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Exploring diversity of marine eukaryotes across 385 ka old gravity core using sedaDNA

Ines Barrenechea Angeles^{1,2}, Luc Beaufort³, Daniel Ariztegui¹, and Jan Pawlowski^{2,4}

¹Department of Earth Sciences, University of Geneva, Geneva, Switzerland

²Department of Genetics and Evolution, University of Geneva, Geneva, Switzerland

³CEREGE, Europole Méditerranéen de l'Arbois, Aix-en-Provence, France

⁴Institute of Oceanology, Polish Academy of Sciences, Sopot, Poland

In the last ten years, sedimentary ancient DNA (sedaDNA) becomes a new proxy for paleoceanographic analyses that provide information about large range of non-fossilized taxa. Usually, the sediment samples destined for sedaDNA study are immediately frozen after collection or stored in special buffer to preserve the DNA. However, there are many cores that have been collected long time before the advent of paleogenomics and that are commonly refrigerated and stored at 4°C. Here, we test whether such cores can be used as a source of ancient DNA, by analysing the sedaDNA samples from 36 meters long marine gravity core that was stored during 14 years at 4 °C. The core MD05-2920 was retrieved during the MD148/PECTEN – Images XII cruise, in Bismarck Sea, off New Papua Guinea, and records the past 385 ka. We analysed samples from 20 layers spanning the interval from 1.6 ka to 384 ka, where isotopic measures of $\delta^{18}\text{O}$ showed significant paleoceanographic changes. We started by analysing a universal eukaryotic marker, the V9 (170 bp) region of the 18S rRNA. However, the obtained datasets were dominated by sequences belonging to species of fungi and amoebae that probably originated from post-collection storage. More data were obtained by using markers specific to selected marine taxa, such as foraminifera, radiolaria, and diatoms. The analysis of these data show clearly that the DNA is preserved in marine sediment down to 385 ka old layers. Our study also shows a possibility to exploit the sedaDNA from refrigerated material stored in cores repositories.