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Sources of sedimentary biomarkers and proxies with potential paleoenvironmental significance for the Baltic Sea

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### Abstract

The Baltic Sea is a shallow, semi-enclosed and intra-continental shelf sea characterized by anoxic bottom waters in the deepest basins, allowing for the preservation of sedimentary organic matter. In the present study, the most abundant, naturally-occurring lipids in surface sediments from the entire Baltic Sea and the Skagerrak area were identified and their potential sources were assigned. Together with long-chain *n*-alkanes derived from land plant leaf waxes, diploptene and branched glycerol dialkyl glycerol tetraethers (GDGTs) are of allochthonous origin, while isoprenoid GDGTs, hydroxylated isoprenoid GDGTs (OH-GDGTs), *n*-C<sub>25:1</sub>, *n*-C<sub>27:1</sub> and *n*-C<sub>29:1</sub> alkenes are autochthonous lipids. The isoprenoid and OH-GDGTs are probably derived from *Thaumarchaeota* and the long-chain *n*-alkenes from phototrophic organisms. Significant correlations were found between indexes based on isoprenoid and OH-GDGTs and Baltic Sea surface and bottom temperatures. The calibrations obtained for surface temperature have statistically similar slopes, but different intercepts than calibrations established for the Nordic Seas. The branched and isoprenoid tetraether index can be used to estimate the percentage of soil (terrestrial) organic matter in the sediments of the Baltic Sea. High values of the P<sub>aq</sub> ratio (defined here as the ratio of odd numbered *n*-C<sub>23</sub> and *n*-C<sub>25</sub> over *n*-C<sub>23</sub> to *n*-C<sub>29</sub> alkanes) in the northern Baltic Sea originate from the presence of both *Sphagnum* mosses in the drainage basin and submerged macrophytes, such as *Potamogeton* sp. and *Myriophyllum* sp., in the freshwater to brackish water of the coastal areas. The P<sub>aq</sub> ratio may thus reflect fluctuations in the regional expansion of freshwater to brackish coastal environments in the Baltic Sea.

### Keywords

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