Geophysical Research Abstracts,
Vol. 11, EGU2009-9764, 2009
EGU General Assembly 2009

Antarctic basal ice shelf melting may enhance Southern Ocean heat uptake under global warming

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Employing a simple parameterization for basal ice shelf melting around Antarctica, a time-varying freshwater flux is applied to the subsurface in a global coupled climate model. The model reproduces realistic melting rates under equilibrium conditions. Under global warming basal melting increases significantly. The resulting subsurface freshwater flux strengthens the gyre circulation in Weddell and Ross Sea due to an enhanced density difference between the gyre center and the freshening coast. Thereby near surface northward transport of cold water masses in increased and oceanic heat uptake between 40S and 54S is enhanced.