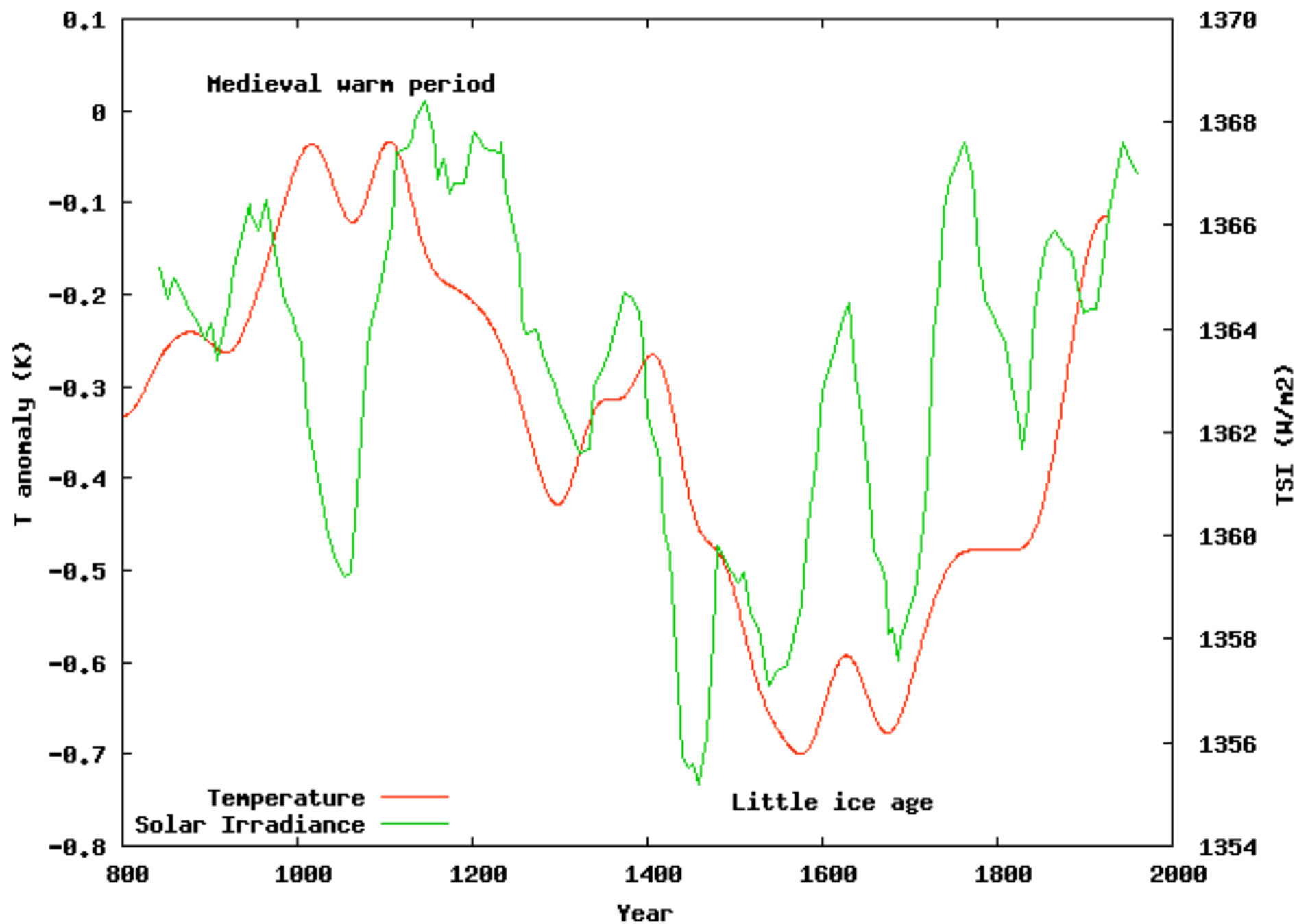


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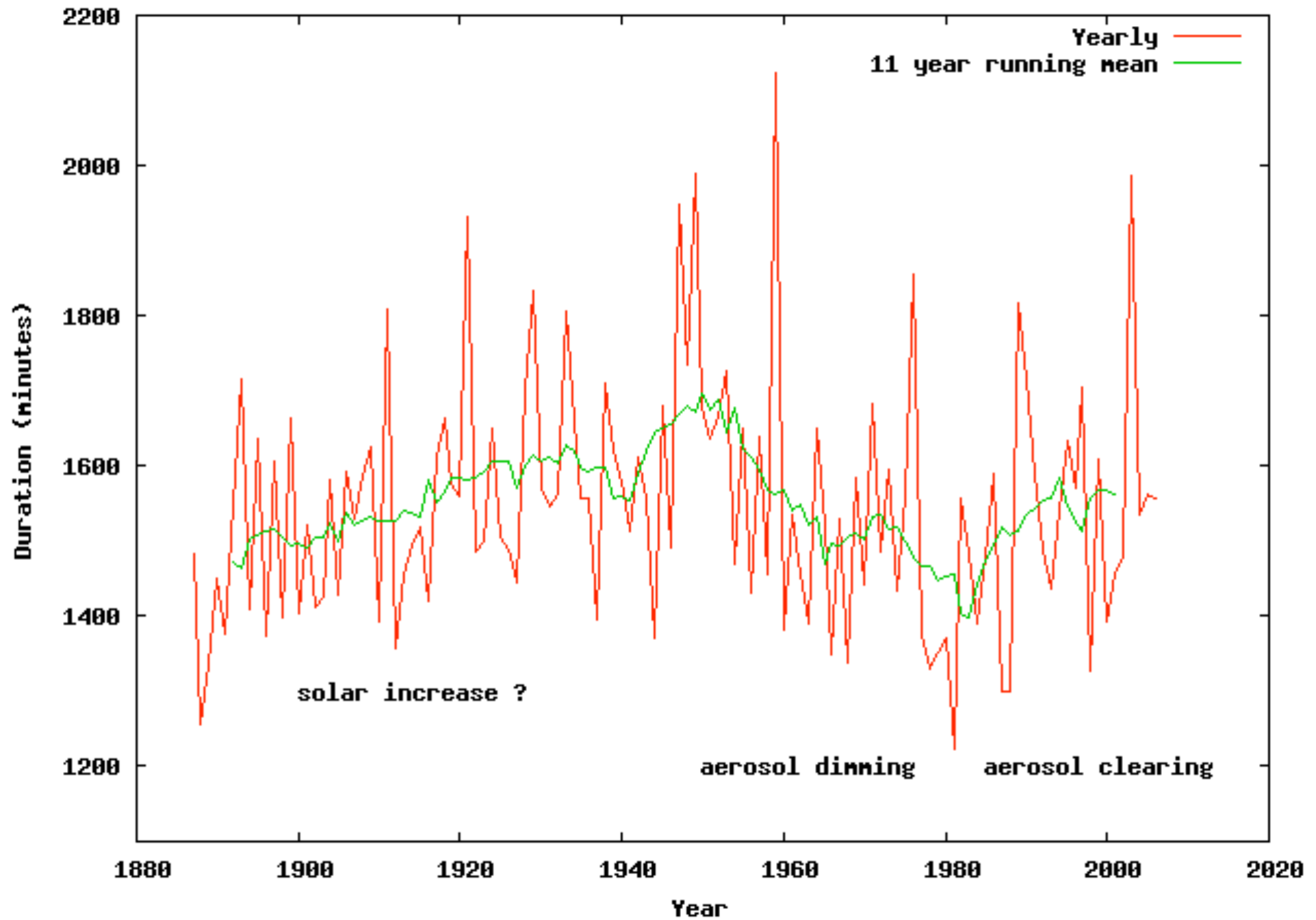
# Total Solar Irradiance measurements: status at the start of cycle 24

*S. Dewitte, A. Chevalier, S. Mekaoui*  
*Royal Meteorological Institute of Belgium*

Hoberg temperature and Bard TSI reconstruction



Campbell-Stokes sunshine duration in Ukkel, Belgium



# RMIB space record

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SPACELAB 1 NASA ESA	1983
ATLAS-I NASA STS-45	1992
<b>EURECA ESA STS-46</b>	<b>1992</b>
ATLAS-II NASA STS-56	1993
ATLAS-III NASA STS-66	1994
HITCHHIKER NASA STS-85	1997
HITCHHIKER NASA STS-95	1998
FREESTAR NASA STS-107	2003

now in space:

**SOHO/VIRGO/DIARAD ESA** Dec. 1995 > 14 year

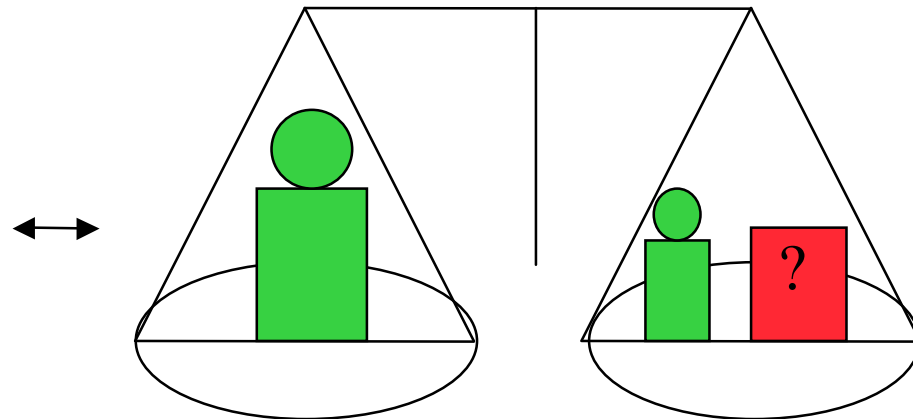
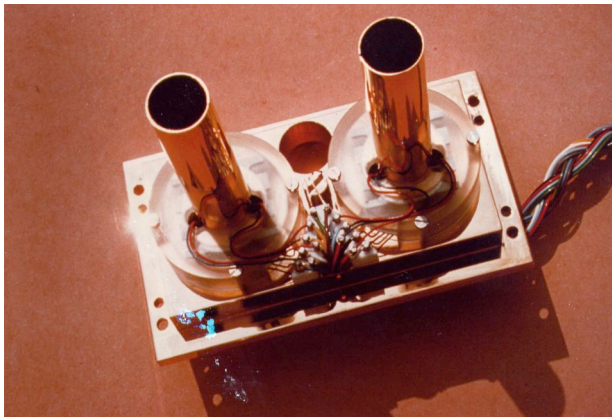
**ISS/SOVIM/DIARAD ESA** Feb. 2008 > 1 year

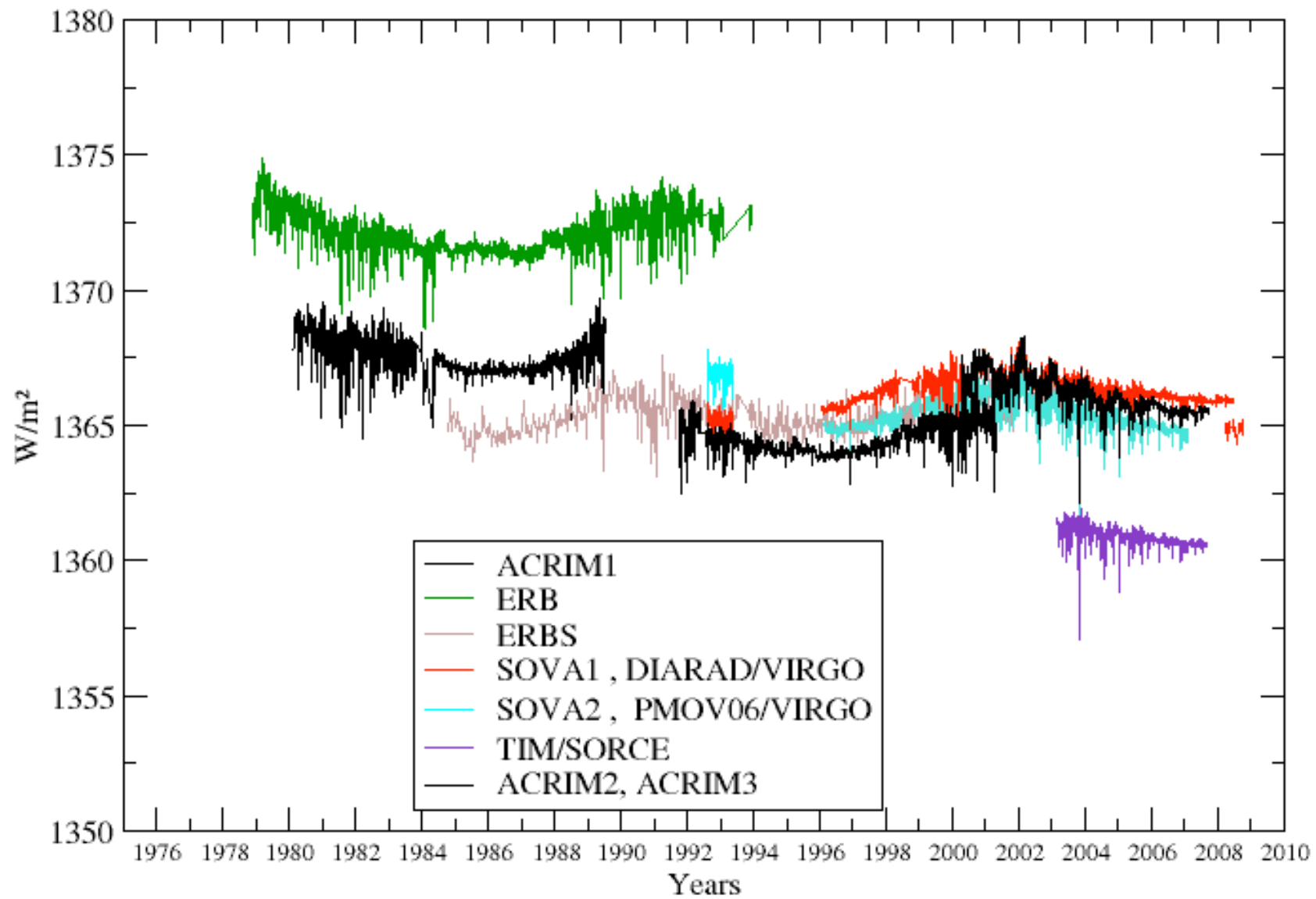
to be launched:

**PICARD/SOVAP CNES** 13 April 2010 > min. 2 year



# DIARAD Instrument principle



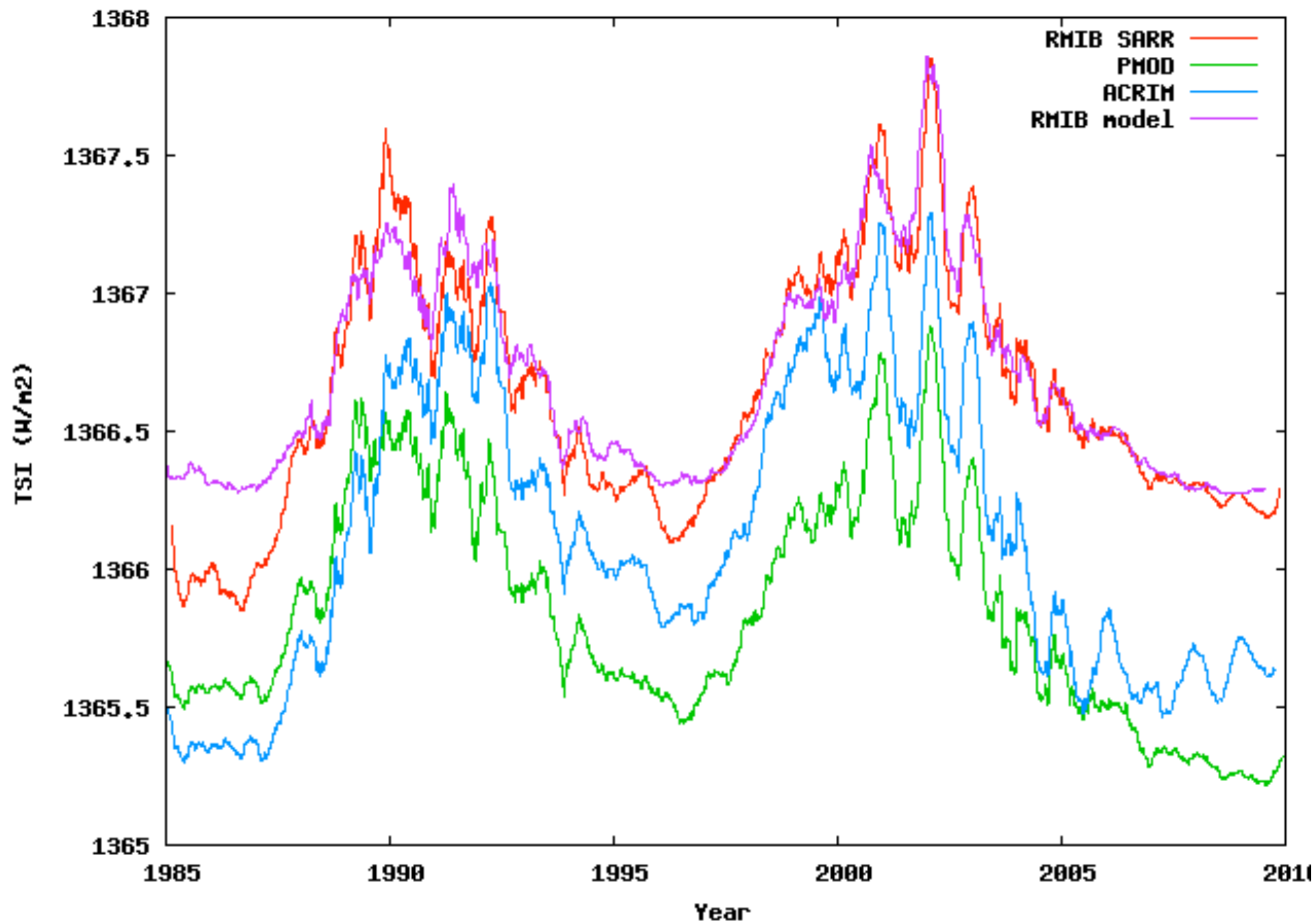


# DIARAD/SOVIM results

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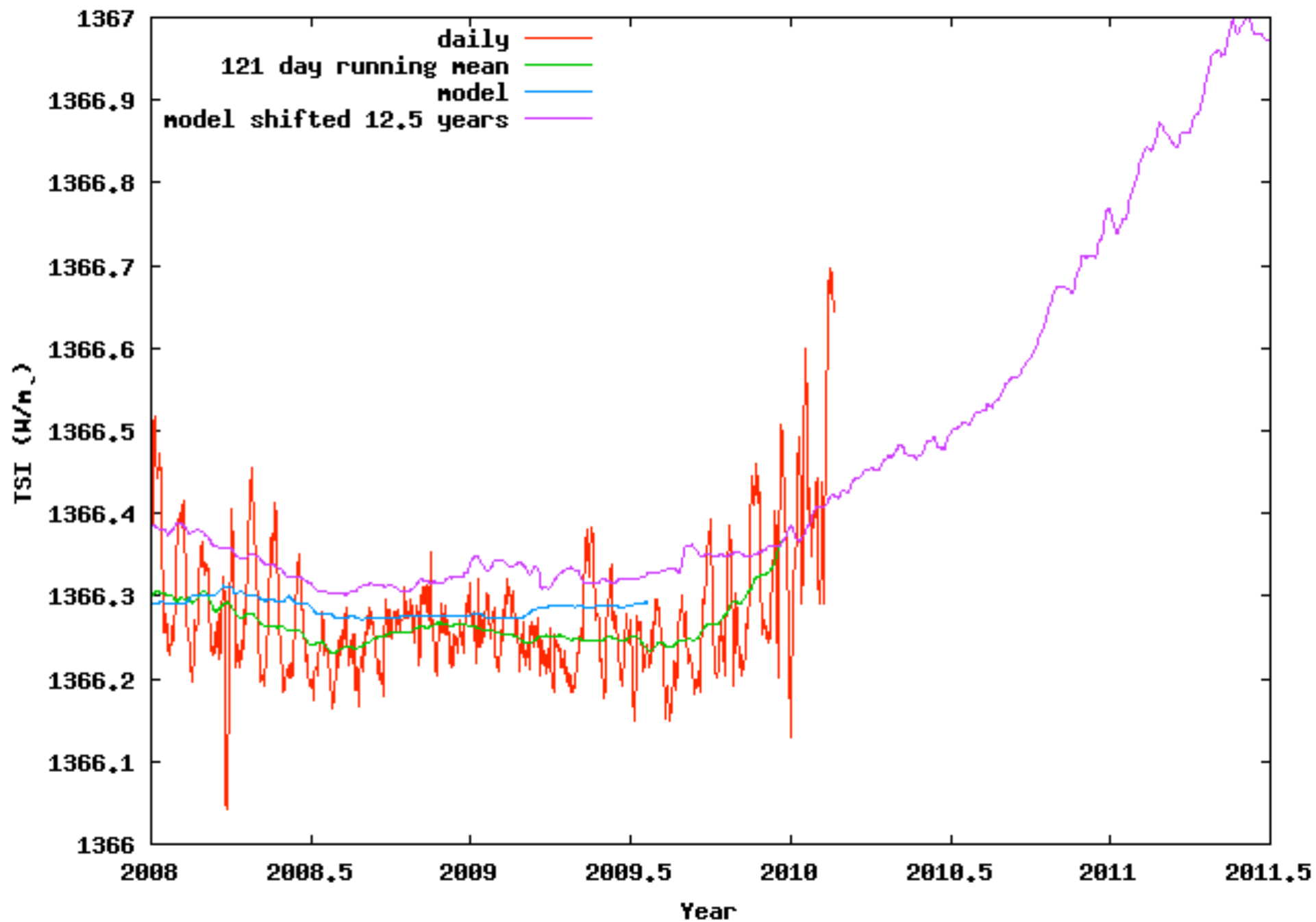
- ◆ DIARAD measurements **confirm** previous measurements
- ◆ Values **1364.75 W / m<sup>2</sup> +/- 0.76 W/m<sup>2</sup> (right)**  
**1364.5 W / m<sup>2</sup> +/- 0.76 W/m<sup>2</sup> (left)**
- ◆ Consistency between the left and right channel  
+/- 0.25 W / m<sup>2</sup> very good
- ◆ DIARAD/SOVIM **can not confirm** TIM/SORCE measurements

121 day running mean of TSI composites





RMIB SARR Total Solar Irradiance

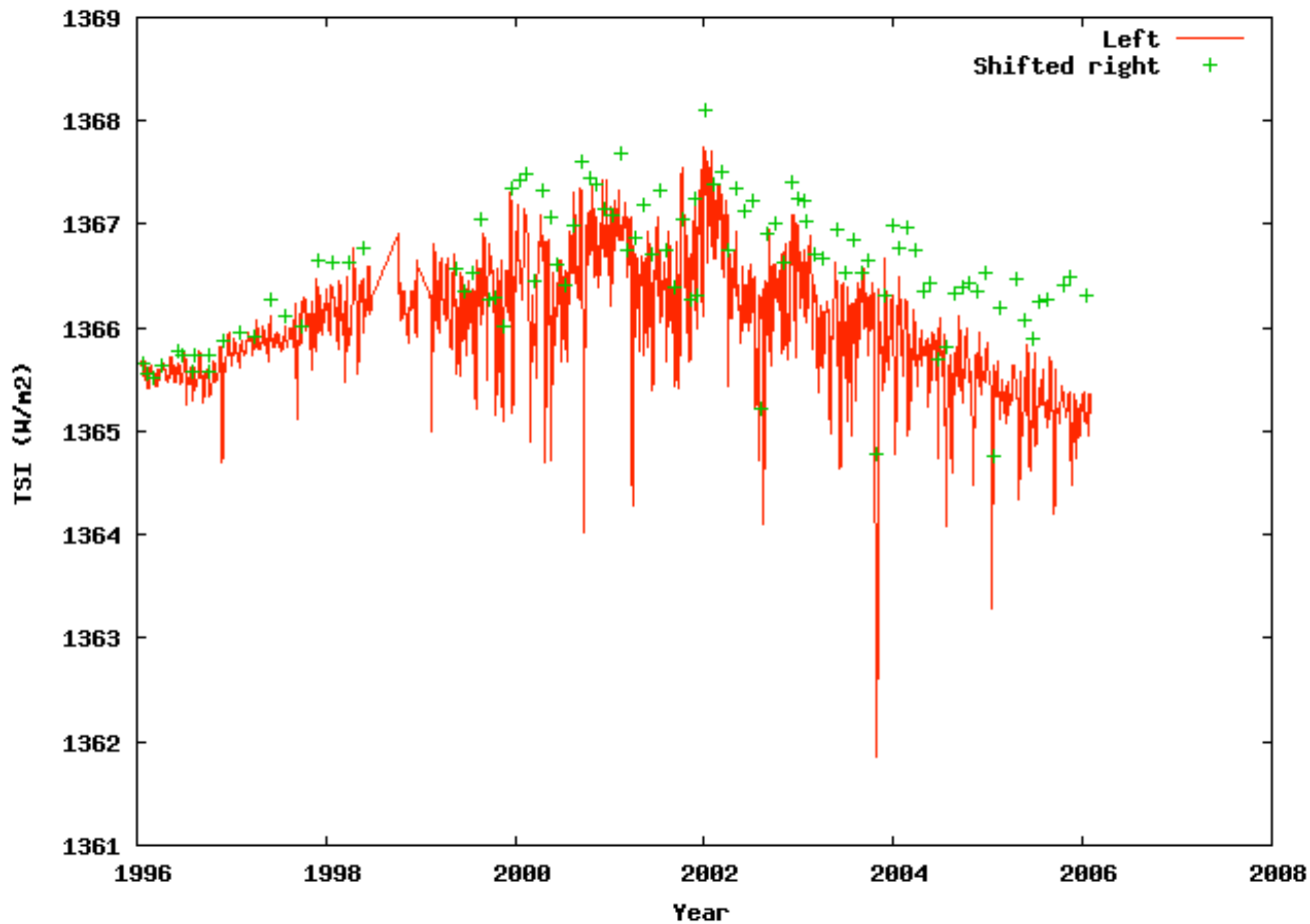


# Solar cycle 23

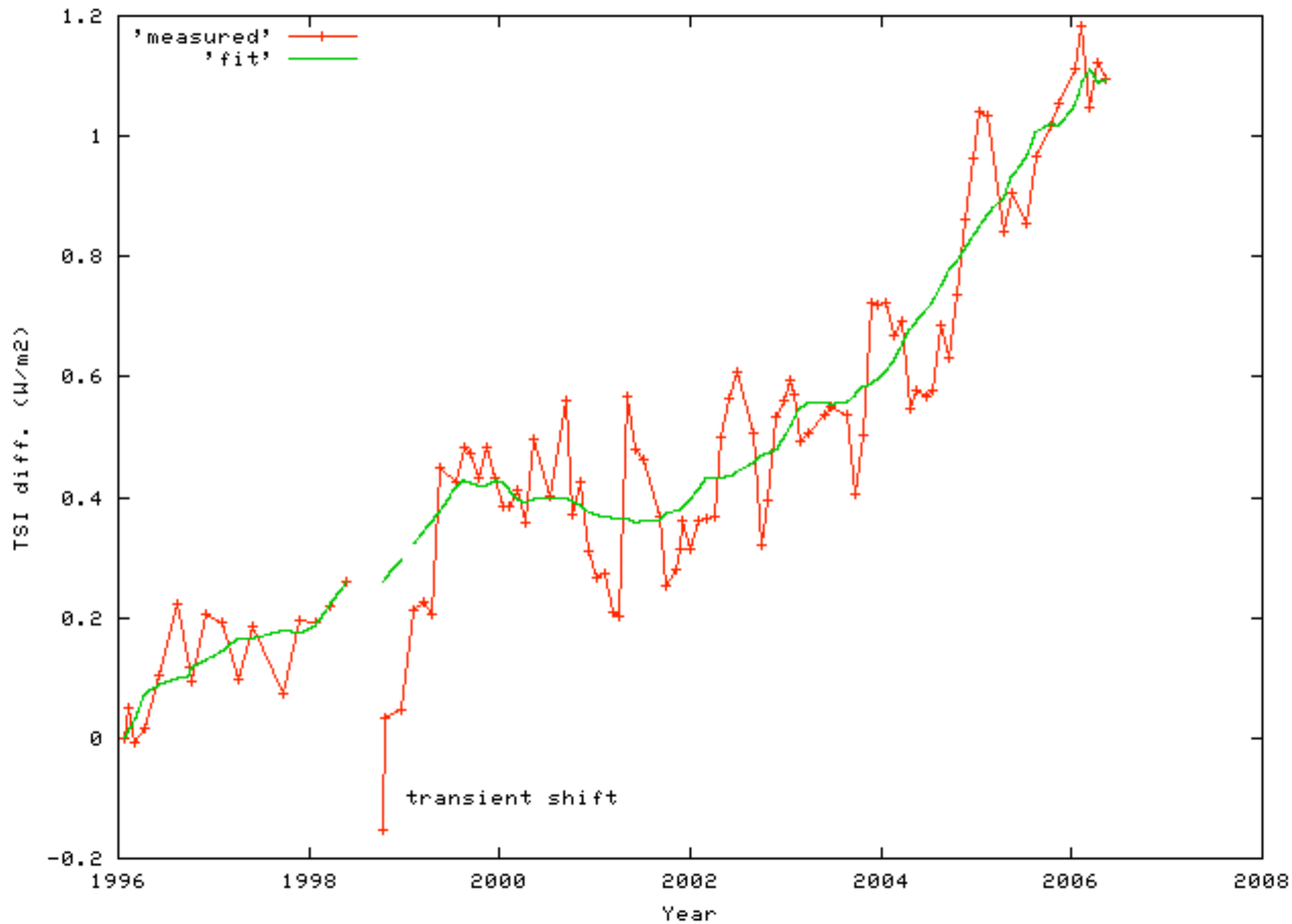
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- ◆ 2 continuously measuring VIRGO radiometers with backup for ageing correction:
  - DIARAD Left + Right(backup)
  - PMO06V A + B(backup)
- ◆ 3rd time series: ACRIM 2 + ACRIM3
- ◆ 4th time series: ERBS + TIM

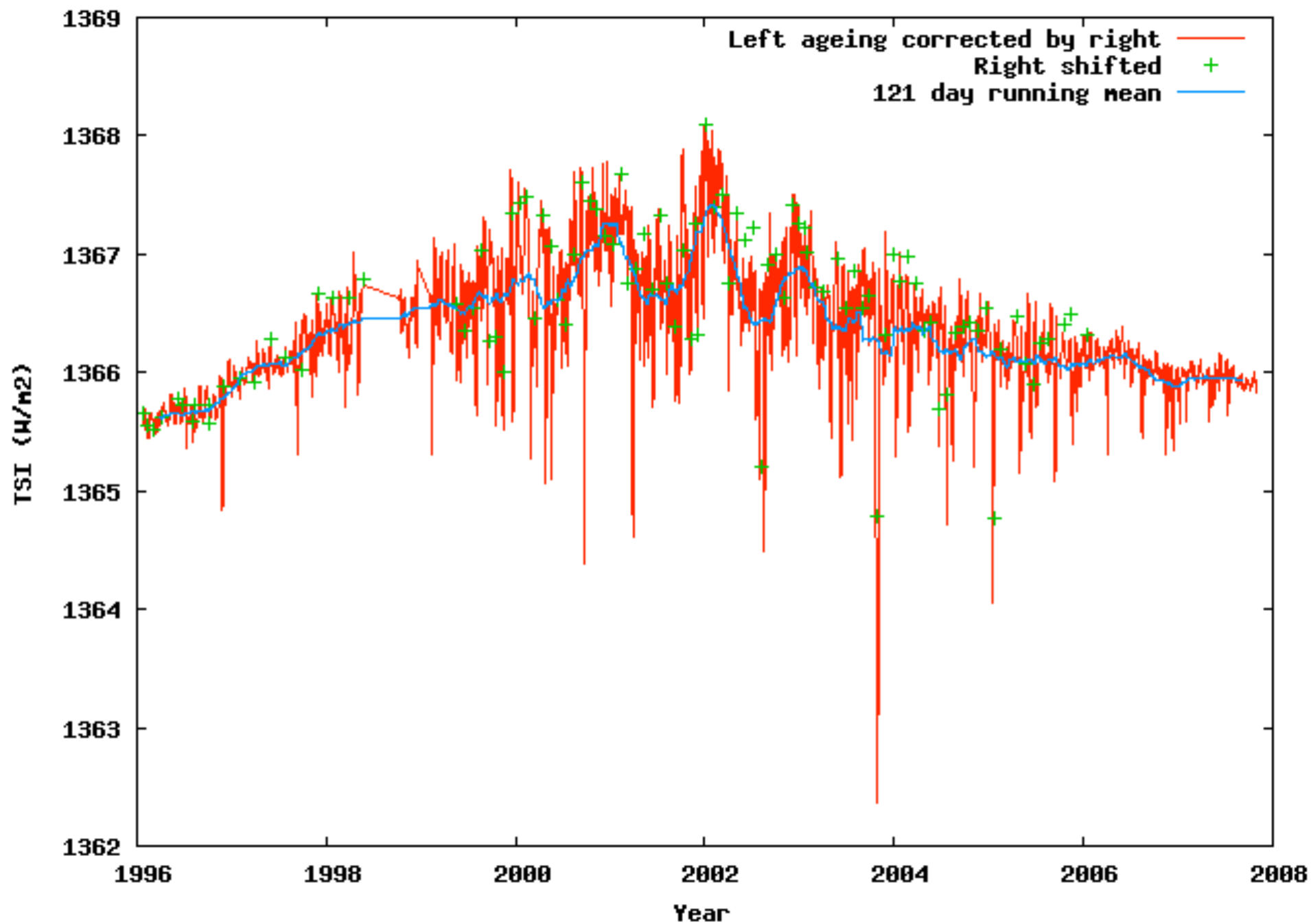
# DIARAD level 1 TSI



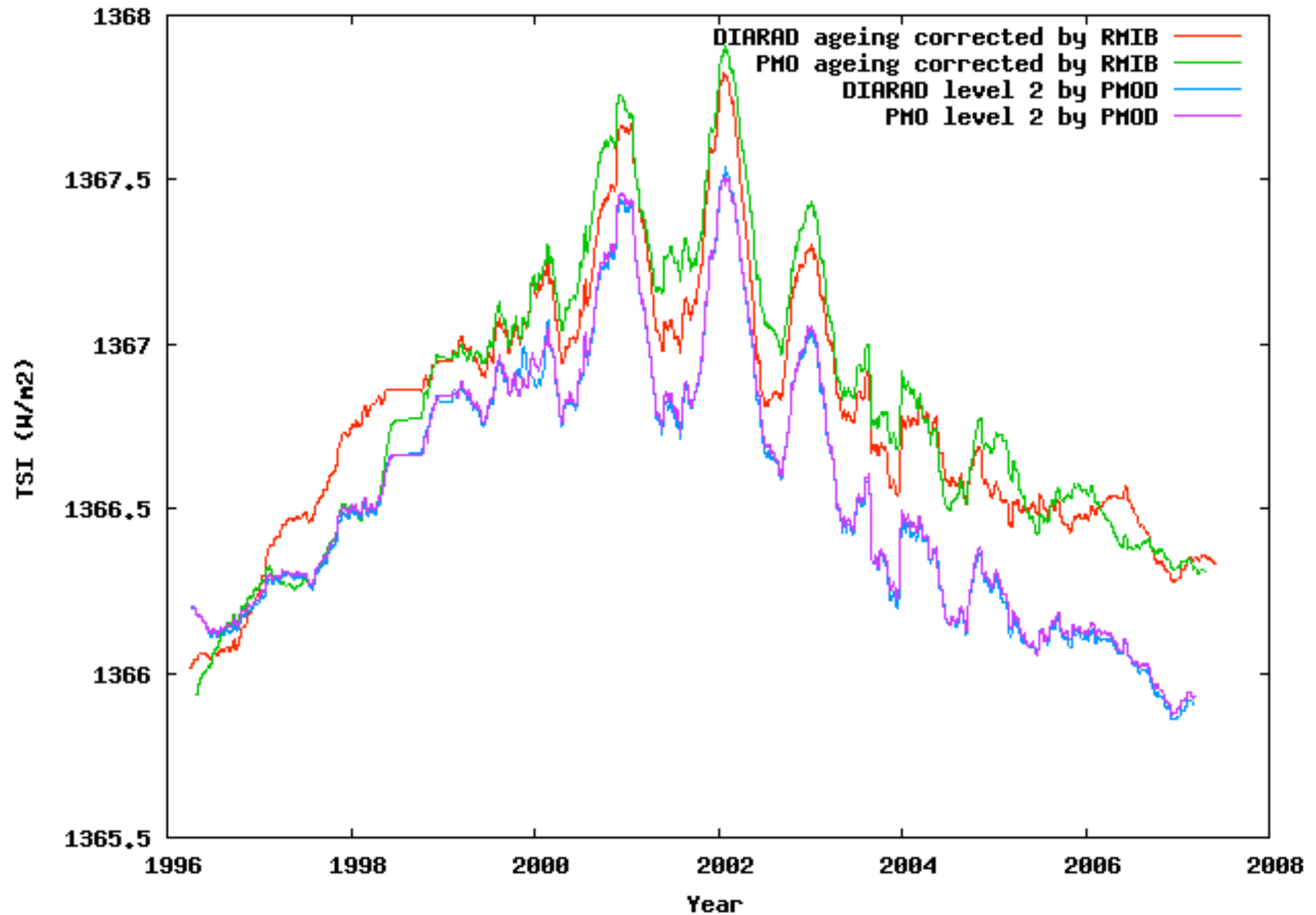
DIARAD Right minus Left TSI



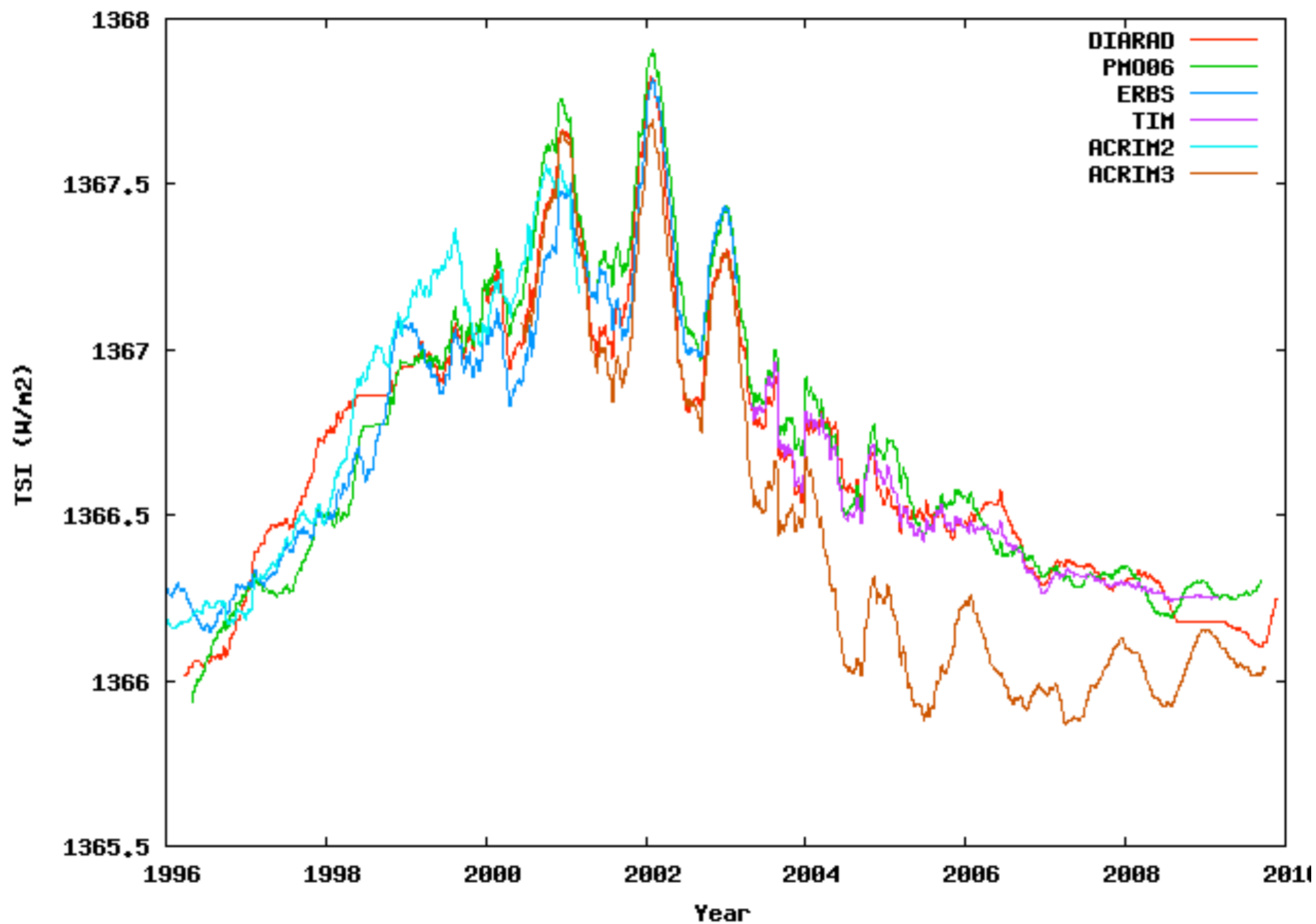
### DIARAD level 2 Total Solar Irradiance



Different versions of VIRGO TSI measurements after adjustment absolute level



TSI instruments: 121 day running mean



# Conclusions

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- ◆ DIARAD/SOVIM gives our best estimate of the solar constant, in disagreement with TIM/SORCE
- ◆ 4 independent TSI time series are available during cycle 23.
- ◆ Time series agree if standard ageing corrections are used.
- ◆ ACRIM3 was diverging, is converging now.
- ◆ Good agreement with models assuming no solar minimum TSI variation.



# References

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- ◆ Mekaoui S., S. Dewitte, 'Total Solar Irradiance measurement and modelling during cycle 23', Solar Physics, 2007, DOI: 10.1007/s11207-007-9070-y
- ◆ Mekaoui, S., S. Dewitte, "Total Solar Irradiance absolute level from DIARAD/SOVIM on the International Space Station", accepted for publication by Adv. Space Res.