A Comparative Analysis of ITRF2014 and ITRF2020 for Enhanced Geodetic Infrastructure: A Case Study of the Sacredion Online GNSS Positioning Service (SOGPOS) CORS Network in Nigeria

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SUMMARY

The International Terrestrial Reference Frame (ITRF) is the fundamental foundation for all precise geospatial activities, and its updates reflect improvements in modeling geophysical phenomena and incorporating new global data. The recent release of ITRF2020 offers an opportunity to assess its impact on national and regional geodetic infrastructure, particularly in Africa where such studies are limited. This study presents a rigorous comparative analysis of the coordinates of the Sacredion Online GNSS Positioning Service (SOGPOS) Continuously Operating Reference Station (CORS) network computed in both the ITRF2014 and the latest ITRF2020. Building on our previous work that established the SOGPOS network in ITRF2014, we reprocessed data from all ten CORS stations using the AUSPOS online service to derive precise coordinates in ITRF2020.

The comparison focuses on quantifying the coordinate differences (dX, dY, dZ) and their resultant horizontal and vertical shifts. We analyze the implications of these datum changes on real-time kinematic (RTK) and post-processed positioning services within Nigeria. Preliminary expectations indicate sub-centimeter to centimeter-level differences, which are critical for high-precision applications like deformation monitoring, crustal motion studies, and the maintenance of a consistent national geodetic framework. The results of this study will provide valuable insights for the Nigerian geospatial community on the necessity and methodology for transitioning from ITRF2014 to ITRF2020. This work is essential for ensuring the long-term accuracy, reliability, and interoperability of Nigeria's geodetic infrastructure, thereby supporting sustainable development goals in urban planning, disaster management, and resource mapping.
