Palaeogene of Samothraki Island: Correlations with the basins of Thrace and Rhodope

Палеогенът на остров Самотраки: корелации с басейните на Тракия и Родопите

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Basement complexes

The pre-Palaeogene basement of Samothraki Island consists (Davis, 1963; Heimann et al., 1972; Tsikouras, Hadzipanagiotou, 1995; Koglin et al., 2009) of Jurassic ophiolites (mostly basaltic pillow lavas), an igneous suite (160 to 150 Ma) that ranges from gabbro to plagiogranite, and a metasedimentary complex (greenschist-facies metamorphism) built of coarse metabreccias and metaconglomerates interbedded with polymictic metasandstones and metasiltstones, and locally, thin metamorphic limestones. The petrography of the pebbles indicates a dual provenance: (i) Almost all ophiolitic petrographies (basalts and dolerites, pillow-lavas included, gabbros, diorites, plagiogranites) of the ophiolitic s.l. complex, and (ii) Pebbles from low-grade metamorphics of the Circum-Rhodope flysch or of shallow marine origin (coral-bearing limestone included) that crop out on the Thracian mainland. No outcrops of these source rocks are observed on the island. Coral remains from a conglomerate pebble found at Aghios Georgios have been determined as Late Jurassic to Early Cretaceous (Heimann, 1967). The metasedimentary complex has been previously referred to the Lower Cretaceous but it may be Cretaceous or Early Palaeogene.

Palaeogene of Samothraki

Ophiolites and the metasedimentary complex are unconformably and transgressively covered by a sedimentary flyschoid complex. Previous research (Christodoulou, 1958; Meinhold, BouDager Fadel, 2009) referred the complex to the interval Middle Eocene–Oligocene. The complex begins either with sandstones and siltstones with shaly and limestone interbeds or with thick limestones that occur as a narrow band around and north of Hora (Samothraki) traced in N–S direction. The upper parts of the section consist of terrigenous rocks interbedded and/or intersected by volcanic rocks of intermediate composition. The central parts of the island are occupied by a large Late Oligocene–Early Miocene? granite pluton (Pe-Piper, Piper, 2002).

The limestones (packstone and wackestone) at the Kastro (castle) of Hora cover directly the ophiolites (s.l.). The contact is sheared, with formation of greenschist facies blastomylonites. Above the highest houses of Hora thin Palaeogene limestone beds have been observed as tectonic insertions within the ophiolites. The thick limestone beds cover directly the basement but laterally continue as discontinuous wedging-out layers or/and large blocks, often rotated, within the terrigenous flyschoid (molasses) complex. These relations between the different components of the complex suggest a reef facies wedging out into an olistostrome and supplying fragments to it. Due to intense postsedimentary deformations, this olistostrome locally passes into a mixed, sedimentary and tectonic mélange. The sedimentary microfacies of the limestones correspond to a proximal middle carbonate platform. The limestones are locally rich in foraminifers, corals, corallines, bryozoans, echinoderms, gastropods and bivalves. Several sections have been systematically sampled, and yielded foraminifer fauna typical of the Late Eocene (Priabonian). Amongst the taxa, *Nummulites incrassatus*, *Nummulites* cf. *fabianii, Spiroclypeus granulosus*, *Asterigerina* cf. *lancicula*, *Haddonia heissigi*, *Fabiania cassis, Heterostegina* sp., *Glomalveolina*?, *Orbitolites* sp., *Sphaerogypsina* sp., *Gypsina* sp., miliolids and rotalids are determined. No calcareous nannofossils have been recovered.

Palaeogene sections in Greek Thraki

Several sections have been studied and sampled in Greek Thrace (Thraki) between Maronia and Pilea.

The sections begin over ophiolites, Triassic (Melia) sandstones or Jurassic–Lower Cretaceous lower-grade metamorphic flysch of the Circum-Rhodope belt with limestones formerly referred to the Middle Eocene. In all sections studied, calcareous nannofossils determined belong to the zones NP17 to NP21. The lowest parts of the section near the ruins of Zona (below the tower) consist of poorly cemented claystones with aragonite? crystals and quartz and feldspar grains. Throughout the limestone section, colonial corals and gastropods are observed. Amongst the calcareous nannofossils determined, *Coccolithus pelagicus, Cocc. eopelagicus, Dyctiococcites bisectus, D. scripsae, Cyclocargolithus floridanus, Reticulofenestra hillae, R. umbilica, R. dictyoda, Ericsonia formosa, Sphenolithus moriformis*, etc. occur. Thus, the onset of the transgression may be dated to around the boundary of the Middle to the Late Eocene. The terrigenous and volcanosedimentary complex that follows corresponds to the whole Upper Eocene and Lower Oligocene.

Correlations and comparisons

Comparisons of the Palaeogene rock sequences and environments of Samothraki and nearby Rhodope and Thrace basins (Okay et al., 2010) enable reconstructions of the palaeogeography and palaeogeodynamics during this time. Several Palaeogene troughs have been formed following the crustal thickening during the Cretaceous collisional orogeny and the extensional collapse of the orogen. Some of the troughs (East Thrace; parts of Bulgarian East and Central Rhodope) had been set on in Palaeocene times, and continued throughout the Eocene. Tectonic compression events (locally with thrusting) in most cases led to interruption of the sedimentation. The following transgression proceeded from late Middle Eocene to Late Eocene times, with platform-type carbonates, reefs and fore-reef terrigenous formations (locally with olistostromes). In the Central and Eastern Rhodope, lacustrine basins developed in Late Eocene time, and were followed by early Oligocene transgression accompanied by volcanic activity.

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