

## **Connections between the growth of *Arctica islandica* and phytoplankton dynamics on the Faroe Shelf**

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In this study we use molluscan sclerochronological techniques in order to obtain closer insights into environmental and ecological dynamics of Faroe Shelf waters. The Faroe Shelf represents a special ecosystem with rich benthic and neritic communities, which also have great importance for many economically relevant fish stocks. Thus, a better understanding of seasonal and year-to-year phytoplankton and stratification dynamics would be useful because they also have implications for higher trophic levels. The water masses of the Faroe Shelf are fairly homogenous and isolated from off-shelf waters but at a certain depth, which is referred to as transition zone, seasonal stratification and horizontal exchange occur. Systematic observations and phytoplankton dynamic investigations have only been performed during the last 29 years but longer records are missing. Thus, we use the growth increment variability in long-lived *Arctica islandica* shells from the transition zone of the eastern Faroe Shelf to evaluate its potential to estimate on-shelf phytoplankton and stratification dynamics since previous studies have shown that the growth of *A. islandica* is highly dependent on food availability. We have built a shell-based master-chronology reaching back to the 17th century. Comparisons between the growth indices of our chronology and fluorescence data reveal significant positive relationships. In combination with an index that accounts for stratification even stronger correlations are obtained. This indicates that the growth of *A. islandica* is largely influenced by a combination of how much phytoplankton is produced and how much actually reaches the bottom, i.e. how well-mixed the water column is. Further significant positive correlations can also be found between the growth indices and other primary productivity data from the Faroe Shelf. In conclusion, our results suggest that the growth indices can be related to year-to-year changes in phytoplankton production and stratification on the Faroe Shelf and may allow past reconstructions of phytoplankton production.