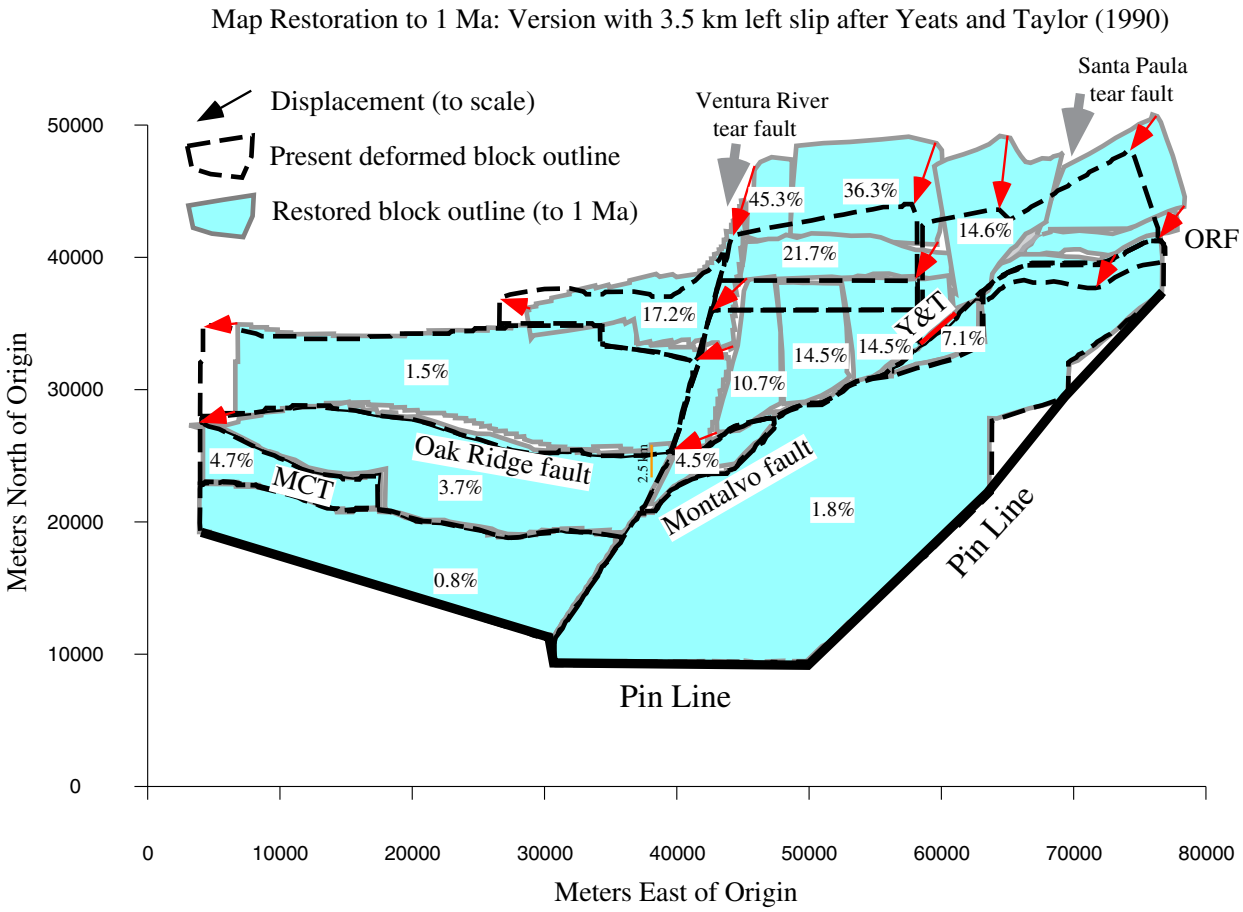

Figure 9: High-displacement restoration of the 1 Ma horizon. The 3.5 km of left slip interpreted by Yeats and Taylor ("Y&T", 1989) is incorporated by addition of the Santa Paula tear fault. Much of this additional horizontal displacement continues as left slip on the offshore Oak Ridge fault.

Shortening and vertical motion across the onshore E-W Oak Ridge fault are related to left-lateral motion on the ENE-WSW coastal section, which is again transformed into shortening and vertical motions on the ESE-WNW segment south of Santa Barbara. A facies change for sediments about 1 Ma, onshore near Santa Paula, was used by Yeats and Taylor (1989) as a geologic line or piercing point for post-1 Ma slip across the Oak Ridge fault; this slip is 3.5 km of left slip and 3.75 km of vertical motion for a total 5.2 km slip. However, it is simply not possible to fit the unfolded blocks with this much left slip, given that the geometry of the deformed layer and of the fault is very well-known. In our low-displacement block fitting, left slip is about 1.5 km in this area (Fig. 8). If this is the correct displacement, the discrepancy would be related to the projection of the piercing point into the air where eroded in the hanging-wall of the Oak Ridge fault. Alternatively, the blocks can be fit with 3.5 km of left slip if left-lateral shear is transferred across the footwall (north) block. The NE-striking segment of the Oak Ridge fault aligns with a NE-striking segment of the Pagenkopp fault of Hopps and others (1995; Nicholson and others, 1997). Therefore, horizontal displacement could be transferred across Ventura Basin from the San Cayetano fault system. Our high displacement restoration includes this option. However, most of this left slip continues along the offshore Oak Ridge fault beyond the west limit of our restored area. NE-striking cross faults are suggested by the sharp bends in both the fault near Santa Paula and offshore, and by a sharp bend in a regional N-dipping fold limb between Oxnard shelf and Santa Cruz Island.