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Implementation and design of a web-based GNSS data management system at Hartebeesthoek Radio Astronomy Observatory (HartRAO)

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The Space Geodesy Programme of the Hartebeesthoek Radio Astronomy Observatory (HartRAO) is actively engaged in improving the African Earth and ocean monitoring network by installing stations across the Sub-Saharan regions. This forms part of the drive to monitor different geophysical parameters via denser networks and with increasing accuracies, as to better our understanding of the Earth system. The instruments being deployed include Global Navigation Satellite Systems (GNSS) reference stations, tide-gauges, seismic stations and meteorological units.

The Space Geodesy Programme has four main space geodetic techniques collocated at HartRAO, making it a true fiducial site. These techniques are Global Navigation Satellite Systems (GNSS), Satellite Laser Ranging (SLR), geodetic Very Long Baseline Interferometry (VLBI) and Doppler Orbitography and Radiopositioning Integrated by Satellite (DORIS). This fiducial site acts as a reference for the data received from the network of instruments located elsewhere.

It is important to avail all the collected raw scientific data as well as the derived data products, in a user friendly manner, to both the scientific community and general public for research and educational purposes. As part of ensuring data integrity a new data management system needs to be implemented at HartRAO. This project focuses on implementing the GNSS sub-section of this data management system. Data are required to be quality checked for errors, reworked into a specific format, and made available in near real-time. We present a model for the GNSS data management system, where all the archiving, station monitoring, pre-processing and processing of the raw data are automated. Furthermore, an automated system to produce GNSS data products such as Precipitable Water Vapour (PWV), positional time-series plots and quality check outputs are presented. These data products are then visualized utilising an interactive web-based map.

Keywords: GNSS, VLBI, DORIS, SLR, PWV, data management

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