We used the data of ~400 GPS sites spanning more than 10 years and ~200 SAR images from 2003 to 2007 to calculate the 3D velocity map of the area including Kashi depression and the border region of Pamir and the south Tianshan, based on cubic spline function and stack InSAR. The horizontal velocity field reveals that the rate decreases from south to north as well as from west to east. The total convergence is not uniformly distributed across the Tianshan Mountains, with 80%~90% of the N-S shortening absorbed along the southern and northern edges, and relatively little deformation accommodated within the interior. There is an obvious boundary feature for the vertical changes in Kashi depression where its north boundary is the south Atushi fault, its south-west boundary is the Wupar fault and its east boundary is the Tarim basin. The vertical changes within the interior of Kashi depression is featured by subsidence at 1mm/a, while the peripheral region is featured by uplift at 1mm/a and decreasing from east to west. The front boundary between the basement of Tarim basin, the south Tianshan and the Pamir Plateau are south Atushi fault and Wupar fault. The vertical change of Keping nappe is characterized by its tectonics structure. The fold belts uplift and the valley area subside at a rate about 1~1.5mm/a. Although the Puchang fault crosscuts the Keping nappe, there are not obvious vertical changes in both sides revealed from profiles across the fault. The lateral changes of the shorten rate of Tianshan across Puchang fault from GPS are evident, indicating that Puchang fault is a quasi transform fault dominated by strike slip.