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® South Africa's Operational Ocean Forecasting Developments

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Algoa Bay is situated at the edge of the Agulhas Current, where it transitions from being relatively stable, to unstable as the continental shelf broadens in the downstream direction. As one of South Africa's largest bays it provides a degree of shelter from the southern hemisphere's most powerful western boundary current and is being utilized for offshore ship refueling operations. The environmental risks involved, the highly dynamic offshore boundary and the good network of measurements in the bay have led to it being identified as a pilot site for the development of an operational forecast system that would support stakeholders and decision makers in the case of coastal hazards. To this end, a step by step approach was followed in order to produce a downscaled forecast system optimized for this region and that can be readily configured for other key locations around the coastline. The first step was to evaluate and intercompare various global models as potential boundary conditions. The next step was to develop high-resolution, limited duration hindcast CROCO/ROMS simulations, using different ocean boundary forcings and resolution atmospheric products. Comparisons with temperature recorders and ADCPs at various locations within the bay reveal the differences in the skill of the different models and that their ensemble mean performs best. The tools for the modelling approach have been 'dockerized' for the ease of implementation and interoperability of the system. Using this dockerized workflow, a second bay-scale operational forecast system has been implemented for the South West Cape Coast region, which is home to a lucrative aquaculture industry that are periodically impacted by severe harmful algal blooms (HABs). These limited area forecast systems are being incorporated into a tool to initialize operational OpenDrift particle tracking simulations with various site-specific applications (e.g. oil spills, search and rescue and HAB advection). The operational system will be integrated into the National Oceans and Coastal Information Management Systems (OCIMS) in support of various decision support tools which promote good governance of the coastal environment.

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