

Anthropogenic forcing of the Baltic Sea thallium cycle since ~1956

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Anthropogenic activities have fundamentally changed the chemistry of the Baltic Sea. This presentation will focus on a recently generated dataset that suggests not even the thallium (Tl) isotope cycle is immune to these activities. In the anoxic and sulfidic ('euxinic') East Gotland Basin today, Tl and its two stable isotopes are cycled between waters and sediments as predicted based on previous studies of analogous environments (e.g., the Black Sea and Cariaco Trench). The Baltic seawater Tl isotope composition ($e^{205}\text{Tl}$) is, however, higher than predicted based on the results of conservative mixing calculations. Data from a short sediment core from East Gotland Basin demonstrates that this high seawater $e^{205}\text{Tl}$ value originated around 1956 CE, immediately after prominent anthropogenic signatures begin to appear in the same core. This juxtaposition is unlikely to be coincidental and suggests that human activities in the surrounding area have altered the seawater Tl isotope mass-balance of the Baltic Sea. Thallium is a highly toxic element, and these results have important implication for Tl bioavailability and its potential impacts on human health.