



Zircon geochronology and geochemistry of Dorud-Azna basement and gabbroic rocks, NW Iran: evidence of Panafrican basement and oceanic units in the Zagros orogenic belt

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The Dorud-Azna basement, exposed in the Sanandaj-Sirjan metamorphic zone (SSMZ) in western Iran, is composed of both continental (granitic Galeh-Doz orthogneiss) and oceanic units (various amphibolites and metagabbros) that experienced a complex history of deformation and polyphase greenschist- to amphibolite-facies metamorphism. These units are intruded by the Darijune gabbro. The Sanandaj-Sirjan zone is part of Zagros orogenic belt. The SSMZ formed during continental collision between the African-Arabian continent and the Iranian microcontinent. A combined study of laser-ablation ICP-MS U-Pb zircon ages from granitic orthogneiss and gabbroic rocks and their geochemical characteristics as well as the geochemistry of various amphibolites and metagabbros of the Dorud-Azna basement provides new constraints on the crustal evolution of this part of SSMZ. The U-Pb zircon ages of 608 ± 18 Ma and 588 ± 41 Ma of the granitic Galeh-Doz orthogneiss indicate the presence of a Panafrican basement with Gondwanan affiliation in the central part of the SSMZ close to the Main Zagros thrust, which is similar to Central Iran and the Alborz Mountains. We conclude that this Panafrican basement in the Zagros belt is part of Iranian microcontinent, which was subducted and subsequently exhumed following subduction of the Paleotethys Ocean. Geochemically, undated amphibolites and metagabbros show sub-alkaline to alkaline basaltic compositions of tholeiitic affinity. These metamorphic rocks originated from a MORB mantle source and their age must be older than a first stage of metamorphism in the SSMZ at around 180 Ma. Therefore, these undated amphibolites and metagabbros are interpreted as the oceanic basement and to have its origin likely in an Upper Paleozoic to Mesozoic N-MORB ophiolite. Finally, in the eastern part of the Dorud-Azna region, the post-metamorphic Darijune gabbro emplaced within the metamorphic complex testified by a U-Pb zircon mean age of 170.2 ± 3.1 Ma. The relationships suggest emplacement in a continental arc setting during initial subduction of Neotethyan oceanic lithosphere. The new data combined with previous data of the SSMZ with its mixed granitic, continental, and metamorphic, oceanic, basement rocks can be interpreted as result of accretion to the Iranian microcontinent during the Jurassic, likely transpressive tectonic processes.