Geophysical Research Abstracts, Vol. 8, 01832, 2006
SRef-ID: 1607-7962/gra/EGU06-A-01832

GPS time series analysis to detect permanent deformations triggered by the Sumatra earthquake

E. Casarotti (1), R. Devoti (1), D. Melini (1), A. Piersanti (1), **G. Pietrantonio** (1), F. Riguzzi (1)

(1) Istituto Nazionale di Geofisica e Vulcanologia, via di Vigna Murata 605, Roma (Italy)

The giant Sumatra-Andaman earthquake of December 26 2004 caused permanent deformations effects in a region of previously never observed extension. In order to evaluate the coseismic displacement field associated with this great earthquake, we analyzed the weekly coordinates of 42 permanent GPS sites of the IGS worldwide network, located in a vast region of approximately 5000 km radius, centered on the earthquake epicenter. We took into account not only a small time window centered in the earthquake occurrence time but, in order to accommodate statistically significant sudden changes in the GPS time series, we considered long datasets, covering more than 8 years of continuous GPS observations, including all weekly determinations from January 1997 to March 2005. Our analysis is based on the definition of a reliable datum to project the weekly loose solutions and on the removal of biases to obtain improved time series. After the reference frame definition, the weekly time series have been detrended and simultaneously the seasonal and Chandler cycles have been filtered out. Since instrumental and/or environmental changes could cause significant steps in the GPS time series, we decided to estimate an offset each time a known change has been reported in the site-log and the offset itself exceeds the 1-sigma confidence region. Moreover we evaluated that the effect of colored noise on the coseismic displacement error is to enhance the standard deviation by a scale factor ranging from 1.5 to 6, depending on the specific site. In the end we compared the GPS-derived coseismic displacements with those predicted by a direct seismic source model obtained with seismological data and with those derived inverting the coseismic field.