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Heavy mineral beach placers of the Ordovician Amdeh Formation (Member 4, Wadi Qahza, Saih Hatat, eastern Oman Mountains): Where is the main source area?

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1 Heavy mineral beach placers of the Ordovician Amdeh Formation (Member 4,
2 Wadi Qahza, Saih Hatat, eastern Oman Mountains): Where is the main source
3 area?

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10 A B S T R A C T

11 We studied an excellently exposed section of the slightly metamorphic siliciclastic Amdeh Formation.
12 The section is near the base of the Amdeh Member 4 (Am4). Am4 is of Early to Mid-Ordovician age
13 and 1677 m thick. Two lensoid placers were examined for their mineral composition (X-ray
14 diffraction, transmitted and reflected light microscopy), geochemistry (X-ray fluorescence), in-situ
15 gamma-ray emissions and the sedimentary structures of the host rocks. The placers were deposited in
16 a beach environment as indicated by sedimentary structures in the associated quartzites, such as
17 parallel lamination, parting lineations and sand volcanoes and as indicated by the compositional and
18 textural maturity of the host rock and the placers. Placer deposition may have been favored by rising
19 sea-levels. Overall, the dark placers contain the following heavy minerals: anatase (up to 35-40%) >
20 ilmenite > zircon > hematite (a few %) > and apatite (<1%, may be present in trace amounts as
21 indicated by low phosphorous contents in XRF analysis). The presence of monazite is indicated in our
22 study by LREEs plus yttrium. Due to the high amounts of ilmenite and anatase, the placers' titanium
23 contents are high (up to 20.5 wt%). In both placers, the concentrations of the light rare earth elements
24 (LREEs) lanthanum, cerium, praseodymium and neodymium plus yttrium (geochemically affine to
25 HREEs) are noteworthy (between ~3000 and 7000 ppm). The source rocks can be expected in
26 metamorphic and acidic plutonic rocks in the basement of Oman, which may have shed detritus from

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