Contribution of coccolithophores to carbon burial during the Late Quaternary on the southern Brazilian continental margin

Juliana de Freitas Gonçalves, Adriana Leonhardt

Federal University of Rio Grande (FURG), Laboratory of Paleoceanography and Palynology, Rio Grande, Brazil; goncalvesjuliana.f@gmail.com, adriana.leonhardt@yahoo.com.br

José-Abel Flores

University of Salamanca, Department of Geology, 37008 Salamanca, Spain; flores@usal.es

The carbon biological pump is key to understanding climate variability because of the importance of the carbon cycle in climate regulation. The Late Quaternary record shows a clear relation between glaciation cycles and greenhouse gas concentrations (Petit et al., 1999). Understanding this period can provide important information about where climate change may be leading us in the future. Coccolithophores, which are very important in the operation of the biological pump, have been providing very accurate information about the palaeoclimate record. For this reason, they have been studied extensively. The aim of this work is to understand the variations in biological productivity and their relation to organic carbon and carbonate burial and to the oceanographic processes that resulted from Late Quaternary climate change on the southern Brazilian continental margin. We studied a sediment core recovered from the slope of the Pelotas Basin (south of Brazil, 29.221286°S, 47.283805°W), which covers from 47 to 7 kyr BP. The N-ratio and the abundance of coccolithophores in the assemblages were the main palaeoproductivity proxies used in the study. Measures of total organic carbon (TOC) and carbonate content in the sediments were also obtained. Our results show that coccolith-rich biogenic carbonate sediments dominated the sediment core, particularly during MIS 3 and MIS 1, which demonstrates a higher contribution of these organisms to carbonate burial during the warmest periods. With regard to productivity, both the N-ratio and TOC curves had a negative correlation with the end of summer/beginning of autumn insolation curve and a positive correlation with the spring insolation curve at 29°S. We infer that this must be due to a strengthening of the Brazil Current meandering flow that promoted shelf-break upwelling of nutrient-rich South Atlantic Central Water during periods of northeasterly wind intensification (Campos et al., 2013), which is analogous to the modern spring/summer condition. This project was sponsored by the IODP/CAPES grant 88887.091729/2014-01.

References

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