

P1.19**Characterizing the carbonate system of the Elbe estuary**

Louise Rewrie¹, Yoana Voynova¹, Holger Brix¹, Gregor Ollesch², Burkard Baschek¹

¹Helmholtz-Zentrum Geesthacht, Institute of Coastal Research, Germany. ²Flussgebietsgemeinschaft Elbe, Germany

Abstract

Estuaries are net CO₂ sources to the atmosphere, releasing ~0.25 Pg C yr⁻¹, which could counterbalance the shelf uptake of ~0.25 Pg C yr⁻¹. River discharge can influence both, the CO₂ flux from estuary to the atmosphere, as well as the magnitude of dissolved inorganic carbon (DIC) exported to coastal waters. For European countries, climate change is expected to cause an increased precipitation in winter and longer periods of drought in summer. The goal of this study is to elucidate the influence of climate-change-induced hydrological changes on an estuarine carbonate system.

The Elbe River is one of the largest river basins in central Europe, where over 24 million people live in the catchment area. Since 2014, annual Elbe river discharge has been relatively low. 2018 exhibited with 441 m³ s⁻¹ the lowest annual mean river discharge since 1992. The Elbe estuary has been extensively sampled by the Flussgebietsgemeinschaft (FGG) Elbe (*Elbe River Basin Community*), qualifying the region as a suitable site to study the natural and anthropogenic impacts on estuarine systems. Historical records of carbonate system parameters collected between 1985 and 2018 are being assessed in the present study.

Preliminary results of the 1985-2018 FGG dataset indicate a major shift in the carbonate system dynamics in the Elbe estuary. Between 1985 and 1995, the mean DIC in the estuary decreased by 32% of 754 µmol L⁻¹. After 1995, mean DIC of the estuary increased by 582 µmol L⁻¹ up to 2190 µmol L⁻¹ by 2018, and displayed a shift in pattern along the estuary. From the freshwater to the mesohaline region, DIC increased from 2100 µmol L⁻¹ to 2400 µmol L⁻¹, but decreased to 2200 µmol L⁻¹ in the polyhaline zone. Further analysis will focus on the period after 2014, when the estuary had experienced drought conditions.

Keywords

Estuary, Carbonate system, Climate change