Provenance of the Paleozoic-Mesozoic siliciclastic rocks of the Istanbul Zone: Constraints on the location of the Rheic suture in Turkey

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The Istanbul Zone (NW Turkey) is regarded as the eastward elongation of Avalonia in Central Europe. Its Paleozoic stratigraphy is characterized by continuous sedimentation from Early Ordovician to Late Carboniferous. However, the Intra-Pontide Suture between the Istanbul and Sakarya zones is regarded as a Neotethyan Suture representing an oceanic domain of Permo-Triassic to Cretaceous age. Here, we present U-Pb ages and Lu-Hf isotopic compositions of the detrital zircons from the Upper Silurian-Lower Devonian, Upper Carboniferous, Permian and Upper Triassic sandstones of the Istanbul Zone. Detrital zircon ages from the Upper Silurian-Lower Devonian sandstone are dominated by Mesoproterozoic zircons (1950-900 Ma), with subordinate peaks at the latest Neoproterozoic to Silurian and Mid-Archean (2850-2750 Ma) confirming its Avalonian affinity. Detrital zircons from Carboniferous to Triassic sandstones yielded a major peak at Carboniferous-Early Permian (360-270 Ma) and a minor peak at Late Neoproterozoic-Cambrian (700-480 Ma) while Mesoproterozoic zircons become insignificant. The εHf(t) values of the detrital zircon grains from Upper Silurian-Lower Devonian, Upper Carboniferous, and Upper Triassic sandstones exhibit a wide range from -21.3 to +11.7, and over 62% of zircon grains have negative values, suggesting mixing derivation of both mantle and crustal melts. Apart from the Permo-Triassic magmatism, the Istanbul Zone is devoid of Carboniferous igneous and metamorphic events. Therefore, abundant Carboniferous zircons and disappearance of the Mesoproterozoic zircons in the Carboniferous to Upper Triassic clastic rocks of the Istanbul Zone require juxtaposition with a continental domain similar to the Sakarya and Rhodope-Strandja zones, which are characterized by widespread Carboniferous magmatism. We suggest that the Intra-Pontide Suture probably represents trace of the Rheic Suture in Turkey, along which Avalonia and Armorica collided during Early Carboniferous.

Key words: Intra-Pontide Suture, Istanbul Zone, Rheic Suture, detrital zircon, U-Pb ages, provenance, Hf isotopes