The effect of light intensity on ^{2}H/^{1}H ratios of highly branched isoprenoids (HBIs) in the diatom *Pleurosigma intermedium*

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Sea ice is a key component of the Earth's climate system. It affects the exchange of heat, gases and water between the polar oceans and the atmosphere. Even though changes in sea ice extent and thickness in recent decades are well documented, understanding processes that control climate in the polar regions back in time and over longer time scales requires proxy-based paleo reconstructions.

Several highly branched isoprenoids (HBIs) and related compounds have been used previously to investigate changes in sea ice extent in the past. However, the potential of these biomarkers – particularly their ^{2}H/^{1}H ratios – to provide information about other parameters of sea ice such as ice thickness and/or snow cover have not been explored.

This study focuses on investigation of ^{2}H/^{1}H of HBIs isolated from the diatom *Pleurosigma intermedium*. We cultured this organism to test the hypothesis that δ^2H values would reflect different levels of irradiance. The diatom culture was grown at different levels of light intensity in laboratory condtions. We obseved an approximately 25 per mil ^{2}H-depletion in HBIs extracted from the culture grown at higher light intensity.

Improved understanding of the magnitude and the underlying mechanisms responsible for the isotopic differences observed in the diatom *Pleurosigma intermedium* would provide key insights for interpreting δ^2H values of environmental samples from the polar regions. The main outcome of this research effort is a new methodological approach that could potentially be used to estimate ice thickness or/and snow cover, which are among key parameters with respect to sea ice albedo and heat exchange between the ocean and the atmosphere.