



## **Sensitivity of Antarctic sea ice to form drag parameterization**

Gaia Barbic (1), Michel Tsamados (1), Alek Petty (2), David Schroeder (1), Paul Holland (3), and Daniel Feltham (1)

(1) Department of meteorology, Reading University, (2) University College London, (3) British Antarctic Survey

A new drag parametrization accounting explicitly for form drag has been recently formulated and applied to the Arctic sea ice (Lupkes et al, 2012 and Tsamados et al, 2014). We summarize here the fundamental elements of this formulation and we then adapt it to the Antarctic sea ice. Considering the general expression of the momentum balance of sea ice, we analyze the total (neutral) drag coefficients by studying separately air-ice and ocean-ice momentum fluxes, and by introducing the parameterization for both the atmospheric neutral drag coefficient (ANDC) and the oceanic neutral drag coefficient (ONDC). The two coefficients are calculated as a sum of their skin frictional contribution and form drag contribution, which comes from ridges and floe edges for the ANDC and keels and floe edges for the ONDC. Due to the contrasting geography of the two polar regions, there are important differences, both dynamic and thermodynamic, between Arctic and Antarctic sea ice. In the Antarctic, sea ice is younger, less ridged (hence thinner and smoother). Due to the intense snowfalls, the snow cover is generally thicker than in the Arctic, with values that vary significantly both seasonally and regionally and can affect the roughness of the surface and can lead to flooding of the ice. At the outer boundary of the Southern Ocean, the ice is unconstrained by land, divergent and subject to meridional advection, which leads to a much faster ice drift than in the Arctic. We show here how the new parameterization accounting for form drag influences the Antarctic sea ice characteristics.