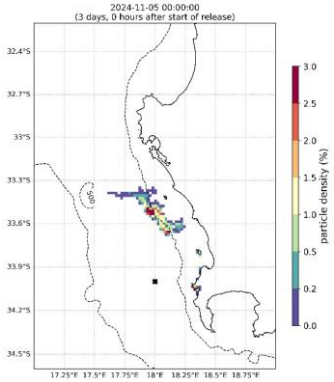
Initial Condition



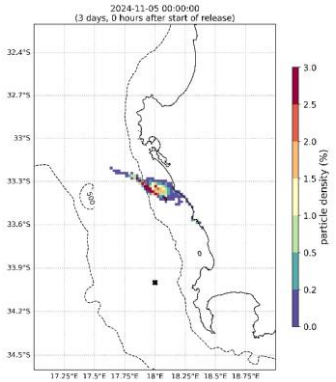
MERCATOR-SAWS



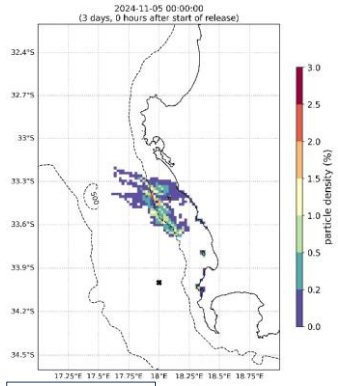
HYCOM-SAWS



MERCATOR-GFS



HYCOM-GFS



Combined

- Application areas: Oil spill response,
- search and rescue

- Main users: South African Maritime
- Safety Authority, Integrated Coastal
- Management, DFFE

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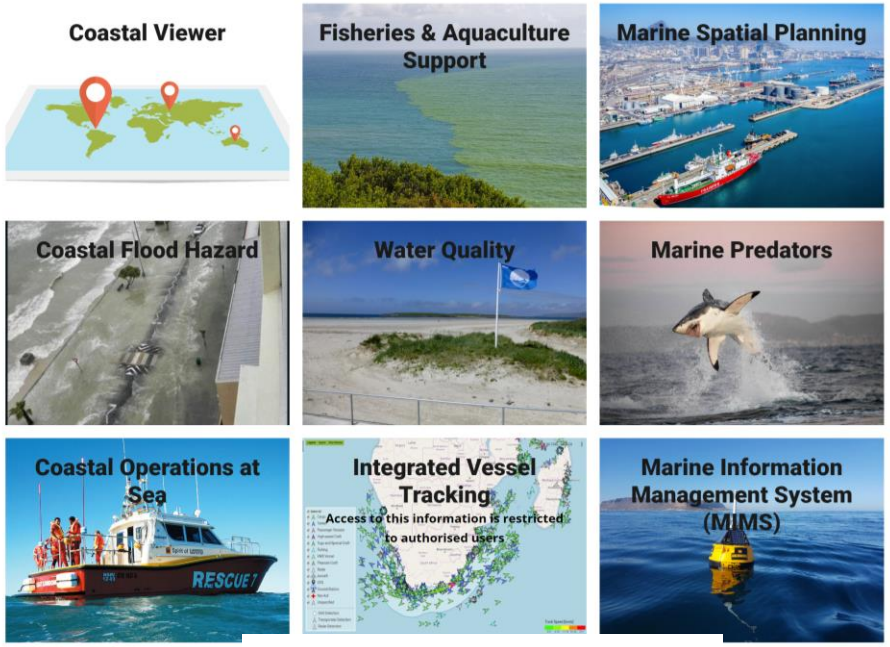
National and international links

National Oceans & Coastal Information Management System (OCIMS)

Decision support tools for improved governance of South Africa's oceans and coasts.



OPERATION PHAKISA
planning | implementation | growth

NATIONAL OCIMS

forestry, fisheries & the environment
Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

South African Weather Service

CSIR
Touching lives through innovation

science, technology & innovation
Department:
Science, Technology and Innovation
REPUBLIC OF SOUTH AFRICA

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National and international links

- Relevant national partners:
  - Department of Forestry, Fisheries and the Environment (OCIMS lead)
  - SAWS and CSIR (implementing partners)

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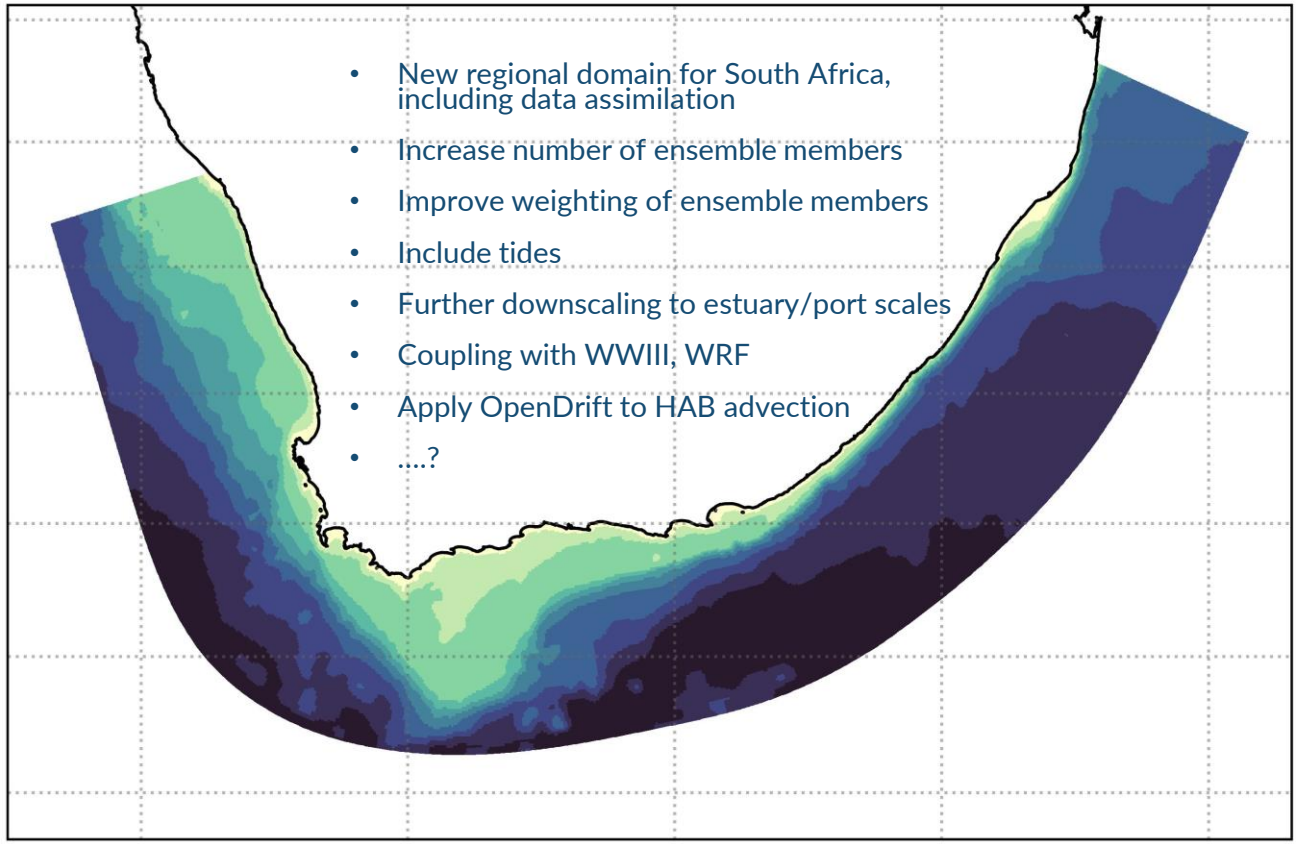
Future plans

- Describe the plans for evolution of your system:
- - Inclusion of entire SA EEZ
- - Wave coupling
- - BGC coupling

- Limitations/challenges:
- - Human capacity/ staff retention (risk)
- - Observations



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