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Constant flow speed of the ACC through Drake Passage between glacial maximum and Holocene.

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The Antarctic Circumpolar Current is the major wind-driven current that encircles the globe at high southern latitudes. It is the site of intense turbulent mixing and air-sea CO_2 exchange. There is an argument about whether the current was faster or slower, driven by stronger or weaker winds, than modern conditions at the last glacial maximum. The flow is spatially variable, even in the topographically constrained Scotia Sea, being faster (top to bottom) under major fronts. Because the flow of this current involves a simple dynamical balance between wind stress applied at the surface and interfacial drag at the bed, the particle size of deposited sediment (which is hydrodynamically determined by bed shear stress) can be used to estimate changes in flow speed and, arguably, wind strength. To constrain possible frontal movement 11 cores across the Scotia Sea, a narrow - 800 km wide – slot through which the ACC must flow, have been studied. Average particle size measured by Coulter Counter for the LGM (19-26 ka) and Holocene (0-12 ka) based on 10 samples for each time period in each core give robust data. Earlier data by Sedigraph at two sites suggested faster LGM, so more comparisons need to be run. Nevertheless, apart from only two cores, there is no significant difference between the two periods averaged across all cores. If this means that wind strength was not changed, then the much higher dust loading at the LGM in ice cores needs an alternative explanation. The potential influence of increased sea-ice cover in decreasing the effectiveness of wind stress does not appear to show up at the southernmost stations where it might be expected. There is also little evidence for movement of fronts which may be topographically locked in place.