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Evidence of conducting fluid was the real cause for the generation of Gujarat earthquake (m_w 7.7) of 2001, India

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The Kutch region has witnessed one large earthquakes in 2001 (M7.7) and three earthquakes of M $\geq$ 6). Such large earthquakes normally occur at plate collision zone because of tremendous compressive stress. The occurrences of such events in continental regions are difficult to explain. The seismicity data reveals that 80% of the earthquakes of Peninsular India of M $\geq$ 6 are confined to trap covered areas. The traps are of volcanic origin and basaltic in nature. They generally lie over a crystalline basement except in certain parts of the region. In the present article the occurrences of earthquakes of M $\geq$ 6 are discussed by petrologic model, which is based on the release of fluid by dehydration process after injection of magma in to the crust through deep-seated rift faults, and shear zones. The energy ratio from Kachch basin to Deccan trap is 20:1 and from trap to rest of the shield 5:1. The maximum magnitude of earthquake in the considered region is 7.7. The detailed geophysical data reveal the presence of conducting fluid in the focal zone. The presence of fluid reflects that the role of fluid cannot be ruled out for generation of medium size to large earthquake of the region. In such regions conducting fluid (petrologic model) can provide better explanation for release of fluid that generates large earthquakes, sprouting of sands, liquefaction, and large number of aftershocks activities and direction of stresses for after shock sequences. The existence of fluid in and below the seismogenic layaer may effect the long-term structural and compositional evolution of the fault zone, change the fault

strength, and after the local stress regime. These influences can be exerted through the physical role of fluid pressure and variety of chemical effects, such as stress corrosion and pressure solution. These influences would have enhances stress concentration in the seismogenic layer leading to mechanical failure of a strong asperity, and thus may have contributed to the nucleation of Gujarat earthquake. The inspection of seismological data shows all the medium size to large earthquake has occurred in shear zone of large gravity gradients or along the four major faults of the region. The number of after shocks and direction of stresses in the focal region of after shocks would depend on the direction of movement of fluid incursion in the focal region after the occurrence of the main events. Bhuj earthquake also show more than 3000 after shocks since Jan 29 to April 15, 2001. The expanding swarm activity in the focal region and the direction of stresses derived from first motion data of after shocks for 2 to 8 km, 8 to 25km, and 25 to 38 km supports the conducting fluid generation mechanism, responsible in triggering of major to great earthquakes.