Introducing the project HabitAnt - Past and future habitability in Antarctic lakes

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Introduction

- Long history & isolation of Antarctica => many endemic taxa.
- Additional high endemism & distinct biogeographical distribution of lacustrine & terrestrial taxa among different Antarctic regions (Figure 1; see Figure 2 A & B for examples from diatoms).
- Recent non-marine ostracods in Antarctica & adjacent regions are less well-studied; they might show similar high degrees of regional endemism (Diaz et al. 2019, summarized in Table 1), but this needs to be confirmed by sampling understudied regions.
- This highly endemic fauna is threatened as models predict increased temperatures & altered precipitation, also in Continental Antarctica.
  => more extensive glacial melt & expansion of ice-free areas will lead to increased connectivity between regions and changes in hydrology.
  => resulting biotic homogenization between regions & loss of regional endemism.

The project HabitAnt

- Will investigate past & present lacustrine diversity of Central East Continental Antarctica (Figure 1) from lake cores (Figure 3), microfossils & recent lacustrine fauna to compare past & present diversities,
- At three different time scales: Eemian interglacial (130-115 ky), last glacial period (115-11.5 ky) Holocene (11.5 ky-recent).
- Methods: dating and multiple proxy analyses of cores, DNA high throughput sequencing & metabarcoding of ancient DNA from lake cores and Sanger sequencing of recent samples; phylogenies to reconstruct evolutionary histories & post-glacial refugia, morphological identifications

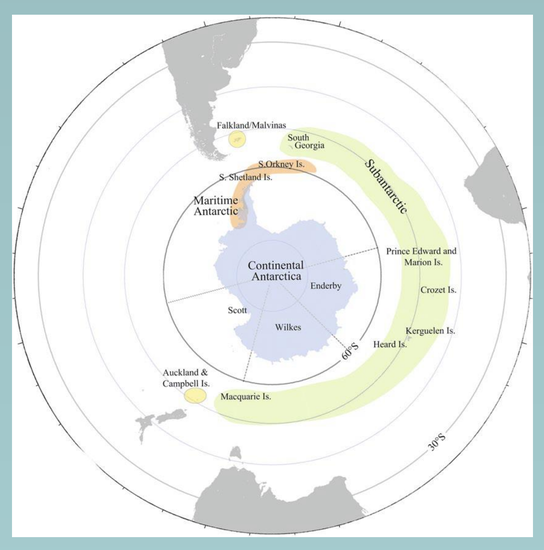

Figure 1: Map with Antarctic biogeographic regions.
Map of the four Antarctic and Subantarctic biogeographic regions. Continental Antarctic (in blue colour), Maritime Antarctic (orange), Subantarctic islands (green) and Southern Cool Temperate (yellow). From Diaz et al. (2019).

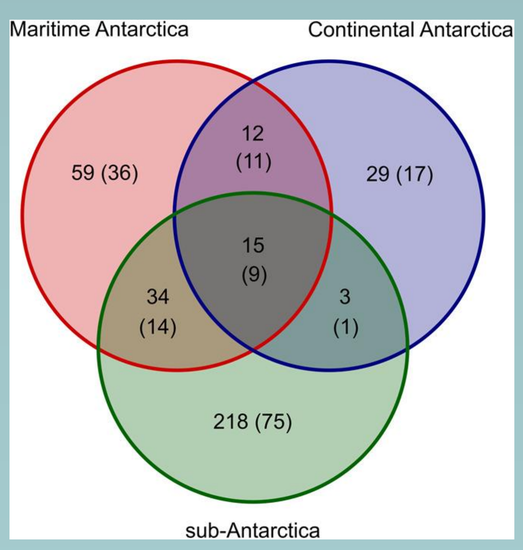

Figure 2A: Endemism of Antarctic diatoms.
Venn diagram with number of diatom species occurring in each of the 3 Antarctic biogeographic regions & those shared between regions. Numbers in brackets are endemic species confined to specific regions or shared between regions. Colours denote the three biogeographic regions: sub-Antarctica (green), Maritime Antarctica (red) and Continental Antarctica (blue). From Verleyen et al. (2021).

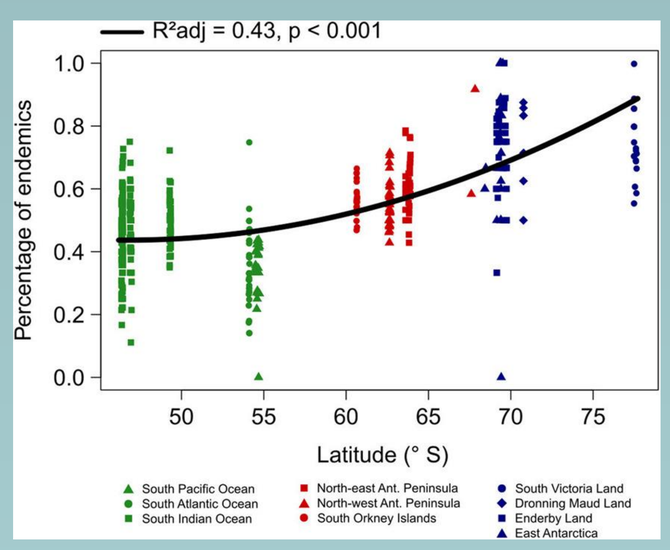

Figure 2B: Latitudinal gradient in diatom endemism
Latitudinal gradient (R2adj = 0.43; p < 0.001) is calculated as total number endemics divided by the total number of species in each lake. Colours denote the three biogeographic regions: sub-Antarctica (green), Maritime Antarctica (red) and Continental Antarctica (blue). From Verleyen et al. (2021).

Table 1: Known non-marine ostracods from Antarctic & Subantarctic lakes and ponds.
From Diaz et al. (2019). Bold species names: endemic to at least one biogeographic province; *endemic to only one biogeographic region but present in different provinces within this region; **endemic to one province within a single region. Provinces: CA, Continental Antarctic; MA, Maritime Antarctic; SA, Subantarctic islands; SCT, Southern Cool Temperate. Regions: En, Enderby; Wi, Wilkes; Sc, Scott; So, South Orkney Islands; Ss South Shetland Islands; Pa, Antarctic Peninsula; S, South Georgia; P, Prince Edward Island; C, Iles Crozet; K, Iles Kerguelen; H, Heard Island; M, Macquarie Island; Fa, Falkland/Malvinas Islands; Ca, Campbell Island; Ak, Auckland Island.
Absence of ostracod species in certain regions might be owing to undersampling.

	Central Antarctica			**Maritime Antarctia**			**Subantarctic Islands**						**Southern Cool Temperate region**		
	En	Wi	Sc	So	Ss	Pa	S	P	C	K	H	M	Fa	Ca	Ak
Candona sp. (Baird, 1845)							X								
Candonopsis falklandica ** (Vávra, 1898)													X		
Chlamydotheca pestai ** (Graf, 1931)							X								
Chlamydotheca symmetrica ** (Vávra, 1899)													X		
Cypretta sp.** (Vávra, 1895)												X			
Eucypris corpulenta ** (G. O. Sars, 1895)										X					
Eucypris fontana * (Graf, 1931)				X			X								
Eucypris virens (Jurine, 1820)									X			X			
Ilyodromus kerguelensis* (G.W. Müller, 1906)								X	X	X					
Neocypridopsis frigogena* (Graf, 1931)				X			X								
Tanycypris sp. (Triebel, 1959)							X								
Newnhamia patagonica ** (Vávra, 1898)													X		

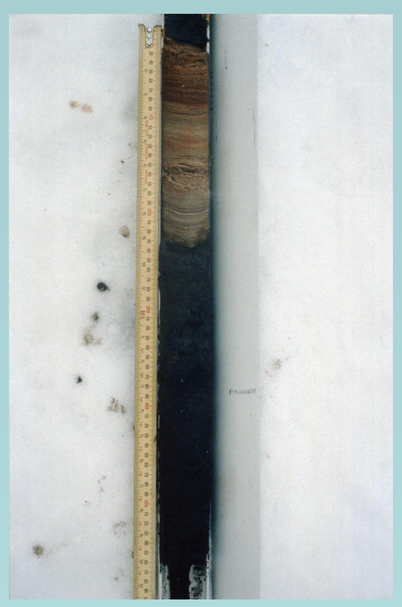

Figure 3: Antarctic lake sediment core.
Taken from Progress Lake (Larseman Hills) in 1997. Picture taken by Dominic A. Hodgson

Acknowledgements
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References:
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