Goldschmidt 2023 Abstract
https://doi.org/10.7185/gold2023.16624

Late Neoproterozoic Takab iron formation, NW Iran: Implication for BIF depositional setting

MARYAM HONARMAND[1], GHASEM NABATIAN[2], GUILLAUME DELPECH[3], GERMAIN BAYON[4], **CHRISTIANE WAGNER-RAFFIN**[5], OMAR BOUDOUMA[6], IMAN MONSEF[7] AND BEATE ORBERGER[8]

[1]Institute for Advanced Studies in Basic Sciences (IABS)
[2]Faculty of Science, University of Zanjan
[3]GEOPS, Université Paris-Saclay, CNRS
[4]IFREMER
[5]Sorbonne Université, Sciences, Paris
[6]ISteP, Sorbonne Université, CNRS-INSU
[7]Institute for Advanced Studies in Basic Sciences (IASBS)
[8]Université Paris-Saclay, CNRS

Presenting Author: christiane.wagner_raffin@sorbonne-universite.fr

The Takab banded iron formation occurred in one of the most important part of the Iranian plateau containing Precambrian crustal segments, now embedded in the Alpine-Himalayan orogenic system. The Takab BIF is hosted in low to medium grade metamorphic rocks including schist, quartzite and marble as well meta-basalt and meta-rhyolite interlayers. The structures of the iron formation are dominated by bands or streaks. The ore body is composed of alternating iron- and silica-rich laminates predominately composed of quartz and mainly magnetite that may be partly transformed into hematite, and goethite. The iron layers and lenses have followed the foliation and deformation of host rocks. All the Fe deposits display similar geological features, with variable trending and dipping, because of folding. The studied iron ore deposits occurred in forms of banded, disseminated and nodular ores. The ore laminas vary in thickness from a few mm to 4 cm.

U–Pb dating results on detrital zircons of the associated schist rocks from lower and upper layers of the orebody bracket the age of 550 Ma for the iron deposition. Major, trace and rare earth elements support the contribution of seawater and hydrothermal fluids through iron precipitation and up to ca. 20% incorporation of terrigenous materials into the chemical precipitate of the original BIF. The geochemical as well as Nd isotopic data, suggest the Neoproterozoic felsic to intermediate crystalline basement in the Takab area as the precursor of sedimentary input. The Ce anomaly suggest suboxic condition for seawater mass during Ediacaran.

Based on geochronological and geochemical data from the Takab iron formation together with those reported from other Neoproterozoic formations and crystalline rocks in the Iranian plateau, as well evidence from glacial sediments and the bimodal volcanism in study area, we propose that the Takab BIF formed in a back-arc basin environment, and can be classified as Rapitan-type. The occurrences of late Ediacaran BIFs and metasedimentary formations with glaciogenic records suggest the presence of active-magmatic marine anoxic basins at ca. ~555 Ma, equivalent to the Ediacaran Sinian glaciation time interval (600-550 Ma).