

## Geochemical Distribution and Foraminiferal Analysis from a Basin in SE Aegean Sea

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### Introduction

This study concerns an area located in the basin between Tilos and Symi, near Kos and Rhodes, southeast Aegean Sea, in the SE Mediterranean (Figure 1). The Aegean Sea is distant and almost isolated from the North Atlantic oceanic circulation and is considered a key region as it reflects high and low latitude climate changes, through an intense atmospheric connection. Reconstructions of climate during the Holocene have revealed the occurrence of determining episodes of severe cooling also on multi-centennial to millennial timescales (Rohling et al., 2002; Casford et al., 2003). The study area is also near the Rhodes gyre where formation of Levantine intermediate waters occurs. Here we present high resolution measurements of organic carbon Corg, nitrogen Ntot concentrations and micropaleontological results focusing on planktonic foraminifera during the S1 deposition. Sapropel S1, deposited during the Holocene Climate Optimum is characterized by strongly dysoxic conditions punctuated by reventilation events in the Aegean sea (e.g., Abu-Zied et al., 2008; Filippidi et al., 2016).

### Material and methods

The chronostratigraphy of the studied core is based on accelerator mass spectroscopy (AMS) <sup>14</sup>C dating performed on planktonic foraminiferal assemblages. Core ST5 (3.81 m long) retrieved from 688 m depth, has been photographed and visually described. Samples for organic carbon and nitrogen analysis were collected with 0.5–4 cm resolution. Samples for planktonic foraminiferal analysis were separated at a high resolution sampling interval of 0.5 cm, were disaggregated using hydrogen peroxide and then wet sieved through a 125 µm mesh. The dried material was split into aliquots using an Otto microsplitter. At least 200 specimens were picked and identified for each sample. In all, 35 samples were collected for stable isotope analyses (δ<sup>18</sup>O) using the tests of the handpicked planktonic foraminifera *Globigerinoides ruber*.

### Results and Discussion

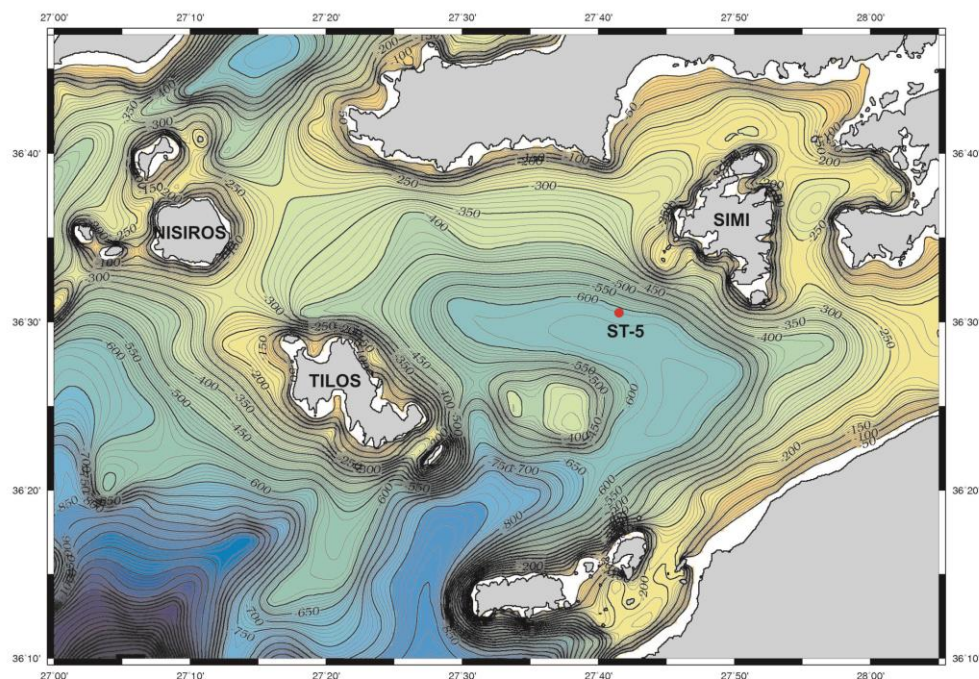
The core ST5 contains a dark color mud that corresponds to sapropel S1 consisting of two discrete layers, the lower layer S1a and the upper layer S1b which are separated by the lighter-colored S1 interruption.

The organic carbon values downcore fluctuate and suggest that subtle changes actually occur during the deposition period. The lower part (S1a) and the upper part of the sapropel (S1b) have similar Corg average concentrations (1.2%) while the interruption interval has an average Corg=0.7%. High organic carbon content in sapropels shows an increase in primary productivity due to enhanced nutrient availability.

The ratio Corg/Ntot in S1a, S1b and Si is respectively 11.6, 10.3 and 9.7. Above S1 we calculated a Corg/Ntot=9.3 and below S1 the ratio increased to 9.9. The difference in Corg/Ntot ratios between sapropels and background sediments could indicate changes in the source of organic matter: algal or land-plant derived organic matter (Arnaboldi et al., 2006; Gogou et al., 2007). The study includes qualitative and quantitative analysis of planktonic foraminifera as the composition of their assemblages reflects water mass conditions (e.g., Casford et al., 2003). The benthic foraminifera are very good indicators of conditions prevailing in the sea bottom (dysoxic /anoxic) and the water masses circulation. In each sample we determined the abundances and some key benthic foraminifera groups.

The determined planktonic foraminiferal assemblages are composed mostly of *Globigerinoides ruber* (*alba* and *rosea*), *Globigerina bulloides*, *G. falconensis*, *Globigerinella calida*, *G. siphonifera*, *Globigerinita glutinata*, *G. uvula*, *Globigerinoides conglobatus*, *G. sacculifer*, *G. trilobus*, *Globorotalia inflata*, *Gl. truncatulinoides*, *Globoturborotalita rubescens*, *Hastigerina*, *Neogloboquadrina incompta*, *N. dutertrei*, *N. pachyderma*, *Orbulina universa*, *Turborotalita quinqueloba*. The species belonging to the SPRUDTS group (Rohling et al., 1997) and *G. ruber* (*alba* and *rosea*) dominate warm and oligotrophic summer mixed layers in subtropical regions and the eastern Mediterranean and consequently the downcore variation of their percentages is considered an indicator of SST variability (Pujol et al., 1995; Triantaphyllou et al., 2016). The warm planktonic foraminifera group ranges from 41 to 65% during the S1a deposition, while it varies in-between 54 and 89% within the S1b deposition interval.

Above the sapropel, the planktonic foraminifera abundance pattern reveals at least two distinct episodes of successive increased and decreased warm water species abundances. This observation due to a high resolution analysis may capture and reveal more detailed information for climatic changes in the area and consequently needs further investigation compiled with the δO<sup>18</sup> measurements on *Globigerinoides ruber* tests.



**Figure 1. Conventional bathymetry of the Nisyros – Tilos – Symi – Chalki region and location of the studied core.**

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