**ACCESS-S1 ocean forecast products for marine industry applications in New Zealand**

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A joint initiative is underway between the Australian Bureau of Meteorology (BoM) and the National Institute of Water and Atmospheric Research (NIWA) in New Zealand to develop multi-week and seasonal ocean forecast products for aquaculture in New Zealand using the Bureau's new seasonal prediction system ACCESS-S1.

ACCESS-S1 has significantly improved horizontal (25km vs 100-200km) and vertical (1m vs 15m for upper layers) grid spacing in the ocean compared to its predecessor POAMA, which permits the resolution of finer features, particularly in coastal areas and for upper-level sea temperature forecasts. This opens up exciting new opportunities for the development of localised forecast products which would have been unfeasible on the coarser POAMA grid.

Fisheries and aquaculture are significant industries in New Zealand (worth ~NZ$1.4B). These industries are sensitive to marine heat waves such as the 2017/18 heat wave, so would benefit from advance warning of extreme events through forecasts of relevant parameters such as Sea Surface Temperature (SST) and Heat Content (HC).

An assessment of the SST and 300m HC ensemble mean and probabilistic forecast skill of ACCESS-S1 has been undertaken using a set of retrospective ensemble forecasts for 1990-2012, verified against Reynolds AVHRR satellite observations and the Bluelink ReANalysis 3.5 (BRAN3.5) dataset. A set of trial realtime forecast products is now being developed, with a focus on Hauraki Gulf, Cook Strait, and Stewart Island – three areas key to the aquaculture and fisheries sectors. These products include SST ensemble mean anomaly and full field maps, as well as probabilistic forecasts such as the probability of a given week or month falling into the top tercile or quintile of the hindcast period.

The improved resolution of ACCESS-S1 provides an opportunity to forecast SST for localised regions around New Zealand, and we have shown that the model demonstrates promising skill in these regions. This will provide a beneficial source of guidance for routine operations. Furthermore, the ability of ACCESS-S1 to signal the onset extreme events such as marine heatwaves will make it a valuable tool for reducing economic loss.