

Accepted Manuscript

Burial and thermal history reconstruction of the Mukalla-Sayhut Basin in the Gulf of Aden, Yemen: implications for hydrocarbon generation from Paleocene potential source rock



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PII: S1464-343X(18)30103-1
DOI: 10.1016/j.jafrearsci.2018.04.005
Reference: AES 3189
To appear in: *Journal of African Earth Sciences*
Received Date: 13 May 2017
Revised Date: 07 April 2018
Accepted Date: 09 April 2018

Please cite this article as: Mohammed Hail Hakimi, Adel M. Al-Matary, Osman Salad Hersi, Burial and thermal history reconstruction of the Mukalla-Sayhut Basin in the Gulf of Aden, Yemen: implications for hydrocarbon generation from Paleocene potential source rock, *Journal of African Earth Sciences* (2018), doi: 10.1016/j.jafrearsci.2018.04.005

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1 **Burial and thermal history reconstruction of the Mukalla-Sayhut Basin in the Gulf of Aden,**
2 **Yemen: implications for hydrocarbon generation from Paleocene potential source rock**

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11 **Abstract**

12 In this study, four exploratory wells from the Mukalla-Sayhut Basin, Gulf of Aden are
13 used for basin modeling study in order to simulate the petroleum generation and
14 expulsion history of the Umm Er Radhuma Formation.

15 The basin models illustrate that the Gulf of Aden is an extensional rift basin and
16 initially developed during Oligocene as indicated by paleo-heat flow values. The heat
17 flow reached peak heat-flow values of approximately 120-160 mW/m² at Early to
18 Middle Oligocene time. This high paleo-heat flow had a considerable effect on the
19 Paleocene Umm Er Radhuma source rock and cooking of the organic matter.

20 The basin models also indicate that the Umm Er Radhuma Formation source rock had
21 passed the peak-oil generation window during the late Oligocene (Chattian) age.

22 Onset of oil-generation began during late Rupelian age (~29 Ma), whereas the main
23 oil was generated during the Chattian age (27-24 Ma). The models also show that the
24 petroleum was expelled from the Umm Er Radhuma source rock since latest
25 Oligocene (late Chattian, < 24Ma) time, with transformation ratio of more than 50%.

26 These basin models suggest that the Umm Er Radhuma Formation is an effective
27 source rock where significant amount of petroleum is expected to be generated and
28 expelled to any nearby potential reservoir rocks within the Mukalla-Sayhut Basin.

29 **Keywords:** Paleocene source rock; Umm Er Radhuma Formation; Basin model; Heat
30 flow; Petroleum generation; Gulf of Aden; Yemen

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