



G L  M A R  
Ph.D. Defence



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Title of the Thesis Colloquium:

**Arctic marine carbon cycle:  
role of pelagic calcite production**

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## **Arctic marine carbon cycle: role of pelagic calcite production**

The Arctic Ocean is substantially affected by ongoing warming and sea ice loss. Changing conditions affect marine organisms producing and storing carbon, which is transported towards the sediments and stored on longer time scales after their deaths. One of those organisms are planktonic foraminifera, calcite shell-building marine protists. Global estimates show that the mass flux of their produced calcite from the surface ocean to the deep ocean and into the sediments contribute to a considerable amount of total pelagic calcite fluxes, with high regional variability. However, their current contribution to the pelagic carbonate flux is not yet fully resolved and detailed information from the Arctic Ocean is lacking, preventing quantitative assessment of potential future scenarios of changes in Arctic carbonate budget.

In order to unravel the effects of changes in the Arctic Ocean on planktonic foraminifera, this work presents studies on planktonic foraminifera from all over the Arctic and Subarctic Ocean, working with samples from both within the water column and from the sediments. The produced calcite mass is determined by comprehensive measurements of shell size and weight of all in the Arctic and Subarctic Ocean abundant species of planktonic foraminifera. On average, a contribution of 5.4 to 30 % of planktonic foraminifera to total  $\text{CaCO}_3$  mass is determined. The planktonic foraminifera mass flux shows a strong seasonal variability, without temperature, temperature-related parameters or the availability of food being able to directly explain the present overall variation in planktonic foraminifera mass fluxes. Nevertheless, the results indicate that it is likely that ongoing climate change will affect their mass production and therefore also the storage of carbonate produced by planktonic foraminifera in the Arctic and Subarctic Ocean.