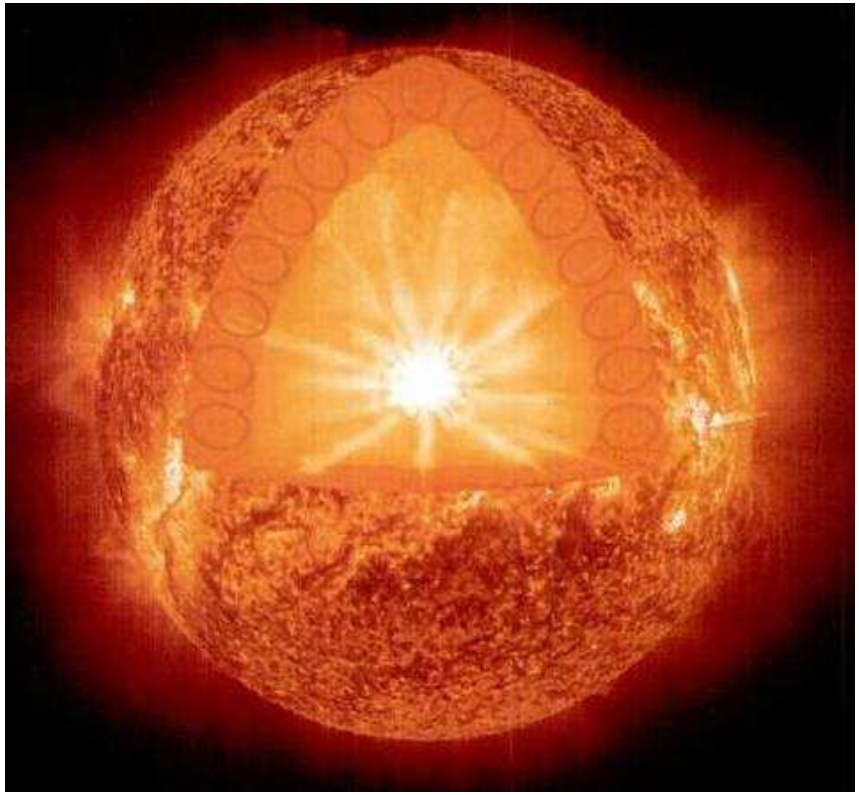
Picard: A new mission dedicated to the sun and our climate

S. Dewitte

RMIB

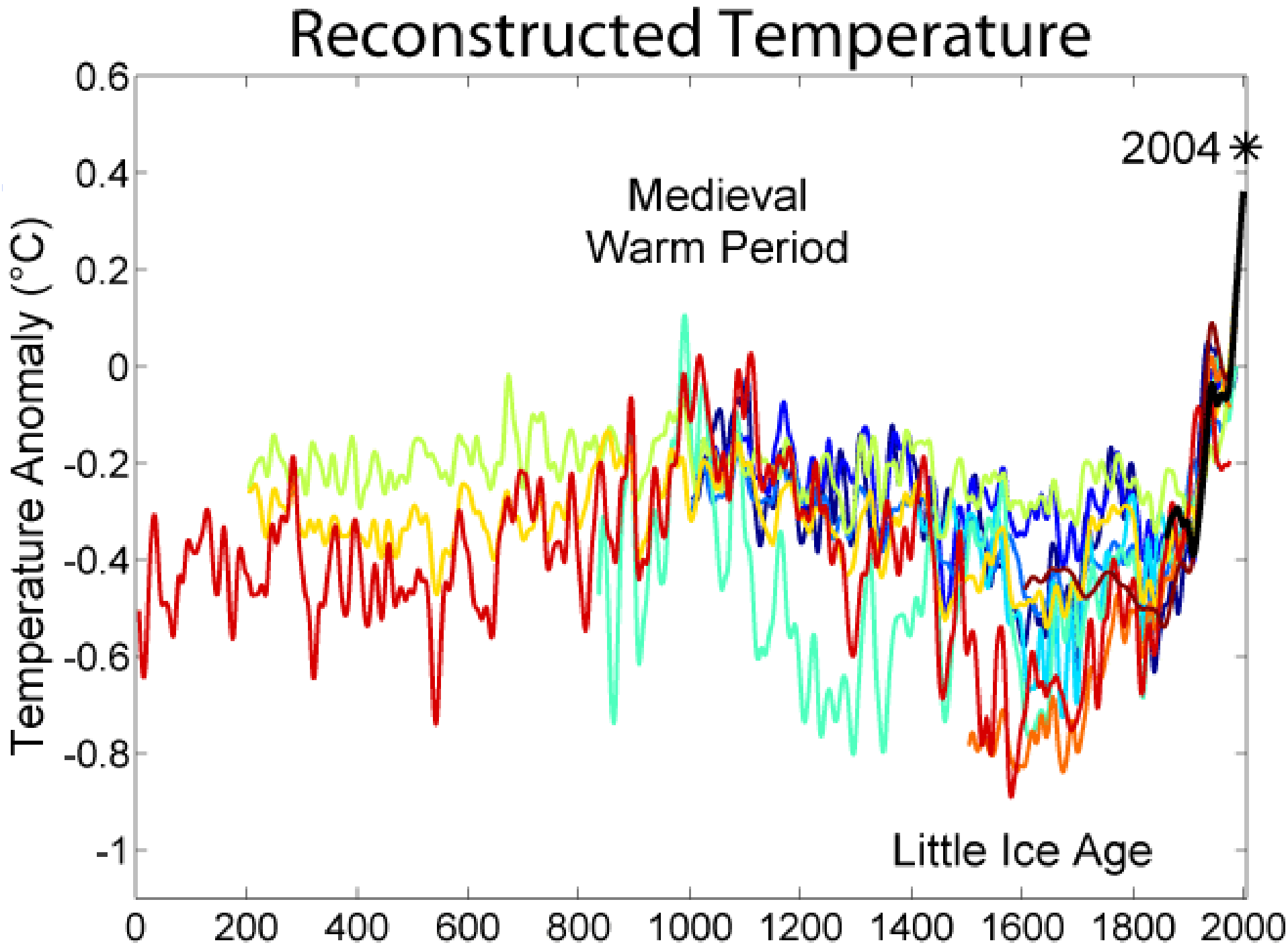
ERB workshop, 09/2010

Incoming solar radiation

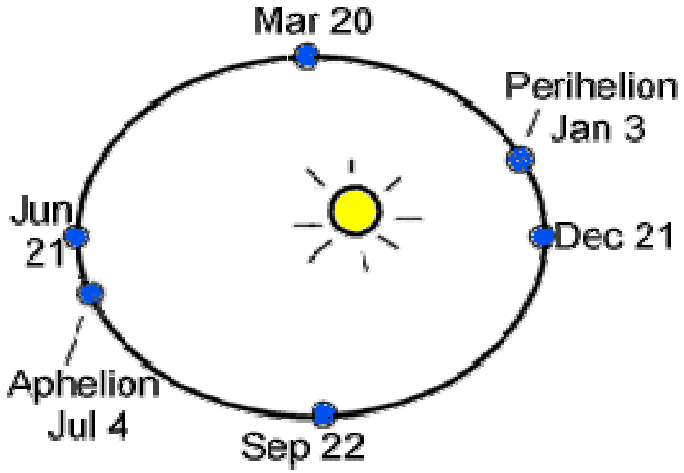


SOLAR

IRRADIANCE


Reconstructed Temperature
Temperature Anomaly (°C)
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2004 *
Medieval
Warm Period
Little Ice Age

Jean Picard



A new space mission

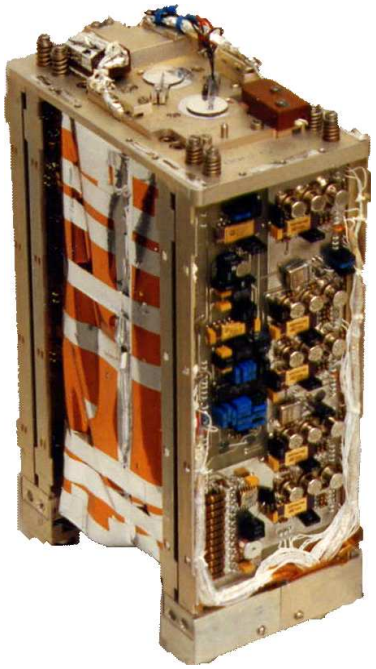
RMIB space record

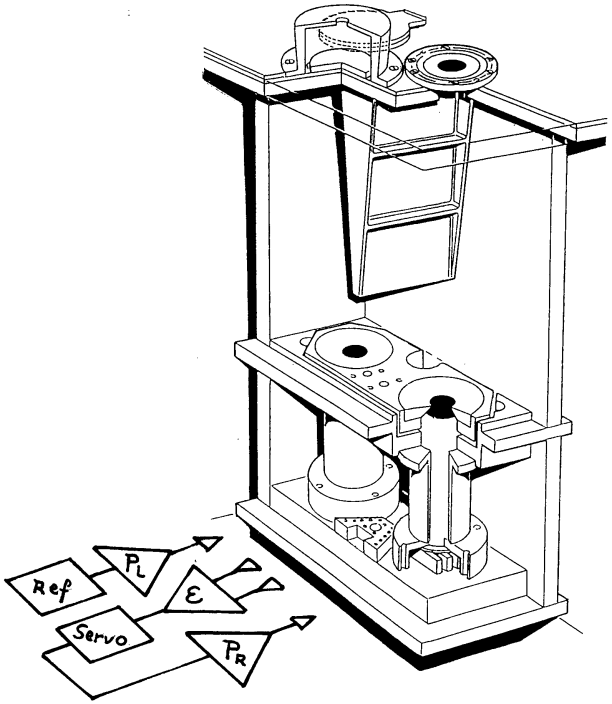
SPACELAB 1 NASA ESA	1983
ATLAS-I NASA STS-45	1992
EURECA ESA STS-46	**1992**
ATLAS-II NASA STS-56	1993
ATLAS-III NASA STS-66	1994
HITCHHIKER NASA STS-85	1997
HITCHHIKER NASA STS-95	1998
FREESTAR NASA STS-107	2003

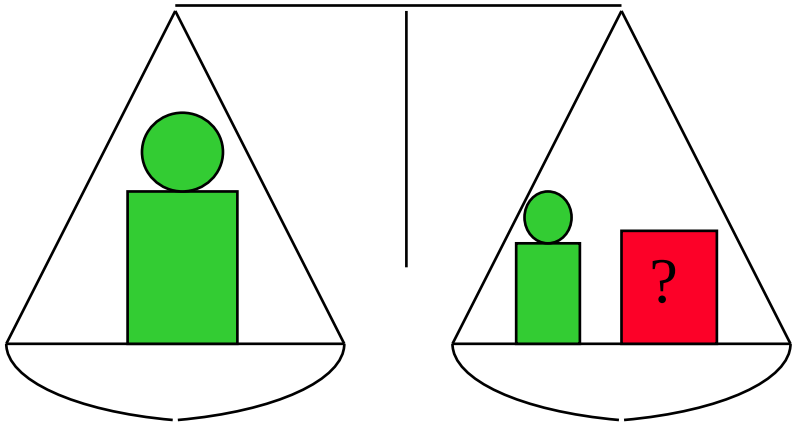
now in space:

SOHO/VIRGO/DIARAD ESA	Dec. 1995	>	15 year
ISS/SOVIM/DIARAD ESA	Feb. 2008	>	1 year
PICARD/SOVAP CNES	15 June 2010	>	min. 2 year

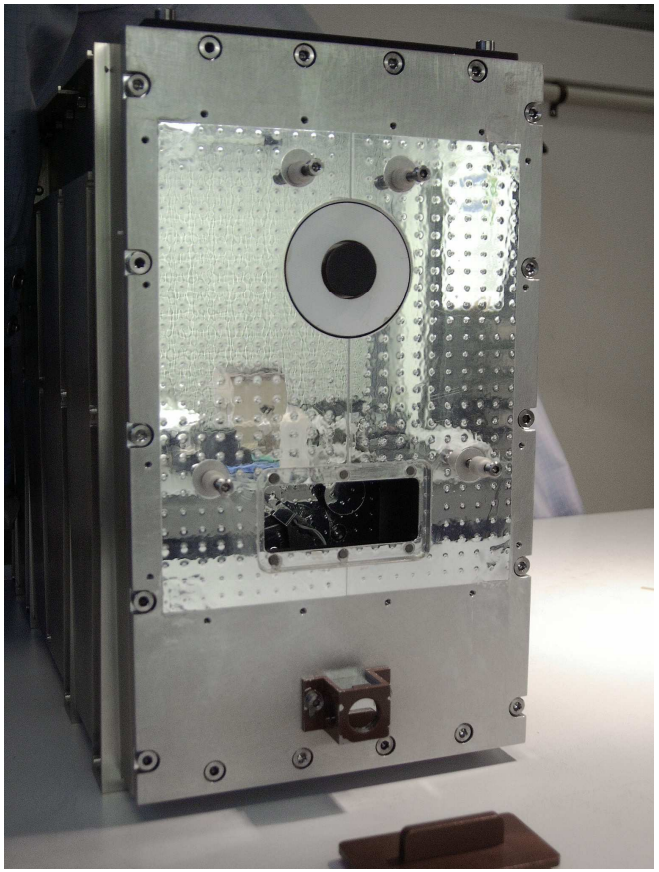
Measurement of solar irradiance: DIARAD

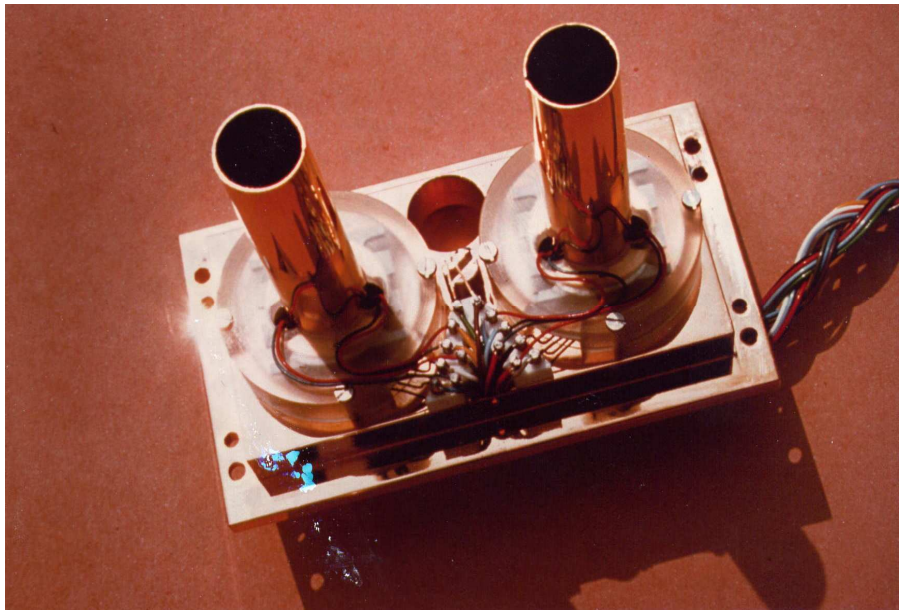


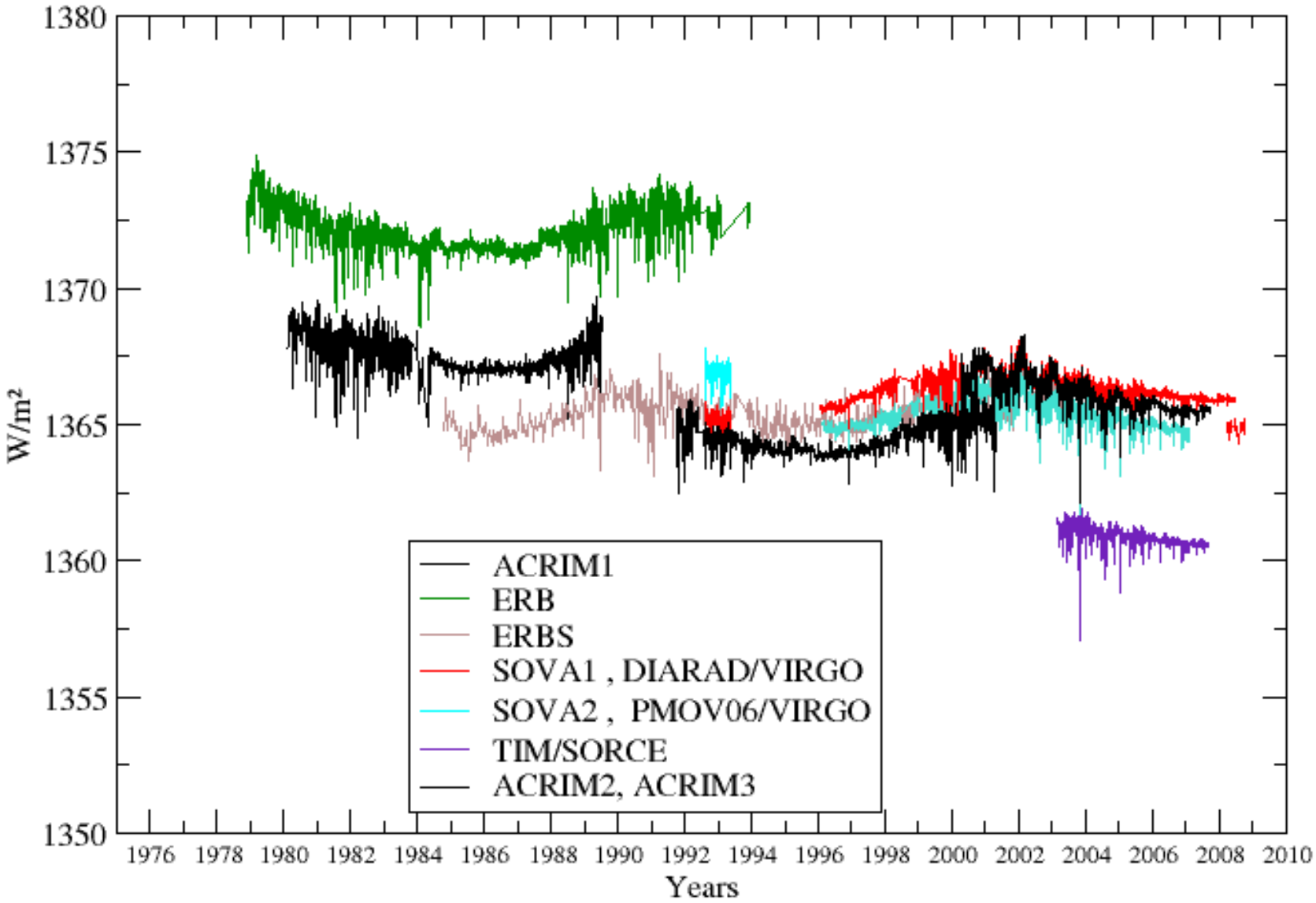


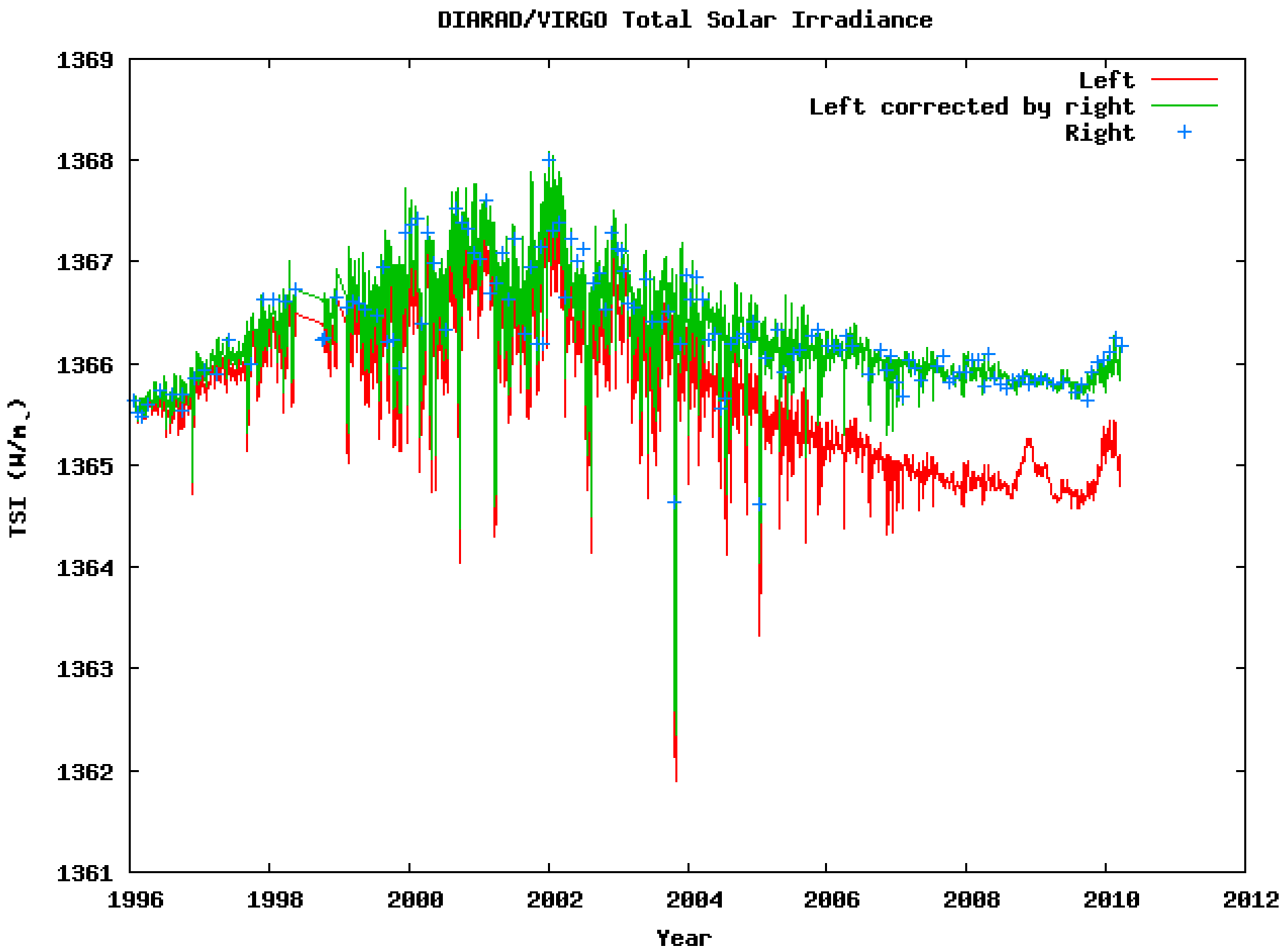


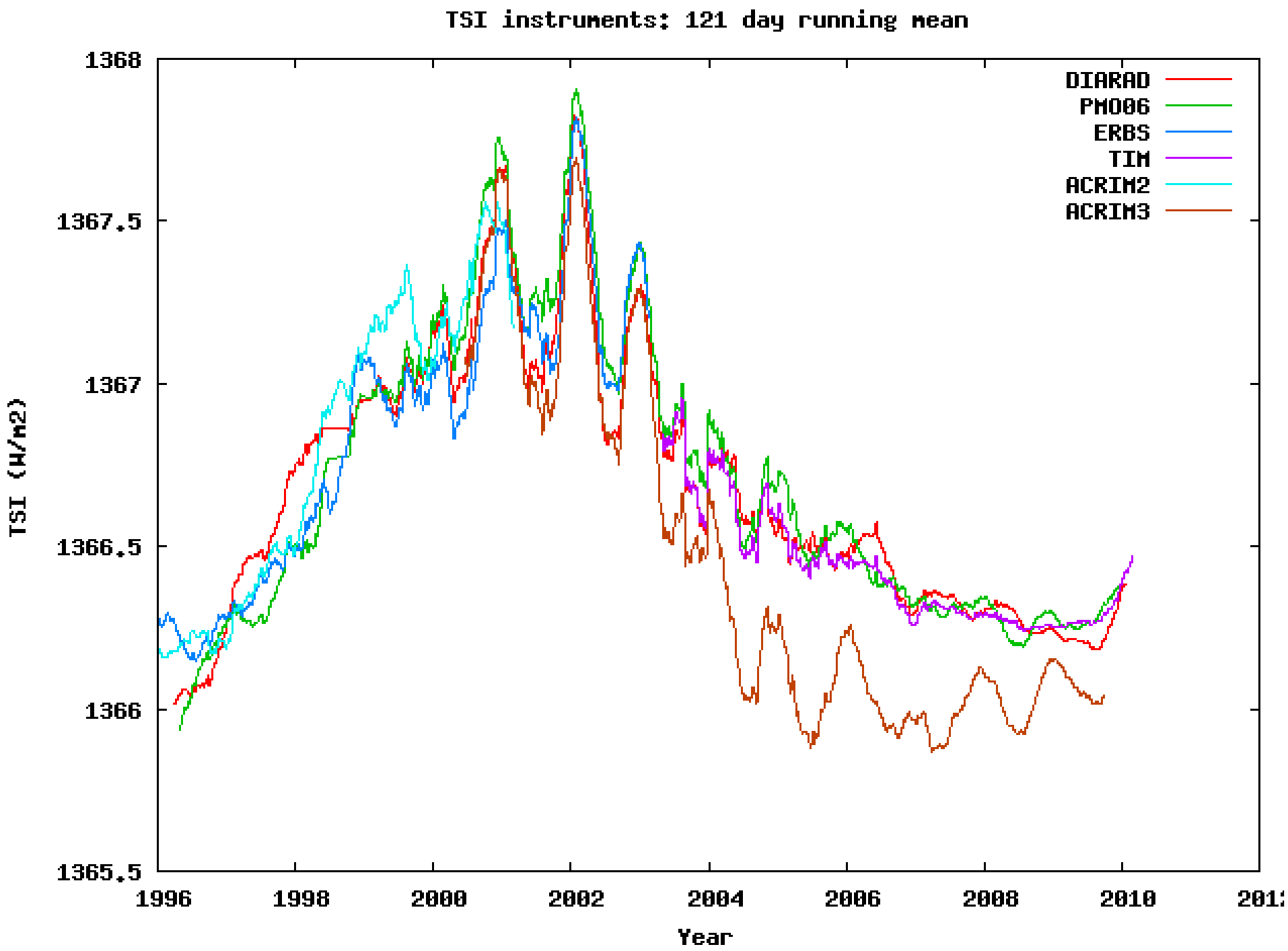
Sovap detectors

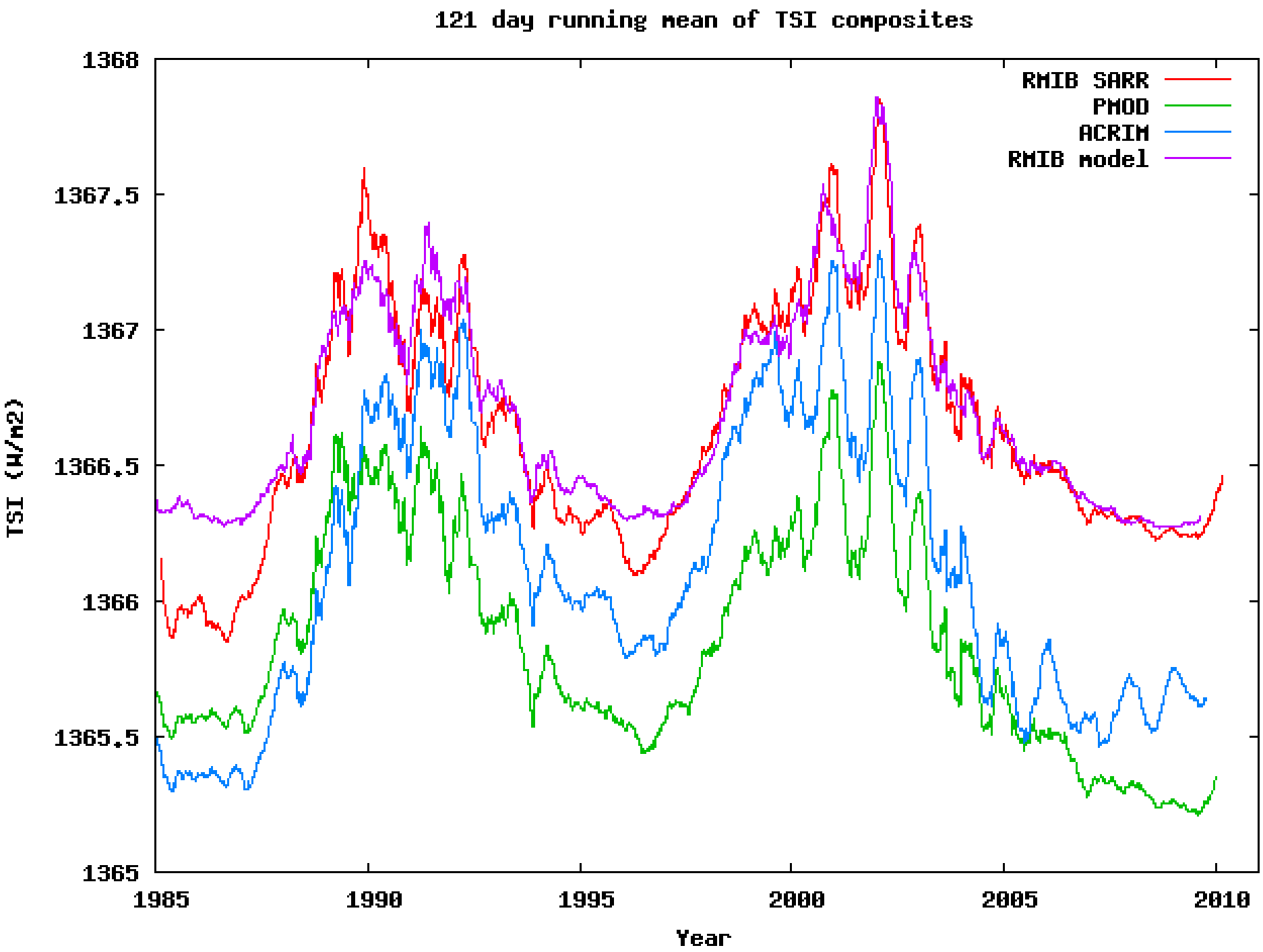


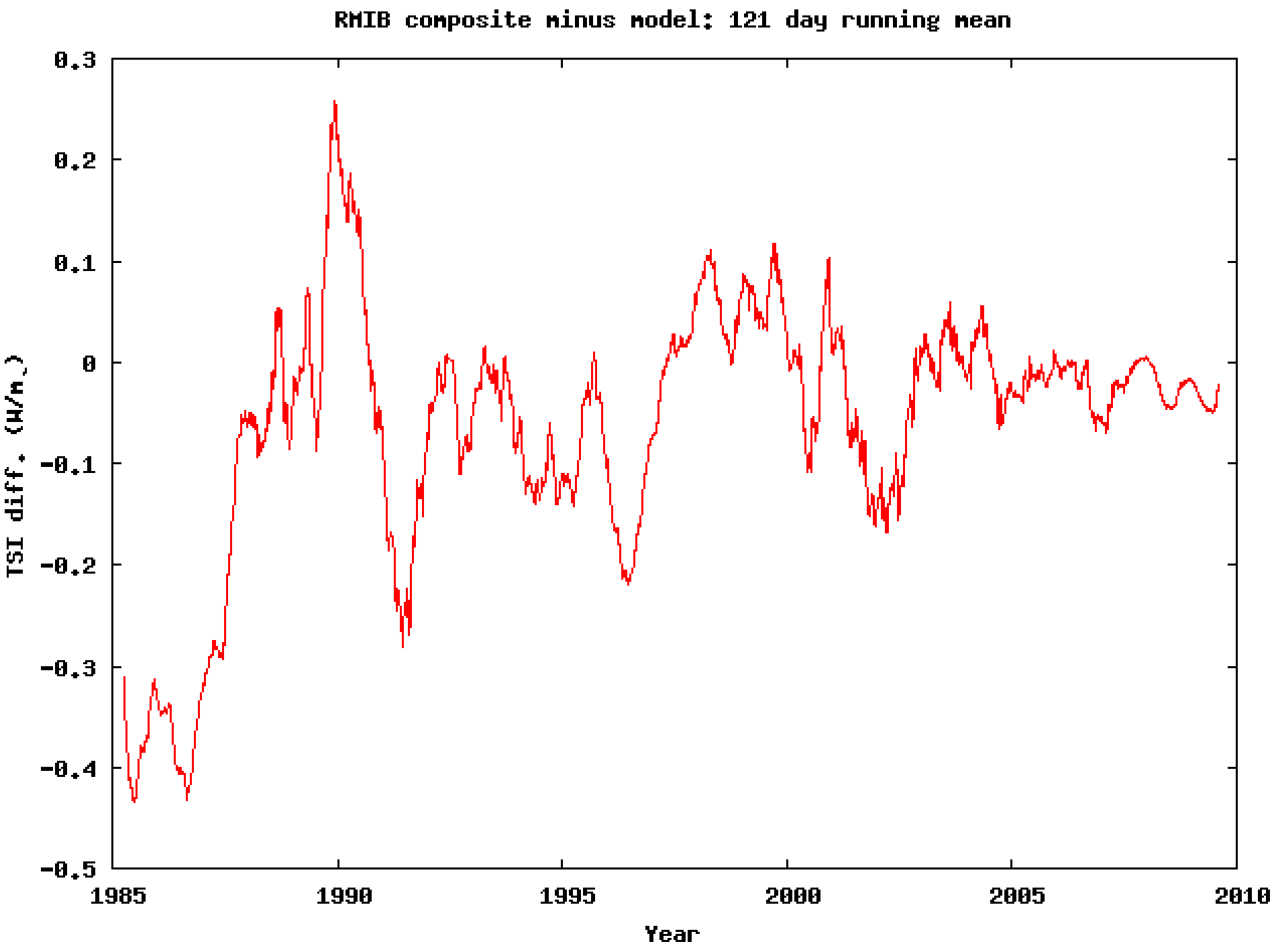



1380
1375
1370
1365
1360
1355
1350
W/m²
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
Years
ACRIM1
ERB
ERBS
SOVA1 , DIARAD/VIRGO
SOVA2 , PMOV06/VIRGO
TIM/SORCE
ACRIM2, ACRIM3

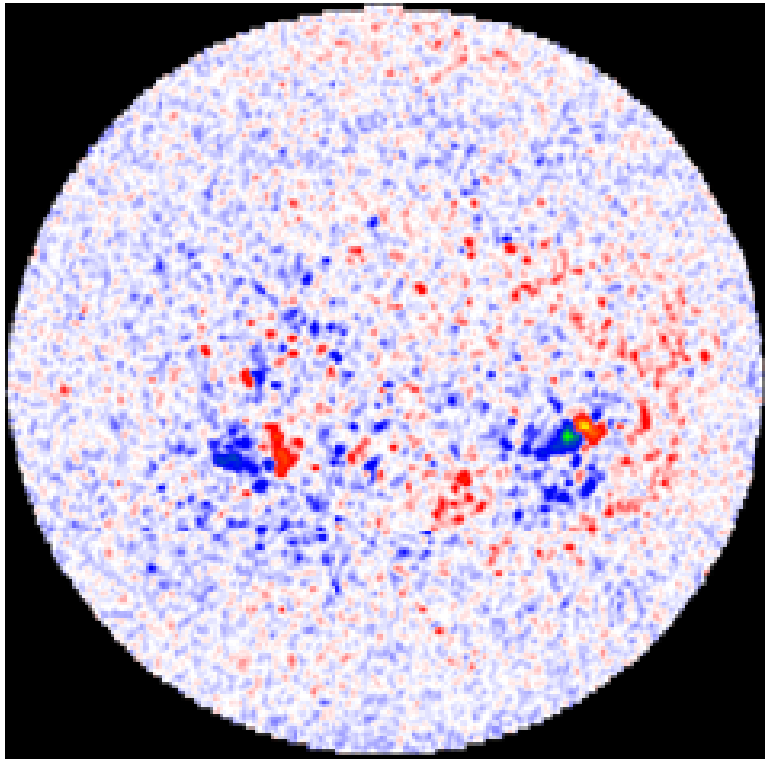

DIARAD/VIRGO Total Solar Irradiance
Left
Left corrected by right
Right
TSI (W/m_)
Year
1369
1368
1367
1366
1365
1364
1363
1362
1361
1996
1998
2000
2002
2004
2006
2008
2010
2012

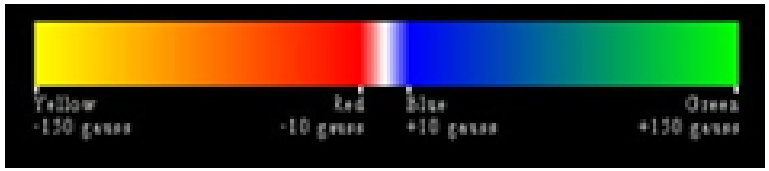

TSI instruments: 121 day running mean
DIARAD
PMO06
ERBS
TIM
ACRIM2
ACRIM3
TSI (W/m2)
1368
1367.5
1367
1366.5
1366
1365.5
1996
1998
2000
2002
2004
2006
2008
2010
Year


121 day running mean of TSI composites
RMIB SARR
PMOD
ACRIM
RMIB model
TSI (W/m2)
1368
1367.5
1367
1366.5
1366
1365.5
1365
1985
1990
1995
2000
2005
2010
Year


RMIB composite minus model: 121 day running mean
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
-0.5
TSI diff. (W/m_)
1985
1990
1995
2000
2005
2010
Year

Mount Wilson magnetic indices





- **Dark Features :**

  Mount Wilson Sunspot Index

  MWSI = Σ(|pixel value | ≥ 100 gauss) / nbr of pixels

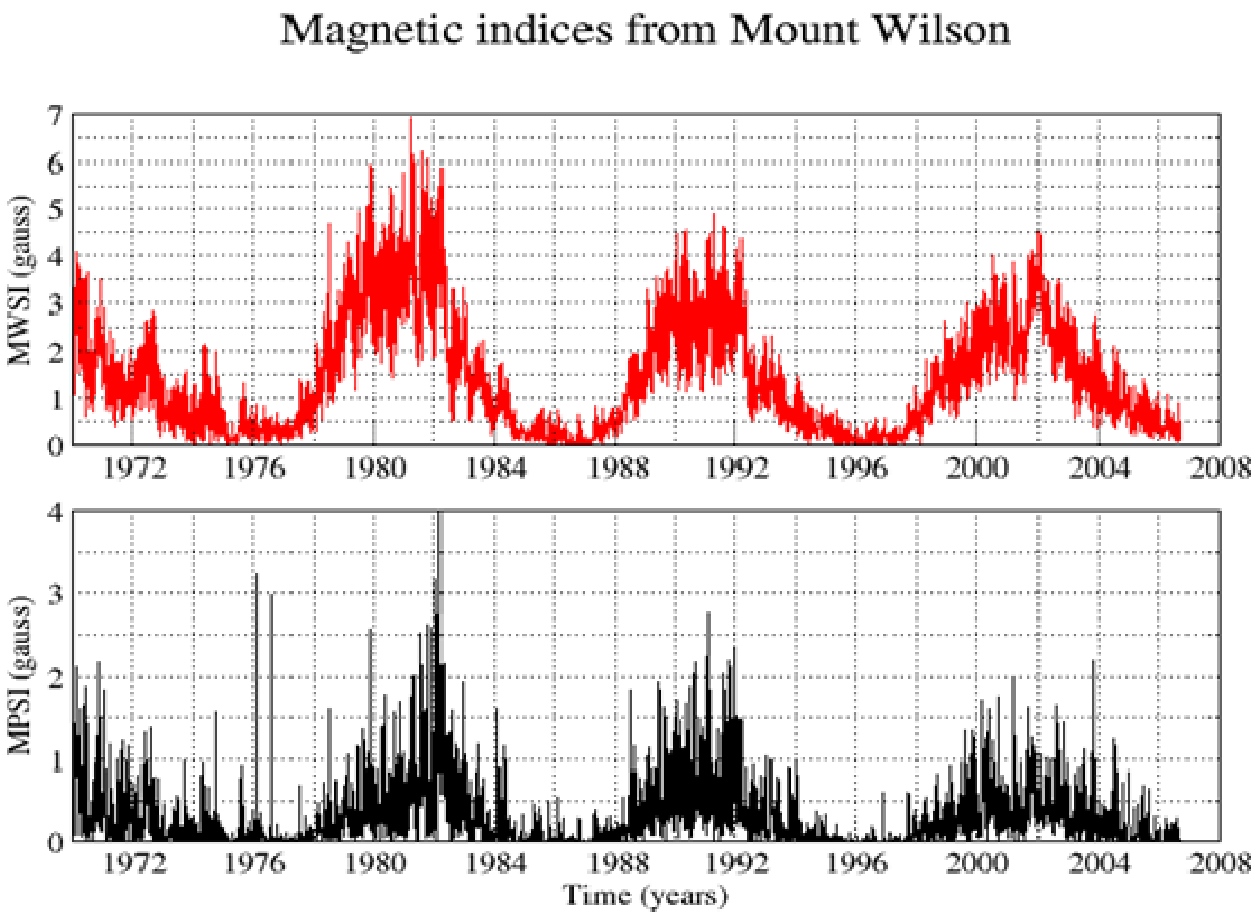
- **Bright Features :**

  Magnetic Plage Strenght Index

  MPSI = Σ(10 gauss <|pixel value | < 100 gauss) / nbr

Magnetic model:

$$TSI = a + b \,.\, MPSI + c \,.\, MWSI$$



Picard provides

- Continuation of TSI measurements.
- Verification of absolute level TSI.
- BOS sensor for simultaneous sun and earth view.
- Measurement of solar diameter.