



Kandidat

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Macroalgal distribution shifts during the climate change induced glacier retreat in Potter Cove, West Antarctic Peninsula, 1993-2016

Referent

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Keywords

Macroalgae, Habitat shift, Species Distribution Models, Community maps, Change detection, Glacier retreat, Potter Cove, Antarctic Peninsula

Zusammenfassung

The West Antarctic Peninsula is one of the fastest changing regions on earth due to global warming. Consequent retreat of Fourcade Glacier in Potter Cove (PC), King George Island, released 1.5 km² of newly ice-free water areas in the last 60 years. Macroalgae, important primary producers in the benthic Antarctic ecosystem, were evidenced to colonize some of these areas. To reconstruct the spatial process of this shift, macroalgal transect data sets, first recorded in 1993 and last in 2016, as well as environmental predictors are available owing to many years of field studies in PC. Species Distribution Models (SDMs) can statistically link species samples with raster predictors to project distribution maps. Macroalgal data is therefore prepared for modeling and grouped in three time steps, 1993-1996, 2008-2012 and 2016. Physical predictors for macroalgal distribution used in this thesis are: Probability of hard substrate occurrence, suspended particulate matter, bathymetry and slope. For each time step, SDMs are calculated for the species *H. grandifolius*, the grouped *Desmarestia* genus, remaining Phaeophyceae (brown algae) and Rhodophyceae (red algae). Community Maps, generated by classifying model results, are presented for the three time steps. They reveal information on species-richness and composition. Additionally a change raster is calculated for area gain and loss during a period between two time steps. In 1993-1996, 2.77 km² of the study area was populated by algae. This area increased by 1.38 km² to 4.15 km² in 2016. 2008-2012 results confirm this growth. 0.5 km² of this gain is located in areas, which were covered by glacier ice in 1956. Species of the class Rhodophyceae show as pioneers in exploring new habitable areas. Complexity and vertical distribution of macroalgal community is reduced in newly ice-free water areas near the glacier due to increased sediment input.

