C21/S21 issue

Point 1 – For the pole tide, we need xp(t)-xp_mean(t) and yp(t)-yp_mean(t).

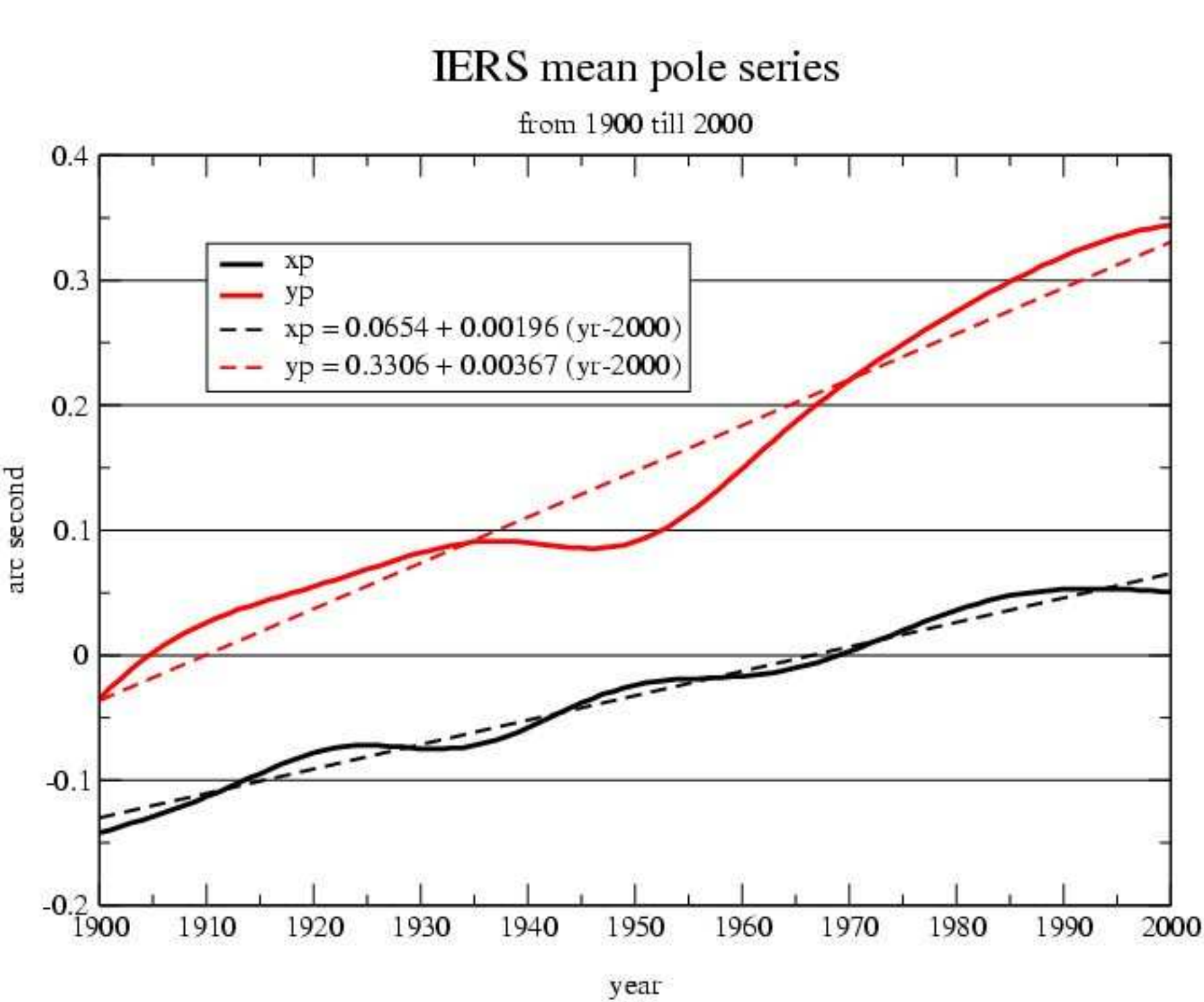
Point 2 – xp(t) and yp(t) come from the official IERS EOP series.

Point 3 – At CNES/GRGS we have taken values of xp_mean(t) and yp_mean(t) based on the last 100 years (see graph next page).

Point 4 – For the geopotential, in EIGEN-GL04S and C, we simply solve for the C21/S21 over the data span, either static or time-variable.

Point 5 – On the other hand, based on the equations from IERS Technical Note 32 p57, recalled by Frank, one can compute the C21/S21 from xp(tref) and yp(tref) and the C20, C22 and S22 from each gravity field. The same applies for C21_dot/S21_dot, from xp(t) and yp(t) and C20_dot, C22_dot and S22_dot.

Point 6 – The values of point 5 do not necessarily coincide with the values of point 4…


IERS mean pole series
from 1900 till 2000
xp
yp
xp = 0.0654 + 0.00196 (yr-2000)
yp = 0.3306 + 0.00367 (yr-2000)
arc second
year
0.4
0.3
0.2
0.1
0
-0.1
-0.2
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000

IERS Mean C(2,1) & S(2,1) Values

Angular displacement from IERS mean reference pole for Epoch Jan 1, 2000

X0 = 0.054 arcsec Y0 = 0.357 arcsec

CNES/GRGS: 0.0654 0.3306

$$X = X0 + 0.0083\ (EPOCH - 2000)$$ **GRGS: 0.00196**

$$Y = Y0 + 0.3570\ (EPOCH - 2000)$$ **GRGS: 0.00367**

$$C(2,1) = +\mathrm{sqrt}(3)*X*C(2,0) - X*C(2,2) + Y*S(2,2)$$

$$S(2,1) = -\mathrm{sqrt}(3)*Y*C(2,0) - Y*C(2,2) - X*S(2,2)$$

C(2,0) = "tide free" coefficient (for GEODYN)

EPOCH = 2004.0, for EIGEN GL04S, ITG-GRACE03S, EGM2008.

IERS Model Includes

C21-dot = -0.337 e-11/yr; S21-dot = 1.606 e-11/yr

Transformed Gravity Models for Epoch 2004

Model	Coef	Original Value	IERS VALUE
EGM 2008	C(2,1)	-0.20661550967418 e-9	-0.236251 26249283 e-9
	S(2,1)	1.3844138913798 e-9	1.511651 1431905 e-9
Eigen GL04S	C(2,1)	-0.225214669755 e-9	-0.236251 31926512 e-9
	S(2,1)	1.44094981423 e-9	1.511651 4419256e-9
ITG Grace03s	C(2,1)	-0.2654790999243 e-9	-0.236251 24068999 e-9
	S(2,1)	1.4753933142830 e-9	1.511651 0029183 e-9