



New thermal constraints on a shallow fossil subduction channel from the Northern Apennines of Italy

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Here we present new thermal constraints (with special regard to vitrinite reflectance, Illite percentage in Illite-Smectite mixed-layers and Kübler Index) derived from both XRD analysis of clay and optical analysis of organic matter dispersed in sediments incorporated in the Apennine erosive subduction channel. This study has the goal to define the distribution of maximum paleo-temperatures in different portion of the subduction channel as well as in the units representing its footwall and hanging wall. We then discuss the results with regards to the time-space tectonic evolution.

In the Northern Apennines of Italy, two tectonic units have been recently recognized as an ancient shallow subduction channel. The subduction channel is represented by the Sestola-Vidiciatico Tectonic Unit and its lateral equivalent, the Subligurian Units. The channel started to form at the transition from subduction to collision between the European and the Adria plates and it was active at least until the middle Miocene. The subduction channel is presently sandwiched between the former oceanic accretionary wedge - the Ligurian thrust nappe - and the underlying Adria sedimentary units deformed by folds and thrusts. The channel has a thickness of about 500 m and is representative of a portion ranging from the shallow diagenetic environment to temperatures of around 150°C, a critical temperature recognized in most of the subduction zones as coincident with the up-dip limit of seismogenesis.

The main component of the subduction channel is represented by material incorporated through frontal tectonic erosion removing the toe of the Ligurian/Subligurian wedge. This toe consisted of former accreted oceanic sediment and their slope deposits, the latter often reworked through gravitational processes. Basal tectonic erosion is shown by blocks of Ligurian rocks tectonically incorporated in the subduction channel. These blocks are generally located in the upper part of the mélangé.

Preliminary data from the clay mineral analysis from the Sestola-Vidiciatico Tectonic Unit and Subligurian Units indicate I% in I/S in a range between 80 and 90% and KI between 0.63 and 0.77. The analysis of organic matter gives Ro% generally in the mature stage of hydrocarbon generation with estimated paleo-temperatures between 80°C and 140°C. The data from the footwall are highly variable -from thermally immature to mature- and allow to detect the changes in thickness of the hangingwall and the channel, i.e. the overthrust Ligurian wedge and the Sestola-Vidiciatico Tectonic Unit and Subligurian Units.