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Characteristics and results of two years of a VLBI southern hemisphere intensive observing program

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The parameter dUT1 (UT1-UTC, difference of universal time to atomic time) is essential for the transformation between celestial and terrestrial reference systems, inherent in precise navigation and positioning applications. Geodetic Very Long Baseline Interferometry (VLBI) is the only technique to directly observe dUT1. Real-time or near-real-time navigation tasks are dependent on rapid access to Earth orientation estimates or predictions. On a rapid turnaround basis, dUT1 is provided via so-called intensive sessions, which are routinely observed daily for one hour on one or sometimes more baselines. All currently operational intensive sessions are observed using northern hemisphere stations only.

In a joint initiative of TU Wien, the University of Tasmania, the Hartebeesthoek Radio Astronomy Observatory, and later on also ETH Zurich, we set up the southern hemisphere intensive observing program (SI). The SI sessions are observed with three VLBI telescopes all located south of the equator: HART15M (South Africa), HOBART12 (Tasmania), and YARRA12M (Western Australia). Observations including HOBART12 are observed in mixed-mode configuration, using the VGOS receiver in Hobart and the legacy systems at the two other stations.

By January 2022, we have successfully observed, correlated, and analyzed more than 50 SI sessions from the years 2020 and 2021. The resulting dUT1 values from the southern intensives are compared with dUT1 from the EOP 14 C04 series and with the results of other "northern intensives". The residuals with respect to C04 of the SI are on the same level as those of the INT1 and INT3 sessions and also match the level of agreement between all the various southern and northern intensives series.