

HOSTED BY



Contents lists available at ScienceDirect

Egyptian Journal of Petroleum

journal homepage: www.sciencedirect.com

Full Length Article

Organic geochemistry investigations of crude oils from Bayoot oilfield in the Masila Basin, east Yemen and their implication for origin of organic matter and source-related type

Mohammed Hail Hakimi*, Saddam A. Al-Sufi

Geology Department, Faculty of Applied Science, Taiz University, 6803 Taiz, Yemen

ARTICLE INFO

Article history:

Received 14 September 2016

Revised 8 November 2016

Accepted 8 January 2017

Available online xxxx

Keywords:

Crude oil

Basement reservoir rocks

Biomarker

Organic source input

Bayoot oilfield

Masila Basin

ABSTRACT

Thirteen crude oil samples from fractured basement reservoir rocks in the Bayoot oilfield, Masila Basin were studied to describe oil characteristics and to provide information on the source of organic matter input and the genetic link between oils and their potential source rock in the basin. The bulk geochemical results of whole oil and gasoline hydrocarbons indicate that the Bayoot oils are normal crude oil, with high hydrocarbons of more than 60%. The hydrocarbons are dominated by normal, branched and cyclic alkanes a substantial of the light aromatic compounds, suggesting aliphatic oil-prone kerogen. The high abundant of normal, branched and cyclic alkanes also indicate that the Bayoot oils are not biodegradation oils.

The biomarker distributions of isoprenoid, hopane, aromatic and sterane and their cross and triangular plots suggest that the Bayoot oils are grouped into one genetic family and were generated from marine clay-rich source rock that received mixed organic matter and deposited under suboxic conditions. The biomarker distributions of the Bayoot oils are consistent with those of the Late Jurassic Madbi source rock in the basin. Biomarker maturity and oil compositions data also indicate that the Bayoot oils were generated from mature source rock with peak oil-window maturity.

© 2017 Production and hosting by Elsevier B.V. on behalf of Egyptian Petroleum Research Institute. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Masila Basin is one of the main petroleum basins in Yemen, which is located in the east part of Yemen (Fig. 1a). Masila Basin is considered as an oil-rich province in Yemen and contains several, well known oilfields (Fig. 1b). The dataset used herein is from the Bayoot oilfield (Fig. 1b). The Bayoot oilfield is one of the most productive oil fields in the Masila Basin, located in the N/W sector from the Masila Basin (Fig. 1a). The Bayoot oilfield is also boarded with several successful producing oilfields such as Sharyoof, Sunah, Wadi Taribah, Kharir and Tasour oilfields (Fig. 1b). However, several studies have been performed on the potential source rocks in the Masila Basin [1–4]. The main source rock in the Masila Basin is Late Jurassic Madbi Formation, which is mainly composited of black calcareous shales with high TOC more than 8% [1,2]. The Madbi black calcareous shales contain mainly Type I/II kerogens with a minor contribution of kerogen Type II/III [1–3]. The Madbi source rock was deposited in a marine environment under suboxic

conditions [5]. The geochemical investigations have also been performed on the oils accumulated in some oilfields in the Masila Basin i.e., Sunah, Wadi Taribah and Kharir oilfields [6,7].

The current study focuses on the organic geochemical characteristics of the oil samples from Bayoot oilfield in the Masila Basin. The main objectives were to: (1) characterize the oil types and compositions in Bayoot oilfield; (2) provide insight into the source organic matter input, palaeo-depositional conditions, and thermal maturity of the oils and (3) get the genetic link between oils and their potential source rock in the basin.

2. Geological setting

Masila Basin is one of the Mesozoic sedimentary basins of Yemen (Fig. 1a), and located in the eastern of Yemen. The Masila Basin is a rift-basin and was initially formed as a result of the Mesozoic breakup of Gondwanaland and the evolution of the Indian Ocean during the Late Jurassic to Early Cretaceous [8–10]. The Masila Basin also developed during the Oligocene–Middle Miocene time as a result of the opening of the Red Sea and the Gulf of Aden during the Tertiary rifting tectonic event [9]. However, these rifting tectonic events formed several normal faults. The

Peer review under responsibility of Egyptian Petroleum Research Institute.

* Corresponding author.

E-mail address: ibnalhakimi@yahoo.com (M.H. Hakimi).

<http://dx.doi.org/10.1016/j.ejpe.2017.01.001>

1110-0621/© 2017 Production and hosting by Elsevier B.V. on behalf of Egyptian Petroleum Research Institute.

This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Please cite this article in press as: M.H. Hakimi, S.A. Al-Sufi, Organic geochemistry investigations of crude oils from Bayoot oilfield in the Masila Basin, east Yemen and their implication for origin of organic matter and source-related type, Egypt. J. Petrol. (2017), <http://dx.doi.org/10.1016/j.ejpe.2017.01.001>

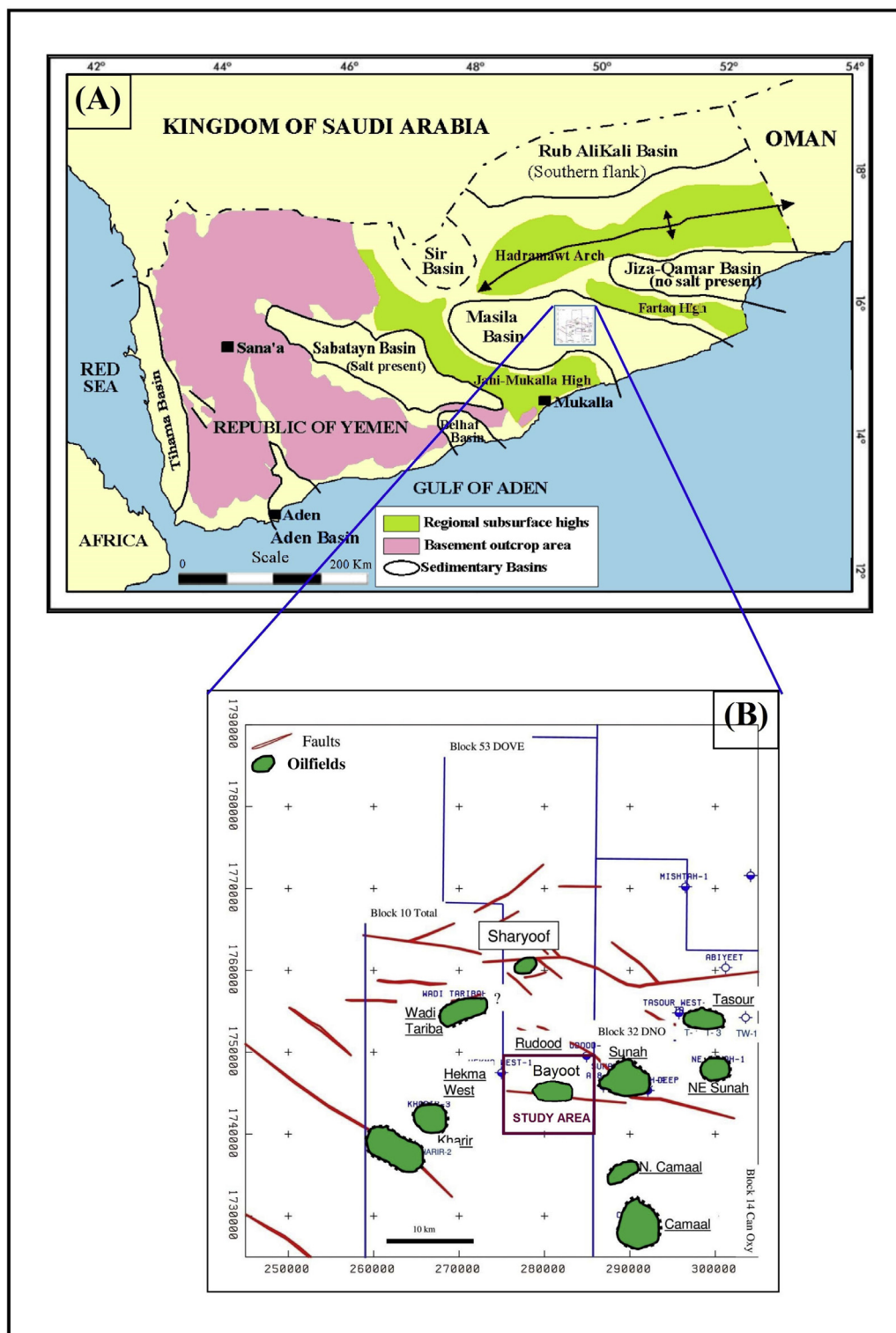


Fig. 1. (a) Main sedimentary basins in Republic of Yemen (modified after Beydoun et al. [8]) and (b) location map of some Masila Basin's Blocks including Bayoot oilfield (Block 53), Hadramawt region of the Republic of Yemen.

main structures in the Masila Basin are characterized by horst, tilted fault blocks (Fig. 2), which are considered as a main structural trap for the hydrocarbon accumulations in Masila oilfields (Fig. 1b).

The stratigraphic section in the Masila Basin is composed of Mesozoic and Cenozoic sedimentary units with dominated by a

thick Mesozoic succession (Fig. 3). However, these sedimentary rocks are mainly marine and subordinate continental sediments, which are composed of clastic, carbonate, shale and anhydrite (Fig. 3). The stratigraphic section of the Masila Basin was subdivided into three major Tectono-stratigraphic phases and ranges from Precambrian to Tertiary (Fig. 3).

Download English Version:

<https://daneshyari.com/en/article/8127706>

Download Persian Version:

<https://daneshyari.com/article/8127706>

[Daneshyari.com](https://daneshyari.com)