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Title: Anomalous high C/O and C/N molar ratio in the Oxygen Minimum Zo (OMZ) of the Eastern South Pacific (ESP)

Abstract:

The OMZs stimulated by an increase of stratification or productivity, a specific chemistry which could disturb the C/N/O molar ratios. Data obtained during 4 oceanographic cruises (2000-2002), along the ESP- the oxycline (20m), show C/O (0.95&#65533;0.4) and C/N (14&#65533;2.6) ratios, 2 twice higher than the classical ratios respectively. These high molar ra would be related to the active OMZ (formation) with -C/O and C/N 4 a times higher than to the passive OMZ phases (destruction or mainten The high C/N/O would be due to an accentuated remineralization mak an intense (O2<5&#65533;mol/kg) and extended (5.106 km2) OMZ (from 20 450m), and producing simultaneously a CMZ (Carbon Maximum Zone represents a CO2 reserve of 13% of the anthropocene atmosphere. T remineralization would be due to a particular bacteria consortium : autotrophic, heterotrophic; aerobe, anaerobe. This bacteria consortiu favour in the very shallow OMZ thanks to the simultaneous availabilit light and O2 from oxic (>130&#65533;mol/kg at 20m) to suboxic conditions (<40&#65533;mol/kg at 30m). These bacteria would support each other. The autotrophic -photosynthetic and nitrifying- bacteria, would provide O2 essential to the aerobe remineralization, and nitrate (NO3-) to the an remineralization (nitrato-reduction). In return, heterotrophic bacteria produce ammonium (NH4+, more stable in reduced OMZ conditions), necessary to the photosynthetic (Procholorococcus, Synechococcus) a nitrifying activities. Consequently, the bacterial activity budget is: con NH4+ (at 68%); balanced for NO3-. During this cycle, the net DIC production (15% of the mobilized DIC) results from a DIC production by heterotrophic remineralizing bacteria, and a DIC consumption of 4 autotrophic bacteria only. These intense remineralized &#65533;New DIC&#65533; in CMZ would be then due for 53% to the aerobe bacteria (remineralizin nitrifying), whereas 47% would be induced by the anaerobe nitrato-re bacteria (denitrifying, nitrato-ammonifying), specific to the OMZ. Thus overall the consortium, coupling carbon and nitrogen cycles associate DIC>2500&#65533;mol/kg and NO3-deficit>15&#65533;mol/kg, would lead to an O2 consumption (>30&#65533;mol/kg), i.e 9 times higher than O2 production, a to understand the OMZ formation. This consortium constitutes a testi a trans-evolutionary, complex and singular collaboration, between bac the past (archaean) and those photosynthetic, nitrifying and denitrify the modern ocean. Extending the high C/N/O observed in the ESP-OM