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Ophiolite suture in Central Anatolia: New insights from the Sivas Basin (Turkey)

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The closure of the Neotethys is classically associated with the obduction of ophiolitic rocks, defining successive suture zones. Theses Alpine-Himalayan ophiolites reflect a complex and still poorly understood paleogeographic framework. In Turkey, various types of ophiolite have been described, involving supra subduction zone and ophiolitic melanges as well. Hence reconstructions of the Anatolian continent assumed the amalgamation of one or more continental fragments during the Mesozoic–Early Cenozoic time.

The Sivas Basin is located in a key position at the junction of three crustal domains: the Pontides to the North, the Anatolide - Tauride platforms to the South, and the Central Anatolian Crystalline Complex to the West. These blocks are separated to the North by the Izmir-Ankara-Erzican suture zone (IAESZ), and by the Inner Tauride suture zone (ITSZ) to the South. Ophiolitic outcrops are common in this area, mainly on the basin borders, and sometimes within the central part. These green rocks have been previously related to the ophiolitic melange from the IAESZ in Northern part and to the ITSZ for the southern parts.

Recent fieldwork on the southern edge of the Sivas Basin allows a proper description of the ophiolitic complex, including from bottom to top: (1) a large volume of intensely serpentinized peridotites, strongly veined with chrysotile, with minor gabbroic intrusions; (2) upward, serpentinized mantle rocks affected by a cataclastic deformation associated with tectonic breccias and ophicalcites ; and eventually, (3) on the top of the mantle, silicates deposits similar to radiolarian cherts cover by sedimentary breccias with mantle clasts.

New geochemical analysis and subsurface data confirm the existence of a southward obducted slice of ophiolite over more than 100km from North to South, forming the basement of the Sivas Basin since the Campanian. This southward obduction related to the IAESZ appears similar to slow spreading ridge or hyper-extended domains derived ophiolites. We interpret the parent body as related to the exhumation of mantle rocks along low angle detachment faults either during the rifting or the oceanic accretion. The peridotites record a high serpentization degree, increasing toward the surface. Outcropping of the mantle rocks at the sea floor is responsible for the reworking of materials as tectonosedimentary breccias (ophicalcites). The emplacement of the gabbro will be constrained by U-Pb zircon geochronology.