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Book of Abstracts

1.9-1 The Role of Polar Regions in the Earth System

Tuesday, 10/Sep/2019: 1:30pm–3:00pm

Session Chair: Josefine Lenz
Session Chair: Loeka Laura Jongejans
Location: Hall A

Recently ice-free areas of an Antarctic fjord and its colonization: the particular case of the soft-coral Malacobelemnon daytoni

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At the West Antarctic Peninsula climate change causes rapid frontline retreat of tidewater glaciers, opening new ice-free areas under water and causing meltwater discharges dragging sediments into the water. We aimed to model current habitat suitability of the soft coral *Malacobelemnon daytoni* using Species Distribution Models (SDMs) for two areas differing in ice-free exposure time. We ran with biomod2 R-package, 360 calibrated and evaluated projections (9 algorithms x 20 repetitions for 2 data sets from 2009/10) to build two final models. The first model predicts habitat distribution after glacier retreat based on presence/absence data from Long-term ice-free areas (LTIFA), whereas the other model, which includes data from middle term (MTIFA) and recently ice-free areas (RIFA), predicts the actual current distribution scenario after a complete glacier transition on land. Our results revealed a dissimilar spatial suitability of this soft-coral in areas overlapping in substrate composition and depth and only < 1.3 km apart, but differing in exposure time to open sea conditions due to glacier retreat. Higher abundances and wider depth distribution were found in LTIFA. In contrast, MTIFA and RIFA showed very low abundances or complete absence of the species, respectively. This difference in colonization of the different areas improves the habitat suitability estimation for suspension-feeder assemblages and ecosystem functioning. Using Potter Cove as a natural experiment of community response to glacier retreat and SDM modelling as a tool to understand the system; may help to determine time lag in colonization for Antarctic coastal key species on newly ice-free areas.

Oceanic gateways to Antarctic grounding lines - a study of sub-shelf bathymetry and near-shelf ocean temperatures

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The floating ice shelves around Antarctica play a key role for the ice flow from the continent into the Southern Ocean, thereby influencing Antarctic sea-level contribution. Being exposed not only to cold atmospheric, but also to relatively warm ocean temperatures, sub-shelf melting is one of the main drivers for the recent mass loss from the Antarctic Ice Sheet. Changes of the ocean water masses within the ice-shelf cavity can enhance melting and thereby accelerate ice flow upstream of the grounding line – where the grounded ice begins to float on top of the ocean. Ocean water masses typically enter the ice-shelf cavities at depth, depending on ocean circulation and wind patterns, sea-ice extent, sub-shelf melting and bathymetry, causing higher melt rates near the grounding lines and less melting or even refreezing towards the ice-shelf front. Troughs and ridges in the continental shelf modulate the access of the deeper, relatively warm water layers to the ice sheet. I here identify potential oceanic gateways and analyse the thermal properties of the ambient water masses, indicating current and potential future vulnerability of the Antarctic Ice Sheet to changes in surrounding ocean temperatures or circulations.