A comparative analysis of coastal environmental conditions in the eastern Norwegian Sea and southern Barents Sea by means of *Arctica islandica* growth records

Trofimova T1, Beierlein L2, Basova L1, Sukhotin A3 and Brey T2

1Saint-Petersburg State University, St. Petersburg, Russia.
2Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research, Bremerhaven, Germany.
3Biological Institute of Russian Academy of Science, St. Petersburg, Russia.

*Email: trofimova.te@gmail.com*

**Objectives**

- To analyse the growth variability in shells of *Arctica islandica* and to compare the results of the Norwegian and the Russian populations.
- To determine the external factors controlling the annual shell growth variability in *A. islandica*.
- To check for decadal oscillations within the growth patterns of *A. islandica*.
- To use stable oxygen isotopes ($\delta^{18}O$) to reconstruct seasonals and water temperatures on a sub-annual level.

**Study area**

We examined the shells from two sampling sites the northern Norwegian coast (69°39'N 18°57'E) and the Kola Peninsula coast (60°11'N 36°05'E) (Fig.1). Both localities are in the realm of the Norwegian Coastal Current (after crossing the border to Russia it is called the Murman Coastal Current). It is expected that similarities in the oceanographic conditions are reflected in the shell, possibly occurring with certain time lag.

**Materials and methods**

The shell material for this study comprises 30 and 32 shells of *A. islandica* from the Norwegian Sea and Russian coast of the Barents Sea respectively. All shells were collected alive and soft parts were removed immediately after collection.

For the investigation of the annual and inter-annual growth variability all collected shells were cut parallel to the line of strongest growth (LSG) (Fig.2) and 3-mm thick-sections were attached to a glass slide. After grinding and polishing, the cross-sections were stained in Murex’ solution. Annual growth bands were identified and measured. To obtain the environmental influence we will use the so-called standardized growth index (SGI) (e.g. Wannamaker Jr. et al., 2009).

After the cutting the second part of the shell was used for stable oxygen isotope ($\delta^{18}O$) analysis (the result is not presented here).

SGI time series were analysed for significant spectral components using software package KSpectra (procedure described in Brey et al. 2011).

**Preliminary results**

The maximum ontogenetic ages are 118 years for the shells from the Barents Sea and 82 years for the Norwegian shells.

The *A. islandica* growth time series comprise 1999 single increment measurements for the shells from the Norwegian coast and 1893 measurements from the Barents Sea coast. Hereby, they cover a 77 year period (1927-2004) and a 113 year period (1897-2010) respectively (Fig. 3).

Spectral analysis (Fig.4) of the SGI records indicate a similarity for both localities in the 2-3 year periodicity. Noticeable cyclic variability in water temperature with the same periodicities have been found in that area (Bochkov, 2005). The signals with frequencies 0.08 yr-1 (period 12 yr), 0.18 yr-1 (5.5 yr) and 0.22 yr-1 (4.5 yr) were detected only in the Barents Sea SGI record.

**Future work questions**

- Is there a significant difference in the growth of *A. islandica* from the Barents Sea and Norwegian Sea?
- Which factors control the shell growth in both populations?
- Do we get seasonal signals from *A. islandica* shells measuring stable oxygen isotopes ($\delta^{18}O_{meas}$)?
- Can we reconstruct water temperatures using $\delta^{18}O$?

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**References**


