

EVIDENCE OF EXPLOSIVE VOLCANIC ACTIVITY AT THE OLIGOCENE-MIOCENE
BOUNDARY FROM THE TYRRHENIAN SEA AREA

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Abstract - In Northern and central Apennines marly sequences of open sea, rich in planctonic microfossiles, Oligo-Miocene in age, outcrop as autochthonous and allochthonous units. Volcanoclastic levels, consisting mainly of glass or of its alteration products are interbedded; preliminary K Ar and fission tracks dating give ages from 28 to 22 m y. As a working hypothesis the glass levels are considered to originated in the Northern Tyrrhenian or Ligurian Sea area.

The autochthonous and allochthonous Upper Oligocene and Lower Miocene sequences of the Northern Apennines and Marche region (Central Italy) contain about 10 volcanoclastic levels interbedded with marly sediments. Petrochemical analysis show that the levels belong to a calcalkaline volcanism. The components are relatable to dacytes and rhyodacytes and display very simple mineralogical composition (plagioclases + pyroxenes; plagioclases + pyroxenes + amphiboles; plagioclases + biotite). The K feldspar and quartz are always absent.

At present it is difficult to locate the source area of the material; the chemical composition and especially the very high glass / crystals ratio are in fact unknown in the volcanites of the same age outcropping in the north-mediterranean area. Only from Sardinia volcanoclastic rocks not yet studied enough, are known to contain clayey components sometimes similar to those produced by the smectitic alteration of the above mentioned levels.

Many Authors suggest that the rotation of the Sardinia-Corsica microplate began during Oligo-Miocene and that the volcanism of this age is due to a compressive tectonic phase. One can hypothesize that in the subductions zones an early submarine volcanism occurred with pomiceous effusions (very high glass/crystals ratio and high water content) and great amounts of hyaloclastites more or less altered into clays for the glass-water-temperature interactions. The finest fractions have been then widespread into the basin and SiO_2 produced by the glass argillification in the water, greatly increased. Some of the last volcanoclastic levels found with no altered glass also suggest subaerial phases with ash formation and deposit.

Taking into account the North-Tirrhenic provenience of the allochthonous units examined and the decrease in thickness of the volcanoclastic levels going from NW to SE, tentatively we locate the source area in the North Tyrrhenian or Ligurian Seas.

Absolute age determinations limit the volcanic activity between 28 and 22 m y. B.P. We are therefore at the Oligocene / Miocene boundary.

The geological formations in question are very rich in planctonic foraminifera. It has been therefore possible to date some important paleontological events as the first appearance of genus *Globigerinoides* and its species *G. primordius*, *G. altiapertura* and *G. trilobus*; the first appearance of *Globigerina woodi* and the last occurrence of *Globorotalia opima-opima* and *Globigerina sellii*.

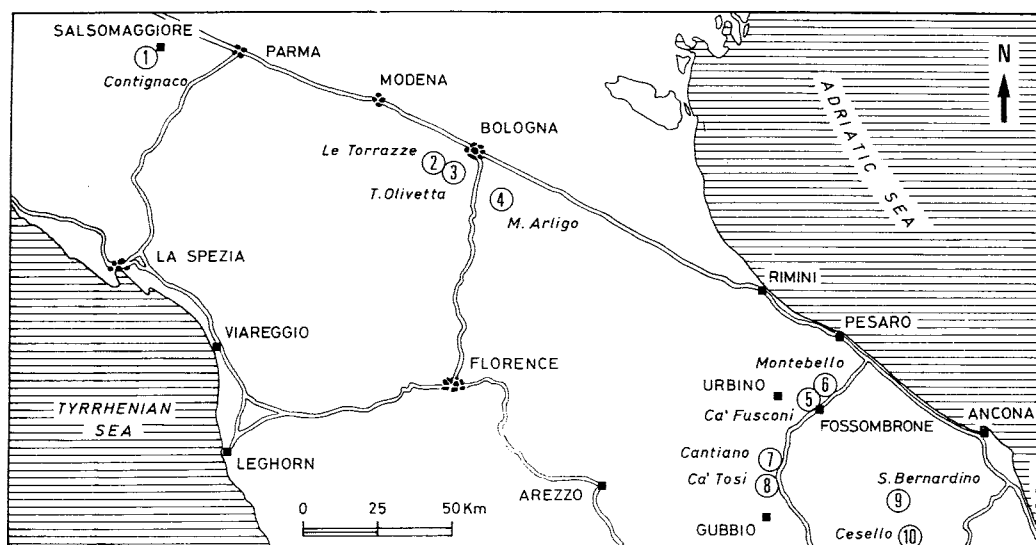


Fig. 1 - Location of the studied sequences

