



AARHUS
UNIVERSITET

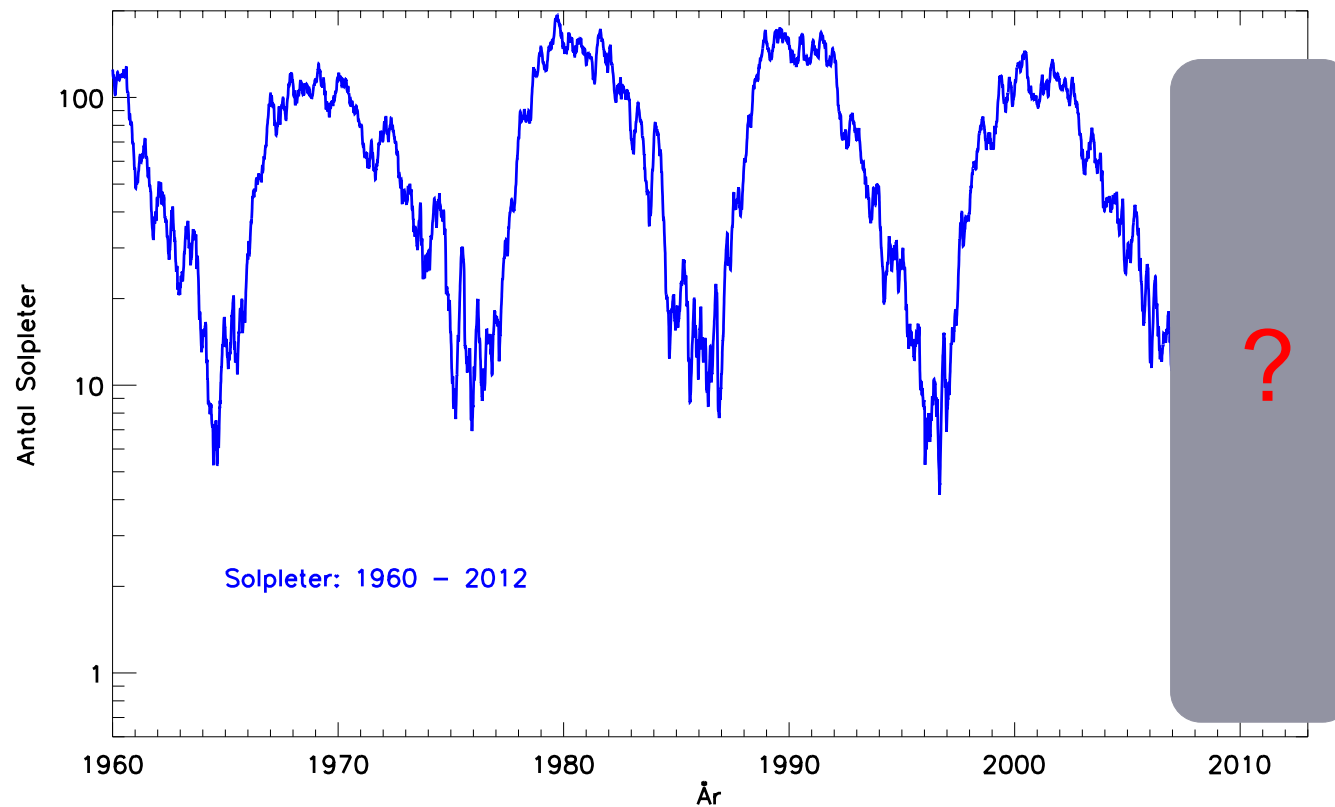


Is the Sun on its way into to hibernation?

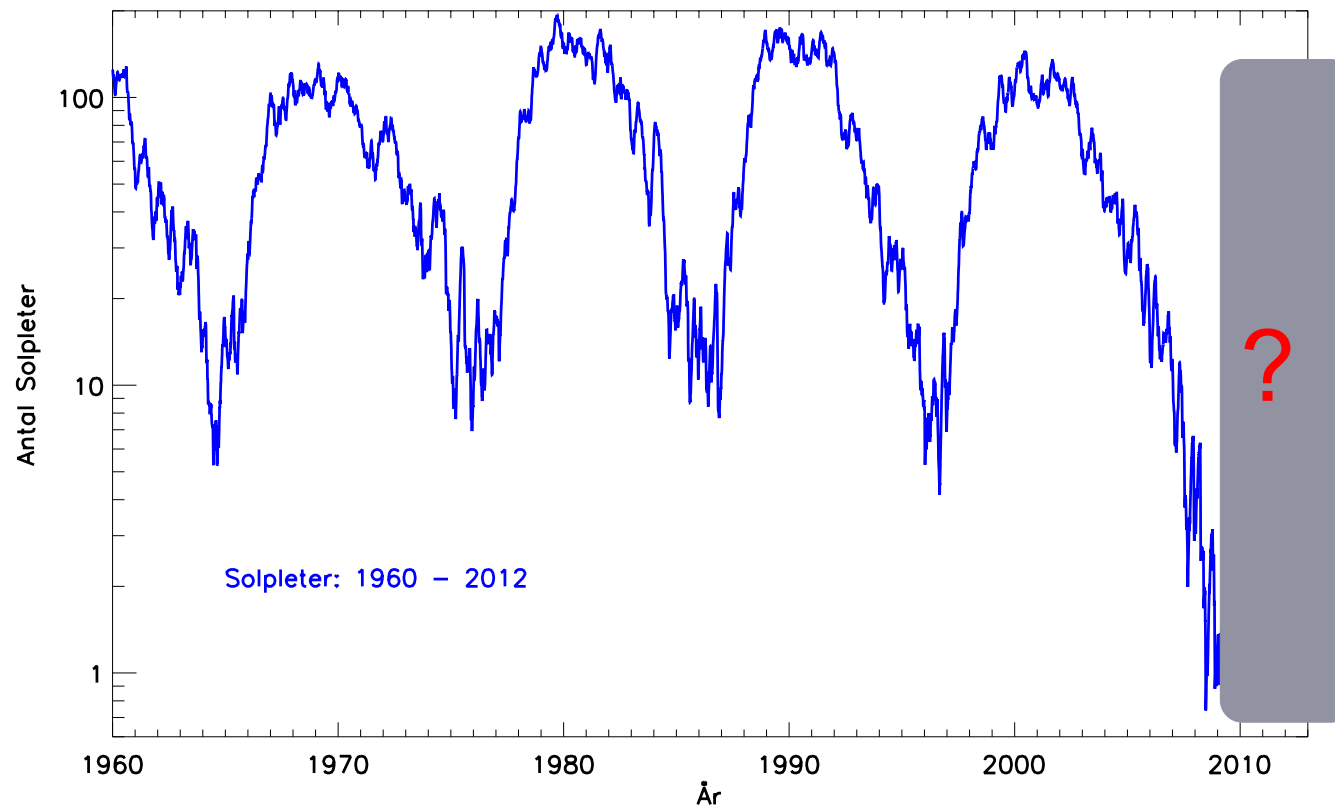
CHRISTOFFER KAROFF

VERSITET

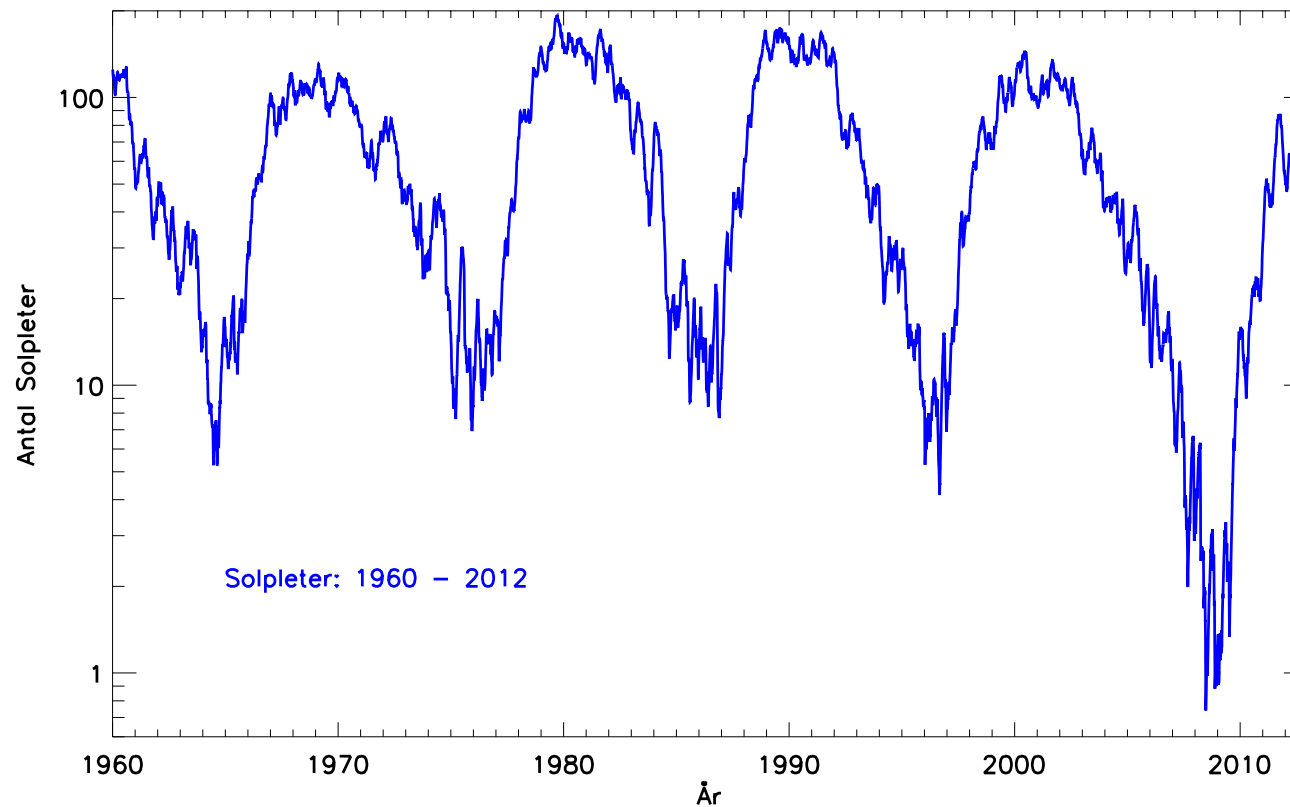
THE SOLAR CYCLE



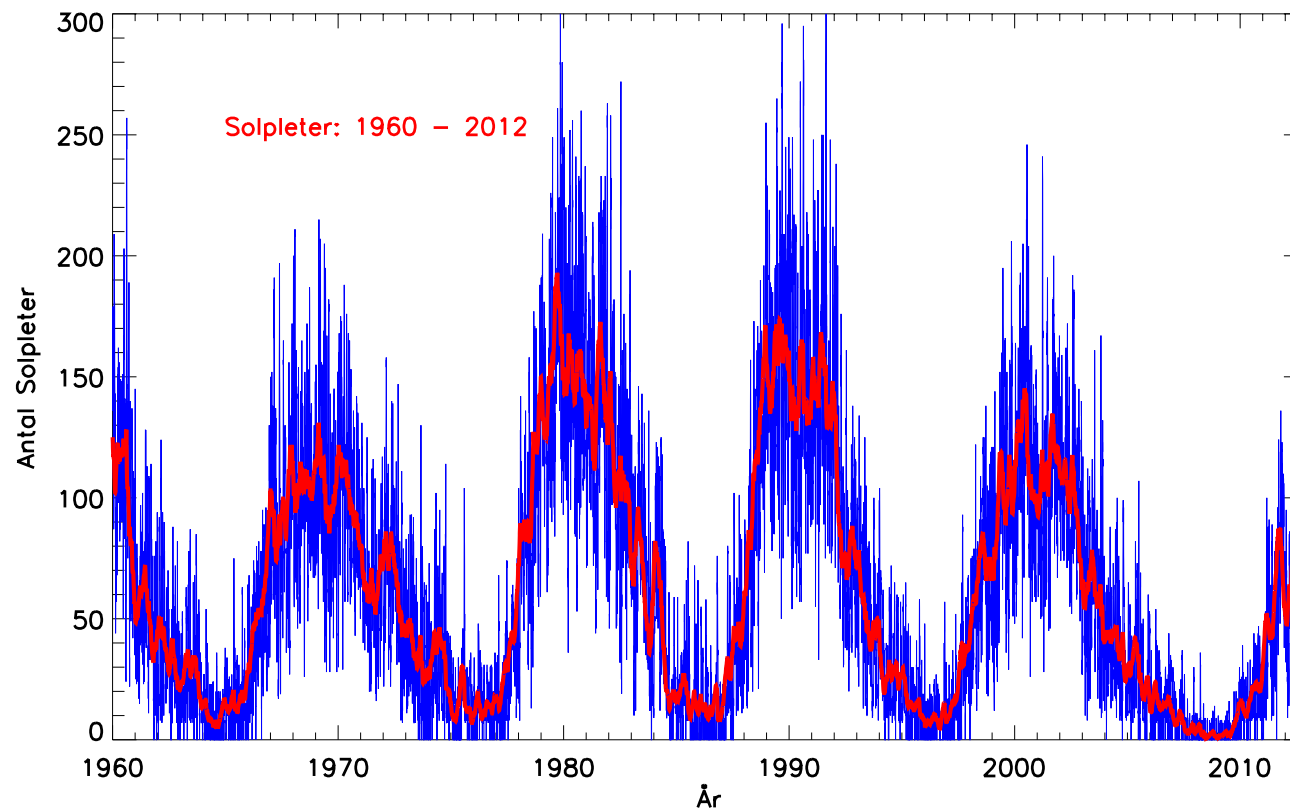
THE SOLAR CYCLE



THE SOLAR CYCLE

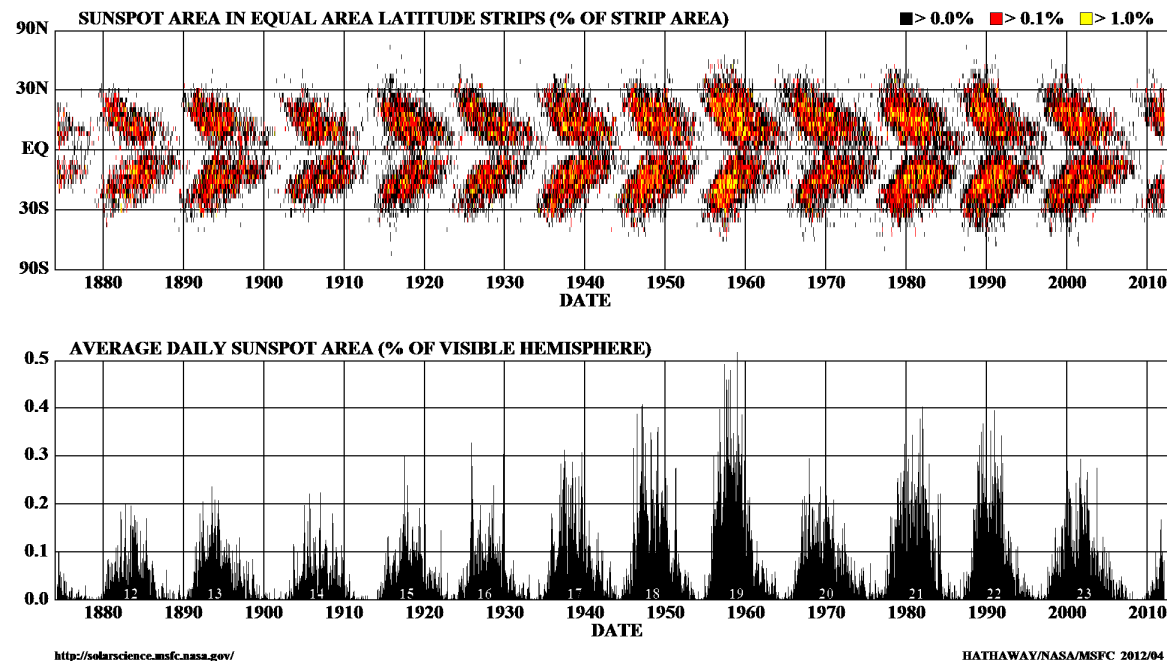


THE SOLAR CYCLE

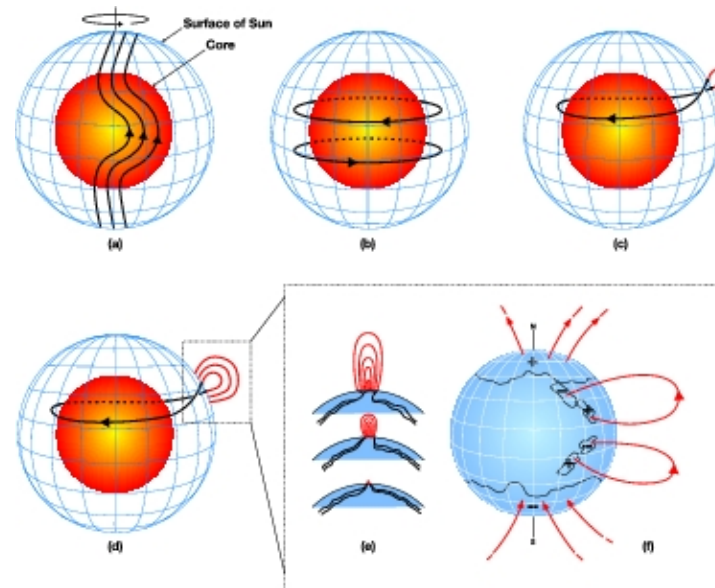


BUTTERFLY DIAGRAM

DAILY SUNSPOT AREA AVERAGED OVER INDIVIDUAL SOLAR ROTATIONS



THE SOLAR DYNAMO

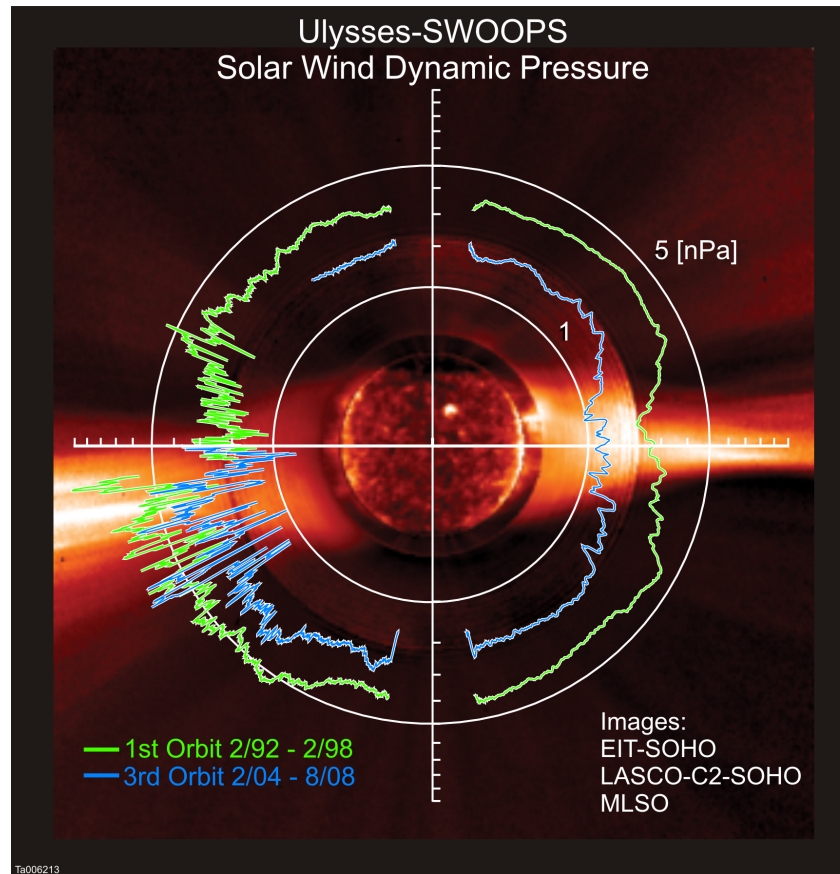


The solar cycle is caused by the solar dynamo.

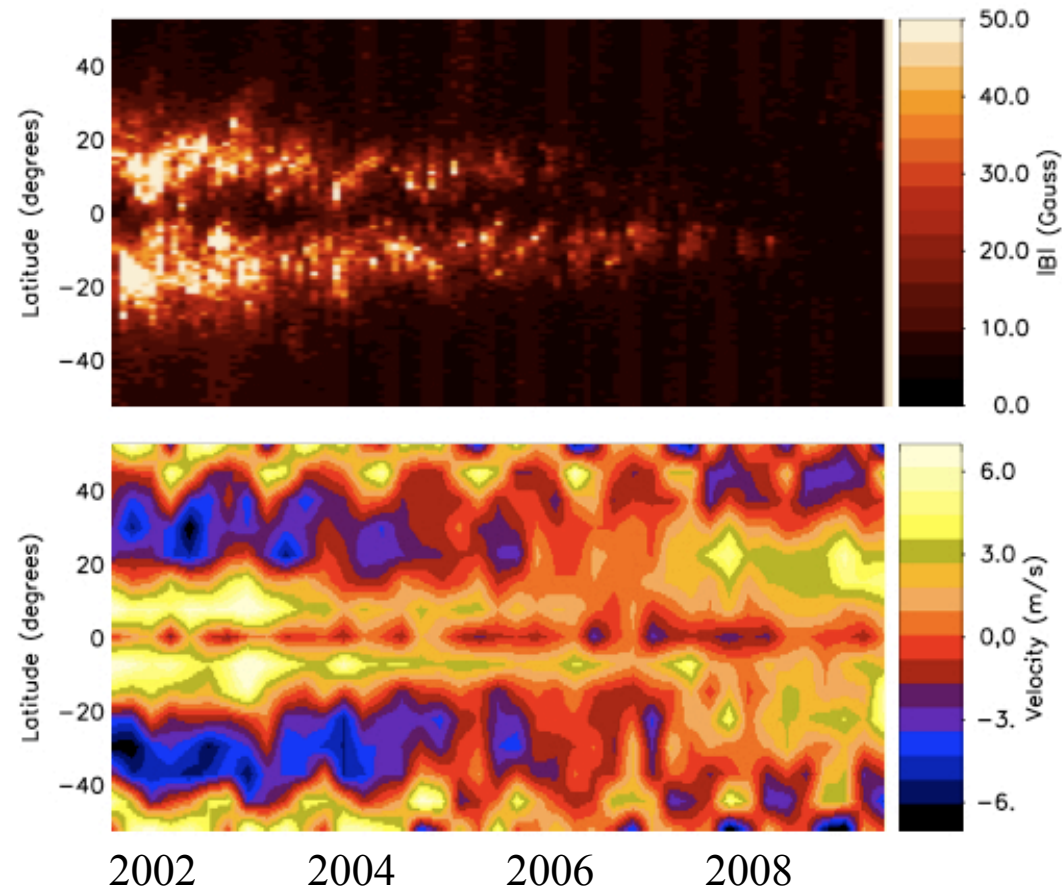
The solar dynamo consists of the Ω and α -effects.

Ω and α -effects are driven by the differential rotation of the Sun and by convection.

THE SOLAR WIND

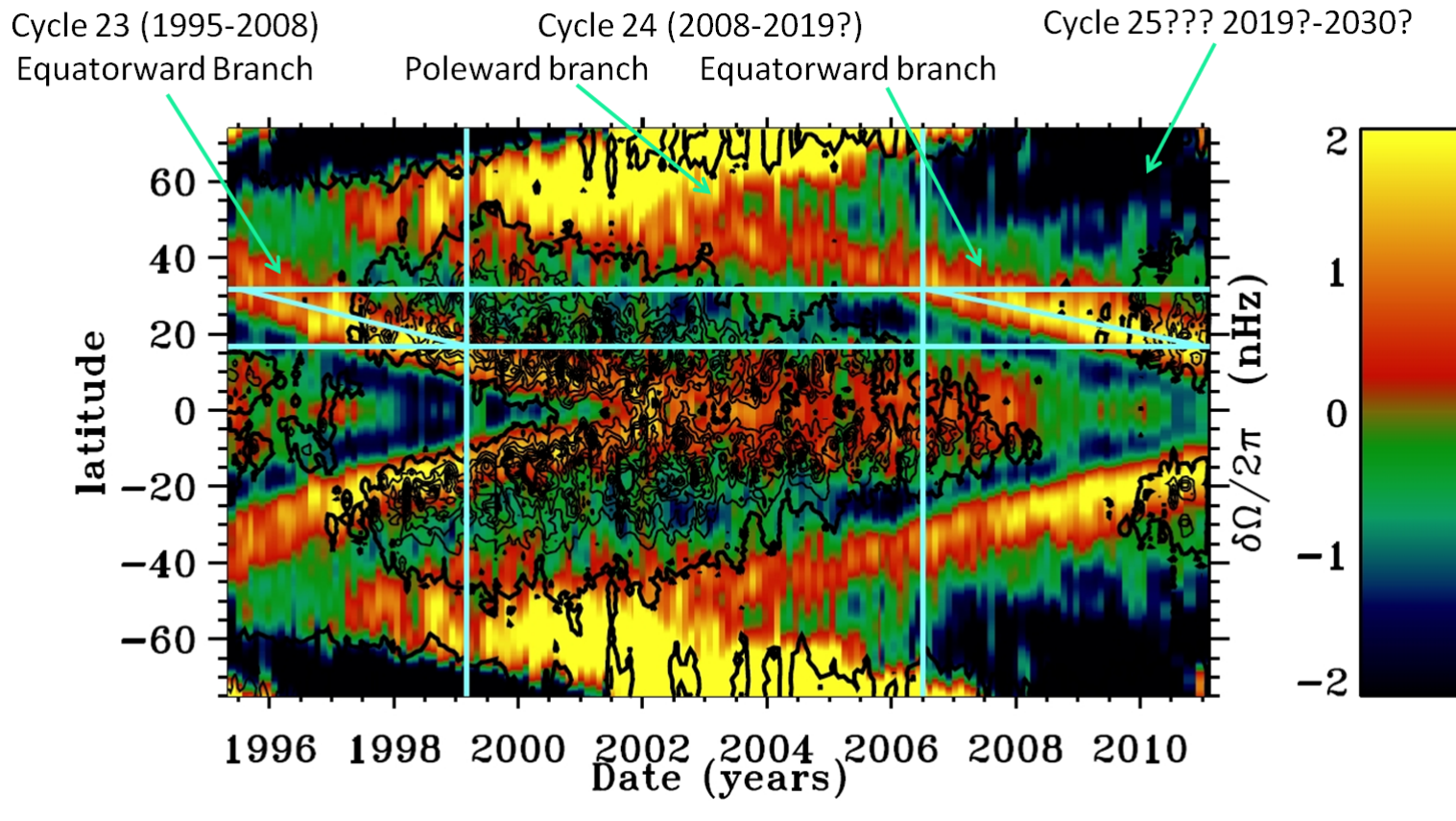


MERIDIONAL CIRCULATION IN THE

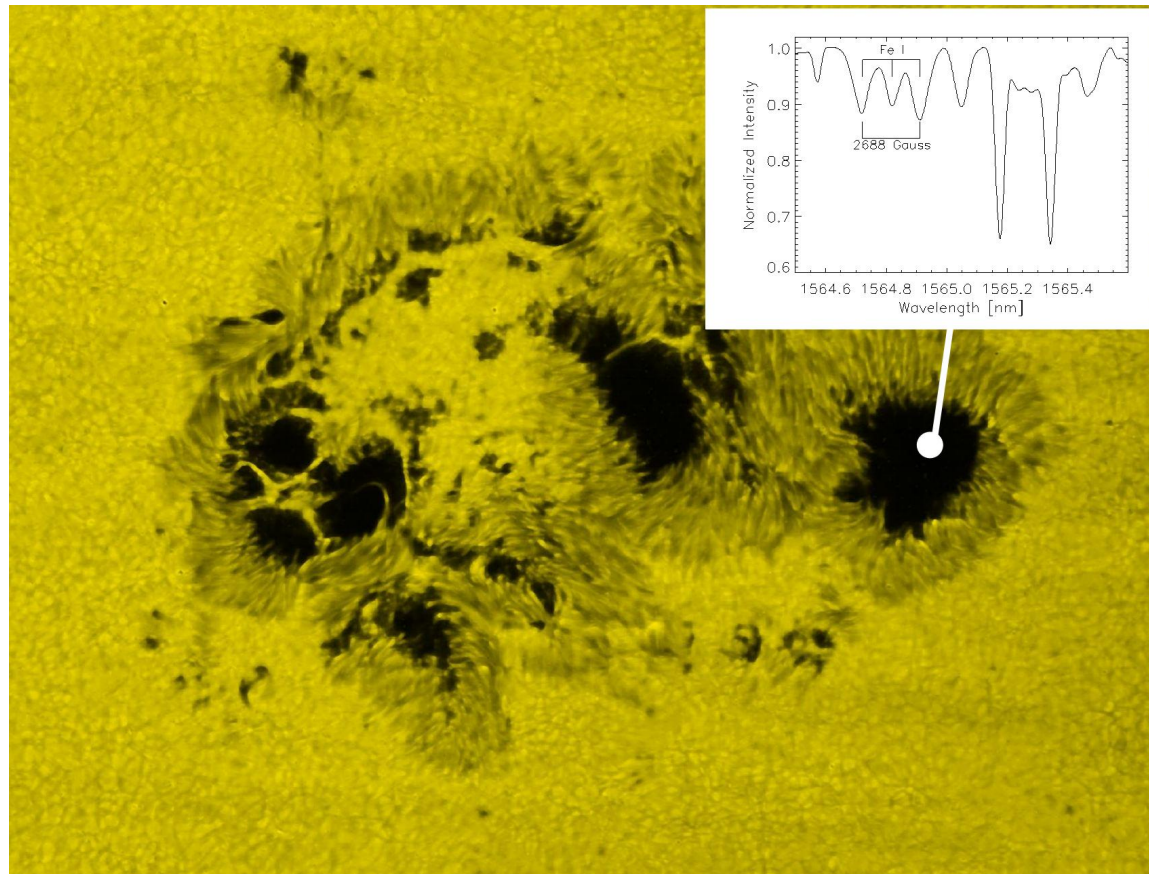


I. González Hernández, R. Howe, R. Komm, F. Hill, *ApJ*, 713, L16, 2010

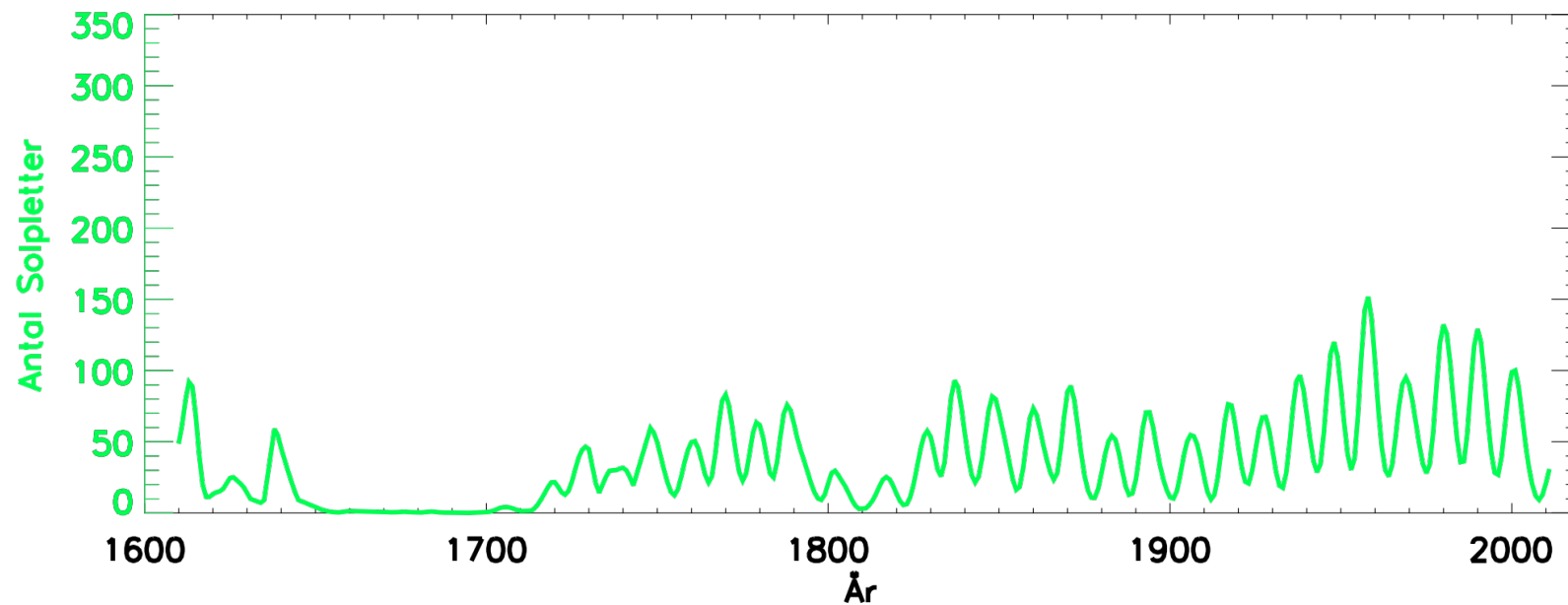
TORSIONAL OSCILLATIONS



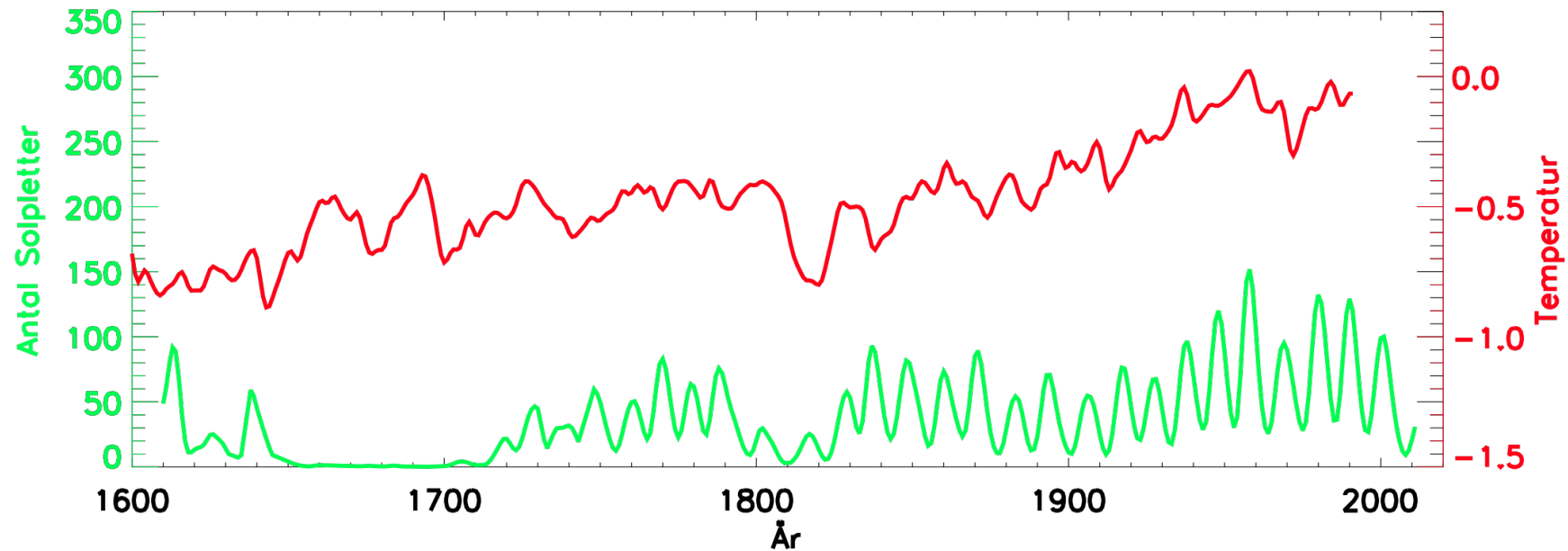
MAGNETFELTER I SOLPLETTER



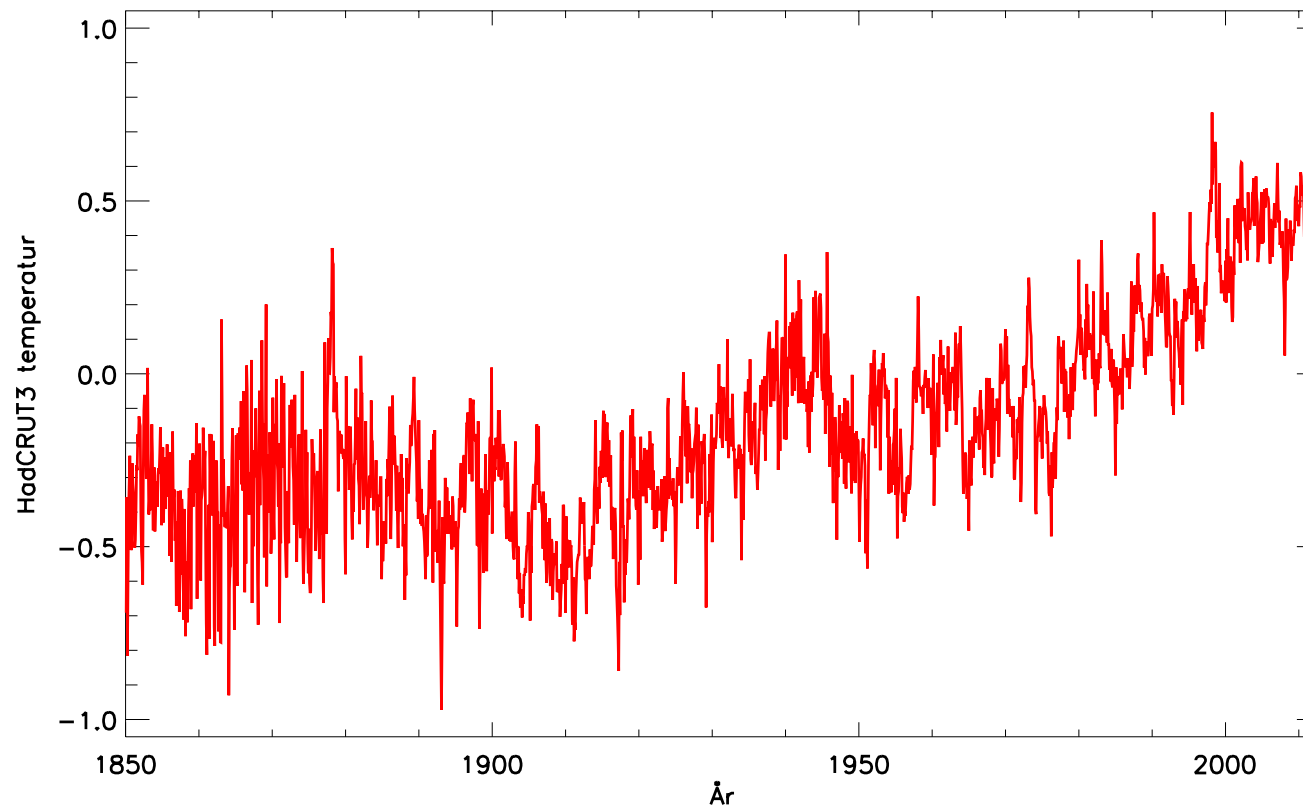
THE SOLAR CYCLE



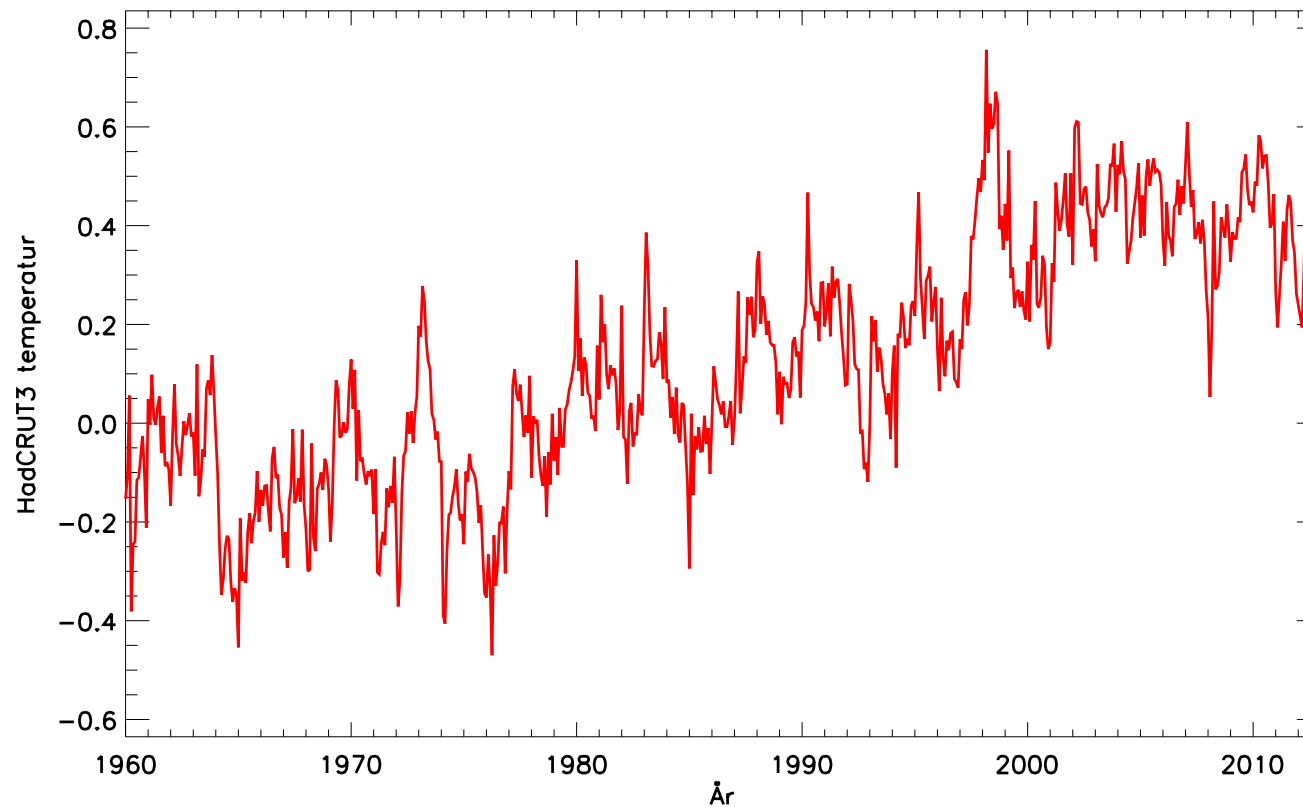
THE SOLAR CYCLE AND CLIMATE



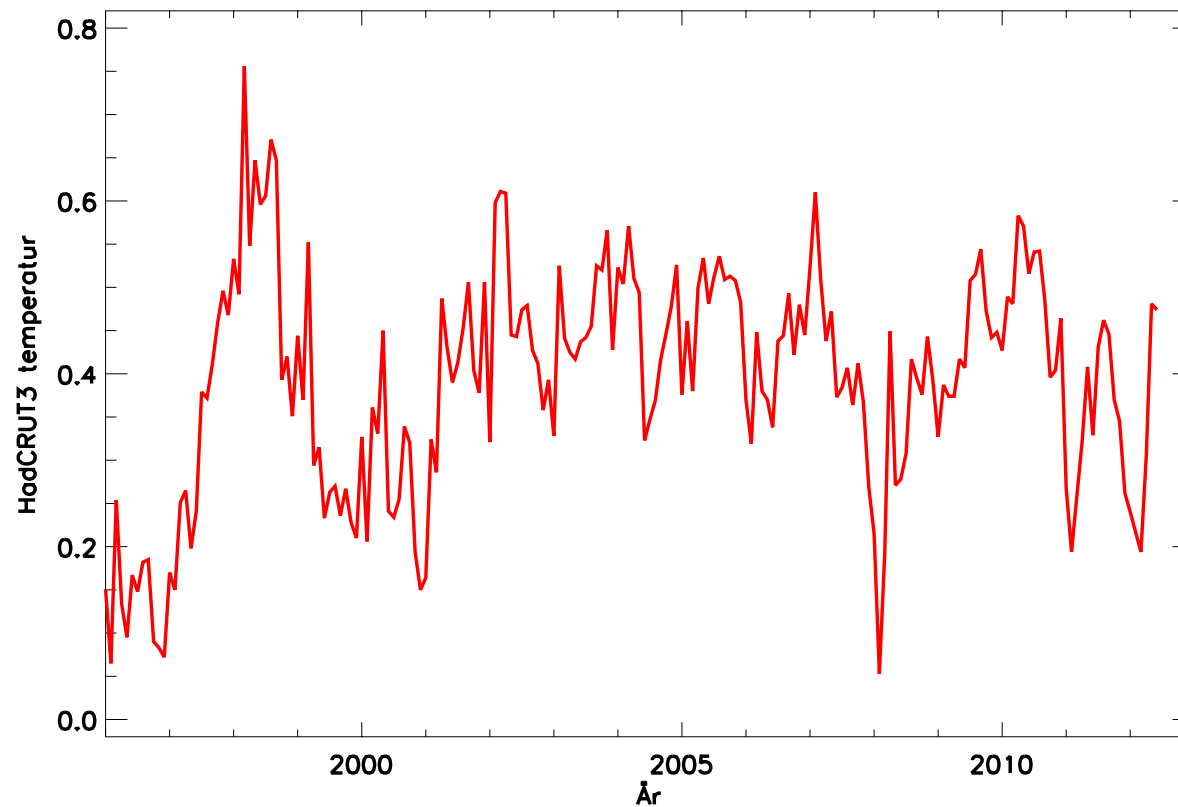
GLOBAL TEMPERATURE (160Y)



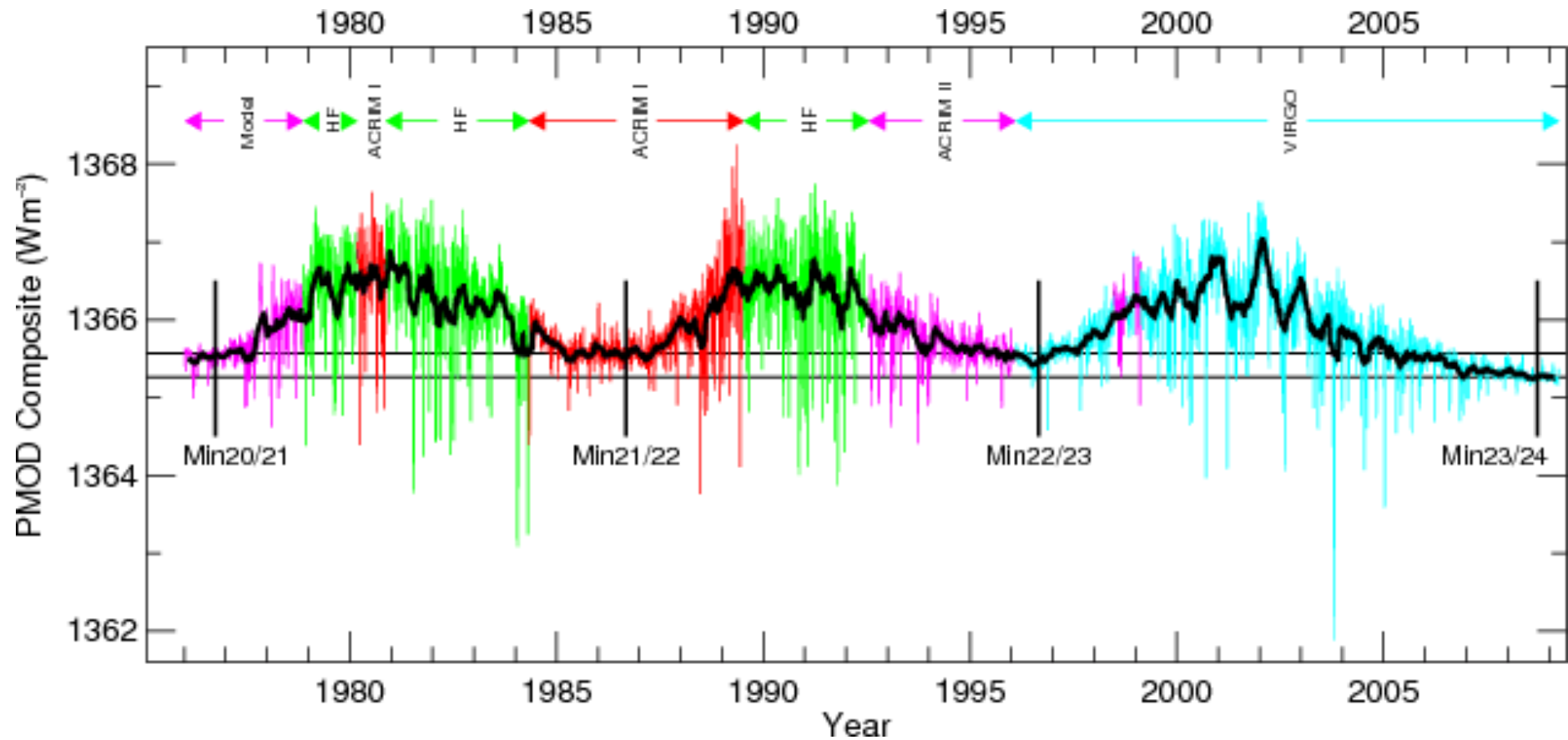
GLOBAL TEMPERATURE (50Y)



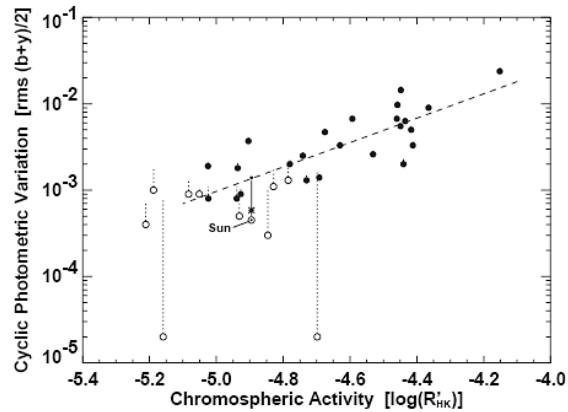
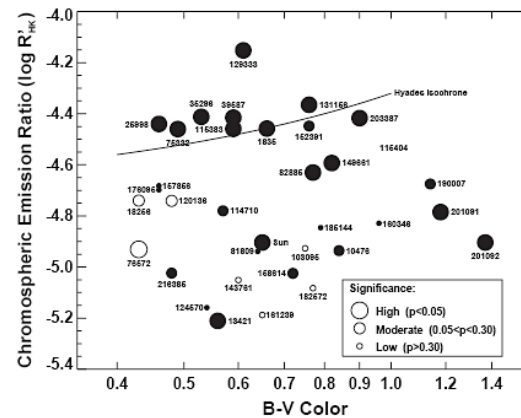
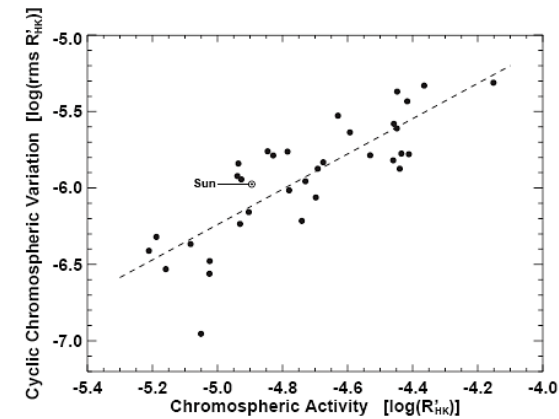
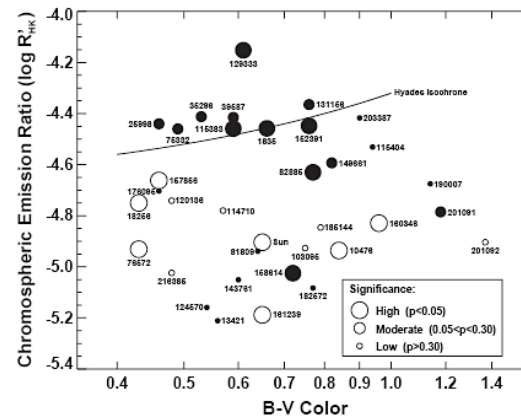
GLOBAL TEMPERATURE (16Y)



TOTAL SOLAR IRRADIANCE



SPOTS AND FACULAE



SECONDARY MECHANISMS

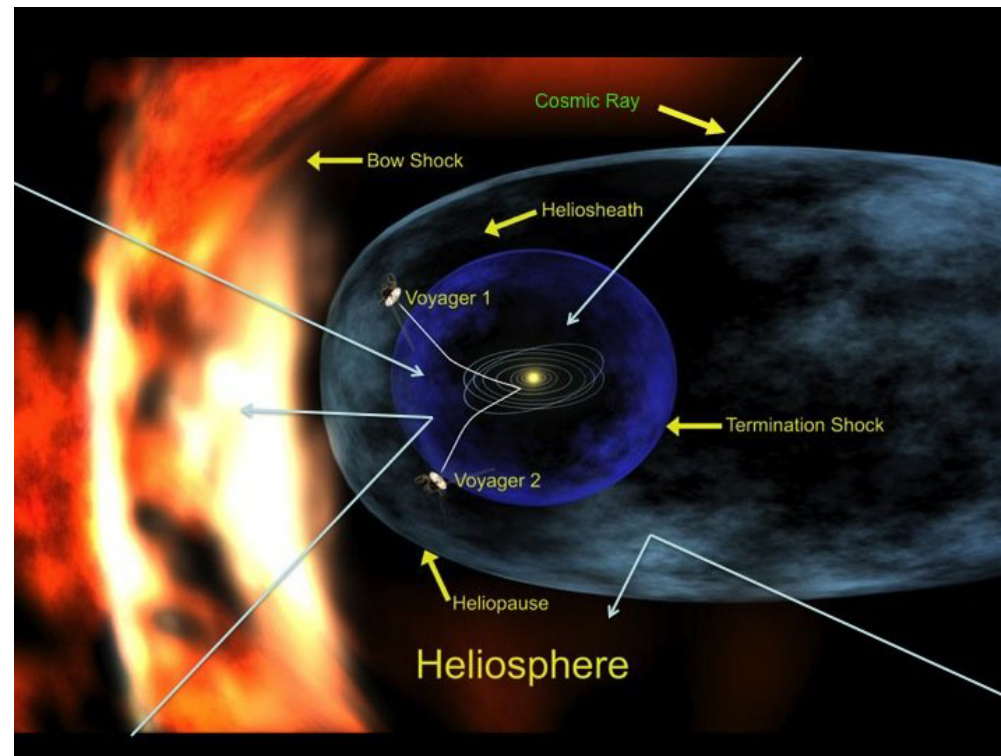
1) Cosmic rays

- The Sun controls how many cosmic rays that hit the Earth's atmosphere.
- Cosmic rays can make clouds.
- Clouds affect the global temperature.

2) Variability in solar UV radiation

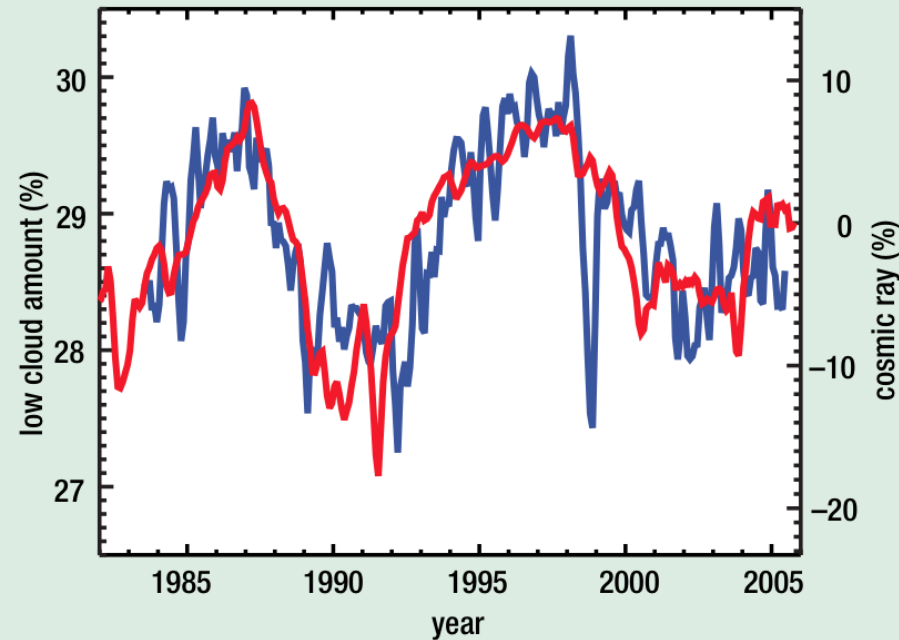
- UV radiation heats the stratosphere.
- This affects the jet streams, which again affect the distribution of climate systems on the Earth.

THE SUN AND COSMIC RAYS

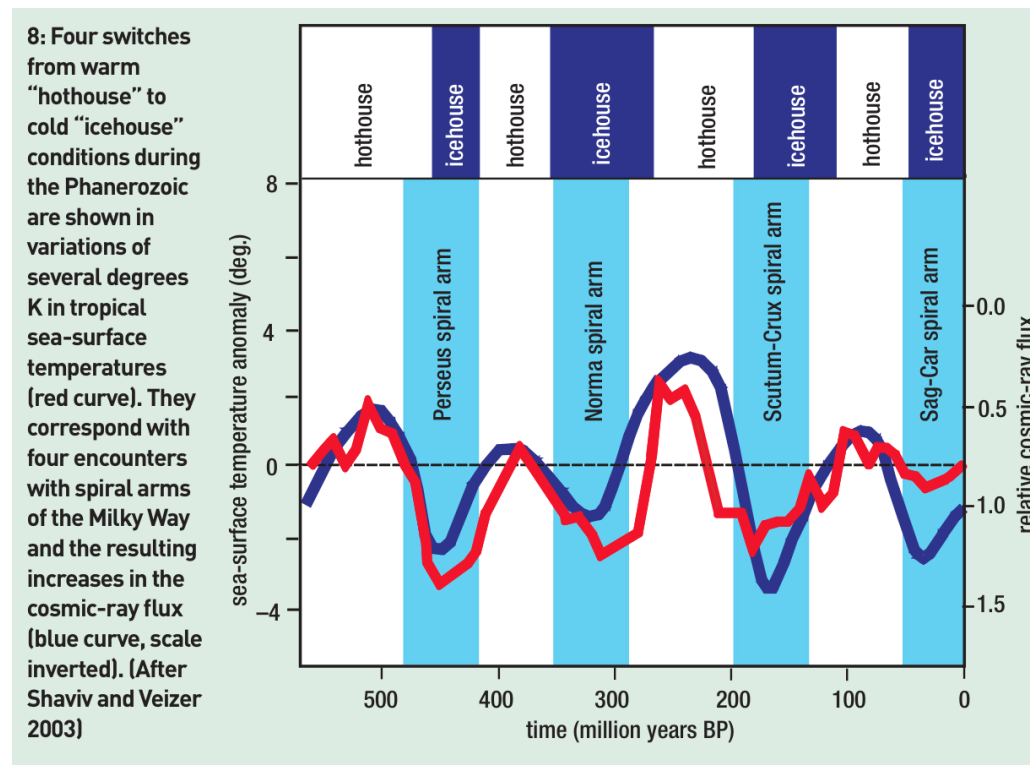


COSMIC RAYS AND CLOUDS

3: As in figure 2, the low-cloud comparison extends over a longer period.



THE GALAXY AND CLIMATE



STAR FORMATION AND CLIMATE

10: When life began about 3.8 billion years ago, the cosmic-ray flux (blue curve) was very low, because of the vigour of the solar wind. Complex life forms (single-cell eukarya and multi-cell metazoa) rose to success during global glaciations, which coincided with high cosmic rays linked to high star-formation rates. The red curve shows the size of variations in the productivity of the biosphere, which was most erratic when the cosmic-ray flux was greatest. (Svensmark 2006b and references therein)

