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Continental crustal shortening and consumption beneath the Zagros Fold Thrust Belt in north Iraq

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The Zagros Fold Thrust Belt (ZFTB) is widely accepted as an example of continental collision between the overriding Iranian and the Arabian continental plates inducing sequential deformation progressively migrates southwestward toward the Arabian continental margin. In Iraq, the situation is not so simple.
The ZFTB consists of five sub-belts extending in NW direction, in contact and parallel to each other. These are, from hinterland toward the foreland, the first, Miocene belt is consisting of southwestward directed thrusts of Cretaceous metamorphosed volcano-sedimentary oceanic sequence that thrust over Palaeogene andesitic volcanic and volcano-flysch sequences and both thrust over early Miocene detrital materials derived from those sheets. This belt is thrusting, in out of sequence thrust relation, over older deformed Cretaceous radiolarian sequence, the second belt, and over the continental early Tertiary deformed sedimentary sequence, the third belt.
Late Tertiary deformed continental sequence continued in southwestward direction, forming the fourth belt and ended by a Plio-plistocene folded continental sequence, the fifth belt which is characterizing by the formation of narrow long positively inverted anticlines separated by wide un-deformed continuously subsiding synclines.
Keeping in mind that surface shortening should be accompanied by similar shortening in the basement, two problems were identified. First, what was the source of contraction stresses and the basement shortening during the formation of belts two and three? Second, how the tangential stresses transferred through the undeformed subsiding synclines to form that compressional positively inverted anticlines of the fifth belt?
Subsidence and thermal history reconstructions of the continental sequence strongly suggest the formation of middle Jurassic - early Cretaceous sub-crustal dense cold (possibly eclogite) bodies of few kilometers thickness beneath most parts of the passive margin basin. Later the central part of the basin (the area of the fifth belt) was affected by intensive late Campanian Maesitrichtian extension and rifting rejuvenating the former Permo-Triassic grabens. This major extension cell induced an eastward contraction which possibly triggered the consumption of the gravitationally unstable dense eclogite bodies (or the remnants of them), and resulted in local basement shortening and consequent surface deformation, shortening and formation of belts two and three respectively. The westward migration of deformation and formation of foreland basins through the late Cretaceous to early Tertiary suggests a parallel migration of the consumption of the subcrustal eclogite bodies.
Post-Miocene intensive basement subsidence of the central part of the basin in response to shortening and elevation of the whole four belts and formation of up to 2000m thick mollase basin triggered the local gravitational instabilities of the eclogite bodies beneath the old grabens, which resulted in restricted subcrustal consumption of these bodies at these sites. These restricted basement shortenings resulted in consequent restricted surface shortenings reflected as positive inversions of the former grabens, while the former horsts were kept undeformed, and the whole area underwent continuous subsidence.