

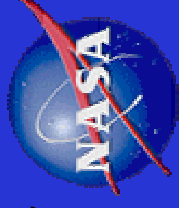
Session 14

New Approaches

Erricos Pavlis, Mark Torrence



*Goddard
Space
Flight
Center*



QL (Preliminary) System Positioning

The FTLLRS @ Chania case

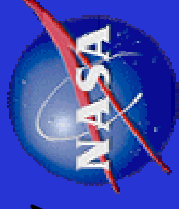
Erricos C. Pavlis
JCET/UMBC - NASA/Goddard/926

2003 ILRS Workshop
October 28 - 31, 2003, Kötzing, Germany



A need for quick positioning

Godard
Space
Flight
Center



- **When an earthquake occurs in the region (e.g. Arequipa)**
- **When mobile systems relocate at a new site (e.g. FTLLRS @ Chania)**
- **When a fixed system returns to operation after a re-build (Mt. Stromlo)**
- **When for any reason there is suspicion that there is “change” at a site**

10/26/03

E C Pavlis/JCET-GSFC926

2



F'TLRS @ Chania

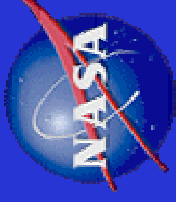


10/26/03

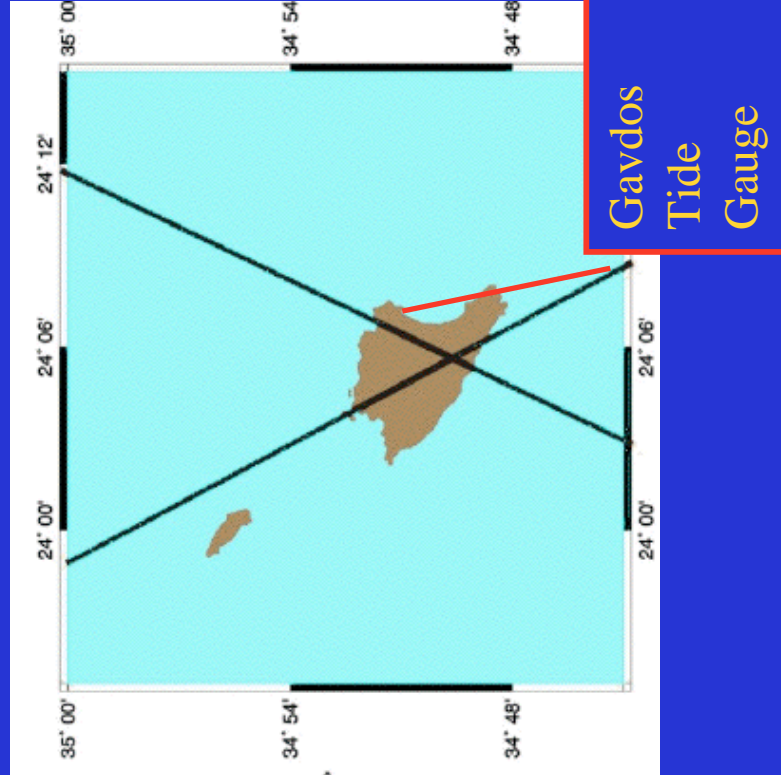
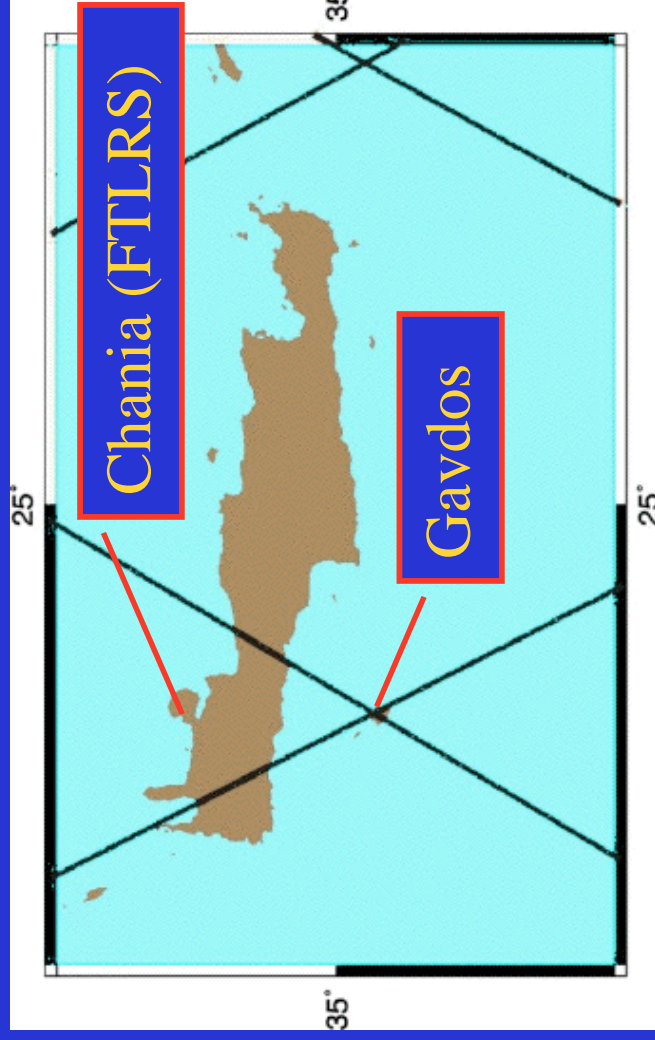
E C Pavlis/JCET-GSFC926



Goddard
Space
Flight
Center



GAVDOS MSL & Alt. Calibration Site



10/26/03

E C Pavlis/JCET-GSFC926



Starting GPS Position

Goddard
Space
Flight
Center



GAMIT Results			
X [m]	Y [m]	Z [m]	
4744552.5533	2119414.5451	3686245.1363	
±1.0 [cm]	±1.0 [cm]	±1.0 [cm]	
ϕ	λ	h [m]	
35° 31' 58".95437	24° 04' 13".96631	161.0495	
±1.25 [mas]	±1.40 [mas]	0.43 [cm]	

Formal 1- σ uncertainties from data collected over 2003 DOY 71 - 81

10/26/03

E C Pavlis/JCET-GSFC926



SLR Data Distribution



NPs
89
232

Passes
15
28

LAGEOS 1:
LAGEOS 2:

Week	LAGEOS 1	LAGEOS 2
2003.04.06	✓	✓
2003.04.20	✓	✓
2003.04.27	✓	✓
2003.05.11	✓	✓
2003.05.18	✓	✓
2003.05.25	edited	✓
2003.06.01	-	✓
2003.06.08	-	✓
2003.06.15	-	✓
2003.06.22	✓	✓

10/26/03

E C Pavlis/JCET-GSFC926



Goddard
Space
Flight
Center



Measurement Bias Estimation

Arc week	Site ID	LAGEOS 1 bias [mm]	σ [mm]	LAGEOS 2 bias [mm]	σ [mm]
20030406	78306901	-2.1	38.0	-15.9	52.2
20030420	78306901	-8.6	53.1	-19.1	38.9
20030428	78306901	-4.8	32.7	-6.2	35.1
20030512	78306901	89.4	122.7	-12.6	57.8
20030518	78306901	-286.8	89.1	-17.2	41.7
20030524	78306901	0.0	0.0	-18.8	33.3
20030600	78306901	0.0	0.0	-16.4	29.7
20030608	78306901	0.0	0.0	-9.4	30.5
20030616	78306901	0.0	0.0	-4.1	34.2
20030622	78306901	17.4	90.2	9.7	35.9

	LAGEOS 1 Bias [mm]	σ [mm]	LAGEOS 2 Bias [mm]	σ [mm]
Minimum	-8.6	32.7	-19.1	29.7
Maximum	-2.1	53.1	9.7	57.8
Points	3	3	10	10
Mean	-5.17	41.2	-11.00	38.9
RMS	5.82	42.1	13.91	39.9

- Thin data set for LAGEOS 1
- Perhaps a $\sim -10 \pm 40$ mm bias on LAGEOS 2

10/26/03

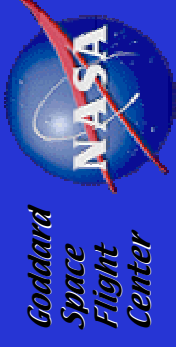
E C Pavlis/JCET-GSFC926



GEODYN Results			
Adopted	Velocity		Vector
V_x [m/y]	V_y [m/y]	V_z [m/y]	
-0.0161	0.0190	0.0094	
First Iteration			
X [m]	Y [m]	Z [m]	
4744552.6490	2119414.4260	3686245.0800	
±1.70 [cm]	±1.50 [cm]	±2.20 [cm]	
ϕ	λ	h [m]	
35° 31' 58".95210	24° 04' 13".96051	161.0482	
±0.34 [mas]	±0.49 [mas]	±2.72 [cm]	
Second Iteration			
X [m]	Y [m]	Z [m]	
4744552.6650	2119414.4160	3686245.0860	
±0.21 [cm]	±0.22 [cm]	±0.19 [cm]	
ϕ	λ	h [m]	
35° 31' 58".95208	24° 04' 13".95990	161.0602	
±0.057 [mas]	±0.077 [mas]	±0.25 [cm]	



Two Independent Results



JCET SLR0 Solution (1997.0): ... 552.665 ... 414.416 ... 245.086
 + Eccentricities (Husson) : +1.351 +0.604 +1.057

JCET IAR Solution (1997.0): ... 554.016 ... 415.020 ... 246.143

*CSR CHANIA 7830 4744554.011 2119415.053 3686246.151

$\Delta(\text{JCET} - \text{CSR}) \text{ IAR}$ 0.005 - 0.033 - 0.008

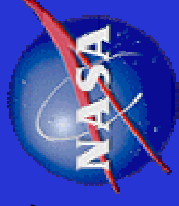
A second CSR solution, adopting the JCET velocity and making use of the eccentricities, resulted in even closer agreement

* CSR/John Ries, Position Derived from JASON data



Summary & Conclusions

Godard
Space
Flight
Center



- SLR can produce ~2-3 cm positions with even sub-optimal data distribution and limited amount of data on LA GEOS-type satellites
- Independently derived (s/w, analyst, satellite) position from JASON, with significantly more data agrees to ~2-3 cm
- Perhaps it is the time to consider such tests in order to qualify targets for inclusion in our routine processing to improve EOP and TRF