

NITROUS OXIDE EMISSIONS FROM EASTERN BOUNDARY ECOSYSTEMS: CASE STUDIES FROM PERU AND BENGUELA UPWELLING REGIONS.

D. L. Arévalo-Martínez^{1†}, A. Kock¹, A. Körtzinger¹, T. Steinhoff¹, and H.W. Bange¹

The role of nitrous oxide (N₂O) as a greenhouse gas and major ozone-depleting substance in the troposphere is well known. Since the ocean accounts for one third of the natural N₂O source to the atmosphere, it's crucial to investigate its distribution and emissions. Although oxygen minimum zones and the associated coastal upwelling bands along the eastern boundaries of Pacific and Atlantic oceans are key sites of production, consumption and exchange of N₂O across the air-sea interface, still most emission estimates rely on extrapolations of open ocean values. Here we present the first comprehensive data sets of surface dissolved and atmospheric N₂O measurements collected during several expeditions to the Peruvian and Benguela upwelling regions. By using high-resolution surface N₂O measurements and vertical profiles of N₂O and relevant biogeochemical parameters, we show that subsurface production in conjunction with vertical transport/mixing leads to enhanced supersaturations and extremely high N₂O emissions to the atmosphere.

¹ GEOMAR Helmholtz Centre for Ocean Research Kiel, Düsternbrooker Weg 20, 24105 Kiel, Germany.

[†] Contact: darevalo@geomar.de