



On the evolution of an ice shelf melt channel on Filchner Ice Shelf, Antarctica

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Enhanced basal melting in so called melt channels on ice shelves has been discussed to play an important role in basal mass loss of ice shelves and to influence their stability. Here, we present a comprehensive study of a melt channel on Filchner Ice Shelf, Antarctica, where Support Force Glacier drains into the ice shelf. Simulated subglacial hydrology indicates enhanced outflow of water from beneath the inland ice at the location where a surface depression is found using remote sensing data. Basal melt rates and vertical strain have been measured in a field campaign using phase sensitive radar, starting about 15km downstream the grounding line. We find moderate melt rates within the channel and further downstream even freezing. Viscoelastic modelling has been performed to study the evolution of the channel as response to basal melt and surface accumulation. The modelled evolution of the surface is compared to remote sensing data, as well as modelled displacement of internal layers is compared to radar profiles acquired across the channels. The modelling is based on the assumption of a simplified geometry, whereas seismic profiles reveal a complex geometry of the ice-ocean boundary across the channel.