

## Review ESSD-2018-97, Arctic benthic traits

Interesting data approach, possibly a useful topic, seems like a good candidate for ESSD. Presentation however leaves much to be desired.

Thinking ahead (starting now) to urgent marine issues in the Arctic (loss of snow and ice, change from solid to liquid precip, changing run-off, changing local mixing and large scale circulation, change from predation to grazing, change in primary production / carbon fluxes / nutrient recycling, invasive species, increase in IUU fishing), and of the key role of benthic ecosystems in all the above, I think the authors intend to take an approach that says “document what we have from a functional approach so that we can better anticipate, monitor, detect and model on-going and future changes.” Further “here we present a tool that can help our community achieve the functional approach”. So far, so good, but how will this tool get used within but particularly beyond the benthos community. What changes, improvements, increased compliance, etc. does this tool need to serve valid research functions for the future Arctic? The authors hint at these directions and questions but give us only bibliometrics and screenshots?

About traits, authors emphasise, particularly in the introduction, usefulness of the trait approach as “indicators of ecosystem functioning” (authors words, page 1 line 30) for which they then elaborate: biodiversity, vulnerability to changing climate, etc. They assume that readers will accept the trait approach as somehow advantageous (“inherent advantage”, page 1 line 33). Perhaps, but a reader reaches the end of this paper having encountered almost no examples (on page 11 we get one useful example of how fuzzy coding works for ‘motile’ species) of how the database, if fully populated, will help us address crucial issues. The authors seem to want to demonstrate a “popular” option while readers want and need to understand how this tool helps us address urgent research questions? Not how popular, how useful!

The Degen et al. 2018 paper in *Ecological Indicators* (open access, thanks) presents substantial sections on challenges and a specific roadmap. Without repeating verbatim, a précis of that message should find a home here, to set the stage? The authors repeatedly allude to this work meeting community needs and community standards. We could better accept those assurances if we had some tangible examples. Suggest a re-write along the lines of the following outline:

Introduce the trait approach to the earth sciences data community

- briefly justify trait approach compared to taxonomic approach,
- what one can do differently / better in terms of monitoring, ecosystem modelling, carbon or nutrient fluxes, etc.
- what more crucial place than coastal shelves of the Arctic.

Your Arctic Traits database

- goals
- approach
- content
- accessibility
- interoperability

Utility, both as an ingest tool and as a research tool

Contents so far

Example (1 or 2) how to use it

- something about biogeography, invasive or migration
- something about carbon and nutrient fluxes, number and clearance rate of filter feeders, how a benthic ecosystem in the Chukchi might respond to changed carbon imports with changed nitrogen returns, dependence of community structure, feeding activity, reproductive timing, nutrient fluxes on temperature and oxygen, differences Chukchi to Barents, etc. Real example or, if present data prove too limiting, hypothetical example.

What next?

- as an ingest tool and community repository

- as a research tool for a changing Arctic

In the view of this reviewer, the authors have sufficient information to provide, after revision, a much improved description of and guide to this database. Don't show us what we can find ourselves on the web page, show us how we can use this tool!

Brief specific comments, assuming the authors make a major revision as recommended:

The review apparently treats benthos as independent of water column, but what about sea ice cover, plankton particulate carbon deposition, carbon fluxes, historical depletion of whale and seal populations, continuing harvest of krill, etc. Give us please the valid benthos fully interactive with and essential to water column processes.

Page 2 line 36: Figure 1. Figure 1 not useful nor relevant. Because this reviewer mistrusts any topic where the authors must 'prove' its relevance by starting from bibliometric records, I suggest you simply leave it out.

What about Russian source materials. Kedra et al, cited, addresses this issue slightly and these authors reference Laptev Sea Lena R outflow transects work published by Kokarev et al. but, as for plankton, any database of Arctic ecology that does not include overt mechanisms to include Russian language publications will miss a very major fraction of possibly useful information? Does the benthos suffer a similar language barrier? If so, how will the authors address such barriers?

Page 2,3, Table 1: Good list but gets messy and out of order by the bottom entries. Include row demarcation? No diatom or coccolithophore (live or as deposited) databases? As for Figure 1, how useful is this table in a description of the particular Arctic benthic database? Leaving it out would not impact the overall description?

Page 3 line 62: "atomised"? A database term? Most readers will not know at this point what you mean by that word. This reviewer knows DarwinCore metadata guidance, but other readers will want a reference?

Page 3 lines 68 to 70: Agree, and this represents the strong motivation and potential impact of this work. Move this statement earlier, in a more prominent position?

Reference to a "pan-Arctic" approach and simultaneously, apparent regional focus (Svalbard, Chukchi)? In fact, we get no biogeographic information whatsoever from this database. Why this regional mention here that never gets a follow up?

Page 4 line 93: Costello et al represents a weak and not particularly reliable reference, mostly a self-citation tool for Costello. Fundamentally, Costello et al. recommend following the BIOTIC and FishBase database models. Do the authors not have something stronger on which to base their selections? One of the other marine species databases listed in Table 1, for example? Or other work that satisfies Steps 1 and 2 of the workshop report?

Page 4 line 95 "deep linked"? A database term? Reader does not know what the authors mean here?

Page 4 line 97: In GBIF a user can find reported occurrences of species by geographic location. As presented today, the Arctic Traits databases offers zero geographic location information. Reader will need to copy the species name from Arctic Traits into GBIF to find location. I tried that for Nereis Linnaeus, more than 7000 records in GBIF including hundreds in the Arctic, but no zoogeographic information in Arctic Traits? Is this an example, not very successful, of "deep linked"? Should Arctic Traits become traits database linked under GBIF, for all co-listed taxa?

Page 4 line 103 to 108: confusing section! Physiological traits not defined nor well justified. Are they interesting or not interesting, retrievable or not retrievable. Are Arctic species generally eurythermal (which also depends on life history stage ) or stenothermal? Reader has no idea what to conclude from this section or about the inclusion or not of physiological traits in the database.

Page 10 line 155, 156: Here readers learn that Arctic Traits database includes species with wider biogeographic ranges, not only those species with exclusively Arctic ranges. This inclusion seems to relate to an earlier question of whether the function descriptions in the trait tables referred to only polar or to cosmopolitan species. Apparently the latter? Needs clarification!

Page 11, 12 fuzzy coding: A necessary inclusion, well described, good use of examples!

I don't know ESSD policy, but most journals do not publish web page screenshots. Give us links instead? Here the authors unfortunately take the approach of showing us the product rather than demonstrating its utility. Walk us through a couple examples, using links in place of screenshots?

Tooltip function (dragging cursor across indicator bar) does not work on my machine (MacBook Pro, OS 10.14 Mohave, Safari 12.0).

To get data I need to submit a request. That means that Arctic Traits knows my IP address and can find my user information?

Downloaded skeleton file, largest category so far, very detailed, successful download, data access seems good. But, now that I have it, how would I use it? Find all the calcareous species to estimate their role in benthic carbon cycle? I find almost 900 records, out of 2040 total, impressive. After this initial sort I would need to resolve too-numerous species overlaps / redundancies? E.g. 900 records might really only represent 500 or 600 valid independent species. The database won't do this taxonomic clarification step automatically? I assume in the database as opposed to the .csv file, I can click through to the exact reference and any text excerpts if I desire? Next, on the carbon question, I would want to know sea floor population density of these calcareous organisms, carbon fixation rates as a function of season, temperature, O<sub>2</sub>, POC or DOC fluxes, biogeographic distribution including proximity to, for example, riverine inputs or ice fronts or ocean circulation fronts. I might find helpful information under Body Weight, Living Habit, Reproduction, Feeding Habit, Tolerance, and Depth Range. Zoogeographic here would provide zero useful information. But, in general, I would or would not find useful information here? As an alternative, for a species whose carbon uptake rates I knew from literature, I could go to GBIF to learn its frequency of occurrence in Arctic regions of interest and then do some spatial and physiologic extrapolations? How did the Arctic traits database help me or hinder me in this case? A weak example chosen on my part? If so, give us a stronger more-favourable example?