

The forgotten star in SA Astronomy

Presented by:
Jacques van Delft
ASSA, Director Solar Section

M081



THE SUN

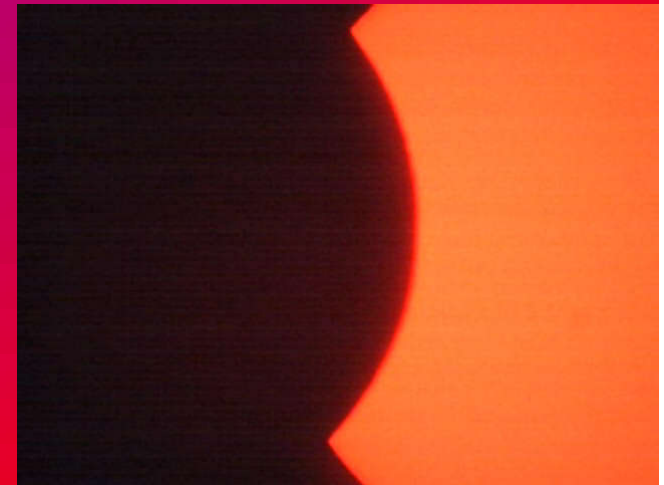
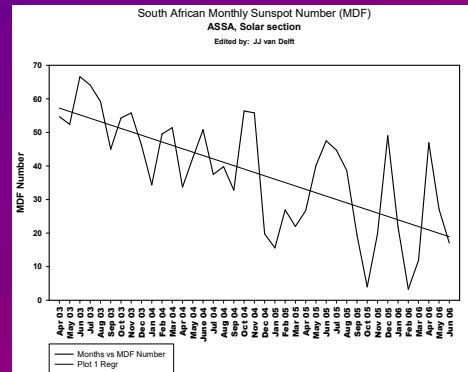
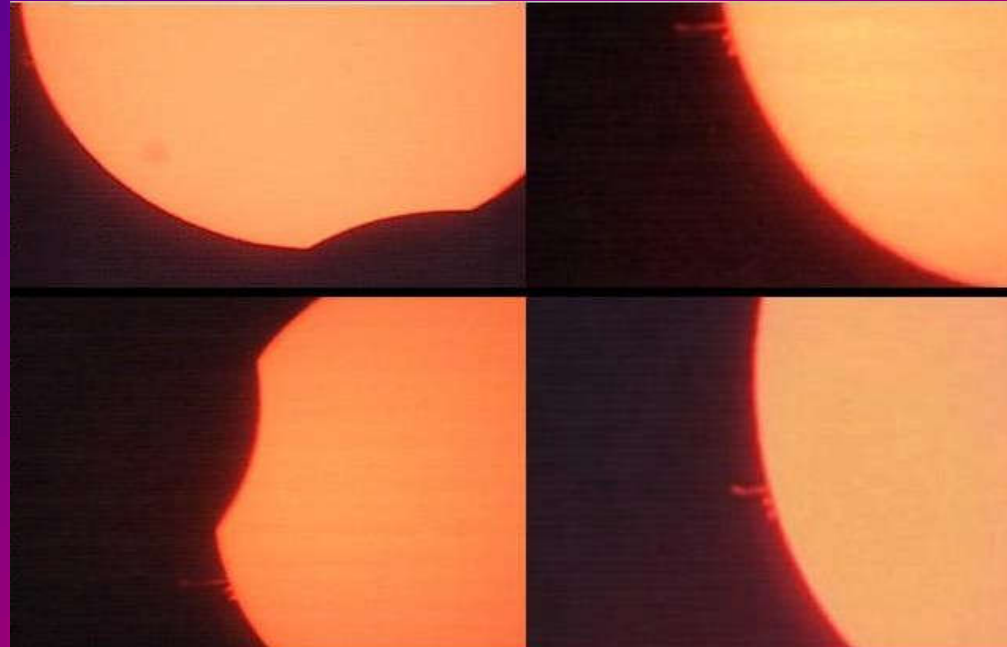
THE NEAREST STAR FROM EARTH

Life on Earth

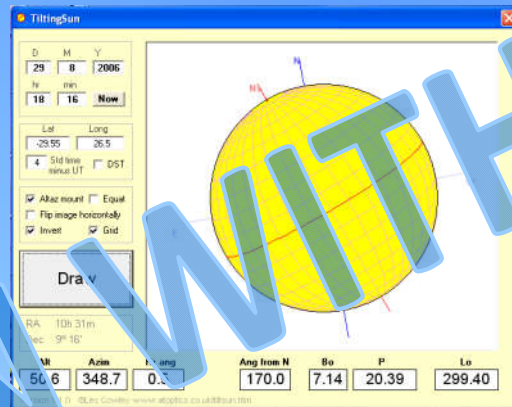
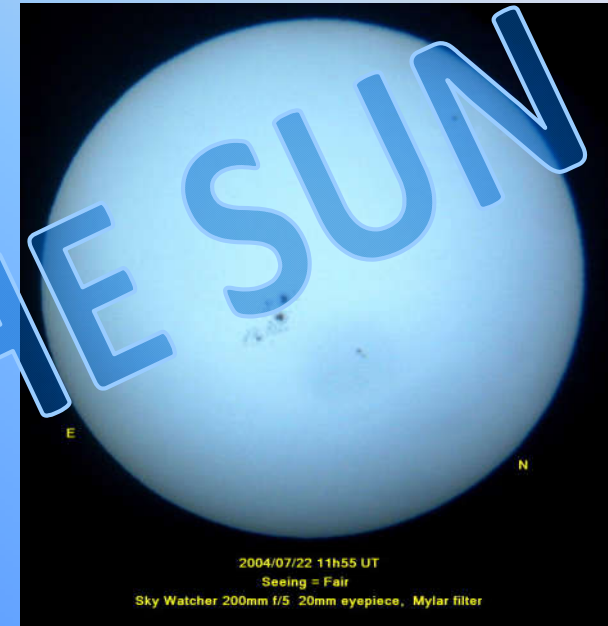
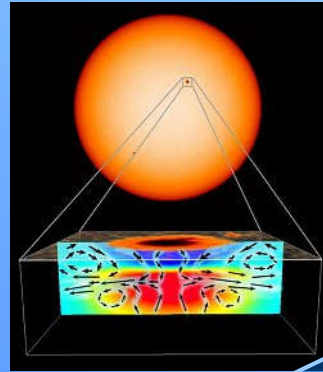
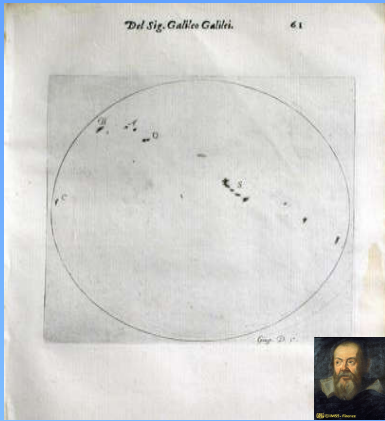
Beautiful Sunsets

Sunny days

2003 : RE - BORN OF SOLAR OBSERVATION IN SOUTH AFRICA



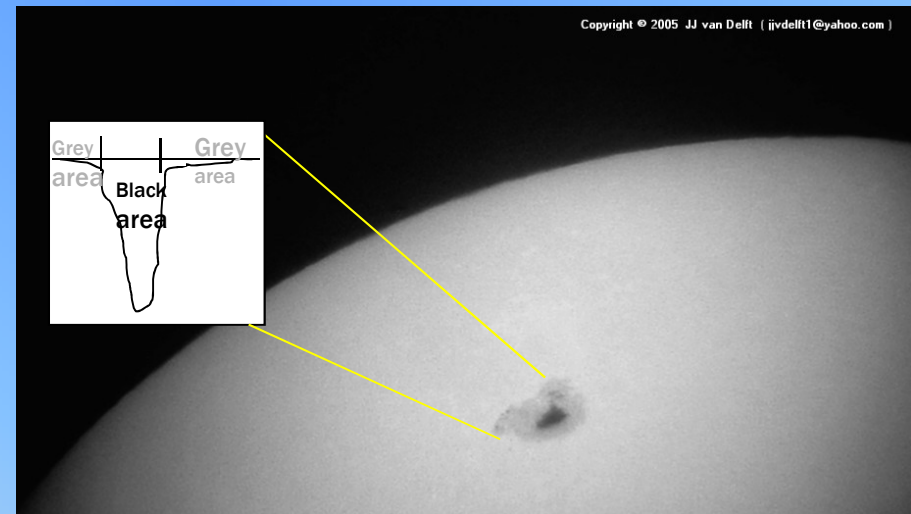
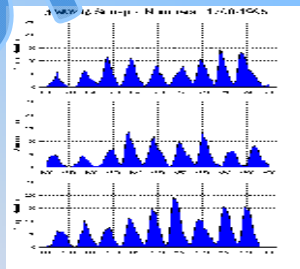
The Solar Observation CD



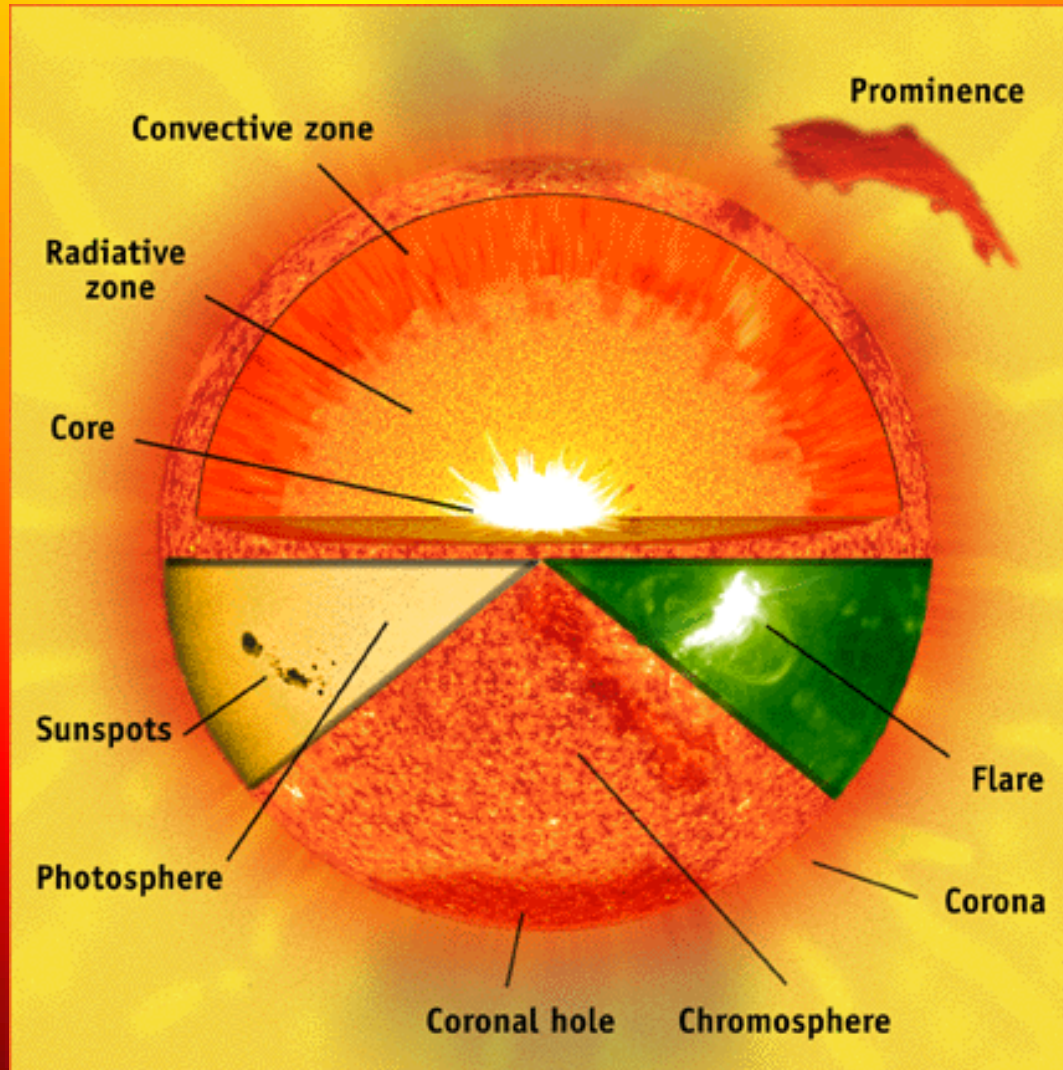
The
Zürich
Index

R_Z

$$R_Z = k(10 \times g) + n$$



INSIDE THE SUN



Distance 149.600.000 km

Diameter 1.390.000 km

Composition:

Hydrogen 71%

Helium 27%

Other 2%

(carbon, nitrogen, oxygen)

Temperatures:

Core 15 000 000 K

Surface 6 000 K

Density: $1.6 \times 10^5 \text{ kg/m}^3$

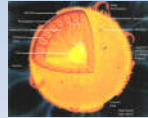
Mass: $2 \times 10^{30} \text{ kg}$

Power output: $3.86 \times 10^{26} \text{ Watts}$

The Sun converts $6 \times 10^{11} \text{ kg}$
Hydrogen into Helium every second.

Age: 4.6 Billion years $\pm$ 50% of its
lifespan

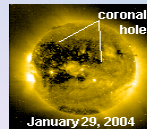
Solar Physics



Different Solar Activities



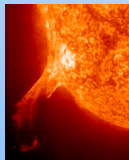
Sunspots
Solar Flares



Coronal holes

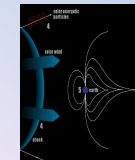


Filaments
Prominence



Coronal Mass Ejections

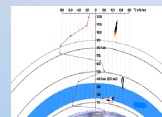
Solar wind



Geo-Magnetic activities



Aurora physics



Atmospheric physics



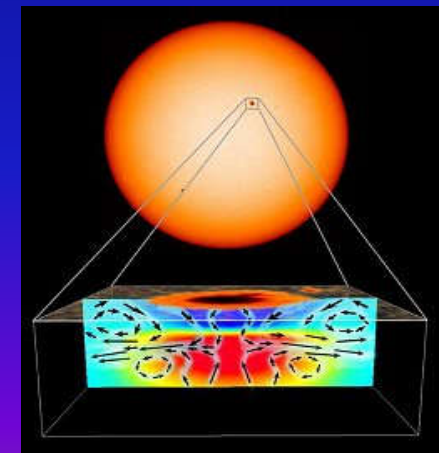
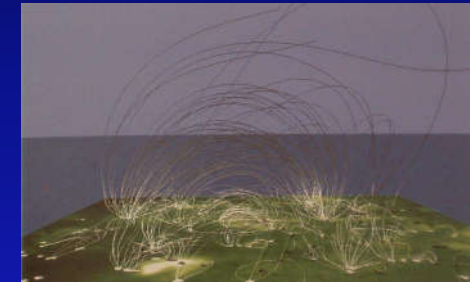
Industrial and climatic disturbance

SUNSPOTS



2004/10/31 12:42 UT Bloemfontein
South Africa

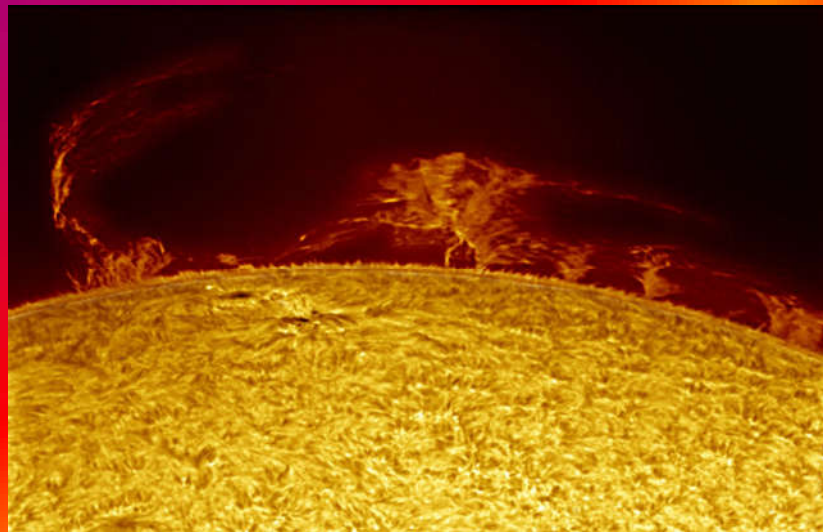
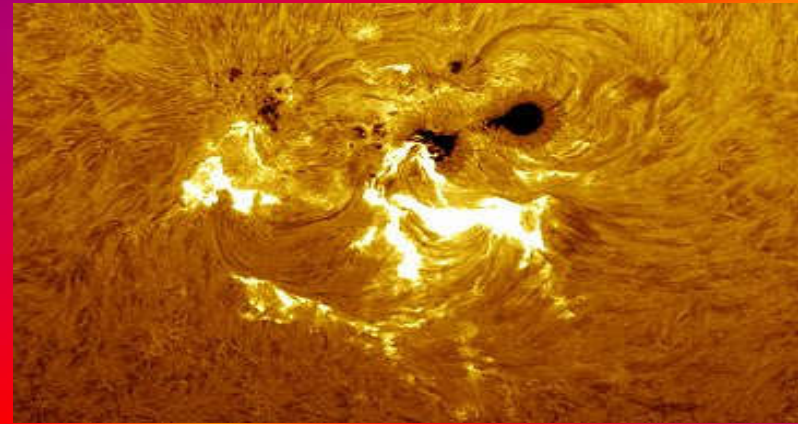
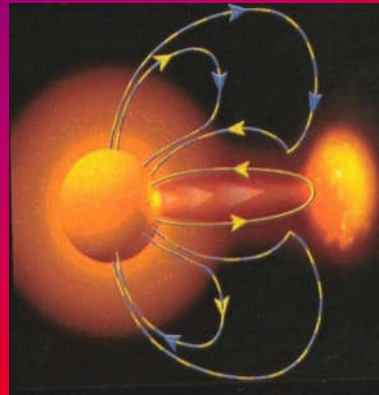
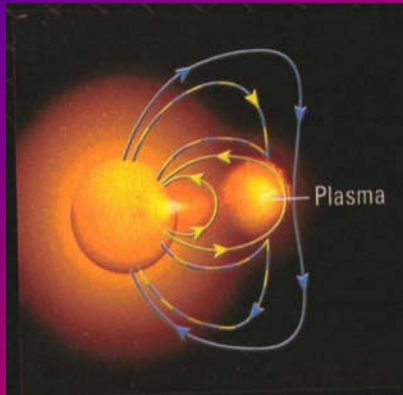
Jacques van Delft
Sky-Watcher 200mm, 20mm W/A Eyepiece
App.Mask 56mm, Mylar filter
jacques@bloemwater.co.za
FujiPix A303 Dig. Camera



WARNING !!

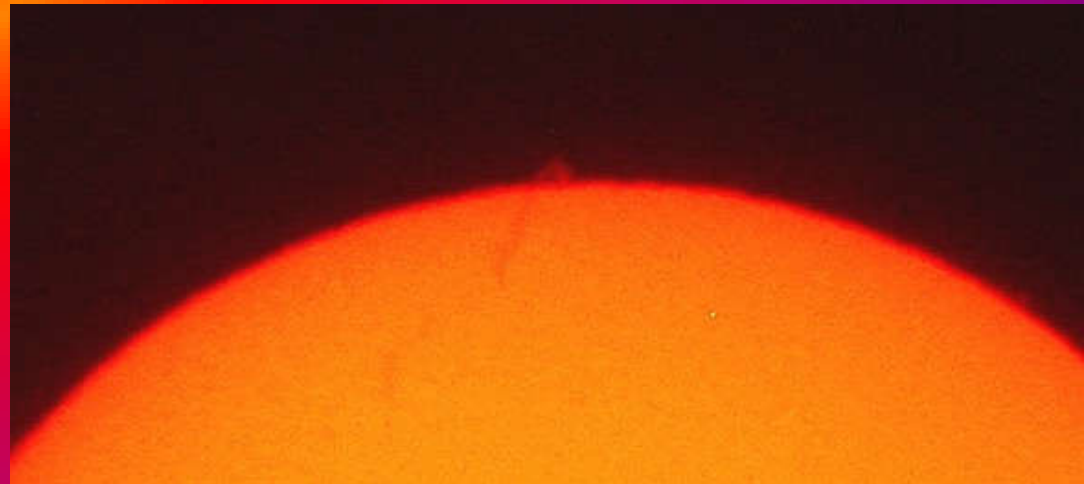
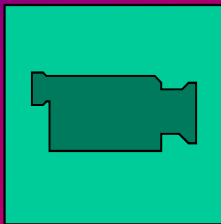
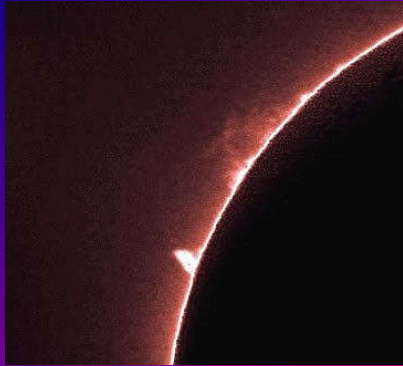
**Never look to the sun with optical equipment without special designed filters !
It will damage your eyes.**

SOLAR FLARES



Coronal Mass Ejections

Filaments & Prominence



Solar Flares

Flare classification

$$? = 10^{-3} \text{ W m}^{-2}$$

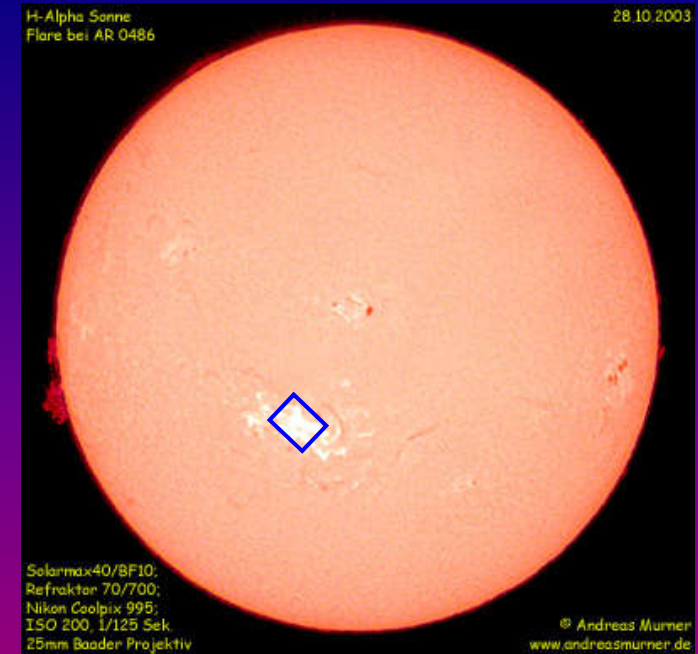
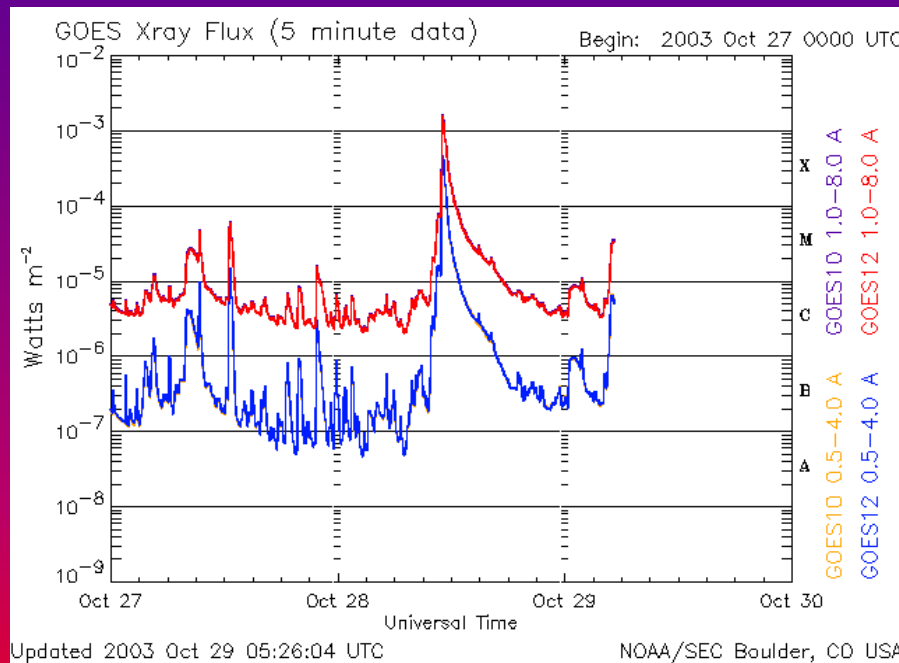
$$X = 10^{-4} \text{ W m}^{-2}$$

$$M = 10^{-5} \text{ W m}^{-2}$$

$$C = 10^{-6} \text{ W m}^{-2}$$

$$B = 10^{-7} \text{ W m}^{-2}$$

$$A = 10^{-8} \text{ W m}^{-2}$$



A, B, C, M and X class
Division 1 - 9

Classification = Electr. Energy (Watts) per square meter.

84 412 723 500 000 sq m

84 412 723 500 000 x 10⁻³ Watts

84,4 Milj Kilo Watts

44 656 Motors

Cap. 27.6 milj L/sec

1hr = 26 Years watersupply
for Bloemfontein (1200 L/sec)

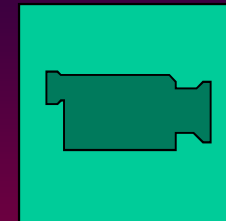


Coronal Mass Ejections

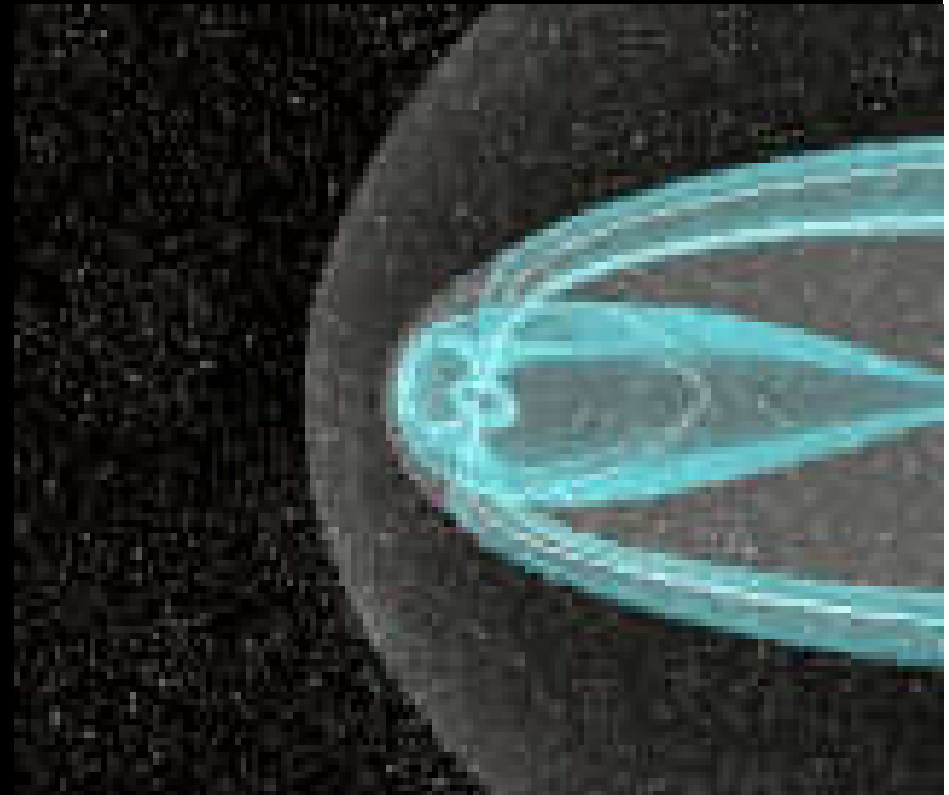
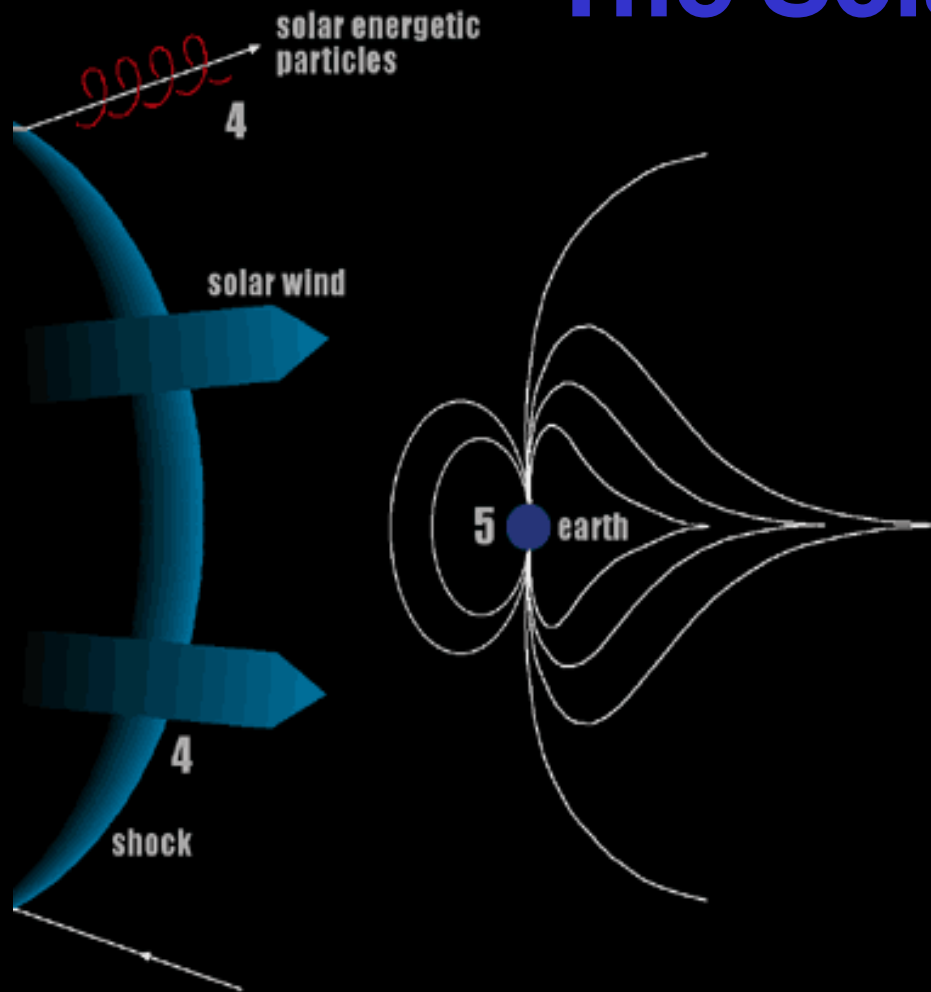
Solar Flare



Coronal hole

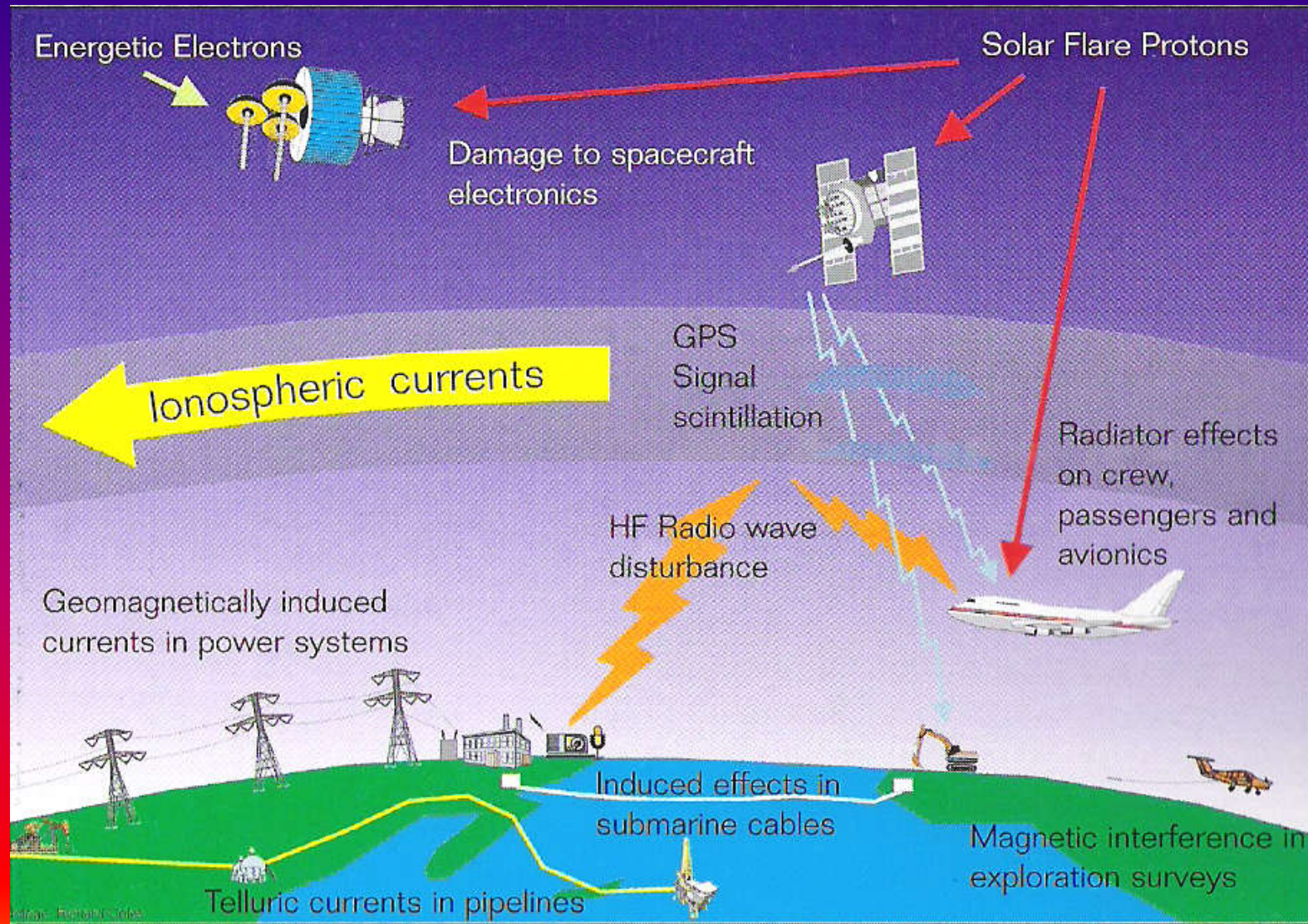


The Solar Wind



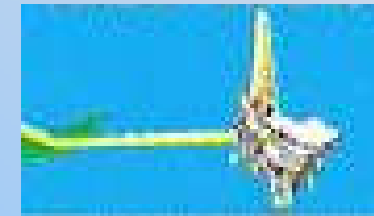
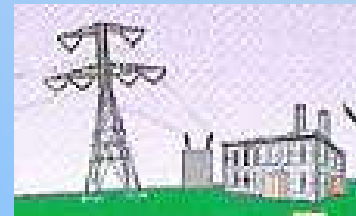


Geo-Magnetic storm disturbance

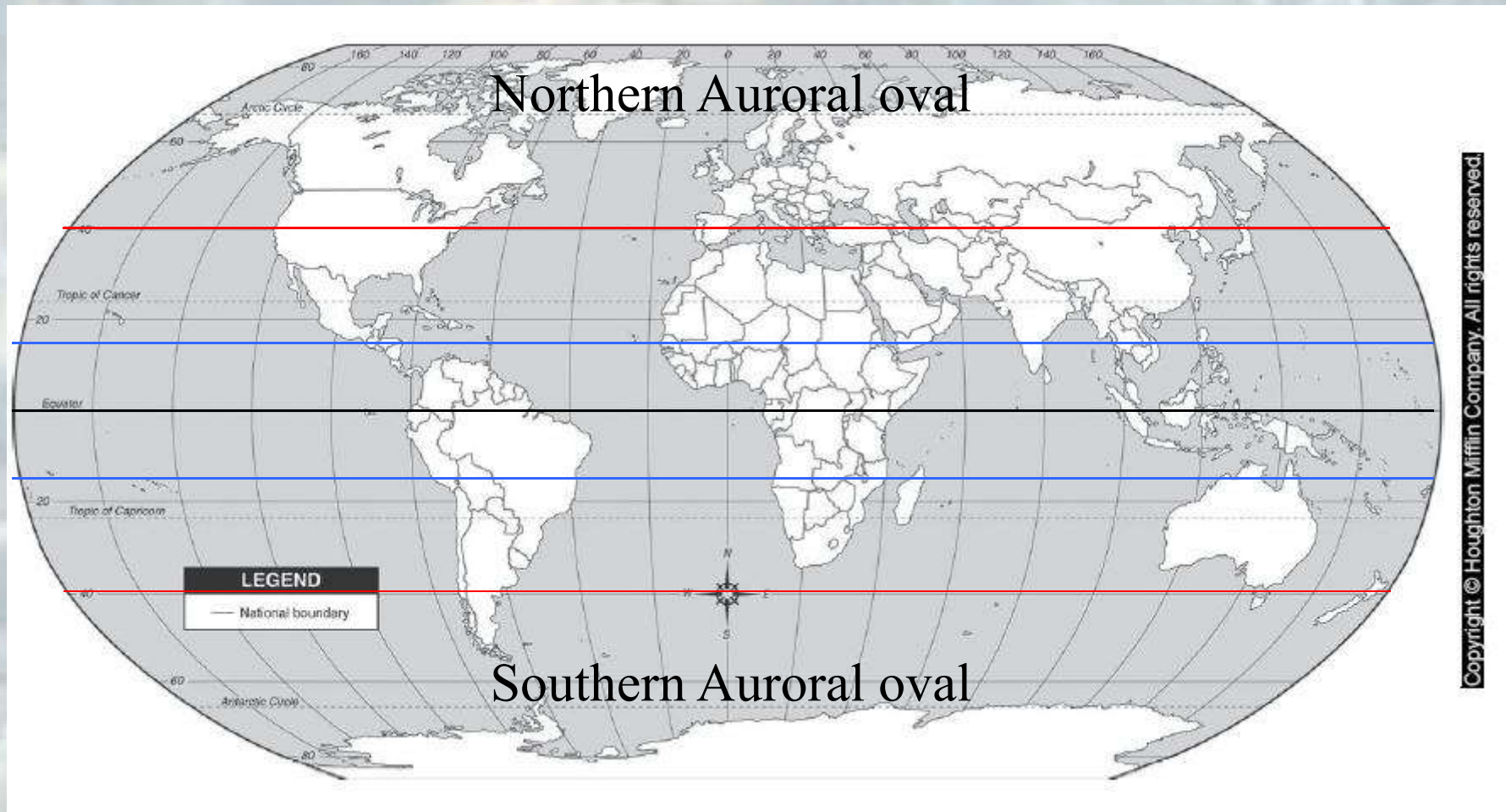


Solar research in practice

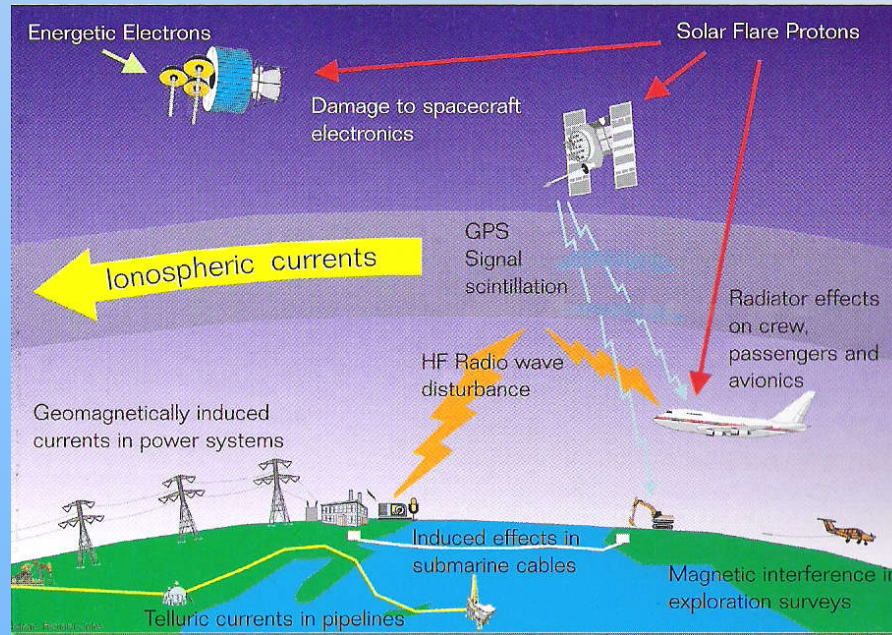
- Space exploration
- Aviation / Communication
- Industrial - Electricity distribution
- Pipelines



The Northern hemisphere is more involved in Solar research, why?



Solar research in South Africa



DSTV – Cell phones – GPS – Security systems

Industrial equipment

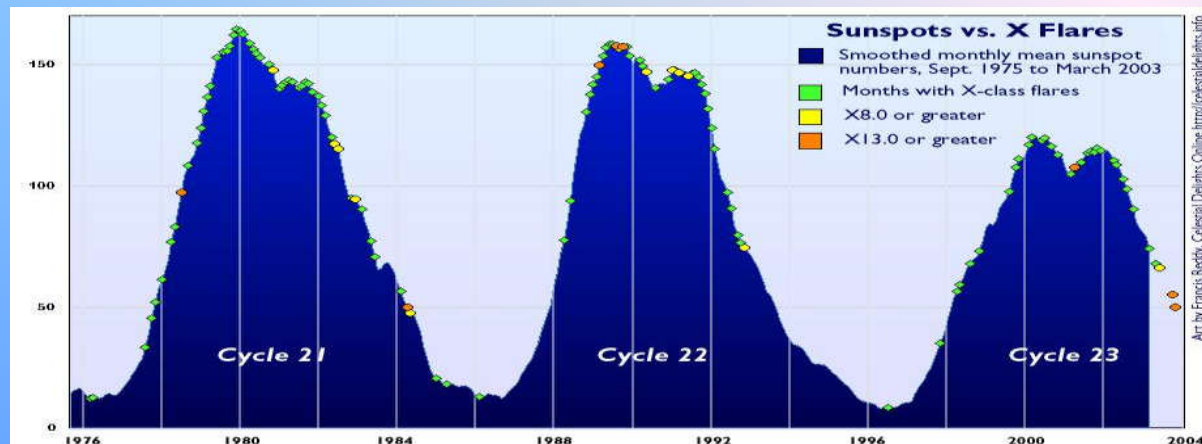
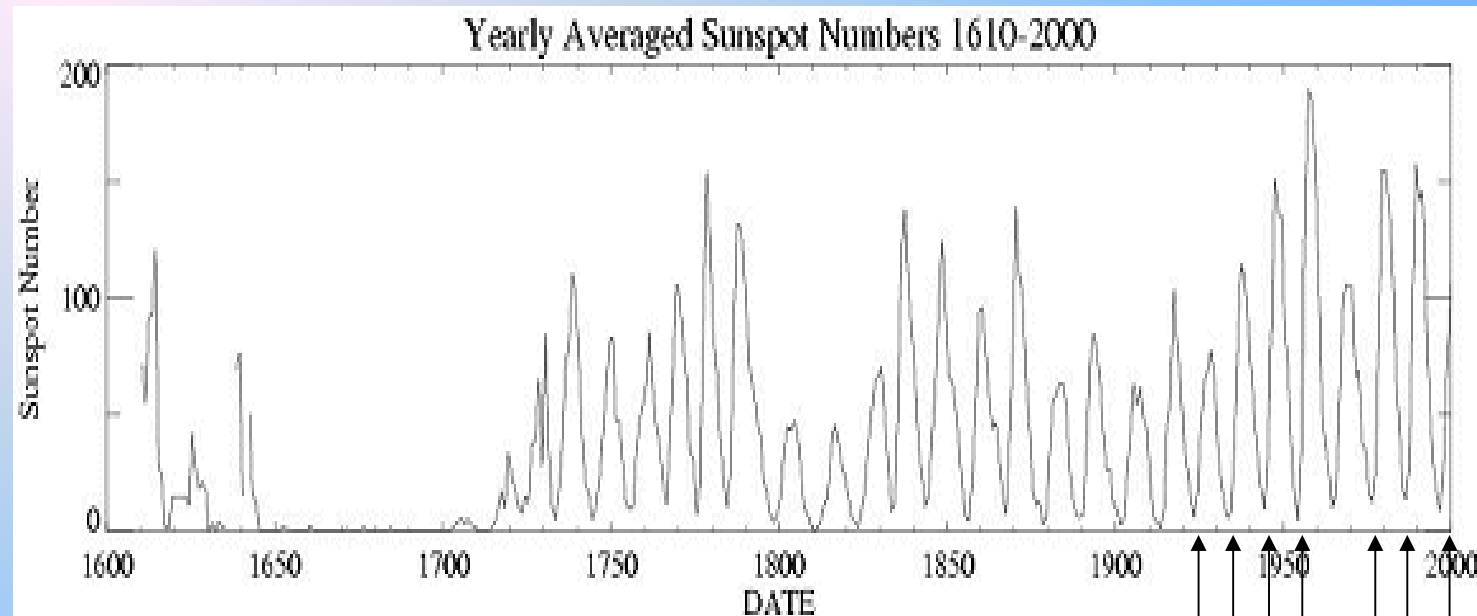
Climatic behavior

Migrating animals

Human body reaction (Long term)



Drought vs Solar cycle



1933 1952 1985
1926 1945 1976 1995

Start of the new solar cycle

Reverse magnetic polarity



2006/09/29 00:05