

Heavy mineral-based provenance studies in the Palaeogene flysch successions of the Pelagonian zone s. l. (Hellenides, Greece)

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The heavy mineral content of the Palaeogene flysch sediments of the Pelagonian zone s. l. was investigated in the Othrys Mountains; Pelion peninsula; on the islands of Evia and Skopelos; at several sites of the Argolis peninsula and on the island of Poros. The flysch successions of the Pelagonian zone, in general ranging stratigraphically from the Upper Maastrichtian to the Eocene, rest above the Mesoautochthon carbonate succession, mainly of Late Cretaceous age. In some places, the flysch sediments developed transitionally from Maastrichtian-Paleocene pelagic limestones; in other places sedimentation commenced unconformably above reworked shallow-water carbonates of the Mesoautochthon cover. The onset of flysch facies, in general, youngs from the east towards the west.

Most of the flysch successions are characterized by highly stable heavy mineral assemblages consisting of zircon, tourmaline, rutile and apatite. With only few exceptions, chrome spinel, as well as garnet, are relatively rare components. The sandstones show an immature petrographic composition, especially rich in feldspar, so that the stable heavy mineral composition cannot be explained by intensive reworking processes or by interstratal solution. Therefore, these heavy minerals mirror the predominantly granitoid composition of the source terrain, with relatively few garnet-bearing rock complexes and ophiolite bodies. In only two regions is the heavy mineral composition of the flysch sediments in contrast to the predominant assemblages: (1) in the western part of the Othrys Mountains, near Domokos, and (2) near Lighourion (Argolis). These successions are characterized by very high garnet contents, accompanied by only low percentages of stable minerals and chrome spinel. In the western Othrys, additionally, blue amphiboles occur frequently, this has not been observed at other sites. This assemblage points to a source area which consisted of large complexes of mica schists and blueschists, whilst granitoid and ultramafic rocks played a subordinate role.

The Palaeogene flysch basin of the Pelagonian realm was supplied from two different provenance terrains. The garnet-rich sediment infill seems to be restricted to western parts of the basin. The main source, characterized by the stable mineral assemblages, had presumably an internal position. Ophiolite complexes, in both sources, were only exposed to a minor extent. Sporadically higher percentages of chrome spinel were only found together with the stable associations. An outstanding chrome spinel content has been observed in the formation underlying the flysch sediments on the island of Poros.

The major part of the Pelagonian flysch sediments supplied from granitoid sources can clearly be distinguished from terminal flysch successions of the External Hellenides, where sediments with such high contents of stable minerals are unknown.