Polar climate predictability seasonal to multi-decadal: Has the ozone hole contributed to increased Antarctic sea ice extent?

<u>Michael Sigmond</u>[†]; John Fyfe [†] University of Toronto, Canada Leading author: <u>sigmond@atmosp.physics.utoronto.ca</u>

Since the 1970s sea ice extent has decreased dramatically in the Northern Hemisphere and increased slightly in the Southern Hemisphere, a difference that is potentially explained by ozone depletion in the Southern Hemisphere stratosphere. In this study we consider the impact of stratospheric ozone depletion on Antarctic sea ice extent using a climate model forced with observed stratospheric ozone depletion from 1979 to 2005. Contrary to expectations, our model simulates a year-round decrease in Antarctic sea ice due to stratospheric ozone depletion. The largest percentage sea ice decrease in our model occurs in the austral summer near the coast of Antarctica, due to a mechanism involving offshore Ekman sea ice transport. The largest absolute decrease is simulated in the austral winter away from the coast of Antarctica, in response to an ocean warming that is consistent with a poleward shift of the large-scale pattern of sea surface temperature. Our model results strongly suggest that processes not linked to stratospheric ozone depletion must be invoked to explain the observed increase in Antarctic sea ice extent.