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How rigid is a rigid plate? Geodetic constraint from the Kalahari craton, South Africa.

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The motion and the rigidity of the Nubia plate provide critical constraint to the geodynamic of the surrounding plates. Unfortunately, the sparse distribution of geodetic continuous station across the plate does not allow to solve with high precision Eulerian pole and to test statistically for the rigidity. The presence of 3 separates cratons, rift valleys, and old deformation belts along the cratons" sutures, indicate that in geological time the plates have not been completely rigid. The amount of current deformation is very difficult to derive and from the gps observations has been constraint to be smaller than few mm/yr. Here, we present the velocity field for 42 stations of the continuous GPS network TRIGNET, a network covering the entire nation of South Africa with an average distance of 200 km. We present the velocity field for the period 2004-2007 and the relative eulerian pole assuming rigid motion of the network. The distribution of these stations on the stable part of the Kalahari craton, allows computing a pole of rotation that can be compared with the rest of the stations within the Nubian plate. Preliminary results show that the entire network behaves as a rigid block with negligible average residual. Exceptions to this rigid motion are some of the costal stations and in the surrounding of Johannesburg. The analysis of the IGS stations on the rest of the plate using the eulerian pole from the TRIGNET network shows that the average residual are well within the errors indicating that the Nubia plate behave as a rigid block within our resolution and that the pole of rotation for the Kalahari craton can be used as eulerian pole for the entire Nubia plate. On the other hand, the non-random distribution of the azimuth of the residual does not exclude a possible CCW rotation of the craton with respect to the Nubia plate that at the stage cannot be

distinguished from the noise.