



Combination at the
Observation Level
IERS Working Group



l'Observatoire
de Paris — SYRTE
Systèmes de Référence Temps-Espace



IERS COL-WG project GRGS COMBINATION CENTRE

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Pole coordinates AIUB

**GPS
daily**

Tropospheric parameters reduces:

BIAS XPO : 4.211 mas
BIAS YPO : -5.547 mas

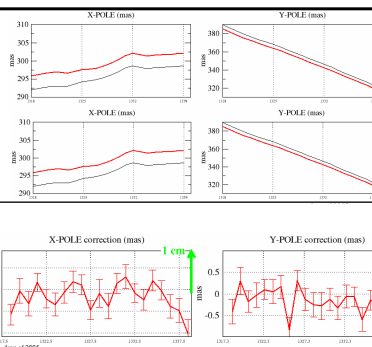
Tropospheric parameters fixed:

BIAS XPO : 3.490 mas
BIAS YPO : -3.962 mas

**SLR
weekly**

Continuity constraints on
Pole coordinates corrections

$\sigma=3\text{cm}$
WRMS XPO = 322 uas
WRMS YPO = 312 uas



Pole coordinates DGFI

SLR weekly	Range bias reduced (RBIAS), STAY 14001S007 eliminated XPO, YPO, UT at 20080823 and at 20080901 eliminated due to instability. Continuity constraints on Pole coordinates Corrections: $\sigma=2\text{cm}$ UT & Stations held fixed to their apriori WRMS XPO = 15 uas WRMS YPO = 4 uas
VLBI daily	Continuity constraints on Pole coordinates Corrections: $\sigma=2\text{cm}$ UT & Stations held fixed to their apriori WRMS XPO = 82 uas WRMS YPO = 107 uas

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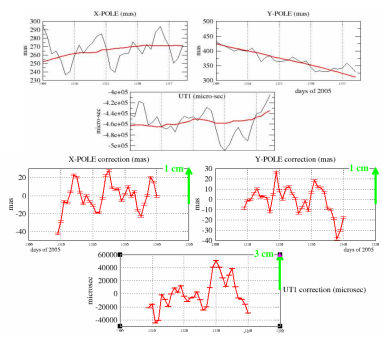
Pole coordinates ESOC

DORIS + SLR weekly	Tropospheric parameters reduced: BIAS XPO : 1.5 mas BIAS YPO : -0.75 mas Continuity constraints on Pole coordinates corrections $\sigma=2\text{cm}$ WRMS XPO = 158 uas WRMS YPO = 88 uas
GNSS + SLR weekly	Continuity constraints on Pole coordinates corrections $\sigma=2\text{cm}$ WRMS XPO = 43 uas WRMS YPO = 37 uas Pole coordinates apriori ESOC $\neq \text{C04}$
SLR weekly	Continuity constraints on Pole coordinates corrections $\sigma=2\text{cm}$ WRMS XPO = 179 uas WRMS YPO = 205 uas

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Pole coordinates GFZ

	GNSS+SLR daily
XPO, YPO, UT-UTC 2pt/d at 00h and 24h STAX, STAY, STAZ 1pt/d at 12h	EOP & Station coordinates estimated simultaneously, Continuity constraints on Pole coordinates corrections $\sigma=2\text{cm}$ Station Stabilization = 50cm WRMS XPO = 15.6 Mas WRMS YPO = 13.3 Mas 

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<ftp://hpiers.obspm.fr/iers/eop/grgs/GRGS/solutions/>

Pole AIUB solutions with DYNAMO

2373 nov 30 15:03 Pole.SLR.AIUB.54688_54709.2.dat
1596 nov 30 15:05 Pole.SLR.AIUB.54688_54709.2.readme

2486 nov 30 12:18 Pole.GNSS.AIUB.55688_55709.1.dat
1875 nov 30 14:25 Pole.GNSS.AIUB.55688_55709.1.readme

Pole DGFI solutions with DYNAMO

1695 nov 24 11:32 Pole.VLBI.DGFI.54690_54707.1.dat
2232 nov 30 15:19 Pole.VLBI.DGFI.54690_54707.1.readme

2373 nov 23 18:17 Pole.SLR.DGFI.54688_54709.1.dat
1876 nov 30 15:22 Pole.SLR.DGFI.54688_54709.1.readme

Pole ESOC solutions with DYNAMO

2373 nov 22 15:49 Pole.DORIS_SLR.ESOC.54688_54708.1.dat
1774 nov 22 15:56 Pole.DORIS_SLR.ESOC.54688_54708.1.readme

2373 nov 22 11:00 Pole.SLR.ESOC.54688_54708.1.dat
1703 nov 22 11:31 Pole.SLR.ESOC.54688_54708.1.readme

2373 déc 1 14:33 Pole.GNSS_SLR.ESOC.54688_54708.1.dat
1892 déc 1 14:38 Pole.GNSS_SLR.ESOC.54688_54708.1.readme

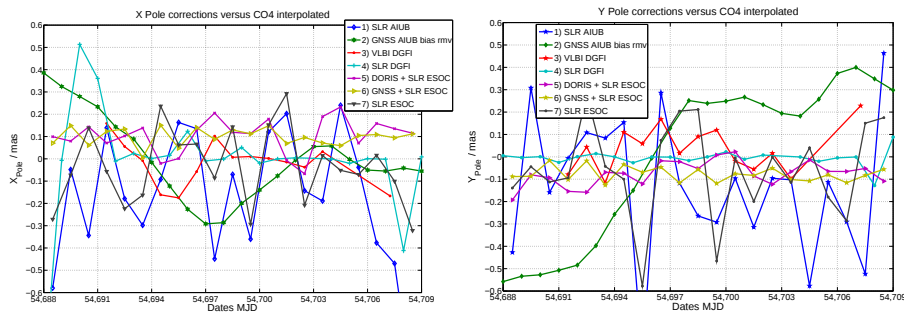
Pole GFZ solutions with DYNAMO

3616 déc 4 21:42 Pole.GNSS_SLR.GFZ.54679_54710.1.dat
1778 déc 6 15:35 Pole.GNSS_SLR.GFZ.54679_54710.1.readme

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X & Y pole corrections versus C04 series

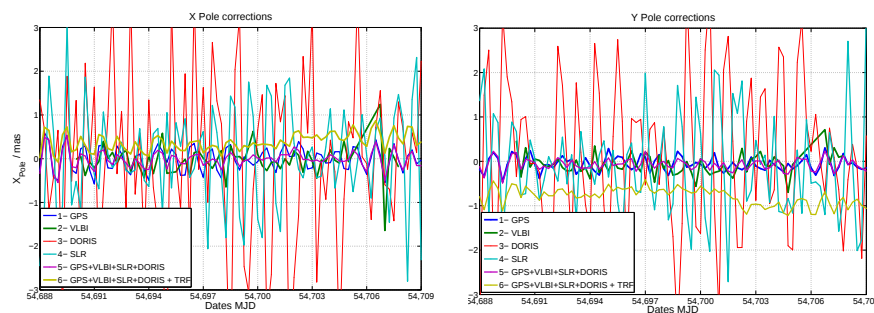


		X correction Mean μ as	X correction WRMS μ as	Y correction Mean μ as	Y correction WRMS μ as
1	AIUB SLR	-144.5	281.5	-124.6	294.6
2	AUIB GNSS	4212.1	175.1	-5549.4	327.2
3	DGFI VLBI	9.7	84.8	13.4	87.5
4	DGFI SLR	-2.4	21.6	-0.2	5.8
5	ESOC DORIS + SLR	106.0	75.3	-74.4	54.0
6	ESOC GNSS + SLR	98.8	36.8	-77.6	31.9
7	ESOC SLR	-42.7	158.2	-52.7	200.7

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GRGS X & Y pole corrections versus C04 series at 6h interval



		Technique	Weighted Mean	Weighted RMS
X_ Pole	/ mas	1- GPS	-10.3	160.6
		2- VLBI	-17.2	188.9
		3- DORIS	31.5	1484.7
		4- SLR	-25.7	855.2
		5- Combined	-10.0	165.6
		6- Combined +TRF	379.8	185.0

		Technique	Weighted Mean	Weighted RMS
Y_ Pole	/ mas	1- GPS	-60.3	116.8
		2- VLBI	-91.7	174.2
		3- DORIS	262	1098.2
		4- SLR	-193	799.7
		5- Combined	-66.8	106.2
		6- Combined +TRF	-794	211.48

statistics results with combination

	DGFI GPS + VLBI	ESOC GNSS+SLR + DORIS+SLR	GRGS GPS + VLBI + DORIS + SLR
X-Pole mean	169 as	100.0 uas	428 uas
X-Pole WRMS	920 mas	99.9 uas	428 uas
Y-Pole mean	61 as	61.0 uas	817 uas
Y-Pole WRMS	1679 mas	61.2 uas	817 uas

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MAO & GRGS X & Y pole corrections comparison versus C04 series at 1d interval over 2008

From Lytvyn Mykhailo -MAO- & C. Bizouard -GRGS

