

Present-Day Strain Field of Africa Derived from the GNSS Velocity Field

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SUMMARY

We compute the present-day strain field of Africa derived from the current GNSS velocity field of Africa. This work is being carried out in the framework of the IGCP Project 601 – “Seismotectonics and Seismic Hazards in Africa” and intends to contribute for the preparation of thematic maps of natural hazards of Africa. We update the previous computed velocity field by enlarging the number of stations and the time-span of the existing ones. The spatial distribution of the existing network of permanent GNSS stations is still far from optimal in particular when we consider the stations with enough long data span and monument/equipment stability (no significant number of epochs with offsets) to produce reliable velocity solutions (we use here a threshold value of 2.5 years data span to compute the station velocity). Nevertheless, the existing number of sites (~100) already permits to compute a velocity field that can be used to infer the current strain field for Africa in particular on Southern Africa and along the East African Rift. This provides us an indicative picture of the main seismotectonic hazards areas of Africa. We also discuss how to compute reliable uncertainties associated with the time velocity field in order to determine the regions where the estimated strain is significant. This strain field, derived solely from space-geodetic data is correlated with the seismicity map of Africa in order to identify the regions prone to seismic hazard and risk and also to detect areas where aseismic processes can be the main cause to accommodate the observed deformation in Africa. Finally, the computation of the time-series is also important to identify the stations that can be used as reference stations to connect the different African national reference systems to the latest realization of the International System: ITRF2008. We are providing a common solution that can be used by the African Mapping Agencies to perform such task.