Abstract title

ORGANIC CARBON ACCUMULATION IN COASTAL ZONES SINCE THE LAST GLACIAL MAXIMUM ? A CLUE FOR VARYING ATMOSPHERIC CO2 LEVELS?

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Abstract

It is a generally accepted concept that the carbon storage within the principal earth surface reservoirs varies in a multitude of time scales. The shallow water continental margins belong to the most fertile areas in terms of organic carbon (OC) production and are also very effective carbon traps. However the rate of OC retention in these zones must be strongly affected by the sea level, therefore it is to large extent controlled by glacial-interglacial cycles. In order to assess the changes of OC storage in the coastal areas, the OC content must be integrated with sediment accumulation rates on shelves, in lagoons and estuaries. We determined organic carbon content in several hundreds of samples taken from cored boreholes which crossed the entire infill sequences of Guadiana, Arade and Boina river estuaries, in Algarve (S. Portugal). These dated sedimentary sequences represent the time span from ca 13000 yr calBP to present and constitute one of the longest records from nonglaciated terrains. The obtained data indicate that until ca 7000 yr calBP, i.e. during the period of fast sea level rise, organic carbon accumulated at an average rate of 240 gm2yr-1. In the Middle and Upper Holocene, when the sea level rise was not exceeding 25cm/century the organic carbon accumulation rate dropped to an average value of 80 gm2yr-1. From the other hand, the analysis of gas bubble content from ice cores indicates that the atmospheric CO2 concentration evolved during the last glacial/interglacial transition, from 180 ppmv minimum during the LGM to the 270 pomp pre-industrial level. Considering that the terrestrial particulate organic matter is an essential fertilizer of the ocean, it is postulated that enhanced burial of particulate organic matter in the coastal areas during the period of fast postglacial sea level rise is responsible for decrease of primary productivity in the open ocean and consequent transfer of 200 Gt of carbon to the atmosphere. We acknowledge the Portuguese Foundation for Science and Technology (FCT) that financed REFLECS project through the POCTI program. This is a contribution to the IGCP 437 and 464 projects.

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