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The Sichuan earthquake, Mw 7.9, struck the Longmen Shan range front, in the western Sichuan province, China, on 12 May 2008. It severely affected an area where little historical seismicity and little or no significant active shortening were reported before the earthquake (e.g. Gu et al., 1989; Chen et al., 1994; Gan et al., 2007). The Longmen Shan thrust system bounds the eastern margin of the Tibetan plateau and is considered as a transpressive zone since Triassic time that was reactivated during the India-Asia collision (e.g., Tapponnier and Molnar, 1977, Chen and Wilson 1996; Arne et al., 1997, Godard et al., 2009). However, contrasting geological evidences of sparse thrusting and marked dextral strike-slip faulting during the Quaternary along with high topography (Burchfiel et al., 1995; Densmore et al., 2007) have led to models of dynamically driven and sustained topography (Royden et al., 1997) limiting the role of earthquakes in relief building and leaving the mechanism of long term strain distribution in this area as an open question. Here we combine C and L band Synthetic Aperture Radar (SAR) offsets data from ascending and descending paths to retrieve the three dimensional surface displacement distribution all along the earthquake ruptures of the Sichuan earthquake. For the first time on this earthquake we present near field 3D co-seismic surface displacement, which is an important datum for constraining modelled fault geometry at depth. Our results complement other Interferometric Synthetic Aperture Radar (InSAR) and field analyses in indicating that crustal shortening is one of the main drivers for topography building in the Longmen Shan (Liu-Zeng, 2009; Shen et al., 2009; Hubbard and Shaw, 2009). Moreover, our results put into evidence a small but significant amount of displacement in the range front that we interpret as due to slip at depth on a blind structure. We verify this hypothesis by inverting the data against a simple elastic dislocation model. We discuss this result and its implications for understanding strain partitioning during the Sichuan earthquake.