

Trace element compositions in whole rock and zircon on the Eocene granitoids in the northern Sanandaj-Sirjan zone, NW Iran

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The Sanandaj-Sirjan zone (SaSZ) located in the west of Iran is an active continental margin and is situated between the Zagros Folding Belt (ZFB) and Urumieh-Dokhtar Magmatic Arc (UDMA). The SaSZ was formed within the Neo-Tethys ocean and thrust over the Arabian plate in the late Cretaceous obduction followed by collision during the Miocene-Pliocene time (e.g. Stockline and Nabavi, 1973; Alavi, 1994). In the SaSZ, Paleozoic and Mesozoic granitic plutons are widely distributed. The SaSZ can be geologically divided into northern and southern sections (Eftekharnejhad, 1981; Ghasemi and Talbot, 2006). Although the granitic intrusions in the northern SaSZ were previously considered to have occurred mainly in the late Jurassic before the collision (e.g. Azizi et al., 2015; Mahmoudi et al., 2011), some Cenozoic granitoid bodies such as Naqadeh (Mazhari et al., 2011), Marivan (Sepahi et al., 2010), and Baneh granitoids (Azizi et al., 2019) have been also reported. However, their magma sources, which is important to establish geodynamic regimes in the northern SaSZ, have not been well known.

The purpose of our research is to specify the tectonic and geodynamic regimes of the Eocene granitoid bodies in the N-SaSZ based on geochemistry of the whole-rocks and their zircon minerals as an indicator of source magma. Zircons generally appear in the early stage of magma crystallization, and are expected to keep their original information on source magma. The abundance of trace elements including Hf, U, Th, Y and HREE in zircons and their chondrite normalized patterns carry characteristics of particular origins and can be distinguished with a useful degree of confidence (Belousova et al., 2002). For example, trace element abundances in zircons generally increase from ultramafic through mafic to granitic rocks (Hoskin et al., 2000).

The geochemical characteristics of major and trace elements for some Eocene granitoids in the northern SaSZ indicate that the granitoids are composed of granitic and dioritic lithologies. The granitoids are classified as high-K, most of them are peraluminous to metaluminous and have geochemical characteristics close to S- and I-type granites. The Sr and Nd isotope ratios for both of the granites and diorites indicate some mafic juvenile crust such as mafic calc-alkaline and some lower crust with amphibolite or some depleted mantle sources. Most of the zircons in the granitoids represent trace element compositions relating to gabbro-diorite (intermediate) types in the magma source, and the zircons from the dioritic group have LREE-depleted patterns which indicate a mafic component for source. In the presentation, we will make more detailed discussions on the magma source and will propose tectonic regimes in the northern SaSZ in the Eocene.

Keywords: Zagros orogeny, Sanandaj-Sirjan zone, granite, Eocene, zircon