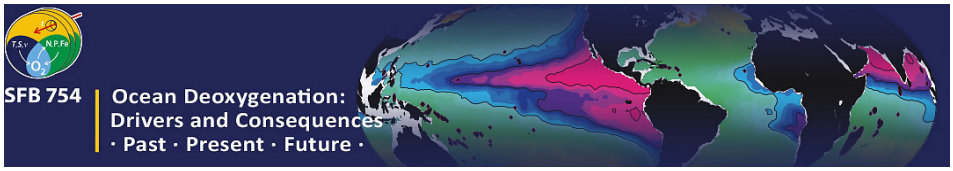

Contribution ID : **207** Type : **Oral**

Oscillations of oxygen in the hypoxic transition zone of the Eastern Gotland Basin (Baltic Sea) – causes and consequences on benthic biogeochemical fluxes

Monday, 3 September 2018 17:00 (15)

Depending on time scales, magnitude and persistency, fluctuating oxygen (O2) levels at the boundaries of oxygen deficient areas strongly affect benthic element cycling and redox-sensitive mobilization of nutrients and trace metals. Via feedback loops, this contributes to maintain or even amplify low oxygen levels. Beside biological consumption, bottom water availability of O2 in such transition zones depends on physical transport and atmospheric forcing, which render them particularly susceptible to environmental change. We present time series of bottom water O2 concentrations measured in water depths of 90 and 120 m in the Eastern Gotland Basin (central Baltic Sea) in conjunction with hydro-dynamical and atmospheric parameters. The depth range of 80 to 125 m referred to as Hypoxic Transition Zone (HTZ) separates the oxic surface layer (0 to ~ 80 m) from the almost persistently anoxic and sulfidic deep basin. Although slightly dampened with increasing water depth, O2 variability in the HTZ was pronounced on temporal scales of days to weeks. During summer, O2 concentrations at 90 m water depth were typically close to anoxia with periodic excursions of up to 30 µM. In the autumn to spring period O2 levels fluctuated around ~20 µM. High levels of up to 170 µM were episodically recorded during storm events. The HTZ makes an important contribution to the internal nutrient loading in the central Baltic Sea, releasing 70% of P (76 kt yr-1) and 75% of DIN (200 kt yr-1) despite covering only 51% of area (Noffke et al. 2016), impeding the recovery of the Baltic Proper from eutrophication. However, this estimate of the annual nutrient load is based on sparse in situ flux measurements mostly taken during the summer season and does not consider the impact of O2 dynamics on nutrient release.

Position

Senior Scientist

Affiliation

GEOMAR

Email Address

ssommer@geomar.de

Are you a SFB 754 / Future Ocean member?

Yes

Primary author(s) : Dr SOMMER, Stefan (GEOMAR Helmholtz Centre for Ocean Research Kiel, Germany)

Co-author(s) : Dr DALE, Andrew (GEOMAR); CLEMENS, David (Geomar); Dr PFANNKUCHE, Olaf (GEOMAR); Dr FLÖGEL, Sascha (GEOMAR)

Presenter(s) : Dr SOMMER, Stefan (GEOMAR Helmholtz Centre for Ocean Research Kiel, Germany)

Session Classification : 08 Coastal Systems: From Understanding to Management

Track Classification : 08 Coastal Systems: From Understanding to Management