

**TITLE:**

Seasonal and inter-annual variability in the atmospheric moisture transport across the Southern Ocean

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**ABSTRACT:**

The Antarctic ice sheet constitutes the largest freshwater reservoir on Earth and is the biggest potential contributor to future changes in global sea level. According to recent studies, the Antarctic icesheet, especially the western part has been losing mass at an accelerated rate. Meanwhile, the sea ice extent in the Southern Ocean has been increasing. Sea ice changes, however, reveal spatial inconsistencies in trends across coastal seas.

In this study we focus on the atmospheric moisture transport across the Southern Ocean – the single most important source term in the Antarctic mass balance equation and an important contributor to the sea ice formation around the continent. We show that the transient eddies play the dominant role in the Antarctic/Southern Ocean atmospheric moisture budget. These features constitute themselves in cyclones and polar (mesoscale) lows and are responsible for 80% or more of total meridional moisture transport and with the help of high-resolution data we are able to resolve them. We employ ERA-Interim dataset for 1989-2009 to assess the seasonal variability and trends in the transient eddy activity. We then compare our results to the synoptic and meso-scale cyclone activity as observed by the other reanalysis, AMPS and the new satellite-derived dataset of synoptic and meso-scale cloud signatures.