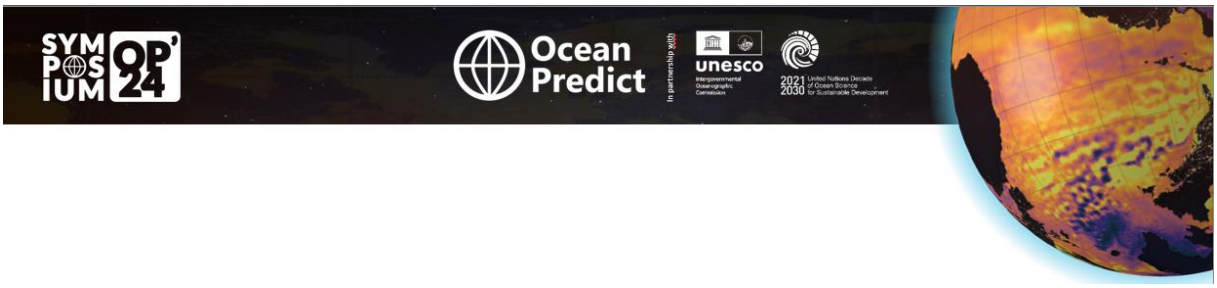

A relocatable approach to regional ocean forecast systems: applications along South Africa's continental shelf

The effective management of South Africa's maritime environment requires high-resolution forecasts of the ocean state which capture the complex oceanographic variability of the region at shelf to coastal scales. As a developing country, South Africa has limited resources available for dedicated operational ocean forecast systems. The focus has therefore been on the development of limited domain shelf to coastal scale models, where they are most needed to address stakeholder needs. One such region is Algoa Bay, located 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. The bay has high ecological value, being one of the last breeding sites of the African Penguin, but is also the venue for ongoing offshore ship refueling operations which pose a threat to the ecologically sensitive assets in the bay. Another region of interest is the west coast of South Africa, within the Benguela upwelling system, which is home to a lucrative aquaculture industry that is periodically impacted by severe harmful algal blooms (HABs). The operational ocean forecast models developed to address these stakeholder needs adopt the Coastal and Regional Ocean Community (CROCO) model to downscale freely available global ocean forecasts to < 1 km resolution in the regions of interest. The ocean forecasts provide input to OpenDrift particle tracking configurations, designed to address specific stakeholder needs, such as the fate of oil spills, HABs, and other floating objects in support of search and rescue operations. The operational workflow for these forecast systems has been developed with the intention of facilitating the rapid deployment in new regions and on different infrastructure in the future. To this end, all the code required to deploy the operational models is maintained on an open-source github repository (https://github.com/SAEON/somisana-croco). We make use of the 'GitHub Actions' feature which allows for the workflow to be run on a local server directly from the remote Github repository, with minimal setup required on the local server. The need for any software installation on the local server has been further minimised by 'dockerising' the various components of the workflow. The system is therefore 'relocatable' both in terms of the domain being modelled, as well as the infrastructure it runs on. It is intended that the workflow might be adopted by other under-resourced nations in the development of their own downscaled ocean forecast systems.

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