

Absolute value of stress prior to the 2000 Tottori earthquake

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The well-determined focal mechanisms of aftershocks of the 2000 Western Tottori earthquake show a bimodal distribution in the direction of P-axes. We interpret these two directions as representing the local stress field before and after the mainshock. At the time of the earthquake, the slip on the fault causes a local change in the stress field, which is reflected in the rotation of the focal mechanism.

Using this change in direction along with the calculated stress change due to slip during the mainshock, we can estimate the absolute value of the local stress field before and after the mainshock. For the direction of the pre-mainshock stress field, we assume east-west compression, which is consistent with the focal mechanisms of the mainshock and moderate earthquakes that occurred during the previous several years. For the direction of the post-earthquake stress field, we use the focal mechanisms of aftershocks that show a rotation of 15 to 20 degrees that is different from the pre-earthquake direction.

Our results show that the level of stress prior to the mainshock was relatively low, on the order of 5 to 20 Mpa at the locations of the aftershocks. The fact that we see any rotation of the stress field, is an indication that the level of stress is rather low. For some of the aftershocks, the level of stress after the earthquake, is higher than the level before the earthquake. This is consistent with the idea that some aftershocks occur in regions where stress is increased due to the fault slip during the mainshock.