
Tobias Hahn1*, Steffen Assmann2, and Arne Körtzinger1,3

1*thahn@geomar.de

GEOMAR Helmholtz Centre for Ocean Research Kiel, Germany
2Kongsberg Maritime Contros GmbH, Kiel, Germany
3Christian-Albrechts-Universität zu Kiel, Germany

Problem
Data show a decline in the global oceanic O2 content of more than 2% since 1960 (Schmidtke et al., 2017).
Quantifying global and regional changes of the O2 distribution improves the understanding of chemical, biological and physical processes in the global ocean, especially in Oxygen Minimum Zones (OMZ).
The faster response time of the novel optical oxygen sensor (optode) HydroFlash™ O2 compared to other optodes is promising to observe various processes with higher spatial and temporal data resolution.

Aim
Integrated characterization of the HydroFlash™ O2 is aimed regarding accuracy, precision, pressure dependance, long-term stability & drift and response time in lab and field (according to Bittig et al., 2018).

Results
The response time of $t_{50\%} = 3 – 4s$ is ~50% faster compared to other optodes.

Lab calibrations yield accuracies with RMSE < 1 µmol L⁻¹.

Implementation on Argo-Float

8+ months mooring data

Underway (UW) measurements: 100+ days
Performance on CTD-Casts: 80+ profiles (up to 6000m)

Conclusion & Outlook
Due to its small dimensions and response characteristics, this novel optode could be used on a wide range of autonomous observation platforms such as ships, time-series stations and wave gliders, yet it is potentially promising on floats and gliders.

Next steps: Complete data & performance evaluation of optode, biogeochemical analysis of South Atlantic M133 underway data

References:

Fig. 1: Global Oxygen Minimum Zones (Keeling et al., 2010)