



## Neotectonic indications of Al-Shihaby fan on Iraqi-Iranian borders

Hanan Abdulqader Darweesh<sup>\*</sup>, Hawraa Daway Jaddoa, Suad Mohammed Ali

Department of Geology, College of Science, University of Basrah, Basrah, Iraq

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### ABSTRACT

Al-Shihaby alluvial fan is considered a significant and major geomorphologic phenomenon that evolved on the east side of Mesopotamia. It is located in the Wasit Governorate, near the Iraqi-Iranian borders. The fan's dominant trend is southwest-northeast. This study aims to enhance our understanding of the indications and continuity of the fan's neotectonic activity. To reach this aim, we used software such as Arc GIS, Global Mapper, and Surfer, in addition to using data from USGS to identify the stages of the fan. A merging of spectral bands (composite bands), a contour map, and longitudinal and transverse topographic sections were done to analyze and interpret the neotectonics of the study area. This study concluded that the fan has passed through five stages in different periods and that its continuation to the present indicates that the fan is still active. These five stages recognized within the fan belong to the Pliocene- Late Pleistocene age range. Each stage is a breakpoint in sedimentation, and when tectonic activity occurs, the next stage begins. Besides that, the study concludes that the elevation range of the area from the cross sections is from 15 m in the southwest of the area to 120 m in the northeast above sea level from the elevation map derived from the DEM file. Besides that, the increase in sediment thickness on the western side of the fan compared to the eastern side, which belongs to the streams on the west side of the fan, in addition to the deposition of the alluvial fan, was related to the Mandali-Badra-Amara Faults (Zagros Front Fault (ZFF)) and its activity, as well as the relative uplifting of the Hemrin structure versus the subsidence of the Mesopotamia Plain.

### 1. Introduction

Al-Shihaby fan represents an important fan in Wasit Governorate in Iraq, where it is situated in the low folded zone on the eastern portion of the Mesopotamia Plain (Fig. 1) (USGS, 2004), with coordinates of 32°50' to 32°56'N and 46°05' to 46°40'E, close to Iraqi-Iranian borders. The region is bordered on the east by the Iraqi-Iranian borders and on the west by the Tigris River in Sheikh Saad. The fan basin extends inside Iranian territory for more than 43 km. It stems from the western Iranian highlands, specifically from the Koh Kabir Mountain, which is an extension of Hemrin with an area of 455 km<sup>2</sup>, all within the Iranian borders (Al-Akkam, 2008). The study area represents the extreme margin of the low folded zone located between the High Mountain and Mesopotamian Plain provinces of Iraq (Yacoub et al., 2012; Al-Shwaily and Al-Obaidi, 2019).

Different studies have been carried out concerning fans in the region in general and the Shihaby alluvial fan in particular.

A study was made for the microearthquake in Badra, east Iraq, by Al-Shukri (1976), which was conducted during the period from

November 1975 to March 1976.

Buday (1980) clarified that the foothill zone is a division of the unstable shelf (the low folded zone). It includes two longitudinal units: the Makhul-Hemrin in the southwest and the Butmah Chemchemical in the northeast.

Domas (1983) prepared a report for the modern classification of the quaternary deposits and geological mapping of the Karbala- Al-Kut- Ali Al-Gharbi areas.

Yacoub (1983) studied the alluvial fans of the Mandali-Al-Fak'ak area and divided them into five stages.

Azhar (1985) studied the landforms from satellite images and drew a map of the area.

Hasan (1985) prepared a report that involves interpretations of the regional photogeological and geomorphological mapping of the Mandali, Badra, Zurbatiyah, Sheikh Fars, and Al-Tib areas.

Harvey (1990) studied the AL-Shihaby Fan, which involves several factors in its development and growth. Still, several factors stood out clearly and were greatly relied on by the fan that led to its development and reaching its current form, which is as follows:

<sup>\*</sup> Corresponding author.

E-mail addresses: [hanan.darweesh@uobasrah.edu.iq](mailto:hanan.darweesh@uobasrah.edu.iq) (H.A. Darweesh), [hawraa.daway@uobasrah.edu.iq](mailto:hawraa.daway@uobasrah.edu.iq) (H.D. Jaddoa), [Suad.ali@uobasrah.edu.iq](mailto:Suad.ali@uobasrah.edu.iq) (S.M. Ali).