Arctic Aliens:

mapping the presence of marine alien species in west Svalbard

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Background

Globally, alien species are considered the third most important threat to biodiversity after habitat loss and fishery. Alien species have the potential to impact the environment and economy by disrupting the ecological system. To better understand what species are, or could be introduced to the Arctic, it is necessary to have a fast, efficient and accurate monitoring method for identifying alien species. We developed and tested a DNA technique that allows an easy detection of the presence of multiple species in a water or sediment sample.

Objectives

- To enlarge the current DNA barcoding database with species that are listed as Arctic invasive species;
- To assess the presence of currently described invasive species in the coastal area of western Svalbard;

Methods

DNA barcoding

A list of 101 species identified as alien species for the Arctic was used as background (http://www.emodnet-arctic.eu/alien-species).

Specimens of 37 species were collected from Svalbard and origin locations for potential Arctic alien species (including the Netherlands). Various methods were used in different habitats to target a variety of species. The specimens were sent to the lab for DNA barcoding to supplement the existing international DNA barcode reference library.

Metabarcoding

32 Sediment samples were collected in the Kongsfjorden, Svalbard. These will be used to assess the presence of alien species *en masse* using a metabarcoding technique.

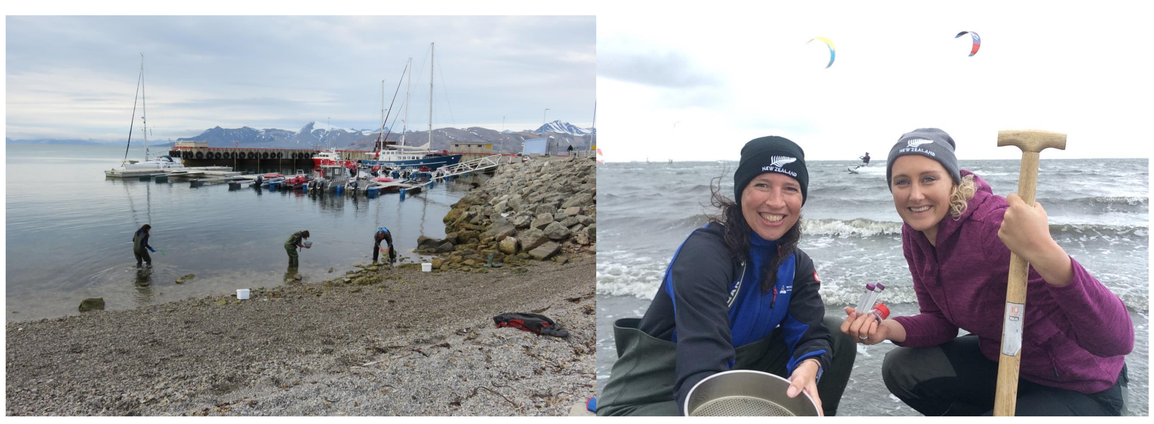

Figure 1. Specimen collection in Kongsfjorden, Svalbard, (left) and from origin locations of alien species in the Arctic (right: Oosterschelde, the Netherlands) for DNA barcoding.

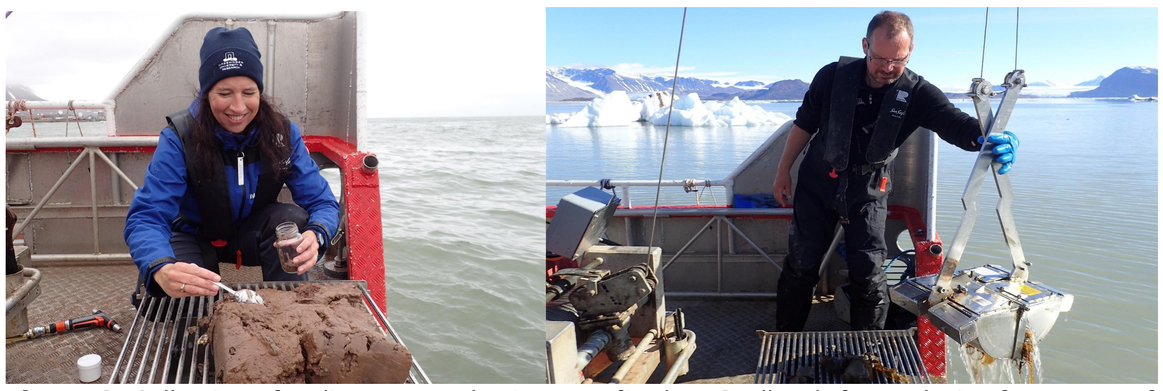

Figure 2. Collection of sediment samples in Kongsfjorden, Svalbard, for analysis of presence of alien species *en masse*.

Results

DNA barcoding

Of the 37 collected species new barcodes could be developed for 31 species for 18S and 28 for C01 (Table 1). This includes eight species identified as Arctic aliens.

Table 1. Number of successful development of new barcodes (18S and C01) for Arctic and temperate marine species.

Area	Location	Site	Barcode 18S	Barcode CO1	Identified as Arctic aliens
Arctic	Svalbard	Kongsfjorden	13	11	-
Europe	Netherlands	North Sea	1	1	1
Europe	Netherlands	Oosterschelde	17	16	7
Total			**31**	**28**	**8**

Figure 3. Examples of specimens of reported Arctic aliens for which successful new barcodes were developed. From left to right: *Hemigrapsus takanoi*, *Cotula coronopifolia* and *Caprella mutica*.

Metabarcoding

The metabarcoding of sediment samples is still in progress. These will be used to determine the presence of marine aliens in Kongsfjorden, Svalbard, by comparing metabarcoding results with the updated DNA barcode reference library.

Conclusions

- New barcodes have been developed for 31 species, of which eight are known Arctic marine alien species.
- With this information we are in the process of further developing the metabarcoding technique for identifying alien species in environmental samples.

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