1116-76-2817 **Kyle C Armour*** (karmour@uw.edu), **Yavor Kostov**, **Cecilia M Bitz** and **John Marshall**.
*Wind-driven expansion of the Antarctic sea-ice cover.* Preliminary report.

The Southern Ocean (SO) has cooled in recent decades, concurrent with an expansion of its sea-ice cover. Here we argue that these changes are a consequence of two mechanisms: (i) the mean overturning circulation of the SO, which has slowed surface warming by upwelling unmodified water from depth; and (ii) separate processes that have given rise to cooling and sea-ice expansion on top of this background of slow warming. Several processes have been proposed, including freshening of the upper ocean, changes in cloud cover, and changes in the breakup of sea ice by ocean waves. However, a competing hypothesis is that changes in the SO surface westerly winds, due to stratospheric ozone depletion, has driven the cooling and sea-ice expansion. We summarize recent work identifying a two-timescale response of the SO to surface wind changes – rapid cooling followed by slow warming – set by ocean temperature gradients. We then show that within comprehensive general circulation models (GCMs), westerly wind changes can drive SO cooling and sea-ice expansion. Further, GCMs that most closely simulate observed SO temperature gradients also most closely capture the observed cooling and sea-ice expansion in response to winds. (Received September 22, 2015)