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# Sensitivity analysis of the GNSS derived Victoria plate motion

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Fernandes et al. (2013) estimated the angular velocity of the Victoria tectonic block from geodetic data (GNSS derived velocities) only.. GNSS observations are sparse in this region and it is therefore of the utmost importance to use the available data (5 sites) in the most optimal way. Unfortunately, the existing time-series were/are affected by missing data and offsets. In addition, some time-series were close to the considered minimal threshold value to compute one reliable velocity solution: 2.5-3.0 years.
In this research, we focus on the sensitivity of the derived angular velocity to changes in the data (longer data-span for some stations) by extending the used data-span: Fernandes et al. (2013) used data until September 2011. We also investigate the effect of adding other stations to the solution, which is now possible since more stations became available in the region.
In addition, we study if the conventional power-law plus white noise model is indeed the best stochastic model. In this respect, we apply different noise models using HECTOR (Bos et al. (2013), which can use different noise models and estimate offsets and seasonal signals simultaneously. The seasonal signal estimation is also other important parameter, since the time-series are rather short or have large data spans at some stations, which implies that the seasonal signals still can have some effect on the estimated trends as shown by Blewitt and Lavellee (2002) and Bos et al. (2010). We also quantify the magnitude of such differences in the estimation of the secular velocity and their effect in the derived angular velocity.
Concerning the offsets, we investigate how they can, detected and undetected, influence the estimated plate motion. The time of offsets has been determined by visual inspection of the time-series. The influence of undetected offsets has been done by adding small synthetic random walk signals that are too small to be detected visually but might have an effect on the estimated trend (Williams 2003, Langbein 2012).
Finally, our preferable angular velocity estimation is used to evaluate the consequences on the kinematics of the Victoria block, namely the magnitude and azimuth of the relative motions with respect to the Nubia and Somalia plates and their tectonic implications.

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