Geophysical Research Abstracts
Vol. 13, EGU2011-3695-2, 2011
EGU General Assembly 2011

A new velocity field for Africa from combined GPS and DORIS solutions: Contribution to AFREF

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We combined up to 15 years of GPS data from two independent solutions with a global DORIS solution to derive a new position/velocity solution for Africa as a contribution to the upcoming Africa Reference Frame (AFREF). We examine the noise characteristics in both GPS and DORIS time series and determine realistic velocity uncertainties. The resulting velocity field describes horizontal plate motion at 106 GPS sites and 9 DORIS sites operating in Africa. We compare our solution with independent ones to estimate position/velocity accuracy. We use our combined velocity field to derive an updated Nubia-ITRF2008 angular velocity, since the reference frame for Africa is likely to be fixed to the Nubian plate in order to minimize coordinate time dependencies, as the primary purpose of AFREF is geo-referencing for practical surveying applications. We also use the velocity field to quantify the level of rigidity of the Nubian plate and updated the angular velocity estimate for the Somalian plate and smaller sub-plates Victoria and Rovuma. The spatial density of the current available GPS and DORIS networks is not sufficient yet to estimate robust angular velocities for a remaining smaller sub-plate (Lwandle) without using additional external geophysical data.