

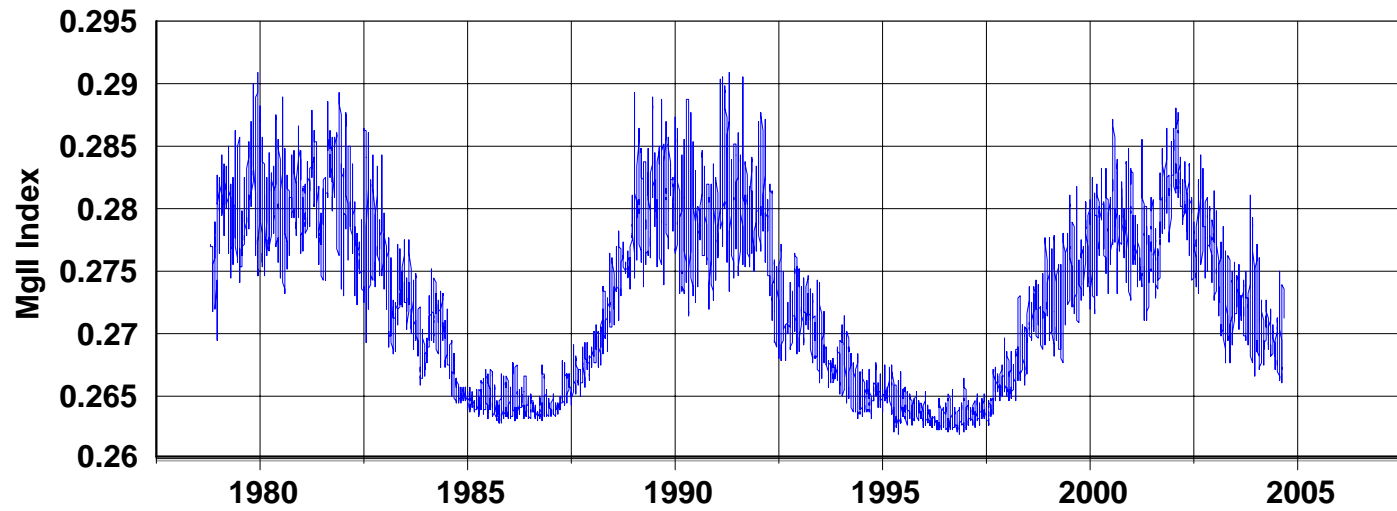
**Variability of the Sun's Radiative Output  
and  
the Global Warming Record  
The Last 30+ Years**

**Oran R. White  
LASP**

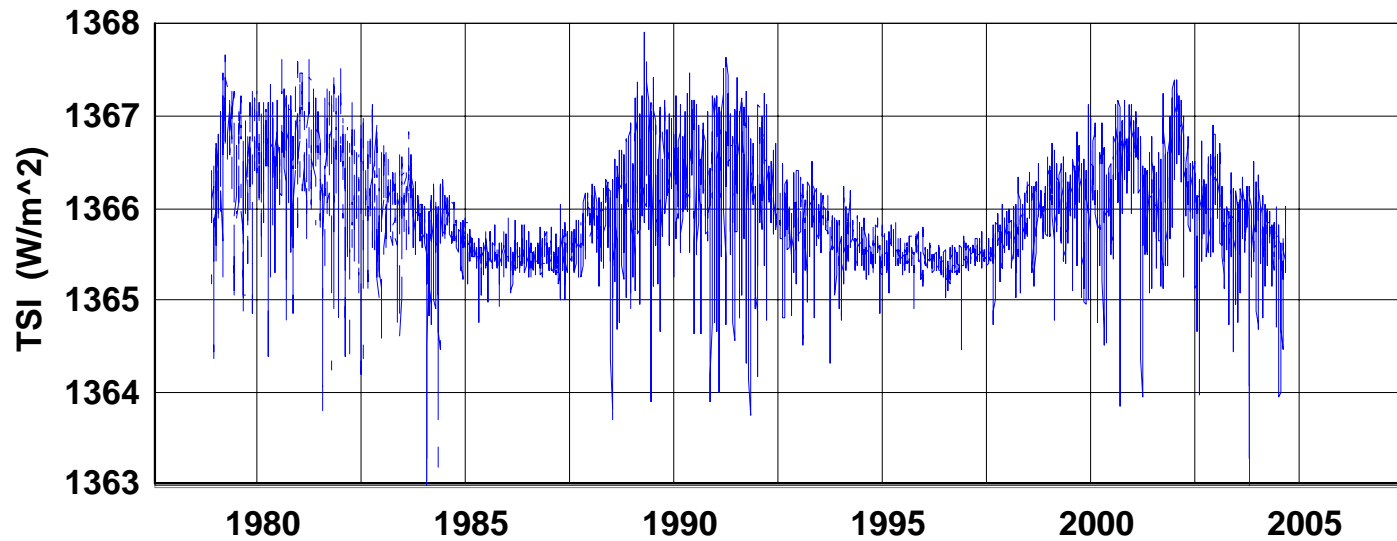
# Summary

- **Importance of the last 30 years in measurement and understanding**
- **Update on Cycle 23 and Global Warming**
- **Solar Output: Past and Future**

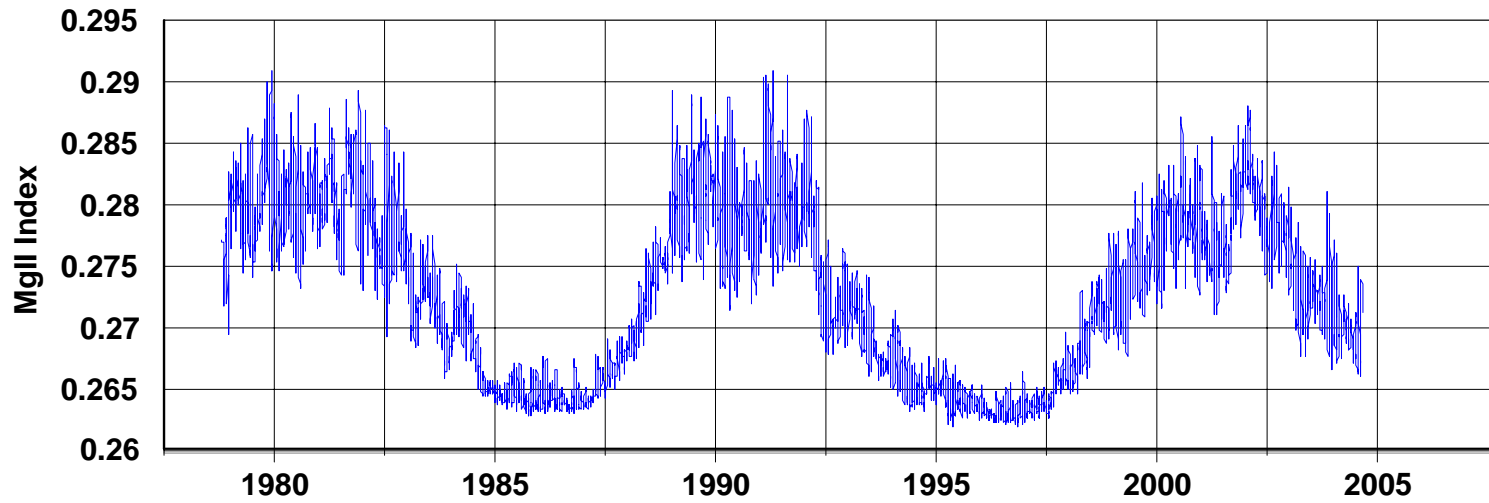
## UV Index Variation



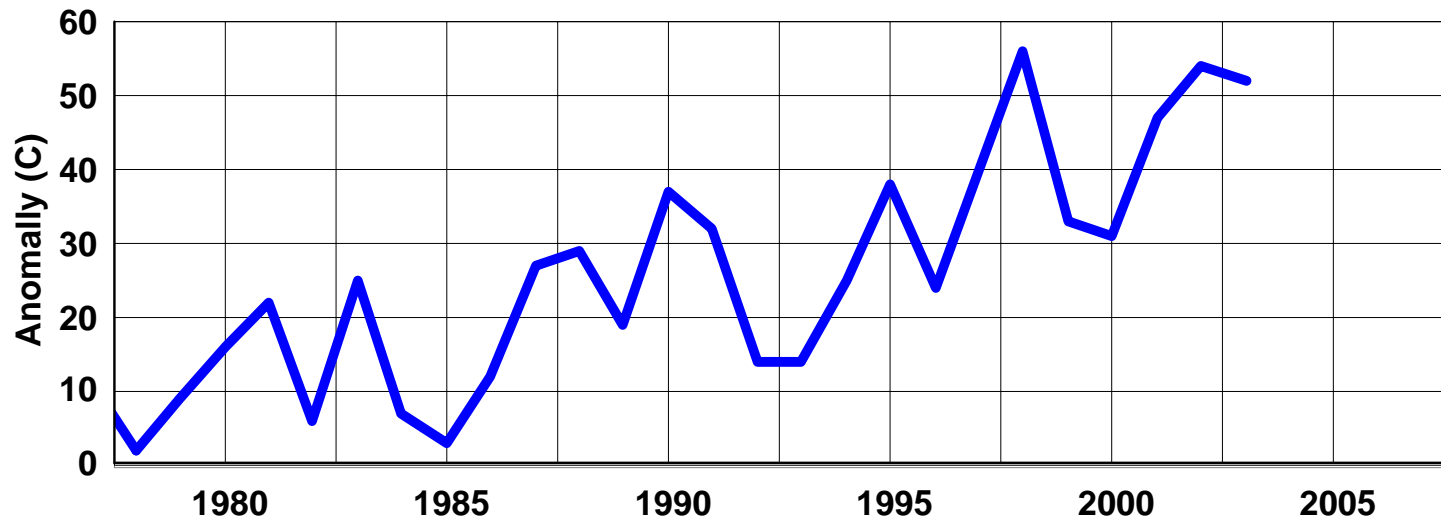
## Total Solar Irradiance Variation



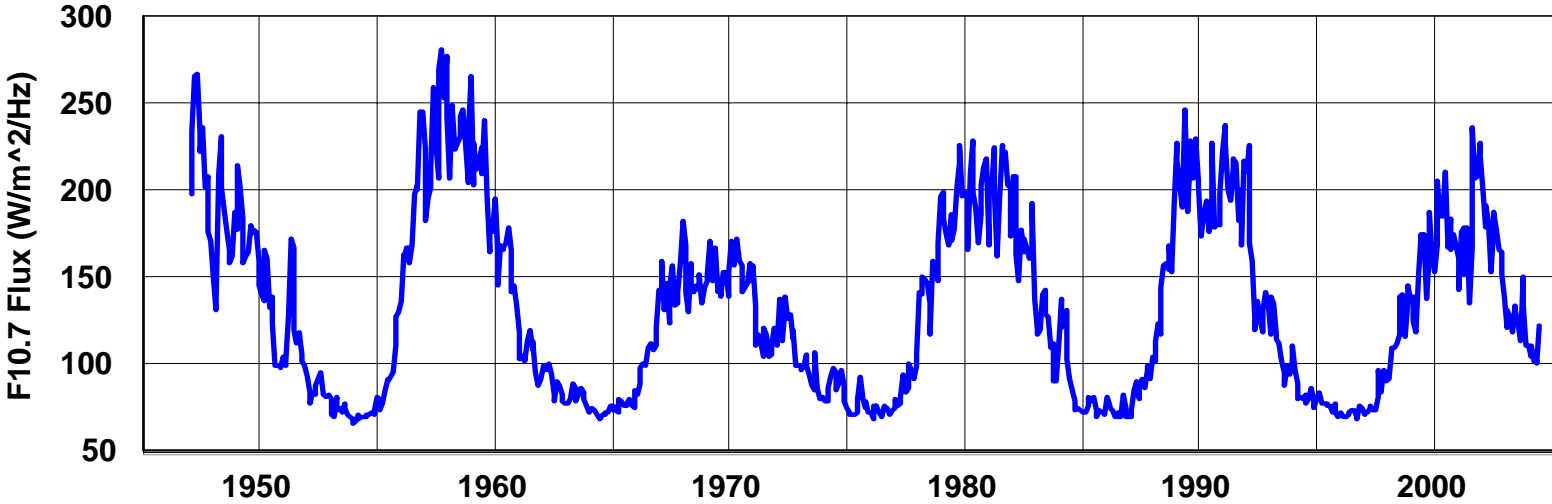
## UV Index Variation



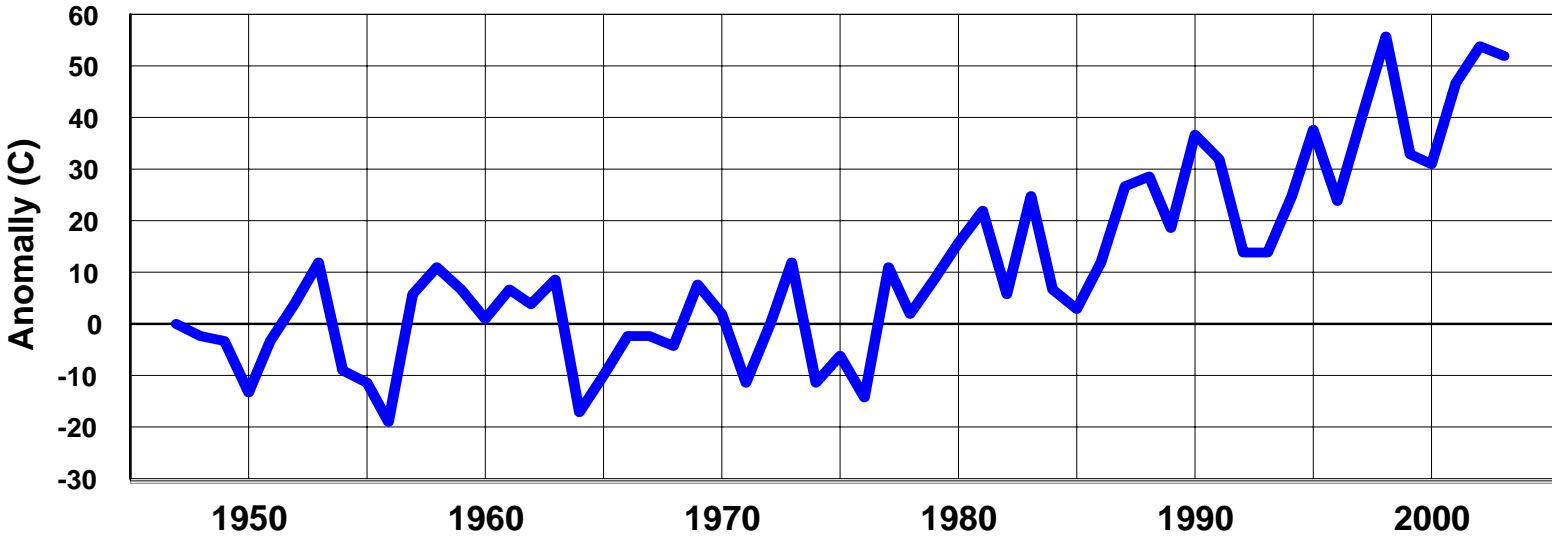
## Global Temperature Variation



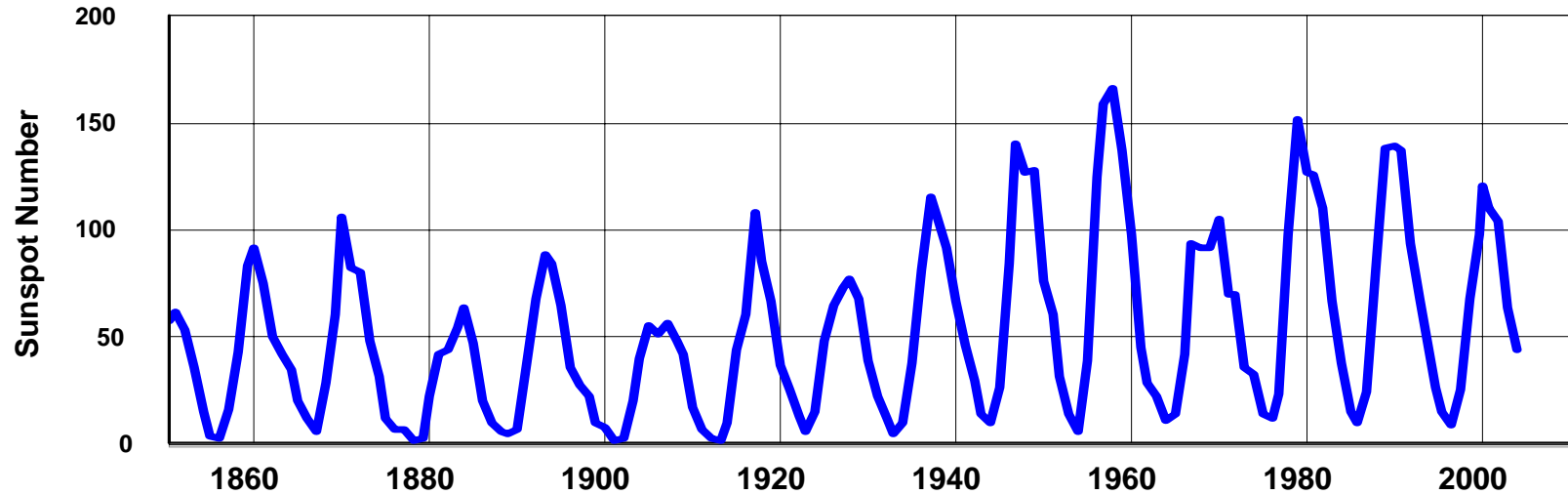
### 10.7 cm Radio Flux



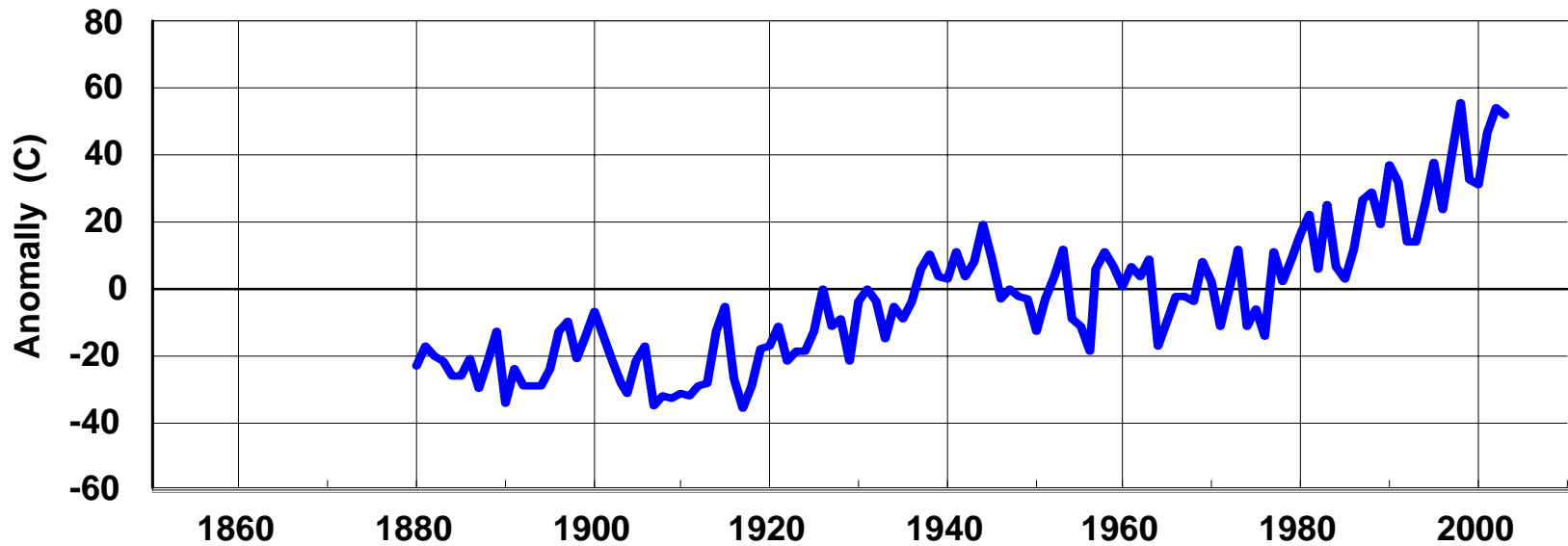
### Global Temperature Variation

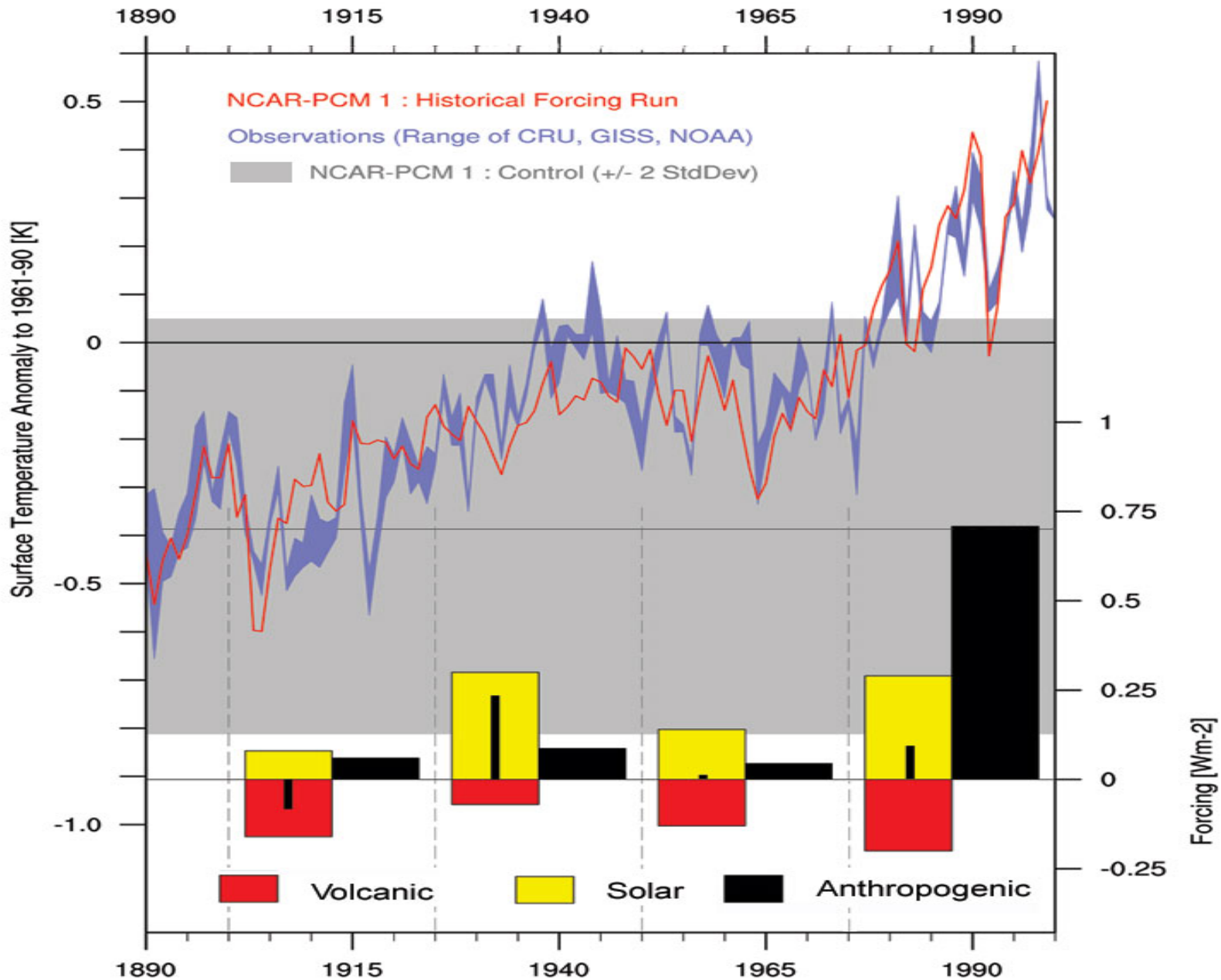


## Solar Activity Variation

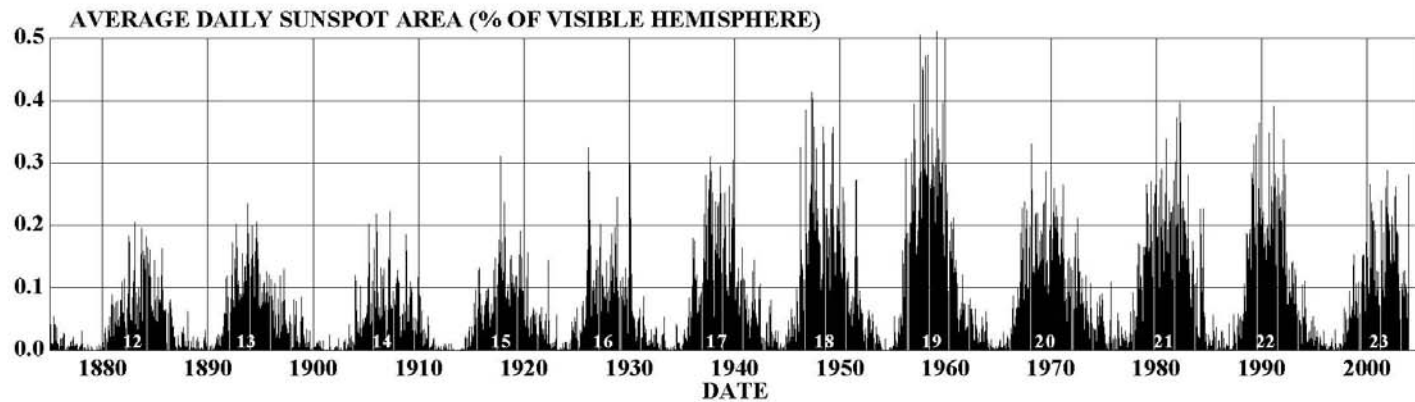
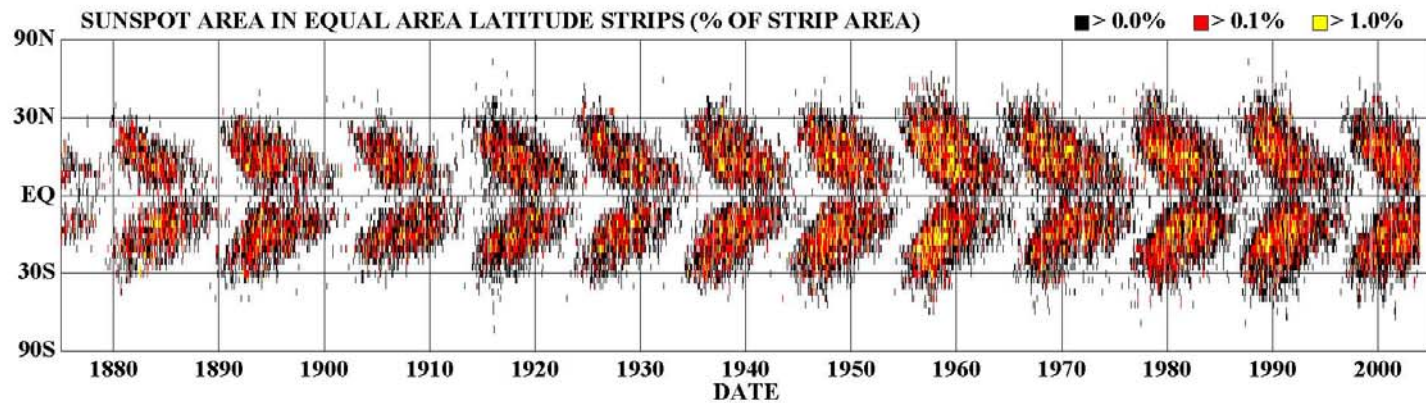


## Global Temperature Variation



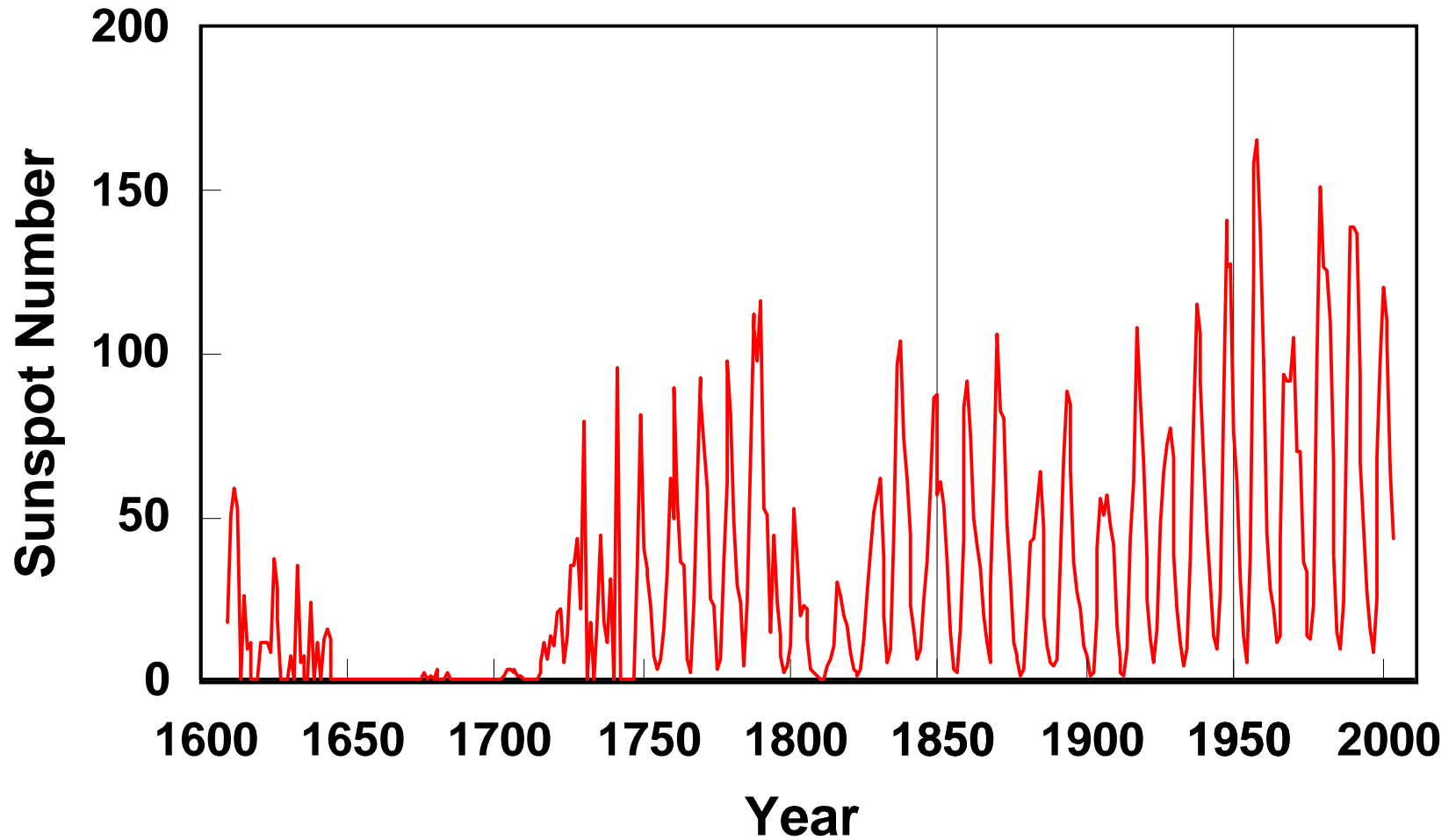


## DAILY SUNSPOT AREA AVERAGED OVER INDIVIDUAL SOLAR ROTATIONS



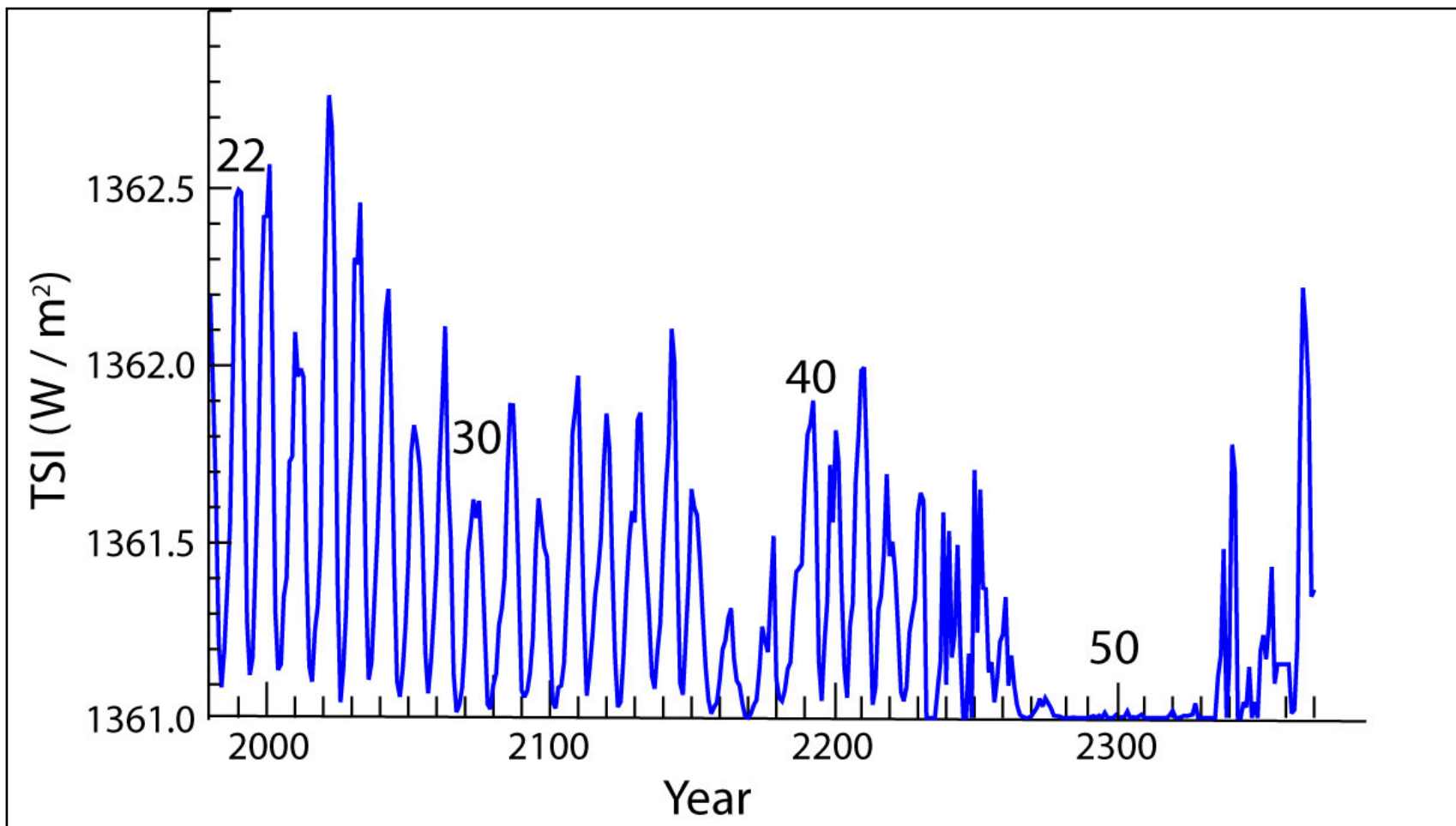
# Sunspot Number Variation

Hoyt-Schatten + orw extension



# Conclusions

- **Solar output cannot account for rapid increase in Global Warming**
- **Solar Cycle 23 is an important case study for both observation and theory**
- **Promising results on magnetic field evolution in Cycle 23**



# Significant Periods

- **SUNSPOTS**
- Schwabe Sunspot Cycle 11y
- Gleissberg Sunspot Cycle 89y

- **COSMOGENIC ISOTOPES**
- Isotope -----years-----
- 14C 88 208 2300
- 10Be 11 88 207 2260