Australian Government

Geoscience Australia

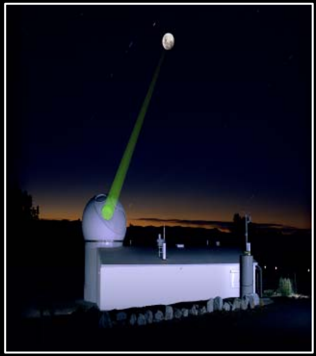
Challenges for Reference Frame Refinement: An Australian Perspective

G. Johnston, J. Dawson, M. Moore,
R. Ruddick

Australia's role in the definition of the International Terrestrial Reference Frame – contributing to GGOS

VLBI

SLR

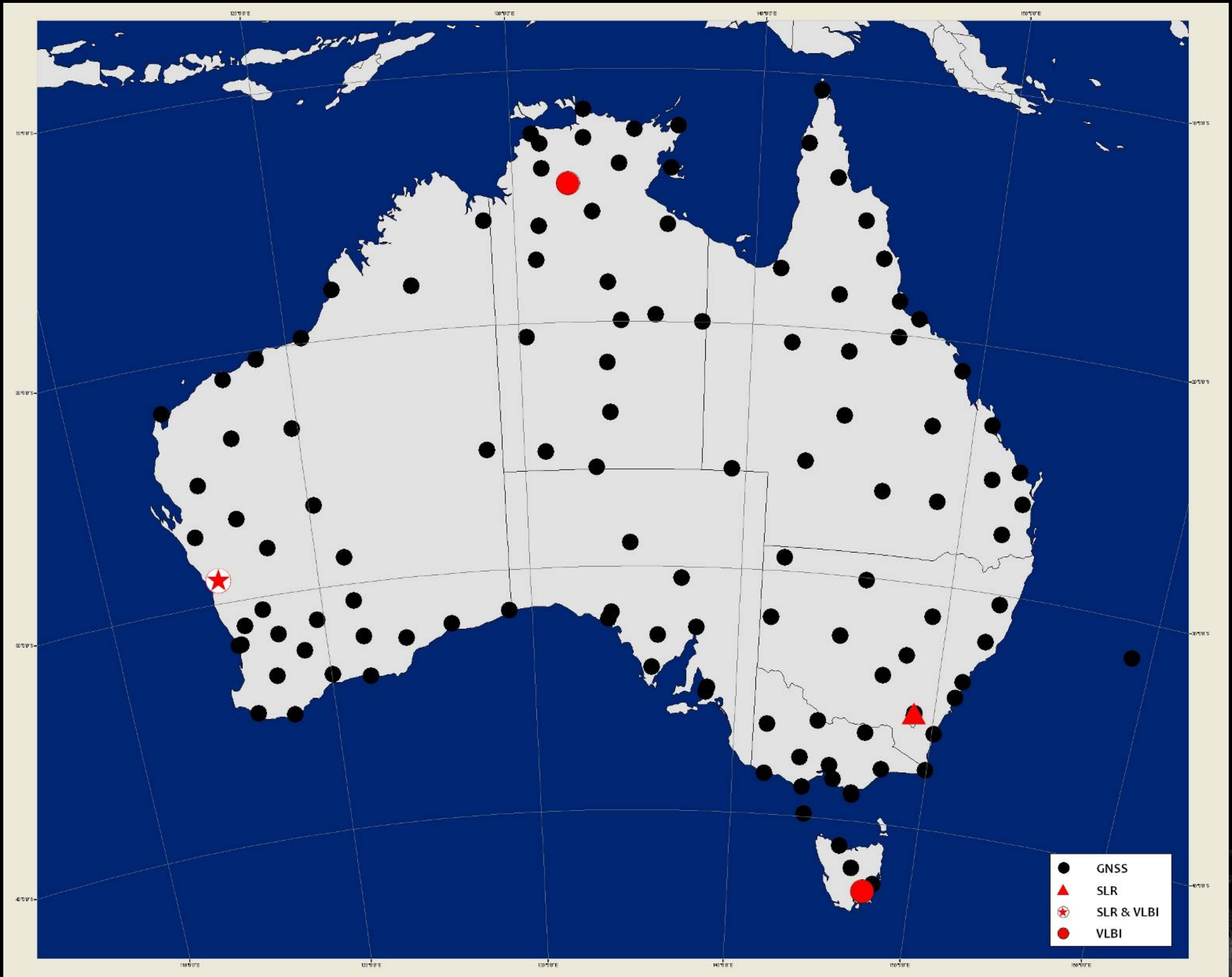


GNSS

DORIS

Inter-technique Local Tie Surveys

AuScope GNSS Network with VLBI and SLR sites



Hobart Local ties

Comparison between the 2002, 2004 and 2009 Mount Pleasant surveys transformed onto the 2002 survey.

YEAR	HOB2 TO …	Δ EAST	Δ NORTH	Δ UP	RANGE
2002	7242	146.0010	125.6052	24.0358	194.0894
2004	7242	146.0012	125.6064	24.0337	194.0900
2009	7242	146.0004	125.6057	24.0368	194.0894
Std Dev		0.0004	0.0006	0.0016	0.0004
2002	UF003	145.9937	175.6753	9.9368	228.6366
2004	UF003	145.9945	175.6762	9.9369	228.6378
2009	UF003	145.9939	175.6754	9.9368	228.6368
Std Dev		0.0004	0.0005	0.0001	0.0006
2002	UF005	79.4199	125.6054	11.1496	149.0253
2004	UF005	79.4200	124.6073	11.1499	149.0270
2009	UF005	79.4201	125.6066	11.1497	149.0265
Std Dev		0.0001	0.0010	0.0002	0.0009
ITRF residuals	Hob2 – 7242	0.0047	-0.0033	-0.0020	0.0014

Yarragadee Local ties

Comparison between the 2003, 2007 and 2010 Yarragadee survey.

YEAR	DON95 TO ...	Δ EAST	Δ NORTH	Δ UP	RANGE
2003	YAR2	22.1591	-6.7103	-0.0436	23.1529
2007	YAR2	22.1594	-6.7106	-0.0450	23.1533
2010	YAR2	22.1577	-6.7107	-0.0446	23.1517
Std Dev		0.0009	0.0002	0.0007	0.0008
2003	YARR	21.8718	-10.5844	0.0331	24.2983
2007	YARR	21.8709	-10.5832	0.0329	24.2969
2010	YARR	21.8704	-10.5839	0.0340	24.2968
Std Dev		0.0007	0.0006	0.0006	0.0008
2003	SLR IVP	0.0184	-0.0083	3.1821	3.1822
2007	SLR IVP	0.0190	-0.0062	3.1823	3.1824
2010	SLR IVP	0.0160	-0.0070	3.1815	3.1815
Std Dev		0.0016	0.0011	0.0004	0.0004
ITRF residual	**Yar1 - IVP**	**0.0033**	**-0.0019**	**0.0144**	**0.0037**
	Yar1 - Yarr	**-0.0005**	**0.0003**	**-0.0068**	**0.0004**

Note the 2010 survey was done using indirect observation methods to the GPS antennas (YAR2 and YARR).

Possible Errors

- Radome over YAR2 (say 5mm error) makes YAR2 and YARR agree
- Both GPS sites agree within 2mm vertically once radome is removed
- Total error is 20mm in Height, but small horizontally
- Appears to be an SLR systematic
- We now have VLBI as well so this might resolve the source of the error. Time will tell !