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Original Article

The nature and movement of thrusts in the eastern Iranian orogen: Sechengi Area on the northern border of Lut and Sistan

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Abstract: The eastern Iranian range, known as the Sistan suture zone in the past, has recently been identified as the Sistan orogen. This Paleogene orogeny is located between the Lut and Afghan microcontinents. The structural analysis shows that most of the thrusts dip towards the NW so that the Permo-Triassic sediments and Jurassic micro-diorites of the Lut Block overthrusted over the younger rocks. Structural studies show that the tectonic vergence was from the NW to the SE of the Sechengi area in the NW part of Sistan orogen. We recognized three deformation phases in eastern Iran. The first N-S deformation event (D1) resulted in the formation of tight E-W folds (F1) and associated cleavages (S1). The second E-W deformation event (D2), which occurred in the late Paleogene led to the bending of older structures, including the axial plane of the first-generation folds giving them a new northwest direction (F2). Additionally, the ramp of the first-phase thrusts (striking E-W) was reactivated, acquiring a new NNW orientation and exhibiting SSE tectonic vergence. The third deformation event (D3) resulted in the formation of NNE and WNW conjugate faults in eastern Iran. Such consecutive deformation events perpendicular to each other are inconsistent with the models of simple linear orogen presented for eastern Iran (i.e. rifting of eastern Iran continental crust and subsequence linear collision) and seem more consistent with the buckling orogeny (Orocline).

Keywords: Thrust; Tectonic vergence; Orocline Buckling; Sechengi; Eastern Iranian ranges.

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1 Introduction

Kinematic analysis of structures is important to understand the history of deformation at local and regional scales (Carboni et al. 2020; Panara et al. 2021, Panara et al. 2017; Cruciani et al. 2017).

The orogenic fold-thrust belts are generally formed as a result of contractional tectonics and converging plates create tectonic environments such as collision boundaries, as discussed in the Himalayas (c.f.