Paleoclimatic changes occurred during the last two centuries in the Gulf of Gaeta (central-eastern Tyrrhenian Sea): a contribution of NEXTDATA project

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A high-resolution integrated study, which includes tephrochronology (tefra layer associated to 1906 AD Vesuvius event) and radionuclide dating method (210Pb and 137Cs), has been performed in a super-expanded marine record (sedimentation rate of 0.47 cm/yr) from the continental shelf of the Gulf of Gaeta (central eastern Tyrrhenian Sea). Planktonic foraminifera, calcareous nannofossils, pollens and oxygen stable isotope data performed on Globigerinoides ruber, revealed environmental changes occurred during the last two centuries. In detail we recognise four paleoclimatic changes. From ca. 1800 to ca. 1865 AD, d18O G. ruber signal combined with evidences of abundance increase of planktonic foraminifera Globoratia inflata and G. truncatulinoides and of calcareous nannofossil Emiliana huxley document cold-temperate phase. Between ca. 1865 and ca. 1882 AD, d18O G. ruber record document a short warm interval associated with a turnover from carnivorous to herbivorous-opportunistic planktonic foraminiferal species and an increase in abundance of calcareous nannofossil Florisphaera profunda. At ca. 1935 AD, d18O G. ruber data indicate a gradually warming, concomitant an evident turnover from carnivorous to herbivorous-opportunistic planktonic foraminiferal species, and associated to the increase of calcareous nannofossil F. profunda. From ca. 1950 AD to the present day the warm phase documents a further strong increase in G. ruber alba, G. quadrilobatus and F. profunda abundances.

The pollen analysis carried out on the same core revealed a two-step increase in arboreal vegetation, this is mostly related to a rise of Olea, Quercus evergreen and riparian trees (Alnus and Salix) from ca. 1882 AD, and increase in conifers (Pinus and Cupressaceae) from ca. 1980 AD. The short lived warm interval documented by d18O between ca. 1865 and ca. 1882 AD may triggered the increase in Olea and the coeval general decrease in deciduous trees. Among herbs, Cyperaceae, along with ferns, show a progressive decline in the upper part of the record, especially from 1935 to the present, suggesting a reduction of wetlands. Since 1920 AD, significant frequencies of dinoflagellate cysts may reflect both a nutrient loading and temperatures increases, as also documented by d18O and micropalaeontological records.

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