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U−Pb LA−ICP−MS ZIRCON GEOCHORONOLOGY AND GEOCHEMISTRY OF THE PAN-AFRICAN, S-TYPE METAGRANITOIDS: IMPLICATIONS FOR MELTING OF CRUSTAL SOURCES, WESTERN TURKEY

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The Menderes Massif in western Turkey comprises nappe packages of Pre-Cambrian high-grade rocks and extensive metagranitoids together with granulitic and eclogitic relicts and Palaeozoic to Early Tertiary metaclastic and metacarbonate rocks that was subjected to high pressure-low temperature and Borrowian-type metamorphic conditions associated with Pan-African and Alpine orogeneses. In this study we discuss the implications of geochronological and geochemical data from the metagranitoids located on the eastern margin of the Menderes Massif, which may provide raw material for understanding the assembly of western and eastern Gondwanaland. Metagranitoids, which cover large areas in the Menderes Massif, comprise augen orthogneisses, porphyritic metagranites and tourmaline-bearing leucocratic metagranites. Laser ablation ICP−MS U−Pb dating on zircon grains yielded concordia ages of 553.8±1.2, 548.8±1.3 and 506.5±1.6 Ma from augen orthogneisses, porphyritic granites and tourmaline-bearing leucocratic metagranites, respectively, confirming their close association with the Pan-African orogeny. Augen orthogneisses are typically mylonitic and consist of K-feldspar porphyroclasts and elongated tourmaline nodules enclosed by quartz, orthoclase, microcline, plagioclase, biotite, garnet muscovite, chlorite and minor zircon and apatite grains. Porphyritic metagranitoids are relatively less deformed and are defined by distinct K-feldspar megacrysts. Their mineral assemblage resembles those of augen gneisses, but lacking of garnet and tourmaline grains. Tourmaline-bearing leucocratic metagranites are rich in felsic minerals and are comprised of quartz, orthoclase, microcline, plagioclase, muscovite, biotite, chlorite, tourmaline and minor zircon and apatite. Mineralogical composition of these metagranitoids appears similar to each other. Metagranitoids have well-preserved intrusive contacts with high-grade mica schists and amphibolites and locally include xenoliths of metamorphic fragments. These metamagmatic rocks can be classified as granite. They are calc-alkaline, high-K in character and are peraluminous based on molecular A/CNK versus A/NK. Chondrite-normalised rare earth element (REE) spidergrams show that light rare earth elements (LILE) are more or less enriched with respect to heavy rare earth elements (HREE) and they have sub-parallel patterns to each other. Buldan metamagmatic rocks have low 143Nd/144Nd (0.512268 – 0.512734) and high 87Sr/86Sr (0.708695 – 0.779115) values, suggesting an upper crustal origin. Geochronological, chemical and Sr-Nd isotopic data indicate that the Buldan Pan-African metagranitoid protoliths have common magmatic origin, therefore comagmatic. S-type peraluminous metagranitoids were possibly derived from supracrustal source and are closely associated with Gondwana supercontinent. They can be suggested to have been emplaced into a collision zone between east and west Gondwanaland during crustal shortening and thickening processes.