Measurement of crustal deformations due to variations of the mass of ice in Antarctic region is key to understanding the current tectonic environment and the past/present-day ice sheet history of the continent. In view of this importance, to elucidate the characteristic of the interplate/intraplate deformations, strain and rotation rates in the Antarctic continental plate, we have established a GPS network of 19 campaign and 1 permanent mode GPS stations in the Schirmacher Oasis region of the central Dronning Maud Land (cDML), which is a part of Antarctic rift system in 2003. The campaign mode stations were reoccupied during 2004 and 2005 and the data were analysed using the GAMIT/GLOBK software by constraining the available International GNSS Service (IGS) stations in the Antarctic continent and expressed the velocity field in ITRF2005. To obtain better perspective and portraying the localized structural details, the relative velocities in Antarctica reference frame are also estimated. To compute the principal strain rate from the horizontal velocity field, we have made the estimates of the velocity gradient tensor from the Delaunay triangular mesh and computed the principal strain tensor at each grid point, using a common least square procedure. Taking into account the direction of principal strain axes, we derived the corresponding rates of shortening, elongation and rotation rates from the velocity gradient tensor. Initial results of the study suggest that horizontal and vertical motion caused by active rifting and post glacial rebound, which can account for the fraction of motion measured over the region. In order to discriminate horizontal and vertical motions caused by active rifting and post glacial rebound, these results are also discussed in conjunction with the plate motion and post glacial rebound models.