

On the barium - oxygen consumption relationship in the Mediterranean Sea: implications for mesopelagic marine snow remineralisation

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In the ocean, remineralisation rate associated with sinking particles is a crucial variable. Since the 90's, particulate biogenic barium (Ba_{xs}) has been used as an indicator of carbon remineralization by applying a transfer function relating Ba_{xs} to O_2 consumption (Dehairs's transfer function, Southern Ocean-based). Here, we tested its validity in the Mediterranean Sea (ANTARES / EMSO-LO) for the first time by investigating connections between Ba_{xs} , prokaryotic heterotrophic production (PHP) and oxygen consumption (JO_2 -Opt; optodes measurement). We show that: (1) higher Ba_{xs} (409 pM; 100- 500 m) occurs in situations where integrated PHP (PHP100/500= 0.90) is located deeper, (2) higher Ba_{xs} occurs with increasing JO_2 -Opt, and (3) similar magnitude between JO_2 -Opt (3.14 mmol $m^{-2} d^{-1}$; 175- 450 m) and JO_2 -Ba (4.59 mmol $m^{-2} d^{-1}$; transfer function). Overall, Ba_{xs} , PHP and JO_2 relationships follow trends observed earlier in the Southern Ocean. We conclude that such transfer function could apply in the Mediterranean Sea.