Arabian Plate Motion Using KACST's GNSS Network; A first results

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King Abdulaziz City for Science and Technology (KACST) has established, in 2016, a recent network of Continuous Operating Receivers (CORS) distributed all over Saudi Arabia, except the southern Empty Quarter. This network was designed to serve many scientific applications; Geodetic Reference Frame, plate motion, ionospheric studies, deformations, etc... It consists of 16 CORS stations connected to a common data center in Riyadh, via dedicated Access Point Name APN. In this paper we show the first KACST results of the Arabian plate motion estimated from this CORS network. Global Navigation Satellite Observations (GNSS) data from 12 stations spanning about three years (from 2016 to 2018) has been collected and processed with Bernese Software V5.2 using The Center for Orbit Determination in Europe (CODE) products. Data from 24 IGS stations has also been included in the processing for frame definition. The data processing was done in the form of daily sessions and free normal equation systems were generated for all days. Daily datum-free normal equation systems were transformed to the geodetic datum determined by IGS stations in ITRF2014 reference frame and the coordinate time series (north, east and up) for the stations were obtained. The coordinate time series of each point were analyzed separately and the effects on coordinate changes with time were modeled. The functional model includes outliers detection, discontinuities, one or more linear velocities, and a set of periodic components. Proper modelling of these effects is of great importance for the reliability of the estimated velocity components. Hence, all parameters of the model (discontinuities, velocity changes, periodic functions and outliers) are statistically tested for their significance. The initial results of the network show that stations velocities are changing between 26-30 mm/year for the north component and 26-35 mm/year for the east components. Finally, the estimated station velocities and Arabian plate motion is compared with the previous studies.