Tectonic implications of U-Pb zircon ages and geochemical data from the basement and cover units of the Armutlu Metamorphics for Late Palaeozoic-Early Mesozoic tectonic development of S Eurasian margin in NW Turkey

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Located between the Istanbul terrane to the north and the Sakarya terrane to the south, the stratigraphy, age and origin of the Armutlu Metamorphics in NW Turkey are hotly debated. The Armutlu Metamorphics comprise an amphibolitic basement and transgressive, low-grade cover units. The only age constraint on the Armutlu Metamorphics comes from dating of metagranitic intrusions within the amphibolitic basement, which revealed Late Neoproterozoic and Mid-Ordovician ages of crystallisation. Arkosic metasandstone and quartzites at the base of the cover succession in the Armutlu Metamorphics are commonly correlated with the Ordovician part of the Palaeozoic sequence of the Istanbul terrane and therefore the Armutlu Metamorphics are regarded as the metamorphic equivalent of the İstanbul terrane.

We report new LA-ICP-MS and ID-TIMS U-Pb zircon ages from both the basement metagranites and the cover metasediments of the Armutlu Metamorphics. Dating of several metagranitic sills, dykes and larger intrusions within the basement confirm that the felsic magmatism was emplaced in Ediacaran (ca. 575 Ma). Geochemical data from the metagranites, on the other hand, are indicative of formation and emplacement of magmatism at an active margin setting. U-Pb dating of detrital zircons separated from a metaarkosic sandstone directly above the unconformity surface and a quartzite (Tazdag quartzite) higher in the succession of the cover units provided a Late Palaeozoic (Permo-Carboniferous) maximum age of deposition.

Our data clearly show that the Armutlu Metamorphics is not an extension of the İstanbul terrane to the N and should be considered as a separate terrane in the NW Turkish orogenic collage. We think that the Armutlu Metamorphics is a sliver of Cadomian/Avalonian intra-oceanic arc that rifted off Gondwana active margin, possibly in Early Palaeozoic, and was later accreted to the S margin of Eurasia in Late Palaeozoic. The S Eurasian margin was a transform margin in Late Palaeozoic-Early Mesozoic time along which Gondwana-derived terranes migrated laterally and were subsequently