

Balancing Best Practices with Innovation: Developing a sustainable program for Local Tie Surveys at Australian Geodetic Observatories

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SUMMARY

The accuracy and reliability of multi-technique reference frames, such as the International Terrestrial Reference Frame (ITRF), depend on the precise measurement of local-tie vectors at observatories with co-located space geodetic observing systems. Australia has several observatories which host a number of space geodetic observation techniques, including Global Navigation Satellite Systems (GNSS), Very Long Baseline Interferometry (VLBI), Satellite Laser Ranging (SLR) and Doppler Orbitography and Radiopositioning Integrated by Satellite (DORIS) beacons. □□Local Tie Surveys determine a vector between the reference point of each technique at the site, and these tie vectors serve as a critical component in combining geodetic solutions and detecting technique or site-specific biases in the global reference frame determination. Additionally, local tie surveys provide essential data for monitoring infrastructure stability and deformation over time, which is vital for ensuring the long-term consistency of geodetic reference frames. □□Geoscience Australia has recently completed a new round of local tie surveys at four major Australian observatories: Yarragadee, Mt Stromlo, Hobart, and Katherine. The program has been able to re-evaluate the established process and document the nuances of completing the survey at each geodetic observatory, offering a chance for improvement and innovation in how the project will be sustainable to continue, and meet evolving requirements of the ITRF. □□The latest survey campaign has successfully balanced theoretical best practices with practical considerations of a modern workforce, including work-place safety, improved documentation, and efficient use of available resources and has provided an updated local tie solution time series for the colocation sites on the Australian continent. □□Further to re-establishing a practical program, the recent campaign explored innovative and simplified observation techniques to validate the primary local tie solutions. This effort offers potential for collaboration with external partners, enabling the development of more efficient and cost-effective methods for future local tie surveys. The updated methodology aims to ensure the robustness, resilience, and safety of future surveys, supporting the ongoing integrity of multi-technique reference frames in the years to come.

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