TECTONIC EVOLUTION OF THE BITLIS SUTURE, SOUTH-EASTERN TURKEY: IMPLICATIONS FOR THE TECTONICS OF THE EASTERN MEDITERRANEAN

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Résumé: On montre qu'un océan du Bitlis doit avoir exité entre l'axe calcaire du Taurus et la plate-forme Arabe depuis au moins le Trias jusqu'au Miocene. La preuve de la formation de cet océan provient des regressions Permo-Triassiques et du development d'une shelf continentale à la fois le long de la côte du Levant et dans le Zagros pendant le Triassique supérieur (?). De plus les corrélations qu'ont ete proposée entre l'axe calcaire et la plate-forme Arabe ne constituent pas une preuve certaine de la contiguité de ces deux zones pendant le Mesozeique et le Cénozoique. La fermeture de l'âge Miocene la long de la région des Plis Bordiers ne peut pas être datée avec certitude mais des géologies de l'Anatolie de l'Est et de la plate-forme Arabe confirment cette interprétation. La fermeture de l'âge Pliocene de l'ocean de Zagros semble avoir exigé la fermeture quasi contemporaine d'un ocean du Bitlis.

Field mapping in the vicinity of Çüngüs area, south of Lake Hazar has shown that there the Bitlis Suture Zone, the highly deformed belt that extends from the Gulf of Iskenderun to Hakkâri, marking the line of apposition between the Arabian Platform and the Anatolide/Tauride Platform, is composed of the following units:

1) The Bitlis-Pötürge imbricated Nappe Complex: This is the tectonically highest unit and it is composed of green schist to amphibolite facies metamorphic rocks. The most common rock types are mica schist, marble, and quartzite, but hornblende schist and amphibolites are also present. These rocks have had a complex deformational history as shown by NS trending similar folds that are subvertical or westwards-verging and probably predate nappe emplacement. Folds possibly associated with nappe emplacement are isoclinal to tight recumbant folds that trend roughly east west and verge southwards. This unit is thrust over ophiolitic mélange and is separated from it by a zone of very fine mylonite that ranges from 20 to 100 cm in thickness.

2) The Maden-Başkale Ophiolitic Mélange Nappe: This ophiolitic mélange is composed of blocks of serpentinites, basalts, spilites, volcaniclastics, micritic limestones, greenstone conglomerates, and black to purple mudstones. This mélange is apparently continuous with the ophiolitic mélange by the Maden area and is Cretaceous through Eocene in age. This mélange occurs as slices in front of and within the crystalline nappe.

3) The Baykan Mélange Nappe: This unit consists of highly disrupted flysch facies sandstones, marls and shales with incorporated blocks of limestone, serpentinite, greenstone conglomerates, and purple mudstones. The sandstone beds are strongly boudined and many are overturned. The conglomerates, mudstones and serpentinite can be matched with those from the overlying ophiolitic melange. The limestones appear to be blocks from the Eocene-Miocene shelf carbonates of the autochthonous platform. No metamorphic blocks were found that can be matched to the metamorphics of the crystalline nappe. The regional foliation trends roughly east-west and dips at low angles to the north. This unit is thrust over the Lice Flysch.

4) Autochthonous to para-autochthonous Lice Flysch: In this area the Lice Flysch is comprised of sandstones, marls, and shales and is lower miocene in age. These sediments are tighly folded and imbricated and indicate a complex, protracted history of deformation. Both thrusts and folds generally verge southwards. From north to south (down section) folds decrease in intensity and become open to gentle in style. The carbonate content increases down the section and the lower portion of this unit consists of coarse sandy limestones and argillaceous limestones. This unit sits with depositional contact on the shelf carbonates of the Midyat Formation.

5) Autochthonous Midyat Limestone: The Midyat formation is a shelf carbonate sequence of the Arabian Platform and consists of massive sandy white limestones, fossiliferous micrites, massive sparites, and chertz micrites. This unit ranges from Lower Eocene to Lower Miocene in age. These carbonates are thrown into open folds and imbricated. Both folds and thrusts verge generally southwards.

All of these units can be traced along strike of the Bitlis Suture Zone and in the Zagros Mountains of Iran, where some of these units are better developed and/or preserved following the Miocene/Quaternary tectonism. Within the Bitlis Suture itself no unequivocal evidence is so far found either to document the timing of formation of the Bitlis Ocean here or that of the terminal suturing of Arabia against an as yet poorly understood Anatolian continental mass.

We here argue that the Bitlis Ocean must have opened sometime between the Permian and medial Triassic based on the following evidence:

a) Along the Levant coast, ocean formation in the present eastern Mediterranean area is indicated by a Jurassic continental shelf/slope/rise development. It is inferred that the same palaeogeography must have existed during late Triassic times.

b) Along the Zagros suture ocean opening took place during the Triassic, perhaps partly synchronous with or just predating the co-cimmerian closure of the "Palaeo-Tethys".

c) Evidence for block faulting on the Arabian Platform, as shown by sedimentation patterns during the Triassic (e.g. the Bozova Fault).

The palaeogeographic relations in the Apulia/North Africa regions seem to preclude the possibility of taking out a continental object from the present eastern Mediterranean in a westerly direction. Anatolia seems to be the only suitable continental piece and it must have moved northwards with respect to Afro-Arabia (present geographic coordinates). We believe that there is no conclusive evidence to indicate that the L'axe calcaire du Taurus represents the direct continuation of the Mesozoic Arabian platform; the suggested correlations to argue in favour of such an interpretation are permissive at best.

The timing of closure along the Bitlis Suture presents another problem, when seen only from the viewpoint of the geology of the suture. However, the geological history of eastern Anatolia and the Arabian Foreland during the Tertiary strongly suggest a medial Miocene closure along the suture which is consistent with the somewhat later collision along the Zagros.

We believe Bitlis Suture to beautifully display all the complexities that are inherent in the interpretation of collision-type mountain belts. The "rooting" problem of its highest, metamorphic allochthous, the pre-terminal suturing episodes of deformation within the sedimentary nappes, and the hinterland/suture and foreland/suture relationships will be presented and some as yet tentative solutions will be suggested.

On a larger scale, the essential differencesbetween the styles of deformation in eastern and central-western Anatolia shows the eastern Mediterranean to have an oceanic character. Whether it is floored by a petrologically oceanic crust or a petrologically continental crust that had been stretched, diked and thinned seems immaterial as far as its tectonic behaviour is concerned. As yet we have no evidence to decide whether the ocean that was consumed along the Bitlis Suture between the Eocene and Miocene times was petrologically oceanic or not.