

A DECADE OF GPS MEASUREMENTS OVER THE TAMDEF NETWORK, SOUTHERN VICTORIA LAND, ANTARCTICA

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A decade of mainly campaign-mode data collection has just been completed for the Transantarctic Deformation Network (TAMDEF) in the Victoria Land region of Antarctica. The original network spans 400km in latitude and 270km in longitude and consists of 24 monuments in bedrock; in 2003-04 we extended the network c. 300 km southward and added 7 new sites. The TAMDEF network runs along the Transantarctic Mountains and spans the offshore Terror Rift, an area in the Antarctic interior with extensive evidence for neotectonic activity. We have established a regional, geologically significant, reference frame consisting of 6 sites located on the geologically stable cratonic margin of the Transantarctic Mountains. The average horizontal motion of these sites is removed from each station in the network; the residual motions of the craton sites are all less than 1mm/yr, indicating their usefulness as reference frame sites. In this framework, there is a remarkably coherent pattern of relative horizontal motion of the remaining network sites toward the northeast; the average motion is 2 ± 0.3 mm/yr at $N52^\circ E \pm 9^\circ$ at 2-sigma level. Examination of the resolved motion with respect to longitude shows that the most eastern sites are moving fastest with respect to the cratonic sites, with maximum relative rates just under 4 mm/yr. The data also indicate that about half of the motion is accommodated over the Transantarctic Mountains Front Zone, the fault zone between the mountain block and the offshore rift basin. The observed motion is perpendicular to the trend of the Terror Rift structures and is compatible with active tectonic extension. Viscoelastic relaxation of the crust in the region in response to the removal of ice load since the Last Glacial Maximum is likely to also be a contributor to the horizontal motions we have measured.