AOGS 2006

Fault-Perpendicular Aftershock Clusters Following the 2003 Mw=5.0 Big Bear, California, Earthquake

WU-CHENG CHI[1], EGILL HAUKSSON[1]

[1] *Institute of Earth Sciences, Academia Sinca, Taiwan*

[2] *Seismo Lab, California Institute of Technology*

We determined differential travel-times and applied the double-difference technique to relocate the 2003 Big Bear, California earthquake sequence. The relocated aftershocks form three spatially distinct clusters in a 4 km $\times$ 4 km $\times$ 3 km volume. The main aftershock cluster coincides with the 3 km long northwest striking sub-vertical mainshock fault. The other two sub-vertical clusters that are located at opposite ends of the mainshock rupture, are almost perpendicular to the mainshock fault trace, contradicting the 60o separation angle of conjugate faults as predicted from classical frictional laws. The style of mainshock and aftershock faulting consists mostly of strike-slip and some dip-slip movement, which was determined from detailed moment tensor inversion of the larger events using complete waveforms and first motion focal mechanisms of the smaller aftershocks. Most of the P-axes trend due north, which is consistent with the regional crustal stress field. We use a conceptual slip model of the Big Bear mainshock to derive Coulomb Failure Stress (CFS). In turn the CFS pattern is used to interpret the perpendicular aftershock clusters. We conclude that the perpendicular aftershock clusters were triggered by the static stress perturbation caused by the mainshock.