DATAZIONE DI UN LIVELLO CINERITICO DEL PLEISTOCENE MEDIO: RELAZIONI CON SEDIMENTAZIONE, SOLLEVAMENTO E TERRAZZI MARINNELL’AREA CROSIA-CALOPEZZATI IN CALABRIA (ITALIA)

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In the Crosia-Calopezzati area (Ionian coast of Calabria), east of the Trionto River, crops out a Pleistocene marine succession which is uplift and marine terraces in the Crosia-Calopezzati area (Calabria, Italy), affords an excellent prismatic sedimentary Pleistocene and, in the parts more proximal, is transgressive on the terrigenous Miocene. The sollevamento dell’area ha originato la formazione di 4 ordini di terrazzi marini, già descritti in un precedente lavoro; il rinvenimento e la datazione di un livello cineritico nel substrato argilloso pleistocenico ha permesso di ottenere una datazione indiretta degli stessi. The level cineritico, per il quale è stata calcolata un’età di 450.000 anni ±10% con il metodo delle tracce di fissione, è stato infatti inquadrato stratigraficamente all'interno del corpo sedimentario; ciò ha consentito di trarre anche ulteriori deduzioni e ipotesi, sia cronologiche che quantitative, sul sollevamento e sull'erosione del prisma sedimentario pleistocenico e sulle velocità di sedimentazione.

ABSTRACT: Bigazzi G. & Carobene L., Fission-track dating of Middle Pleistocene ash layer: relationships to sedimentation, tectonic uplift and marine terraces in the Crosia-Calopezzati area (Calabria, Italy). (IT ISSN 0394-3356, 2004).

In the Crosia-Calopezzati area (Ionian coast of Calabria), east of the Trionto River, crops out a Pleistocene marine succession which is transgressive over Miocene – Pliocene (stratum Fig. 1; Fig. 2). These sediments deposited during a lowering phase of the marine terraces margin, which caused the formation of important sedimentary basins in Calabria and Basilicata. A significant stage of knowledge of the geology of these regions during lower and middle Pleistocene times had been already attained through studies that were performed on these basins.

The uplift of the study area determined the formation of four orders of marine terraces (Fig. 5) already described in a previous article (Carobene, 2003). Discovery and analysis of an ash layer interstratified with the Pleistocene clayey substratum (Fig. 3) provided the opportunity of inferring some considerations on the sedimentation rate and, consequently, on the onset of the sedimentation of the transgressive body. It was also possible to deduce some constraints on the beginning of its emersion as well as on the age of the marine terraces and on the uplift rate of the study area. The main results of this work can be summarized as follows (Fig. 9): 1) Age determination of the pyroclastic layer. The ash layer, referred to as “Calopezzati ash”, looks poorly cemented, porous and white colored. Dating of a population of glass shards separated from the Calopezzati ash was performed using the fission-track method at the C.N.R. Institute of Geosciences and Earth Resources of Pisa (Fig. 4). An age of 450,000 a ± 10 % was determined (Table 1). Taking into account the close analogies found out with the pyroclastic layer named “Parmenide ash” recognized in the nearby Cutro basin, in the Crotone peninsula (Massari et alii, 2001), the deposition age of the Calopezzati ash might be 420,000 a.

2) Sedimentation rate. The position of the studied ash inside the sedimentary body allowed to compute a thickness of the overhanging clay cover of around 100 m and to deduce that sedimentation stopped at the end of MIS 9 (280,000 a ago) (Fig. 8). Therefore, during the considered time span the average sedimentation rate was around 0.6 mm/a.

3) Coastal area lowering (subsidence) and Pleistocene sedimentation. Based upon the mean sedimentation rate (see point 2 above) and taking into account the computed thickness of the sedimentary prism (around 400-500 m), we argue that sedimentation started during late Pleistocene – early middle Pleistocene times.

4) Onset of the tectonic uplift. The onset of the uplift rate of the area is about coeval with the ash deposition, therefore an age of around 450,000 a can be deduced for the beginning of the uplift phase (Fig. 6 - A).

5) Erosion of the sedimentary prism. Obviously erosion is diachronic. It took place with evidence in correspondence with the eustatic lowering following the interglacial peak of MIS 11, and it is testified by the sediments located at higher elevation (277 m, Fig. 5); the sedimentary top does not coincide with the most recent sediments.

6) Tectonic uplift and marine terracing. The interglacial high level subsequent the first emersion is attributed to the MIS 9. It originated a wide terrace (I order terrace) nowadays to a great extent remodelled, with an inner margin at an elevation of 210 m (Fig. 5). An algal limestone sample yielded a Th/U > 300.000 a (Carobene, 2003). We computed an average uplift rate of 0.62 mm/a. We assume that the clayey sedimentation stopped with the eustatic lowering (Fig. 8 – A e B). The following interglacial eustatic high level (MIS 7) determined the formation of the II order terrace which nowadays has an inner margin of 105÷120 m (Chapter 4); the corresponding average uplift rate is 0.56 mm/a (Tab. 2). The last eustatic high of stage 5 (MIS 5.1) produced the IV order terrace, which is of less importance than the previous ones as regards surface width and sediments thickness. The present elevation of its inner margin, 25÷30 m, allowed us to compute an average uplift rate of 0.46 mm/a. The chronological succession of the four orders of terraces and of the sedimentary top elevations (Fig. 5 and Tab. 2) proves an almost steady course of the uplift rate (Fig. 6 – B), slightly decreasing with time (from 0.68 down to 0.46 mm/a). Taking into account the uncertainties related to the attribution of the age to the palaeo-eustatic peaks and to the estimate of their original elevation, we have reckoned the variability interval of the computed uplift rate values reported above (Fig. 7).

Parole chiave: livello cineritico, datazione con le tracce di fissione, terrazzi marini, tettonica quaternaria, eustatismo, Pleistocene, Calabria.

Keywords: ash layer, fission-track dating, marine terraces, Quaternary tectonics, eustasy, Pleistocene, Calabria.

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