TECTONO-STRATIGRAPHIC EVOLUTION OF THE NW SEGMENT OF THE ZAGROS FOLD-THRUST BELT, KURDISTAN, NE IRAQ

F. A. Lawa¹, H. Koyi² and A. Ibrahim¹

Abstract
The Kurdistan (NW) segment of the Zagros fold-thrust belt, located in the Kurdistan Region of NE Iraq, forms the external part of the Zagros orogen and is bounded by the Zagros suture to the NE. To the SW is the Arabian Plate into which the deformation front has migrated progressively, beginning in the Late Cretaceous and culminating in the Tertiary. Regional compression resulted in obduction of the Mawat ophiolites and emplacement of the Avroman and Qulqula nappes onto the continental margin, and the formation of the Kurdistan foreland basin. In this paper, structural, stratigraphic and palaeontological data together with new field observations are used to investigate the tectono-stratigraphic evolution of this basin, and to study the propagation of the deformation front from the Zagros Imbricate Zone in the NE towards the Mesopotamian foredeep in the SW. Six unconformities within the Kurdistan foreland basin succession are recognized: Turonian (base-AP9; 92 Ma); Danian (base-AP10; 65 Ma); Paleocene–Eocene (intra-AP10; 55 Ma); late Eocene (top-AP10; 34 Ma); middle-upper Miocene (a local unconformity; intra-AP11; 12 Ma); and Pleistocene. These unconformities can be divided into two groups; obduction-related (Turonian, Danian, and Paleocene-Eocene); and collision-related (late Eocene, middle-upper Miocene, and Pleistocene).

The geographical position of the unconformities is used to determine the rate of propagation of the deformation front, which is estimated at ca. 3 mm/yr. This is in agreement with previous studies which suggested a NW-ward decrease in the propagation rate. The rate was most rapid (2.95 mm/yr) in the Low Zagros Fold-Thrust Zone and slower (2.06 mm/yr) in the High Zagros Fold-Thrust Zone. The more rapid propagation rate in the former area may be attributed to the presence there of the Miocene Lower Fars Formation which acted as a shallow décollement surface.

Within the Zagros fold-thrust belt, the intensity of deformation decreases towards the foreland (SW). Deformation in the High Zagros Fold-Thrust Zone is characterized by thrust imbricates and high amplitude fault-propagation folds at the surface separated by narrow synclines. However, the Low Zagros Fold-Thrust Zone (Simply Folded Belt) is characterised by detachments and low amplitude fault propagation folds separated by broad synclines. In the foredeep area, folds are confined to the subsurface. Deeply buried Jurassic units, together with Upper Cretaceous – Paleocene siliciclastics, and the evaporite-dominated Lower Fars Formation may have acted as décollement surfaces in the NW segment of the Zagros fold-thrust belt, and controlled the structural geometry and evolution of the area.