

LPOD2005: A Practical Realization of ITRF2005 for SLR-based POD

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New Reference Frame: ITRF2005

LAGEOS-1/2 SLR residual RMS for 1992-2005 using 60-day arcs*, GGM02C, Mendes/Pavlis refraction model, 17-station 'core' network

	ITRF2000	ITF2005	ITRF2005 (scaled)
SLR RMS (mm)	13.3 / 12.5	12.6 / 12.3	12.0 / 11.4
Variance Decrease (mm ²)	-	18 / 5	33 / 26
SLR Mean (mm)	1	3	<1
YARAG Mean (mm)	3	6	<1

* 60-day arcs used for geocenter estimation

Performance for Jason-1

Average over Cycles 1-90, EIGEN-GL04C gravity model

	ITRF2000	ITF2005	ITRF2005 (scaled -1.2 ppb,
SLR RMS (mm)	15.5	15.7	15.4
SLR mean (mm)	<1	3.5	<1
DORIS RMS (mm/s)	0.354	0.352	0.351
DORIS mean station height error (mm)	4	3	2
Alt. crossover Mean/RMS (mm)	-1.4 / 59.0	-1.4 / 59.0	-1.4 / 59.0

However, looking at data in 2008, degraded performance observed in 2008 for important sites such as Zimmerwald, Ajaccio, RGO, Arequipa

Rationale for LPOD2005

- Need reference set of laser ranging station coordinates for POD for T/P and Jason-1 reprocessing, as well as for Jason-2
 - Must be good enough for high-precision orbit determination
 - Identify major bias problems and data that should not be used
 - Example: RGO (12 mm bias starting 2/10/07)
 - Example; Arequipa (do not use data between 6/23/01-3/24/02)
- Like DPOD2005 for DORIS, LPOD2005 based on ITRF2005
 - Propose to use SLRF2005 (ITRF2005+ITRF2000+new stations)
 - Propose alternative coordinates where tests reveal problems
 - Example: use Arequipa velocity from GPS for DORIS and SLR
- Not intended to be open-ended cutting-edge SLR analysis; only 'good enough' for robust SLR-based POD
- Current (V11 and all past) versions of LPOD2005 available at <ftp://ftp.csr.utexas.edu/pub/jason/models/coords>

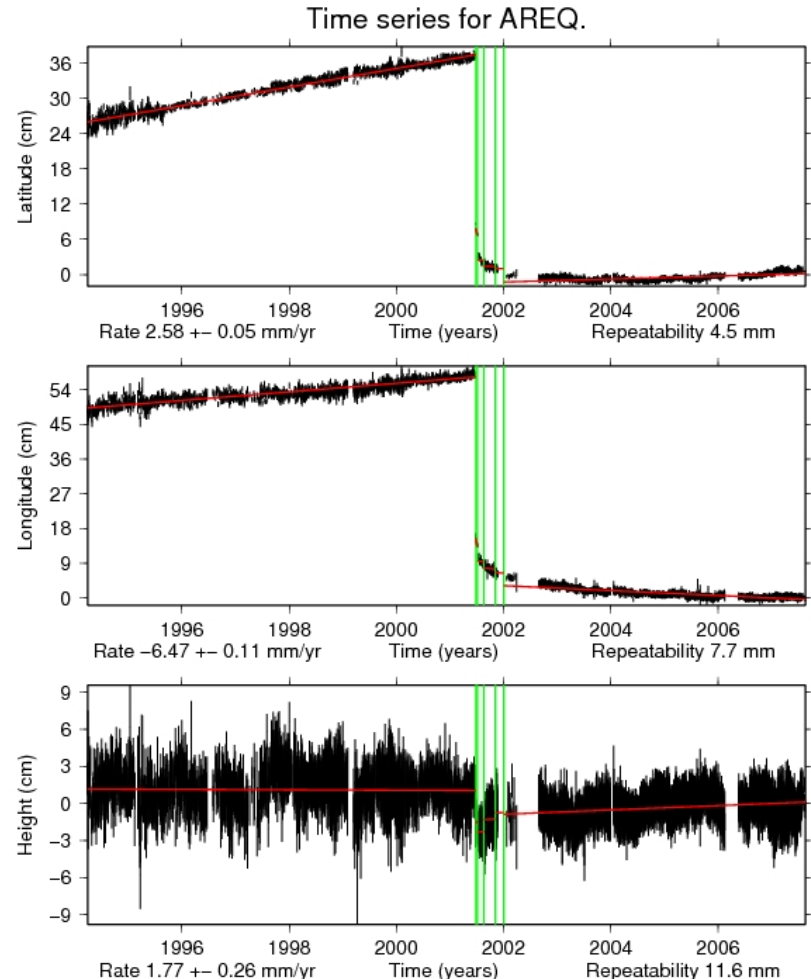
Example: Arequipa (7403)

- Use GPS velocity after earthquake and post-seismic deformation
- Appears to stabilize to near-linear motion around March 2002
 - Data between July 21, 2001 and ~March 24, 2002 should not be used (or downweight...a lot)
- Following DPOD2005, use two linear velocity segments to represent motion after March 24, 2002

See <http://www.ipgp.jussieu.fr/~willis/DPOD2005.htm>

- Estimate separate SLR positions consistent with velocity

<http://sideshow.jpl.nasa.gov/mbh/all/AREQ.html>

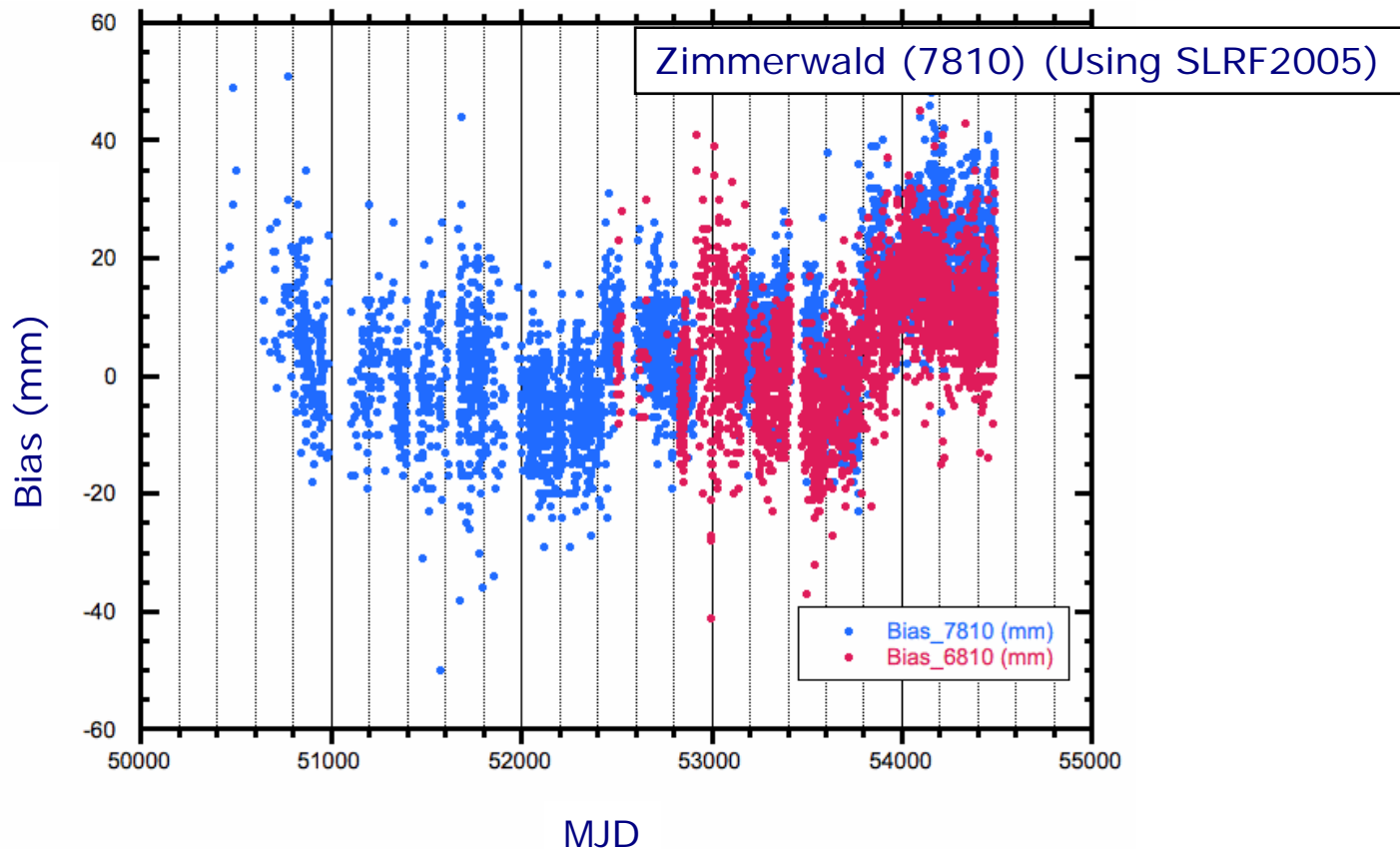


Other Examples

- Riyadh (7832)
 - Vertical velocity seems too large in ITRF2005/SLRF2005 (bias issues?)
 - Shows up more clearly when extrapolated to recent epochs
 - Used previous velocity (ASI) and re-estimated position
- San Juan (7406)
 - Updated velocity from ASI based on more data; re-adjusted position
 - Data editing: exclude all data prior to May 5, 2006
- Ajaccio (7848)
 - Poor fits with ITRF2005 (5.5 cm vs 1.5 from previous coordinates)
 - Velocity taken from previous ASI estimate; position re-estimated (< 1 cm)
 - Used over 500 passes of Starlette data (little LAGEOS data to work with)
- Burnie (7370)
 - New station; preliminary position from Starlette (over 200 passes)
 - Plate model velocity may not be accurate but should hold up till next TRF
 - 1.5 cm performance on LAGEOS-1 for few passes available

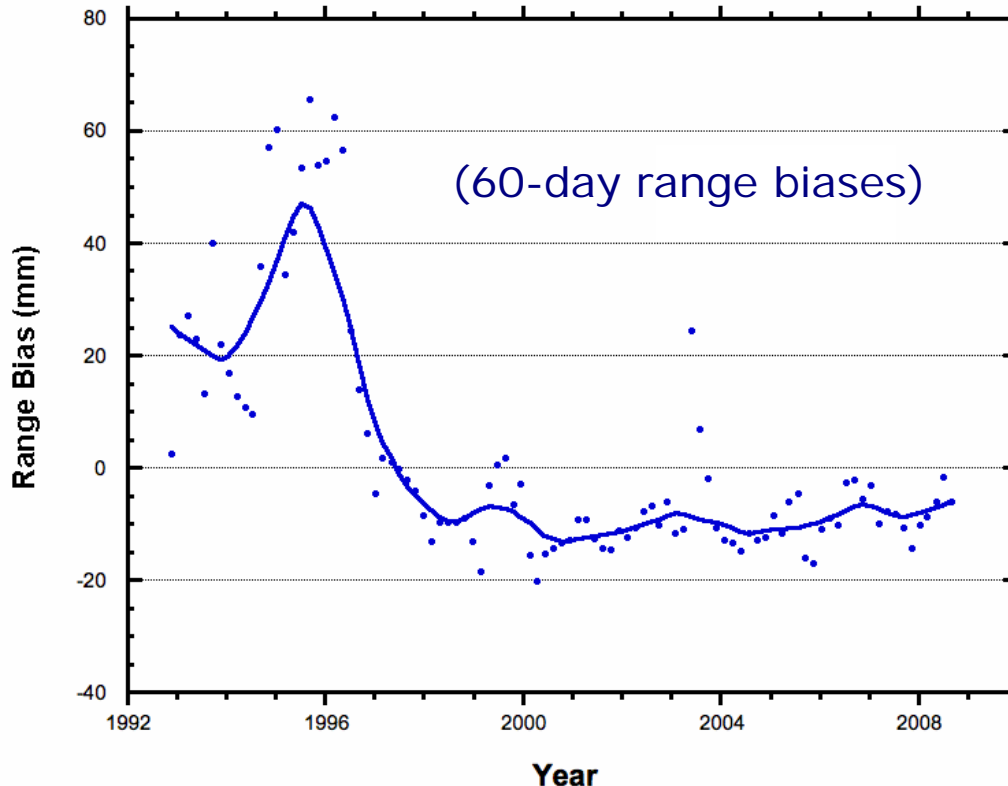
Bias Issues Affecting Coordinates

- Zimmerwald (7810)
 - Bias history affected ITRF2005 position estimate
 - Adopted ILRS AWG bias model and readjusted position; results good



Bias Issues (cont.)

- Wettzel (8834) new in Version 11
 - Bias problems throughout data span affected velocity estimate
 - Adopted approximate bias model and VLBI velocity; readjusted position (9-10 mm performance in 2008 for LAGEOS-1/2)
 - However, recommend routinely estimating bias (arc-by-arc) for all data (biases for L1/L2 differ from Starlette/Stella by 7-10 mm)



Summary

- LPOD2005 attempts to modify SLRF2005 minimally but still provide good SLR-based POD performance
- Bias issues are an ongoing concern; not a static problem
- Feedback encouraged

<ftp://ftp.csr.utexas.edu/pub/jason/models/coords>