

Miocene phosphogenesis in Southern Italy : a sedimentological and geochemistry analysis

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In this master thesis, we investigated phosphogenesis in four different Miocene hemipelagic sedimentary successions in southern Italy, in order to compare them with neighbouring settings in the central Mediterranean. The Miocene period is characterized by important environmental changes. The Early Miocene was characterized by a generally warm climate, which shifted to a colder one around 14.5-13 Ma (Föllmi et al. 2007). As elsewhere in the world, the Mediterranean area was affected by the paleoceanographic and paleoenvironmental changes related to this phase of climate cooling.

Sections were studied on the Abruzzese-Campania and the Apulia Platforms.

The Apulia platform corresponds to the southern margin of the Miocene Mediterranean. Three of the outcrops are on the Salento Peninsula, which is constituted of several laterally deposited carbonate successions, between the Late Cretaceous and the Pleistocene, separated by major unconformities (Bosellini et al. 2001). The area of interest is the interval from the Late Chattian to the Early Messinian represented in the field by condensed and allochthonous phosphate-rich beds, hardgrounds and phosphatized conglomerates of different generations.

The Abruzzese-Campania platform is an open-shelf depositional system. A carbonate deposit rich in phosphate grains is studied which has an age range from the Burdigalian to the Tortonian.

The samples were analysed with different methods. Bulk rock mineralogy and C/O isotope analyses were performed to determine the sedimentology and the evolution of the different successions. For an accurate age determination the samples were analysed for their strontium isotopes. Finally, thin sections were made to determine the microfacies by microscopy.

In the field, for the outcrop in Baia del Ciolo, two phosphogenetic phases have been observed, which encompass the time period between the Chattian and early Messinian. In Cursi-Melpignano two levels of phosphogenesis, of approximately the same age as in the Ciolo sections, were determined. One phosphogenetic event during the Langhian in the Matese mountain sections was defined. Total phosphorus content shows a drastic increase in P around the phosphatic level. The negative carbon isotopic trend can be correlated to the general model of (Zachos et al. 2001) for some of the sections. $\delta^{13}\text{C}$ is decreasing around the phosphatic levels, whereas the interpretation of the $\delta^{18}\text{O}$ remains difficult. Microfacies shows a systematic deepening of the environment of deposition around the phosphogenetic episodes. Finally a model of phosphogenesis is established for the Abruzzese-Campania Platform and two for the Apulia platform.