

## Tomography of the Source Area of the 2001 Bhuj Earthquake: Evidence for fluids at the hypocenter

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The January 26, 2001 Bhuj earthquake (Mw 7.5) is one of the most catastrophic Indian earthquakes, which occurred in the Gujarat (23.4N, 70.3E) province of western India. We have attempted to investigate the 3-D seismic velocity and Poisson's ratio structures of the source area (60X40 sq km) to understand the probable cause of triggering the devastating earthquake at Bhuj. We used 1948 P and 1865 S-waves high quality arrival times from 331 Bhuj aftershocks recorded at a temporary seismic network consisting of 12 seismic stations, which were set up following the Bhuj mainshock. Significant velocity variations up to 5% and Poisson's ratio up to 10% are revealed in the aftershock area. The Bhuj mainshock is located in a distinctive zone which is characterized by high P-wave velocity (high-Vp), low S-wave velocity (low-Vs) and high Poisson's ratio. In contrast, areas with high aftershock activity are mainly associated with low Poisson's ratio. The low-Vs and high-Poisson's ratio anomaly at the Bhuj mainshock hypocenter is visible in the depth range of 22 to 30 km and extends 10 to 15 km laterally. This feature is very similar to that appeared in the 1995 Kobe earthquake area [Zhao et al., 1996]. The anomaly may be due to a fluid-filled, fractured rock matrix, which might have contributed to the initiation of a big and killer earthquake, at Bhuj, western India.