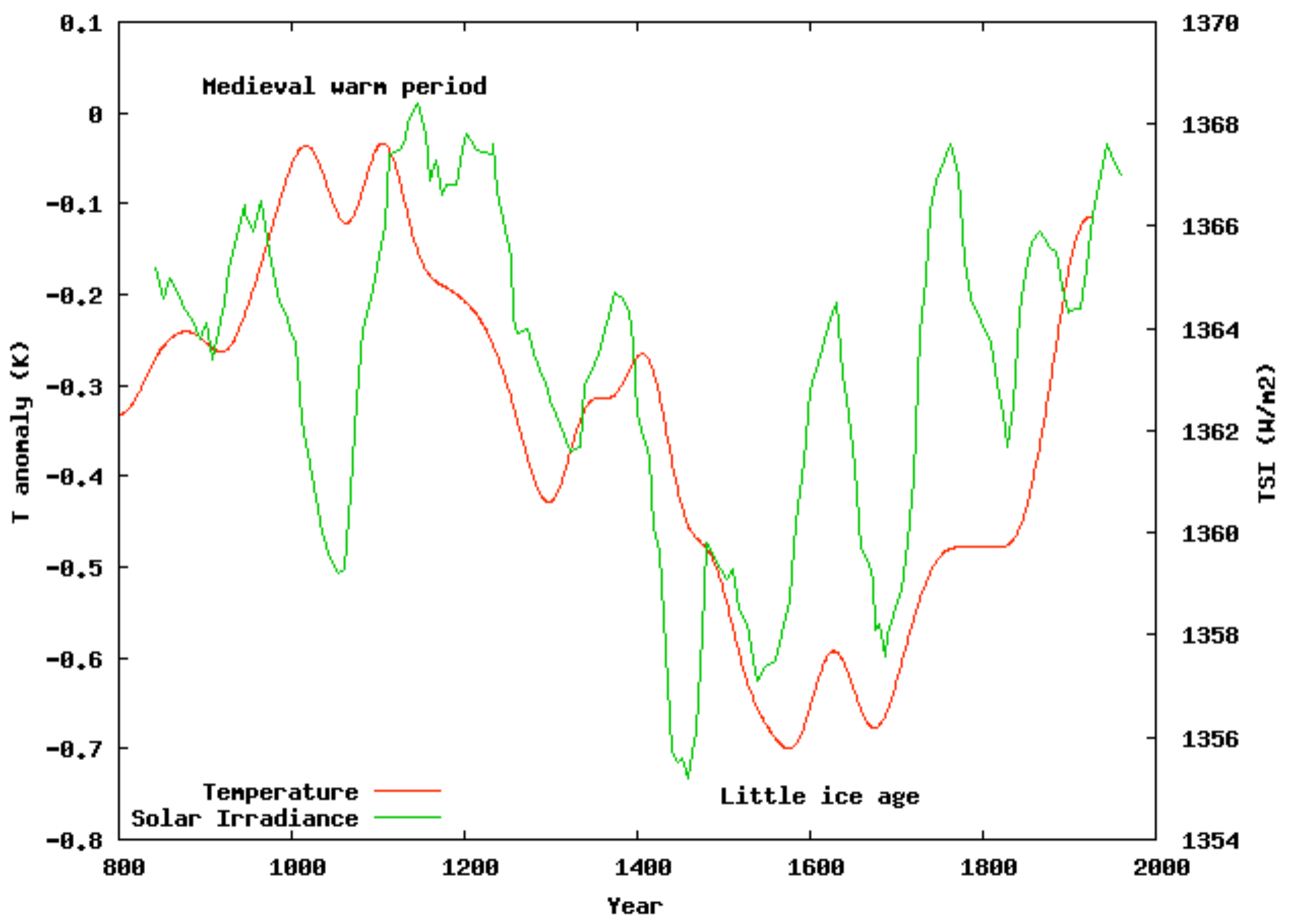

Measured Total Solar Irradiance cycle variability: status at the end of cycle 23

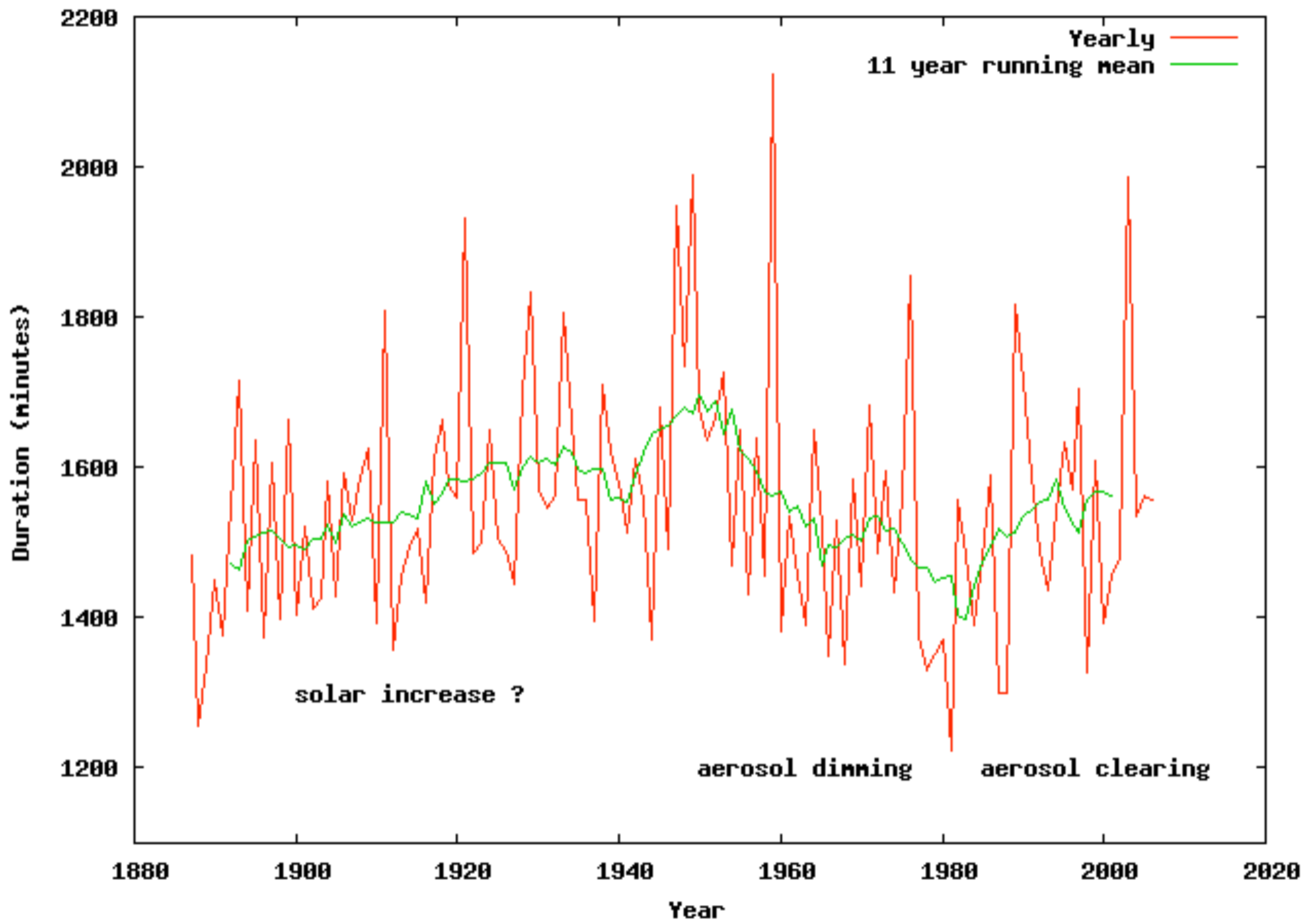
S. Dewitte, S. Mekaoui

Royal Meteorological Institute of Belgium

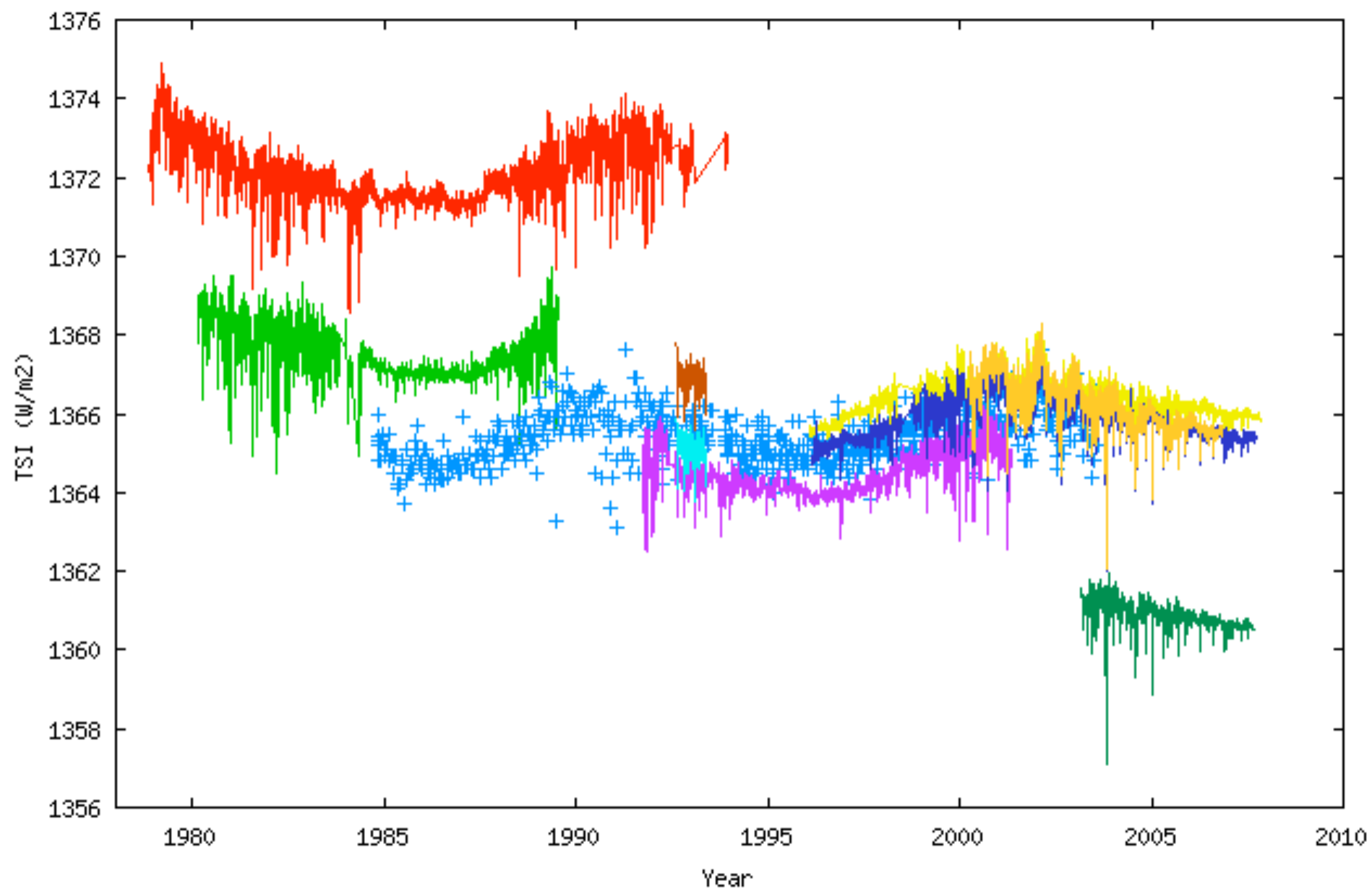
Hoberg temperature and Bard TSI reconstruction



Campbell-Stokes sunshine duration in Ukkel, Belgium



Independent measurements Total Solar Irradiance



ERB/Nimbus7 —
ACRIM1 —

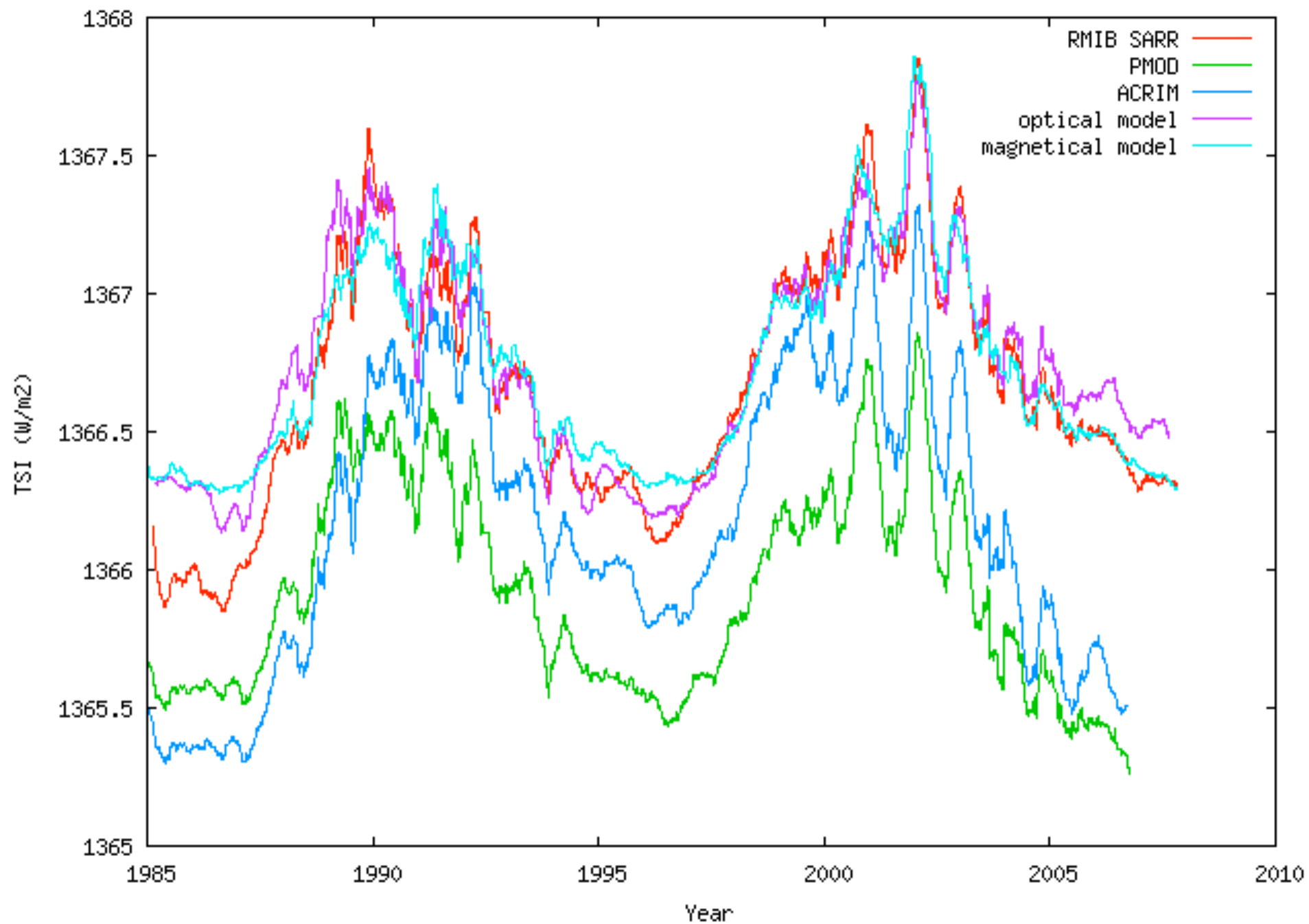
ERBS +
ACRIM2 —

SOVA1 —
SOVA2 —

DIARAD —
PM006 —

ACRIM3 —
TIM —

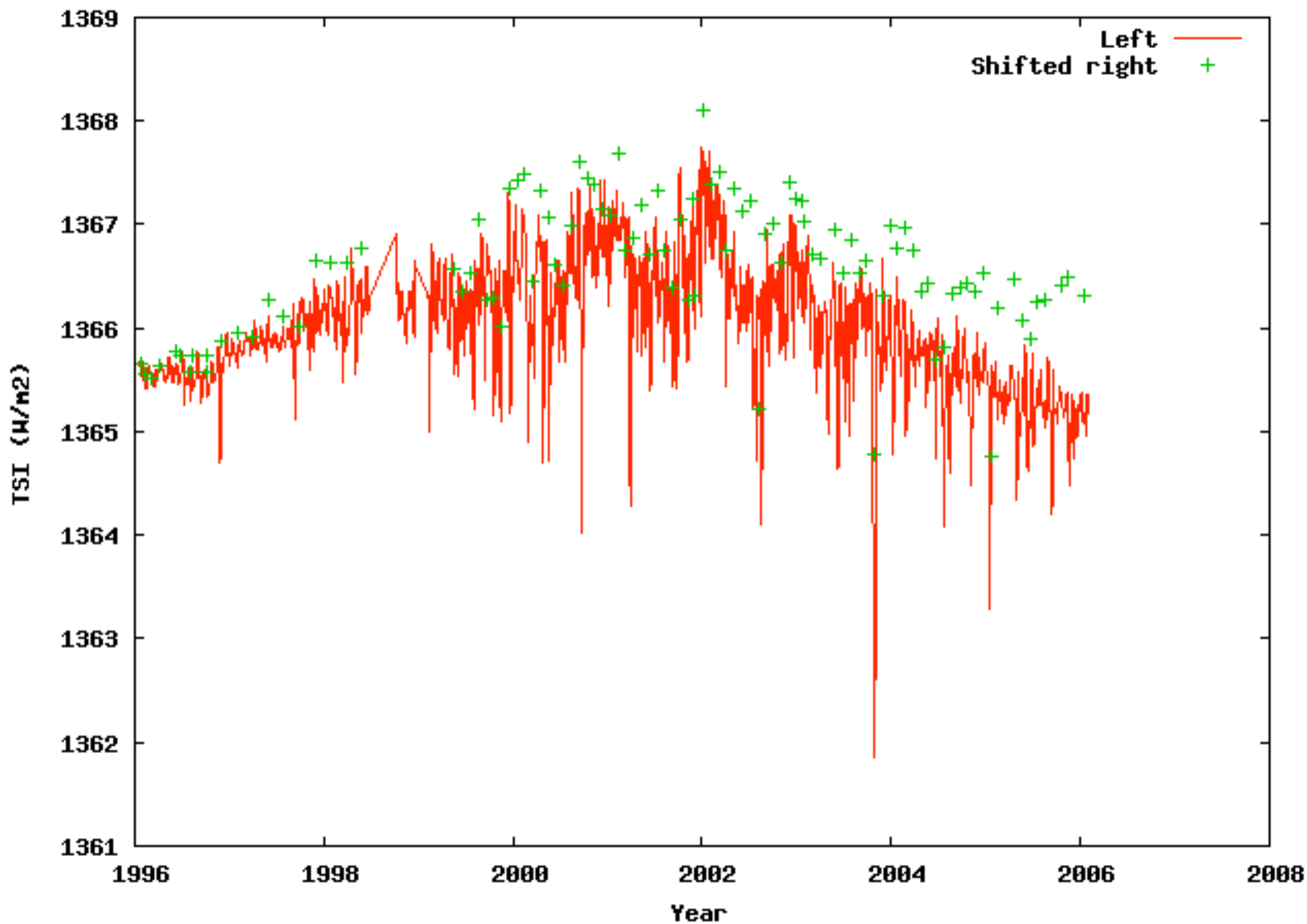
121 day running mean of TSI composites



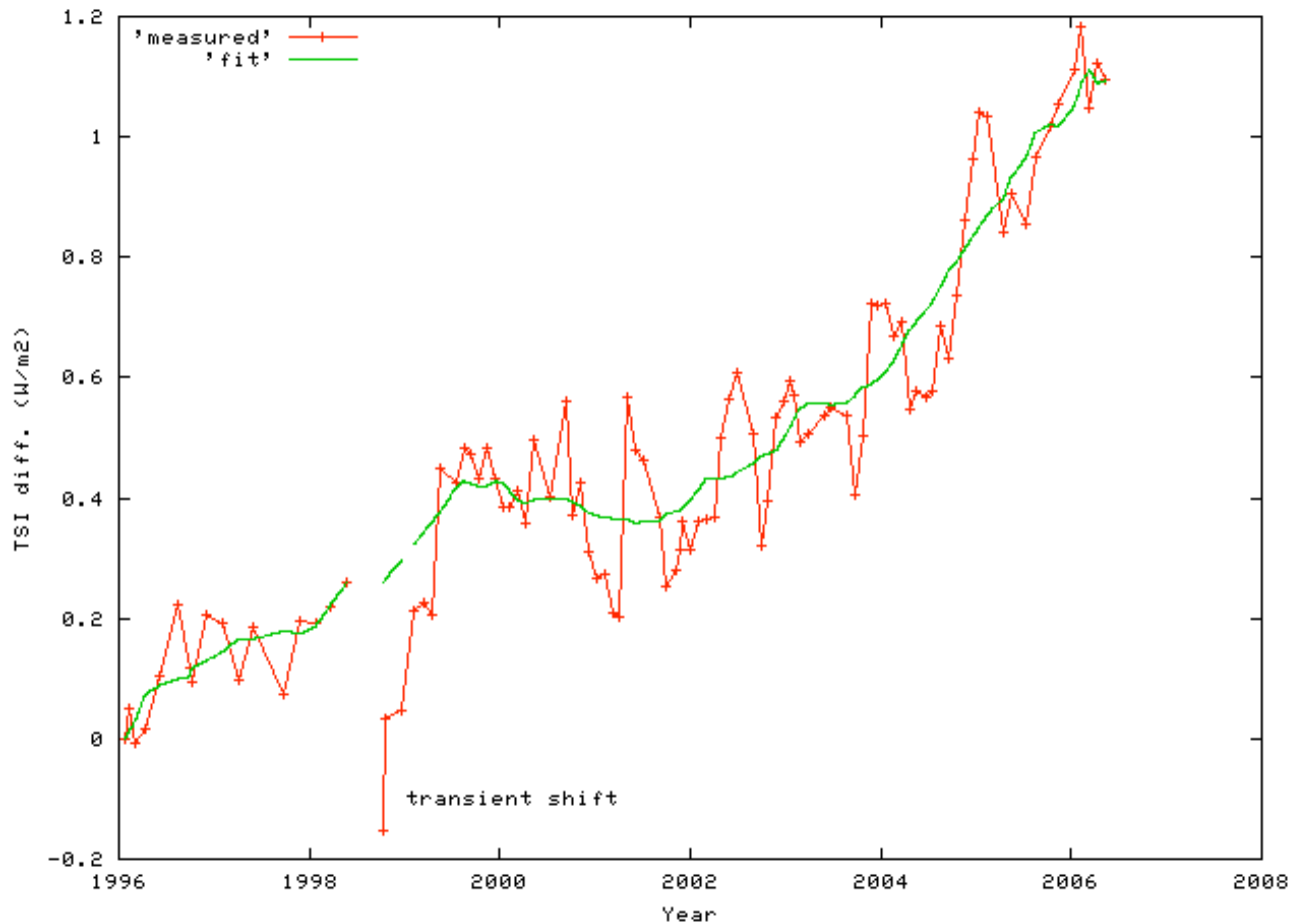
Current solar cycle 23

- ◆ 2 continuously measuring VIRGO radiometers with backup for ageing correction:
 - DIARAD Left + Right(backup)
 - PMO06V A + B(backup)
- ◆ DIARAD: lowest ageing + nominal shutter operation
- ◆ Other independent series: ACRIM 2 + ACRIM3, ERBS + TIM

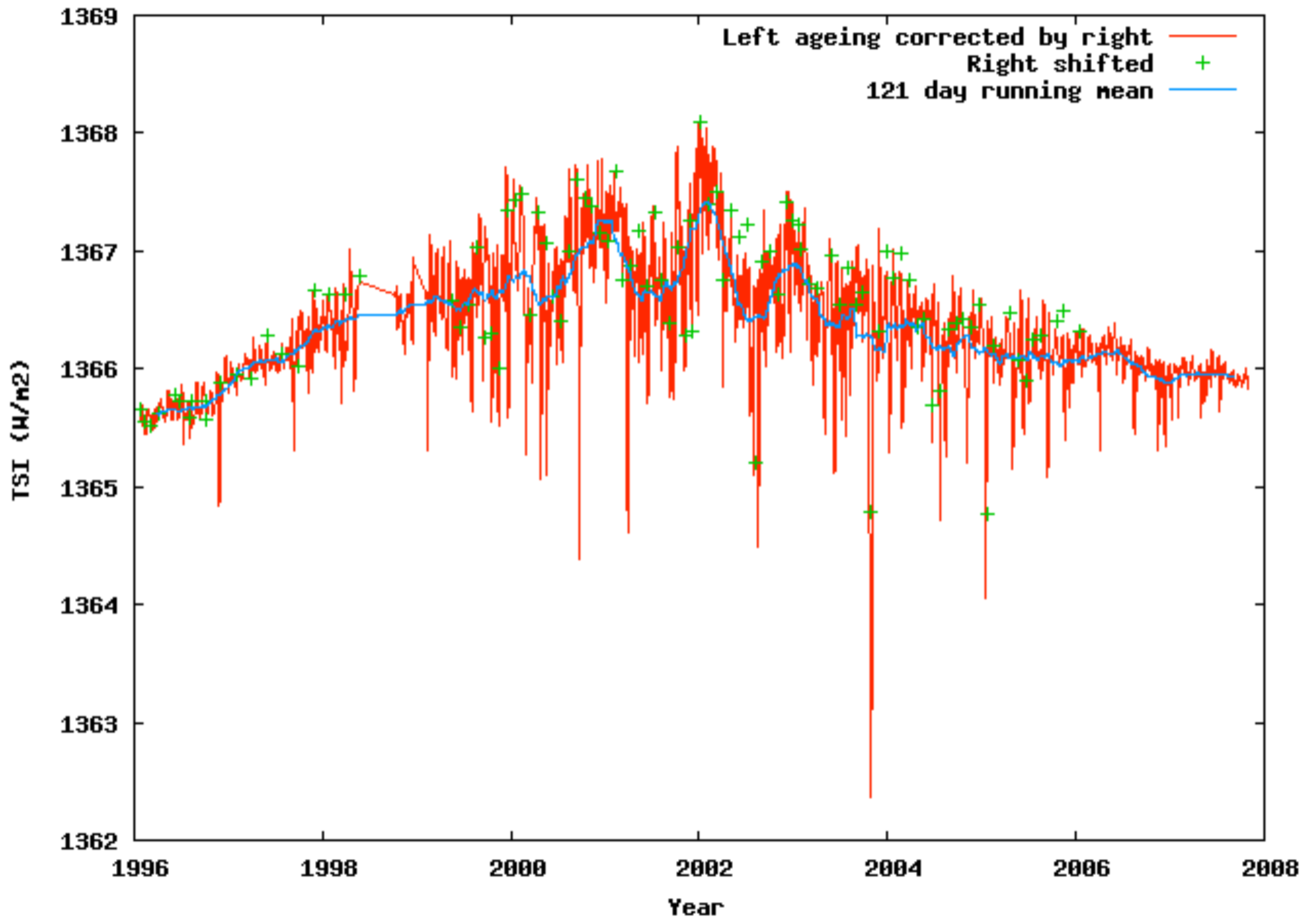
DIARAD level 1 TSI



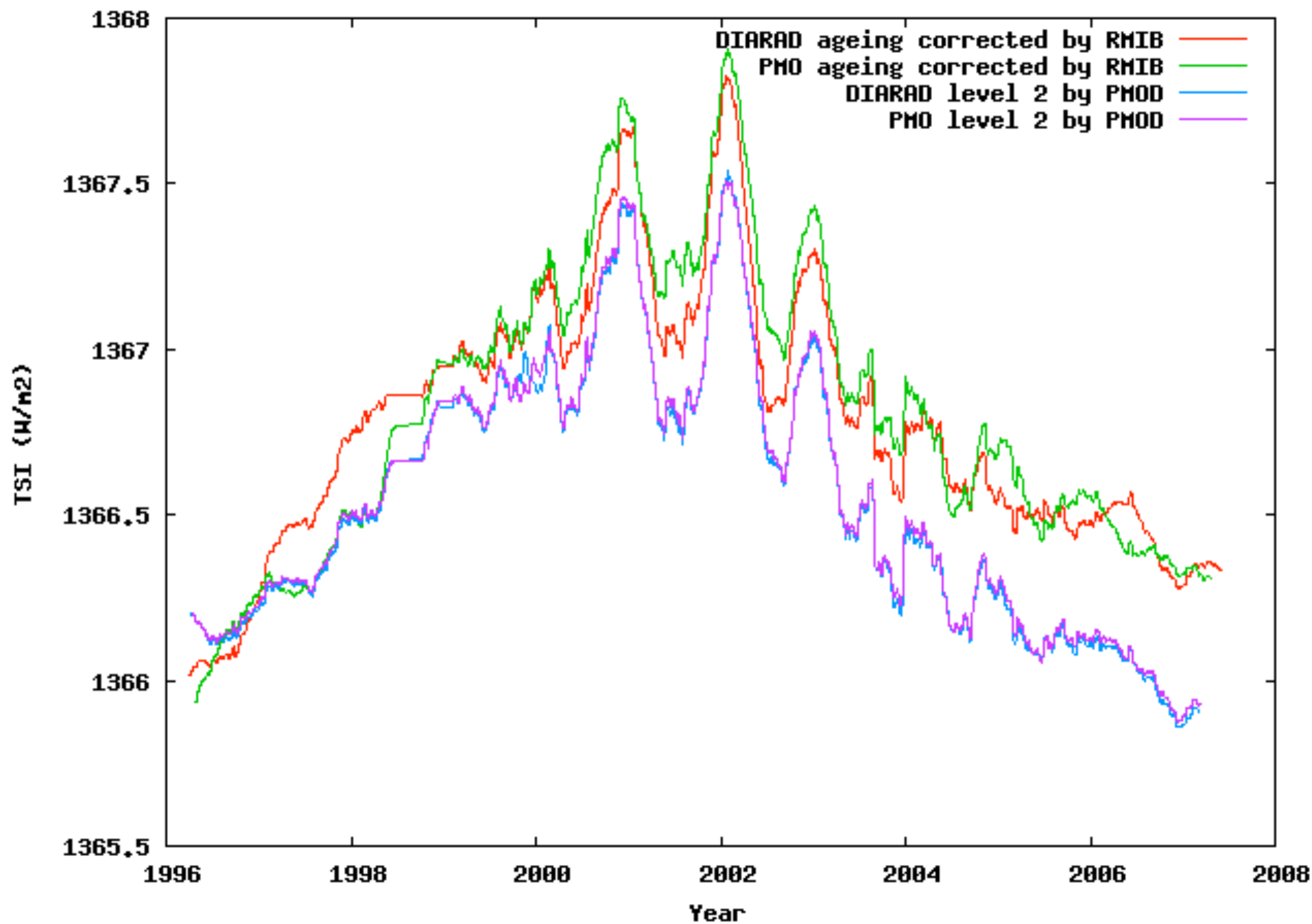
DIARAD Right minus Left TSI



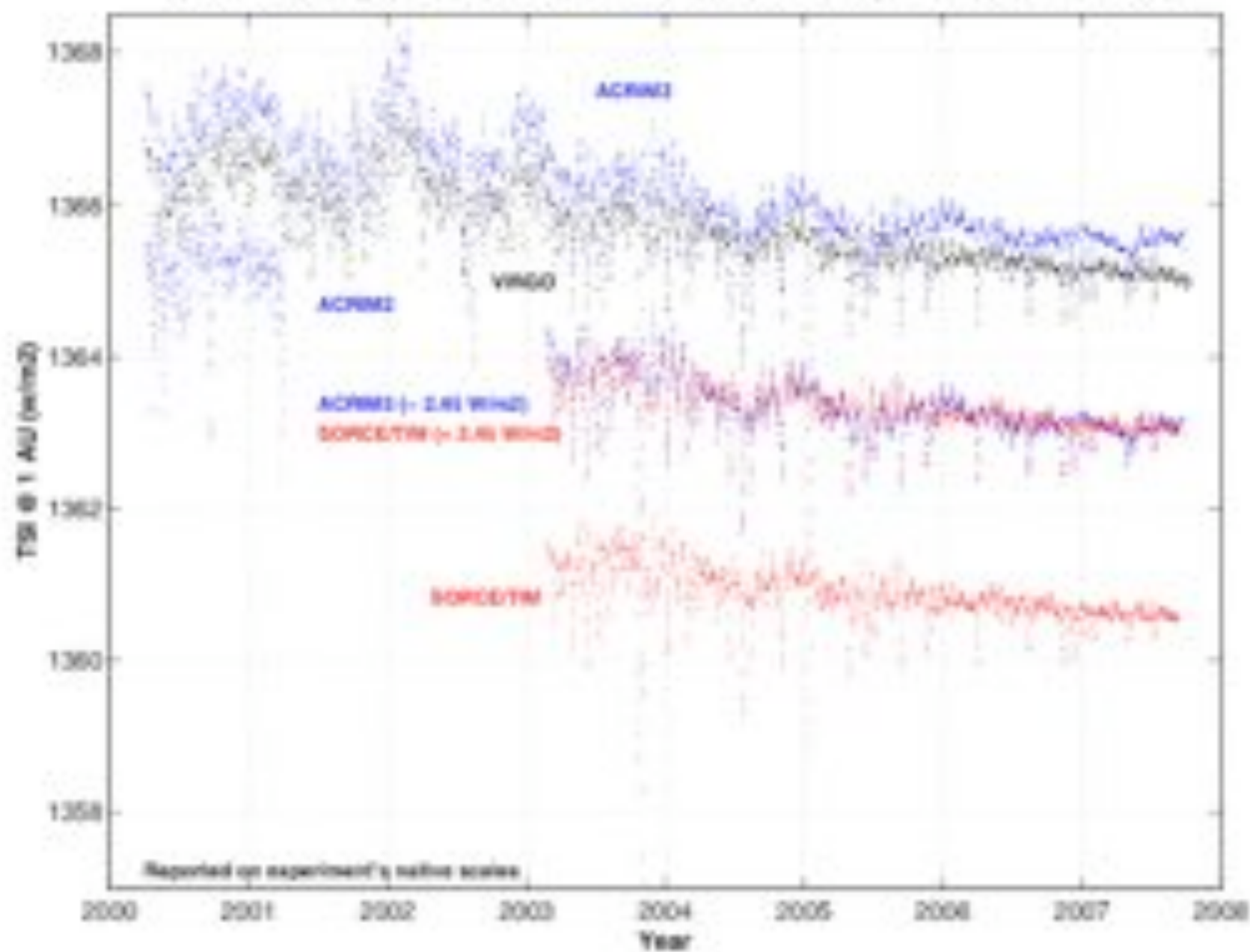
DIARAD level 2 Total Solar Irradiance



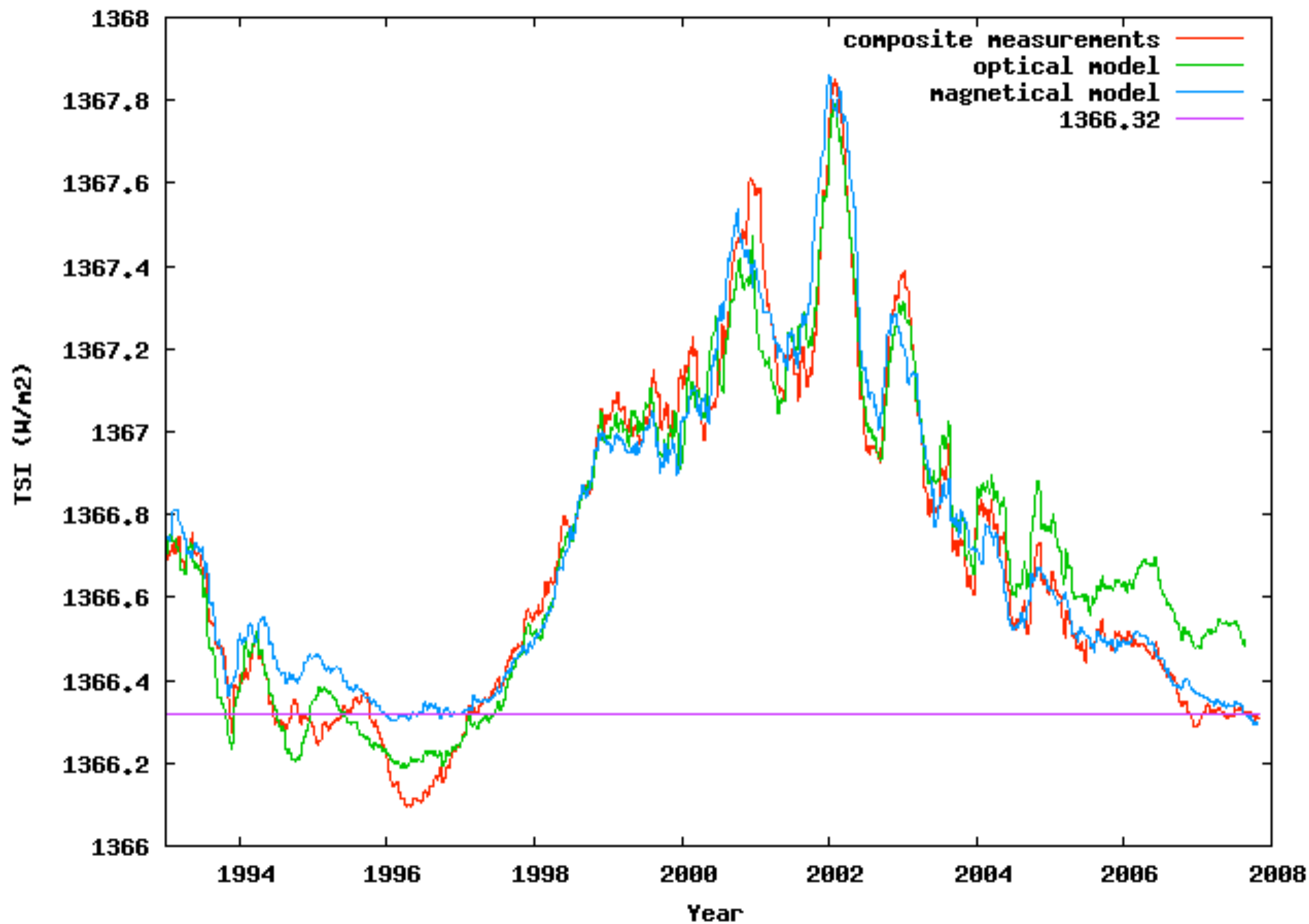
Different versions of VIRGO TSI measurements after adjustment absolute level



TOTAL SOLAR IRRADIANCE MONITORING DURING ACRIM3 MISSION



121 day running mean cycle TSI: end cycle 22 + cycle 23



Regression model ingredients

◆ Optical

MgII C/W
[Vierick]

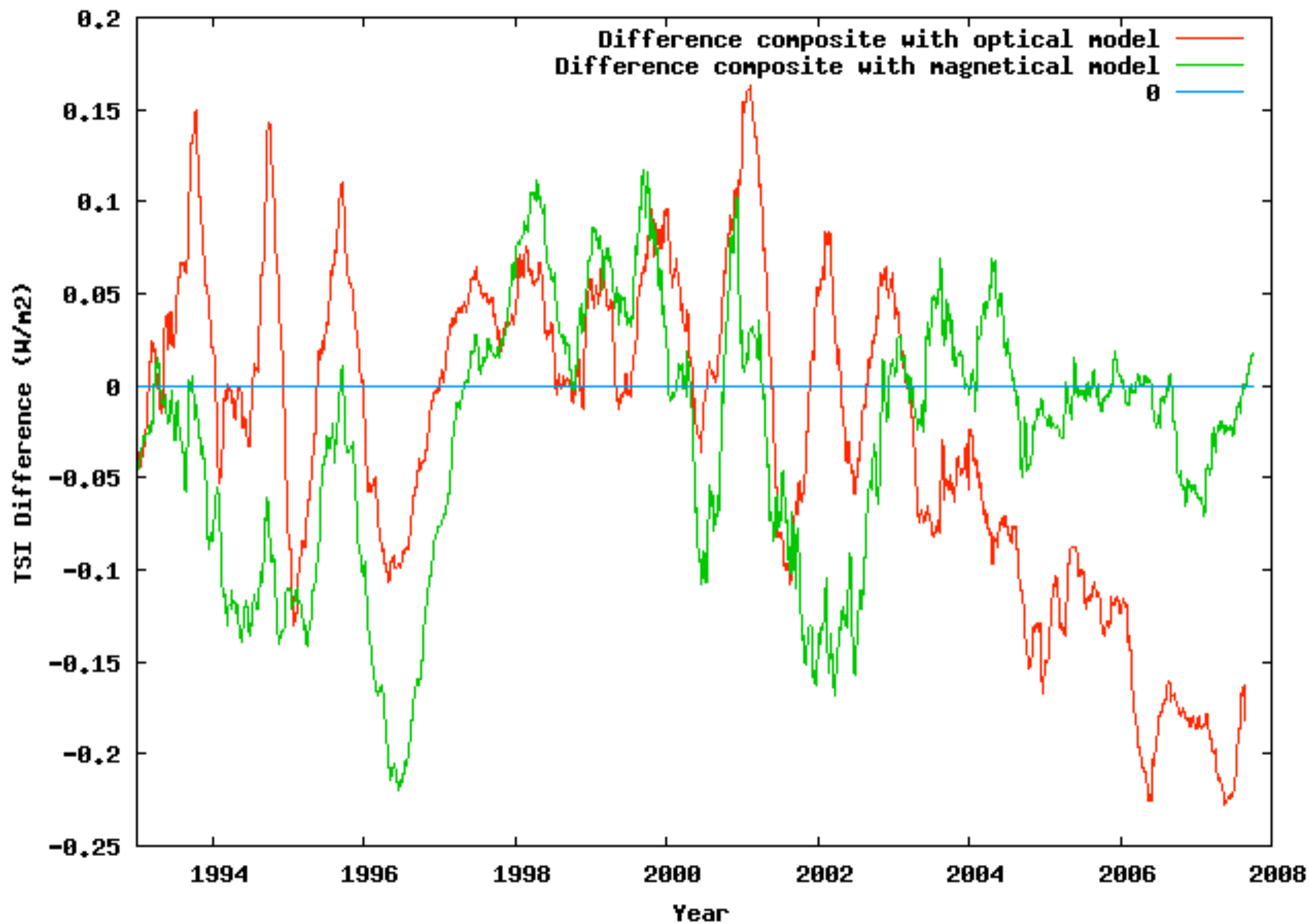
SFO red sum
[Walton,
Preminger]

◆ Magnetical

MW Plage Strength
Index
 $10 \text{ G} < B < 100 \text{ G}$

MW Sunspot Index
 $100 \text{ G} < B$

121 day running means



Future DIARAD instruments

- ◆ DIARAD/SOVIM on ISS: waiting for launch
 - good design and characterisation for absolute accuracy
 - ground solar comparison to reference radiometers
- ◆ SOVAP on PICARD: launch 2009
 - same design and characterisation as DIARAD/VIRGO
 - laboratory comparison to SOVA-1 ('92-'93)
 - ground solar comparison to reference radiometers

Conclusions

- ◆ 4 independent TSI time series are available during cycle 23.
- ◆ All time series agree if standard ageing corrections are used.
- ◆ Best composite = average of 4 series.
- ◆ Good agreement with models assuming no solar minimum TSI variation.

Reference

- ◆ S. Mekaoui, S. Dewitte, 'Total Solar Irradiance measurement and modelling during cycle 23', Solar Physics, 2007, DOI: 10.1007/s11207-007-9070-y