

## **How did the North Anatolian and San Andreas Fault Zones Effect Developments of the Western Anatolia Extended Terrane in Turkey and the Southern Basins and Ranges in the USA, Respectively?**

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Both the San Andreas and North Anatolian Faults are in close geographic proximity to two major extended terranes of the world. The San Andreas is located to the west of the southern Basins and Ranges in the USA. The North Anatolian Fault is located to the north of the Western Anatolia Extended Terrane in Turkey. The two fault zones have played major roles in the development of these two extended terranes. In the USA, the northwesterly movement of the Pacific Plate along the San Andreas fault has caused the northwest movement of the Sierra Nevada Block and the development of continental extension associated with the southern Basins and Ranges. In Turkey, westerly lateral extrusion of the Turkish plate along the North Anatolian fault zone has effected continental extension in the Western Anatolia Extended Terrane.

Field data, available radiometric age determinations and seismic reflection profiles suggest that the N-directed Cenozoic extension in western Anatolia is the product of three consecutive extensional stages and is still continuing today. The first stage was initiated in the late Oligocene along a north-dipping extensional simple-shear zone with a listric geometry at depth. The second stage of extension started in early Miocene and produced the Alaşehir Detachment surface as a secondary breakaway. The detachment controlled the Miocene sedimentation in the Alaşehir Graben. The third stage of extension started about 5 Ma ago when the North Anatolian fault was initiated. This extensional phase produced the second-and-third order faults in the Alasehir and Büyük Menderes Grabens. It also caused strike-slip movement along the third order faults and the north-south trending faults of the northern Menderes Massif. The first stage of extension could be attributed to orogenic collapse, the second stage to subduction roll-back, and the third stage to the combined effects of subduction roll-back and lateral extrusion of the Turkish plate.

In the USA, the southern Basins and Ranges extension is accomplished in two continuous stages. The first stage was initiated by the formation of the San Andreas Fault zone in early Miocene which caused the subduction of the Mid-Oceanic Ridge between the Farallon and Pacific plates. During this stage, partial melting of the lower crust produced granitic melts as ductile extension continued. The isostatic rise of metamorphic core complexes started when ductile extension began to subside about 20 Ma ago. Brittle normal faulting in the southern Basins and Ranges initiated at about 16 Ma ago when the North American Plate cooled sufficiently to allow widespread brittle extension.