

Historical observations of the T-I annual and semiannual oscillations

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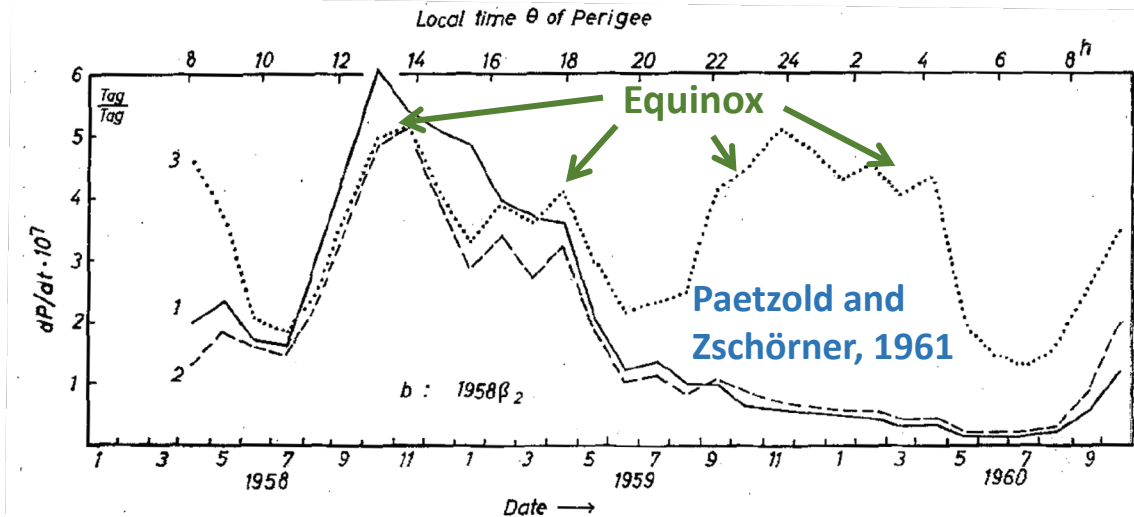
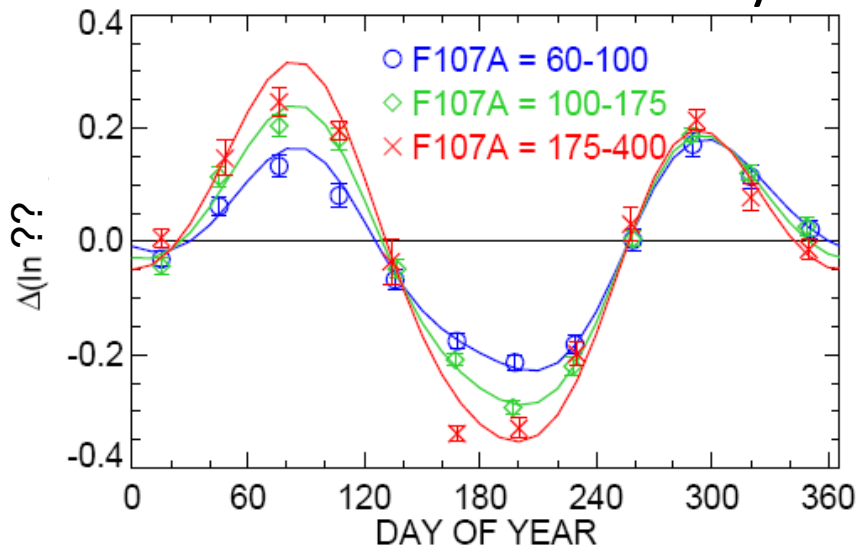


Fig. 1 - Monthly means of the acceleration of Explorer I and Vanguard I.

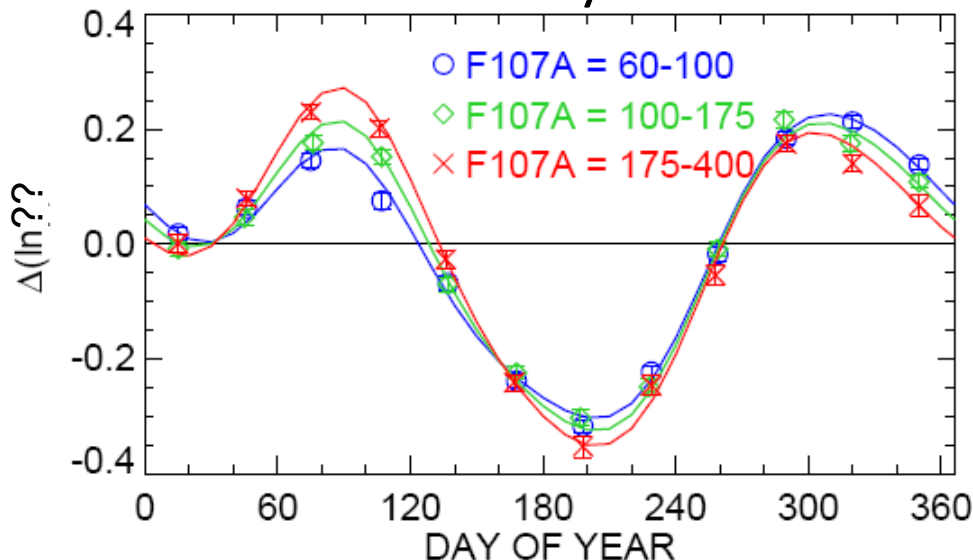
- 1: Observed acceleration,
- 2: Normalized acceleration,
- 3: The residual annual effect.

Global Average Thermosphere-Ionosphere AO & SAO

Total Electron Mass Density or Total Electron Mass Density at 400 km



	Amplitude	Phase
SAO	19.7%	Day 99
AO	17.4%	Day 20



	Amplitude	Phase
SAO	18.7%	Day 106
AO	20.5%	Day 13

Annual Oscillation

(Excluding Sun-Earth Distance)

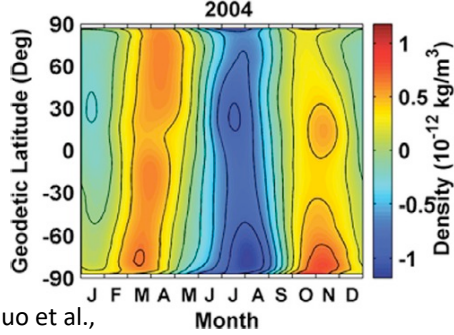
	Amplitude	Phase
Ar ₁₂₀	5.2%	Day 346
O2 ₁₂₀	1.9%	Day 362
N2 ₁₂₀	5.5%	Day 340
O ₁₂₀	8.2%	Day 294
He ₁₂₀	8.6%	Day 31
T _{ex}	1.0% (11 K)	Day 7
T ₁₂₀	0%	

Semiannual Oscillation

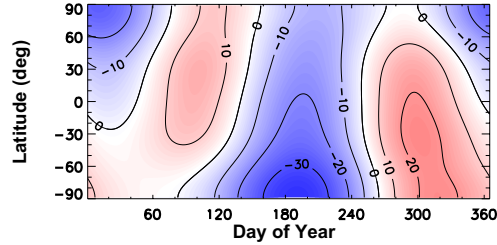
	Amplitude	Phase
Ar ₁₂₀	8.6%	Day 97
O2 ₁₂₀	7.7%	Day 82
N2 ₁₂₀	12.7%	Day 103
O ₁₂₀	19.1%	Day 101
He ₁₂₀	29.6%	Day 104
T _{ex}	1.3% (13 K)	Day 130
T ₁₂₀	2.1% (7.8 K)	Day 8

Latitude Structure

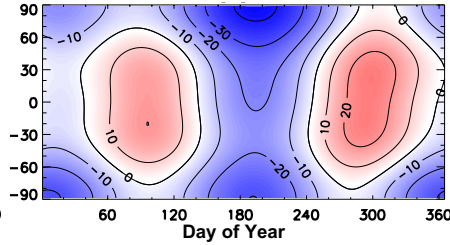
CHAMP Mass Density at 400 km



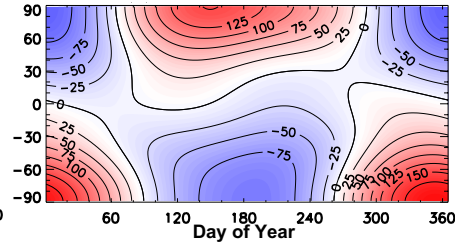
MSIS Mass Density at 300 km



MSIS [O] at 300 km



MSIS Temp. at 300 km



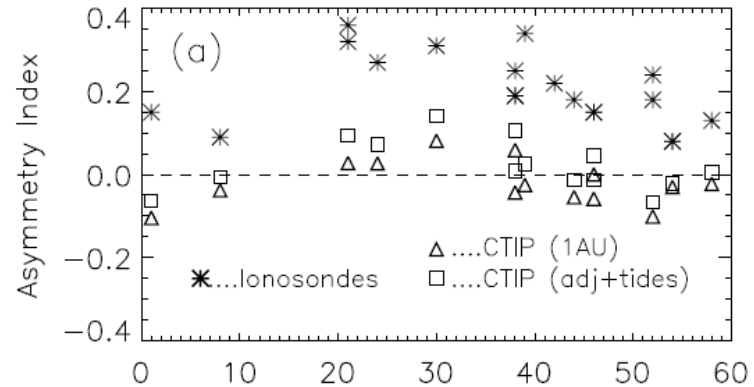
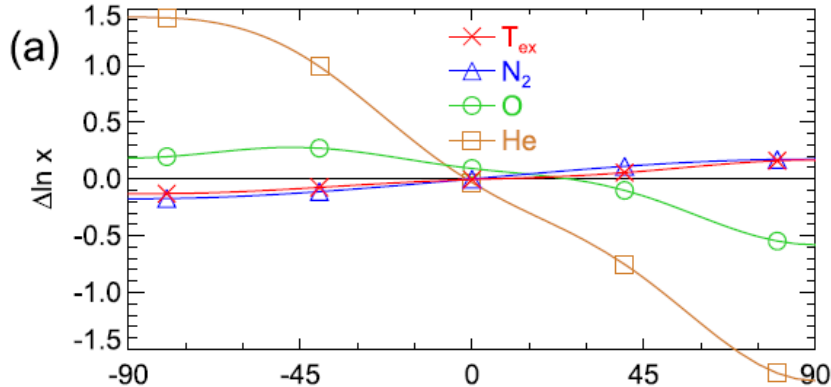
Guo et al.,
JGR, 2008

Ionosphere NmF2 Annual Asymmetry

$$AI = (A/M) = \frac{NmF2(N+S)_{Jan} - NmF2(N+S)_{July}}{NmF2(N+S)_{Jan} + NmF2(N+S)_{July}}$$

Noon

NRLMSISE-00 LATITUDINAL VARIATIONS AT JUNE SOLSTICE



Rishbeth and Müller-Wodarg,
AG, 2006