

The stratigraphy and U-Pb zircon age of the Itapanhoacanga formation, Espinhaco supergroup, Brasil

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In earth history, the rising of the atmospheric oxygen level contributed to the deposition of the oceanic dissolved ferrous - abundant iron formation. Depositional age of iron formation tends to concentrate in some limited era such as Archean, Paleoproterozoic or late Neoproterozoic (Bekker et al., 2010). About the ages of these iron formations, some theory for the sedimentation and depositional environment has constructed (Bekker et al., 2010). In this study, we studied iron formation of the Itapanhoacanga Formation and conducted U-Pb zircon grains dating with LA-ICP-MS to understand when this iron formation deposited and how its depositional environment differs from other iron formation.

Sao Francisco craton is located in central eastern Brazil and consists of Archean to Paleoproterozoic granitic-gneissic TTG basement with Mesoproterozoic to Phanerozoic sedimentary covers. The Espinhaco fold and thrust belt, cutting the craton vertically, consists of Espinhaco supergroup that is shallow marine depositional sequences and its strata were metamorphosed under conditions of lower greenschist facies (Cabral et al., 2013). This metamorphism is affected by the Neoproterozoic Aracuai-West Congo orogen, one of many Brasiliano/Pan-African orogens that developed during the assembly of West Gondwana (Alkmim et al., 2006). The Espinhaco fold belt extends approximately 1000km N-S from the southern border of the States of Piauí and Pernambuco to the 'Quadrilato do Ferrífero' ('Iron Quadrangle') in the State of Minas Gerais (Franz et al., 2013). This Espinhaco supergroup is divided into Northern Espinhaco, the Central Espinhaco and Southern Espinhaco. In type locality, the Espinhaco supergroup is subdivided into two groups and nine formations (Chemale et al., 2012). Chemale et al. (2012) showed the U-Pb zircon age of the Sao Joao da Chapada Formation, one of the basal formations of the Espinhaco supergroup, near Diamantina as maximum depositional age, 1703 ± 12 Ma. The Sao Joao da Chapada Formation has a tectonic contact with the Itapanhoacanga Formation at the southeastern border of Espinhaco basin.

Itapanhoacanga Formation is located in Southern Espinhaco Range border and it is composed of metamorphic rocks that are originally shallow marine deposits and consists mainly quartzite, banded iron formation, polymictic metaconglomerate and hematite phyllite (Herrgesell and Pflug, 1986). These rocks were affected by a low metamorphic grade event. Even though Itapanhoacanga Formation is partially and highly deformed by effect of folds and thrust faults, it is possible to find regions with preserved stratigraphy.

In one of the sections researched, the sedimentary sequence shows fining-upward beginning with an unconformity boundary at its bottom. At the bottom of the sequence, highly elongated and flattened metaconglomerate appears. The middle part is dominated by quartzite and at the top of the sequence, BIF is gradually deposited on silicic fine sandstone. The BIF contains thin laminate of fine quartz.

In our study, LA-ICP-MS age dating was carried out on detrital zircons grains picked up from quartzite or siliciclastic matrix of metaconglomerate of the Itapanhoacanga Formation. 462 zircon grains are measured and 278 age data are collected. Most of them have indicated a discordant age and only 82 data show a concordant age. The zircon ages form some peaks at 1734Ma, 2166Ma, 2682Ma, 2811Ma, 3159Ma and 3289Ma. The youngest age was obtained from one zircon grain, showing 1639 ± 79 Ma. In conclusion, it is suggested that the Itapanhoacanga iron formation was deposited after c.a. 1.7 Ga.

Keywords: Espinhaco Supergroup, BIF, Detrital zircon