CARBON DIOXIDE UPTAKE IN THE SOUTHERN OCEAN AND THE FORMATION OF ANTARCTIC INTERMEDIATE WATER IN OCCAM 1/12 DEGREE

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ABSTRACT
The formation of Antarctic Intermediate Water is investigated in a state of the art numerical model. Results are compared with a previous, lower resolution version of the model, and with data from the World Ocean Circulation Experiment.

CO_2 IN THE SOUTHERN OCEAN
The global ocean plays an important role in the context of climate change. It absorbs up to a third of the total anthropogenic emissions of carbon dioxide (CO_2) to the atmosphere. The Southern Ocean is believed to account for about half of the global air-sea CO_2 influx; nevertheless, the processes underlying this uptake are poorly understood. Given the imbalance between high uptake and low storage of CO_2 in the Southern Ocean, it has been suggested that water masses forming in the region and subsequently flowing equatorwards may be of particular interest. Antarctic Intermediate Water (AAIW) is an obvious candidate; however, even its formation is still a topic of debate.

A HIGH RESOLUTION VIEW
We present preliminary results from an investigation of the formation of AAIW in an eddy resolving, high resolution general circulation model, OC_{12}; this is the OCCAM 1/12 degree horizontal resolution ocean-only model, with 66 vertical levels. The results are compared with OC_4, the 1/4 degree resolution version of OCCAM, to identify differences arising from the improved horizontal resolution. Both models are compared with data from the World Ocean Circulation Experiment (WOCE) Southern Ocean Hydrographic Atlas.

This work will inform further research into the pathways for anthropogenic CO_2 in the Southern Ocean. Such knowledge will improve our capability to predict the future response of the ocean to the continued increase of CO_2 levels in the atmosphere.