

New constraints on the Karlioiva Triple Junction between Arabia, Eurasia and Anatolia

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The right-lateral North Anatolian Fault (NAF), together with the conjugate East Anatolian Fault (EAF), accommodates the westward extrusion of the Anatolian block toward the Aegean Subduction Zone. This process started most probably 12Ma ago during a late phase of collision between Arabia and Eurasia. The Karlioiva triple junction between the NAF and the EAF is a pivotal region making the transition between continental shortening to the east and the extrusion regime to the west. Volcanism younger than 7 Ma covers nearly entirely the region and provides an ideal marker to record deformation. We focus here on the relationship between faulting and volcanism at the Karlioiva Triple Junction to further constrain the evolution of the Anatolian Extrusion.

Along the NAF, we are able to reconstruct a single volcanic edifice from two offset volcanic structures by a left-lateral displacement of 50 km. Both structures have similar 2.5 to 3.5 Ma ages distinct from the surrounding volcanism. In addition the offset volcanic structures have an undistinguishable geochemistry considering major or trace elements, quite distinctive from the surrounding volcanism. In the same area, we use the volcanism along the EAF to further constrain the NAF age to be younger than 4 Ma and its total offset to be about 20 km as already proposed.

Those new constrains confirm that the Anatolian extrusion indeed developed in two phases. The Anatolian extrusion first occurred between the NAF and a proto EAF. A second extrusion phase then started about 2.5 Ma ago, with the activation of the EAF followed by the eastward jump of the TJ to its present location near Karlioiva. The following scenario is fully compatible with the overall evolution of the Karlioiva Triple Junction modeled in a plate-tectonic framework and constrained by fault geometries, total offsets and ages presented here.