

## **GEOMETRIC AND FRACTURE ANALYSIS FOR THE TRIPLE CONNECTION OF THREE ANTICLINES IN NORTHERN IRAQ**

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### **ABSTRACT**

*The three folds Bekhair, Brifca, and Zawita anticlines are located geographically in Northern Iraq within the boundaries of Dohuk Governorate and tectonically within the unstable shelf and High Folded Zone Thrust Belt. The anticlines are trending NW-SE and plunge toward each other in triangular shape area. The southeastern plunge of Bekhair anticline in map view is unusual wide area represented the base of the triangle. The south corner of this wide area faced to the northwestern plunge of overturned Brifca anticline and the north corner continuous in plunging to be faced to the plunge of Zawita anticline.*

*Four traverses were chosen perpendicular to the fold axes in the area of plunges trending NE-SW. The aims of study concentrate on the geometrical analysis to classify the folds shape in the area of connected plunges, in addition to analyze the fractures (faults, joints, veins) interplay with fold generation to detect the tectonic agents controlling this connection. Exposed rocks of sedimentary sequences in the area range in age from Paleocene to Miocene including the older Kolosh formation, Khurmala, Gercus, Avannah, Pila Spi, Fatha and the younger Injana formation. Collected field data are analyzed by (Stereo 32 Software program) to determine the geometric elements and classify the anticlines in the area of their connected plunges. More than 300 reading of fractures were collected from 11 stations along the traverses and analyzed by (Georient 9.5.0 program) to detect the paleostresses affected the area.*

*This study determines the bifurcation of the general NW-SE trending major axis of Bekhair anticline into two axes in the area of its southeastern plunge. This bifurcation lead to form Northern and Southern Domes with fold axes trending NE and SE respectively separated by small syncline. The research also determines that Zawita anticline composed of two structures (A and B) separated by saddle area. Structure (A) represents the continuous plunge of Northern Dome of the southeastern plunge of Bekhair anticline. Structure (B) is named in this study Benarinke anticline trends NW-SE.*

*Kinematic analysis of fractures reveals that the main compressive and extension stress is oriented in the same direction of the regional compressive and extension phases during the historical geology of the area. The main compressional stress is represented by  $hko < a$ ,  $ac$  fractures, and the main extension stress by  $hko < b$ . High percentage of  $hkl$  indicates local stress associated with more than one phase of deformation.*

**Keywords:** Benarinke, fracture analysis, geometric analysis, plunge, triple connection.