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C-RISC: Relocatable storm surge forecasting for predicting extreme sea levels in coastal areas

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The marine environment represents a large and important resource for coastal communities around the world. However, the marine environment also increasingly presents hazards that can have a large negative impact on the community. One important marine hazard stems from storms and their accompanying surges. This can lead to coastal flooding, particularly when surge and astronomical high tides align, with resultant impacts ranging from destruction of property to saline degradation of agricultural land and coastal erosion.

Where tide and storm surge information are provided and accessed in a timely, accurate and understandable way, the coastal community can benefit by being able to take actions based on the prediction to reduce the impact of storm surge events. Examples of actions include deploying flood prevention measures or mobilizing emergency response teams. To be able to provide this type of tide and storm surge data in the form of a forecast prediction at high spatial and temporal resolution requires a dynamic ocean model.

The National Oceanography Centre maintains world class interdisciplinary oceanographic research, with many research strengths. One of these strengths is shelf-sea, coastal and global ocean models. Since the 1970's NOC has provided the UK storm surge warning system, currently run by the UK Met Office and fed into the Environment Agency early warning systems to warn coastal communities. However, to set up such a model requires a lot of resources both in time and cost. Being able to reduce this cost and be able to build storm surge models in new locations quickly and easily that can feed into early warning systems would be very beneficial to coastal communities that are vulnerable to storm surges but not located within the boundaries of an existing operational storm surge model.

In addition to a numerical model, observations from the region being simulated are also important to help build confidence and validate any numerical models that are used to feed into an early warning system. To this end ingesting available data regarding sea level height provided from various in-situ observations such as tide gauges and remote observations such as satellite altimetry is very important to ensure any storm surge model provides useful predictions to the coastal communities that will use it.

This presentation will present our progress on a current project to develop an information system for the Madagascan Met Office. The project, C-RISC, being executed in partnership with Sea Level Research Ltd, is translating the current modelling capability of NOC in storm surge forecasting and tidal prediction into a system that will provide information that can be easily transferred to other regions and is scalable to include other hazard types. The outcome, an operational high-resolution storm surge warning system that is easy to relocate. It will directly benefit coastal communities, giving them information, they need to make effective decisions before and during extreme sea level events such as storm surges.