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## Characteristics and Variability of Antarctic Intermediate Water in the UKESM1-0-LL CMIP6 model

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Antarctic Intermediate Water (AAIW) is the dominant intermediate water mass in the Southern Hemisphere. AAIW plays a key role in the hydrological cycle and also contributes to the replenishment of nutrients at low latitudes. It is characterised by a mid-depth salinity minimum. Although its salinity minimum signature can be clearly identified, the formation mechanisms and how its properties evolve with climate change are unclear.

The aim of this study is to assess the ability of the UKESM1-0-LL CMIP6 model to represent the key characteristics and variability of AAIW and to evaluate its evolution under radiative forcing (with the SSP5-8.5 and SSP2-4.5 scenarios).

A diagnostic is developed to identify the core of AAIW in the different basins and scenarios. AAIW can be identified in the UKESM1-0-LL model but it is lighter than in observations. The Pacific, Atlantic and Indian type of AAIW have core density values of  $26.5 \text{ kg/m}^3$ ,  $26.6 \text{ kg/m}^3$  and  $26.9 \text{ kg/m}^3$  respectively. AAIW presents different properties across each basin with different depth, temperature and salinity properties. The Pacific type of AAIW is lighter and fresher than the Atlantic and Indian types of AAIW. Under radiative forcing, it is found that AAIW shoals and becomes warmer. The largest changes in temperature, salinity and density are found in the Pacific. The outcrop location of the salinity minimum remains constant in the different scenarios in spite of the surface conditions changing with climate change.

A change in depth could have major implications on the overturning circulation. Ongoing and future work focuses on identifying which mechanisms need to be improved in CMIP6 models to reduce the bias observed in AAIW.