Geophysical Research Abstracts
Vol. 15, EGU2013-4070-3, 2013
EGU General Assembly 2013

Coseismic and postseismic stress in the northern "Eastern California Shear Zone" over the past 150 years.

Alessandro Verdecchia and Sara Carena

Ludwig-Maximilians-University Munich, Department of Earth and Environmental Sciences, Luisenstr. 37, 80333 Munich, Germany (alessandro.verdecchia@iaag.geo.uni-muenchen.de).

Diffuse plate boundary regions are characterized by a high rate of deformation, but distributed over a wider zone when compared to plate boundary faults like the San Andreas and the North Anatolian faults. In diffuse plate boundaries the space–time relationship between activity on specific faults and the location of previous and subsequent events in the region are not clear. The Eastern California Shear Zone (ECSZ) is part of such a diffuse boundary. The purpose of our work is to determine how faults in the northern ECSZ interact in terms of static stress transfer at different spatial and temporal scales. Here we calculate the evolution of Coulomb stress in the northern ECSZ due to coseismic and postseismic redistribution of static stress induced by moderate and large ($M_w \geq 6$) earthquakes, beginning with the 1872 M_w 7.8 Owens Valley event. Our preliminary results show that the 1872 Owens Valley earthquake, the largest event to have occurred in the region over the past 150 years, has a significant influence in terms of coseismic and postseismic stress changes. This event produced significant stress increase in northern Owens Valley, where seven $M_w \geq 6$ earthquakes struck between 1980 and 1986. Stress changes were significantly amplified by postseismic relaxation. The total stress increase may have influenced the renewed activity of the Long Valley Caldera resurgent dome. In turn, magmatic activity in the caldera increased stress in the region of the 1980-1986 earthquake sequences. Several of the 1980-1986 events also appear to be connected to one another in terms of Coulomb stress loading. Finally, we find that significant stress, in the order of 3-4 bars, has by now accumulated on the White Mountains fault and the northern Death Valley fault, where no historical events have been recorded. Both these faults are capable of producing $M_w \geq 7$ earthquakes. We are now working on improving our model in terms of fault geometry and kinematics, and on extending it to the western Basin and Range.