been shown to correspond with a speed up in ice flow on the Byrd ice stream (Stearns et al., 2008) and plays a crucial role in a thermally driven ice flow internal feedback (Tulaczyk et al., 2000). Meltwater plumes beneath ice shelves cause large melt rates due to entrainment of warmer ocean water (Jenkins et al. 1991, Payne et al., 2007) and contribute to circulation in the sub-ice-shelf cavity. However, despite its importance, the nature of the subglacial hydrological regime remains as yet poorly characterised in Antarctica. Here we present the first direct evidence of large-scale meltwater channels beneath the Antarctic Ice Sheet extending as a plume under the ice shelf, melting huge sub-ice-shelf channels. We infer that the channels beneath the grounded ice sheet are only a few metres wide, however, once the meltwater exits the grounded ice sheet it forms a plume, entraining local, warmer ocean water and melts channels into the underside of the ice shelf of the order of 1 km wide by 250 m deep. The sub-ice-shelf channels show evidence of migration of drainage routes, recording the history of the subglacial drainage network. The existence of a channelised hydrological system has implications for the modelling and prediction of future behaviour of the ice sheet, but also has implications for the representation of freshwater input to sub-ice-shelf circulation and the stability of the ice shelf.

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Lee, Jae Hak

Two types of wind effect on the Circumpolar Deep Water inflow into the Amundsen Sea shelf

Jae Hak Lee[1], Chang-Su Hong[1], Ho Kyung Ha[2], Tae Wan Kim[2], Sang Hoon Lee[2]

1. *Korea Ocean Research and Development Institute (KORDI);*
2. *Korea Polar Research Institute*

Though it has been believed that basal melting of the Amundsen Sea Ice Sheet is induced by intrusion of relatively warm Circumpolar Deep Water (CDW), direct field observation to support it is rare. During the austral summer season in 2010 and 2012, Korea Polar Research Institute conducted hydrographic surveys in the central Amundsen Sea shelf using the Korean IBRV ARAON. The data of CTD castings and year-long mooring current meters indicate that the near bottom penetration of CDW into the shelf area has temporal variability at multiple time scales ranging from sub-seasonal to inter-annual. Such variations in the intensity of CDW intrusion may be attributed to changes in regional wind forcing. We will present two types of conceptual model for wind effect on the CDW inflow.

Losch, Martin

Estimating Pine Island Ice Shelf melt rates from hydrography and an ocean circulation model

Martin Losch[1], Patrick Heimbach[2], Michael Schodlok[3], Pierre Dutrieux[4]

1. *Alfred-Wegener-Institute für Polar- und Meeresforschung;*
2. *Massachussetts Institute of Technology;*
3. *NASA Jet Propulsion Laboratory;*
4. *British Antarctic Survey*

The fast flowing ice stream of the Pine Island Glacier (PIG) in West Antarctica feeds the Pine Island Ice Shelf (PIIS). Its flow acceleration, thinning and mass loss has been associated with changes in sub-ice shelf ocean circulation. Several recent field and remote sensing programs focused on the Pine Island Embayment and PIG to study the local circulation, water mass properties, as well as bathymetry and cavity geometry. Observations of water mass properties entering and leaving the ice-cavity of the PIIS, as well as observations within the cavity are used to estimate a horizontal map of basal melt rates for the PIIS. For this purpose a regional ocean general circulation model that includes ice-ocean interactions is fitted to observations using optimal estimation methods. Hence, the estimates combine on both observations and the dynamical information about the circulation underneath the ice-shelf as resolved by the numerical model. The control variables, that are adjusted during the estimation process, are initial conditions, open boundary conditions, vertical mixing parameters, and melt rates. Data coverage, but also the choice of bathymetry and melt-rate parameterization, affect the state estimate and the net melt rate.

Makinson, Keith

Modelling the seasonal ocean circulation and water mass distribution beneath Filchner-Ronne Ice Shelf

Keith Makinson[1], Paul R. Holland[1], Keith W. Nicholls[1], Adrian Jenkins[1], David M. Holland[2]

1. *British Antarctic Survey, High Cross, Madingley Road, Cambridge, CB3 0ET, UK*