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Contributions by NGRI as part of the densification of GPS sites for ITRF to estimate the variations in the Earth Orientation Parameters due to Sumatra Earthquake

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Being part of IGS network, the IGS Permanent GPS Tracking Station at NGRI, Hyderabad and the permanent GPS Station at Maitri, Antarctica contribute to International Earth Rotation Services (IERS), France to realize the reference frames and also to estimate the Earth Orientation Parameters (EOP) continuously since the primary goal of the densification of IGS network is the realization of the global accessibility to and the improvement of the IERS Terrestrial Frame. The IGS terms of reference recognizes the need to densify the global reference frame and to monitor the deformation of the IGS Polyhedron since this is very important to support geodetic and geophysical research activities and also the densification of GPS solutions rescales the ITRF 2000 Reference Frame by 1+0.6969 ppb and standardize the Reference Frame. By participating continuously in the estimation of Earth Orientation Parameters along with IGS, the effects of the great Sumatra earthquake on the EOP were studied after the occurrence of the earthquake on December 26, 2004. The results of these studies are very revealing as the two parameters, polar motion and the length of day (LOD) of the EOP give a new insight to the effects of this devastating earthquake, though as a thumb rule every major earthquake has some barely noticeable effects on EOP. Since this Sumatra earthquake is of greatest intensity, the changes are detectable however small they may be. The analysis reveals that the earthquake has affected the physical shape of the earth by decreasing the oblateness (flattening on the top and bulging at the equator) by one part in 10 billion thereby decreasing the length of day by 2.68 microseconds. Another significant estimation is that the " mean North Pole" has shifted by about 2.5 cm in the direction of 145º E Longitude. This shift towards East is in conformity with the long-term seismic trend identified in earlier studies as quoted by Chao et al. The total influences of these changes in EOP could be on the global climate changes, sea surface temperature, and the sea wave currents.