Geophysical Research Abstracts, Vol. 9, 00139, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-00139

SPI and micro-electrode profiles to define organic load in coastal areas

S. Mulsow(1), Y. Krieger(1) and R. Kennedy(2)

(1) Instituto de Geociencias, UACH, Valdivia-Chile, (2) Martin Ryan Marine Center, NUI, Galway, Ireland

Two state-of-the-art techniques were used to assess the impact of organic loading from fish farming in two fjords of Southern Chile, Pillan and Reñihue Fjords. A sediment profile imaging (SPI) camera was deployed and sediment microprofiles (oxygen, redox and pH) were measured i undisturbed sediment cores collected using a HAPS corer. Four out of seven stations in Pillan Fjord were found to be severely disturbed: SPI images showed azoic conditions (no apparent Redox Potential Discontinuity layer, no evidence of macro-aerobic life forms, presence of un eaten fish food layer, negative OSI scores). These findings were corroborated by very high oxygen consumption rates (700 -1200 mmol m^{-2} d^{-1}). H_2S concentrations increasing quickly within the sediment column and redox potential decreasing towards negative values within a few mm down core. Results for Reñihue Fjord were not so straighforward. SPI images indicated that most of the stations (R3 to R7) presented well-mixed conditions (high apparent RPD layers, presence of infauna, burrows, etc), but oxygen profiles yielded consumption rates of 230 - 490 mmol m^{-2} d^{-1} and organic carbon mineralization of 2.16 to 4.53 g C m^{-2} d^{-1}. These latter values were close to the limit of aerobic degradation of organic matter although no visible changes were recorded within the sediment column. The relationship between TOC and oxygen consumption for the two fjords was different. At Pillan Fjord, oxygen consumption increased 3 times as TOC increases from 2 to 10 % dwt. At Reñihue, oxygen consumption rates does not increase even at TOC % ranges form 6 to 20 %. In view o our findings, the importance of integrating multidisciplinary methodologies in impact assessment and estimations of environmental carrying capacity for fish farms were discussed.