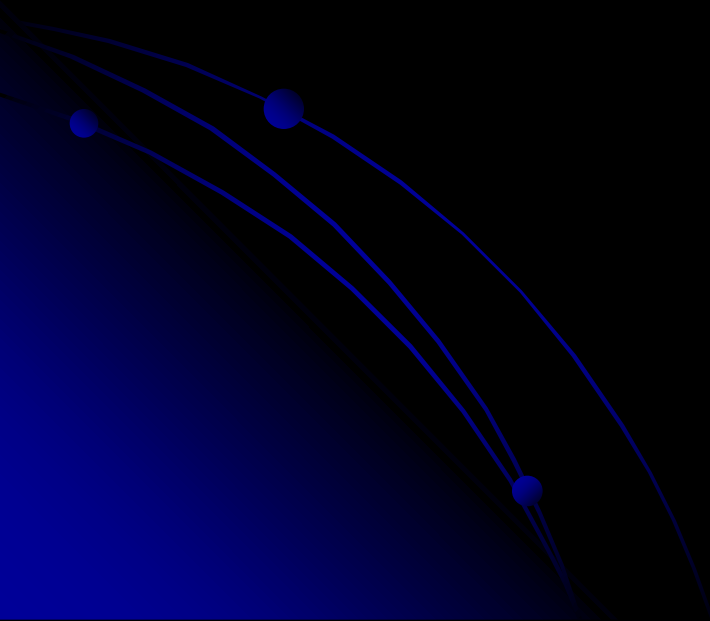


ΕΜΒΙΟ- ΗΛΕΚΤΡΟΜΑΓΝΗΤΙΣΜΟΣ

Μάθημα 2^ο

Ηλιακές – γεωμαγνητικές επιδράσεις



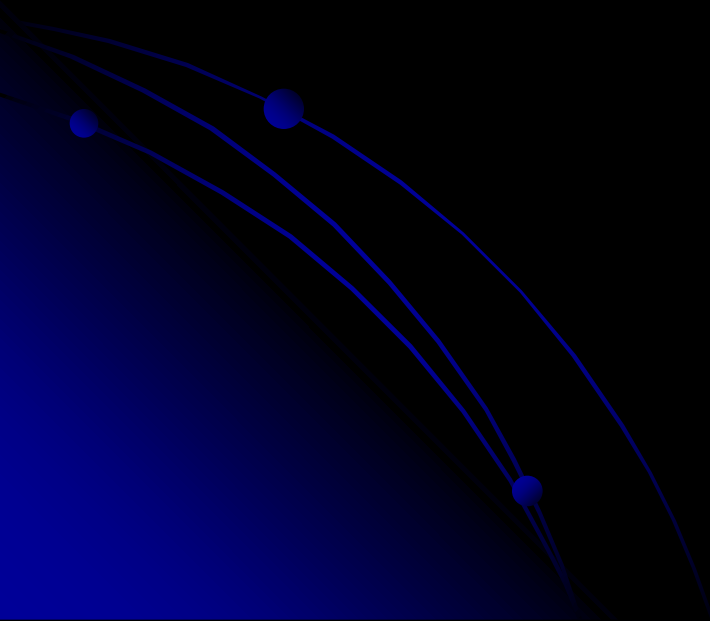






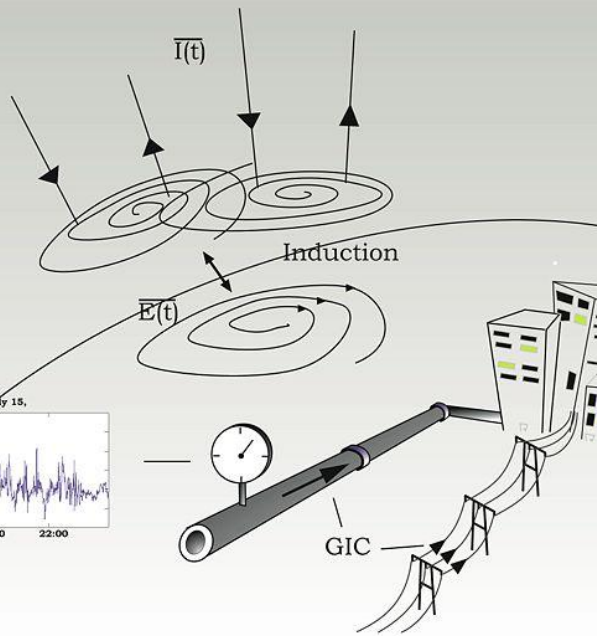
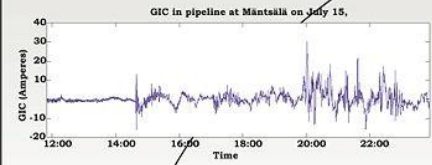


ΗΜ ΕΠΙΔΡΑΣΕΙΣ ΤΟΥ ΠΕΡΙΒΑΛΛΟΝΤΟΣ -1



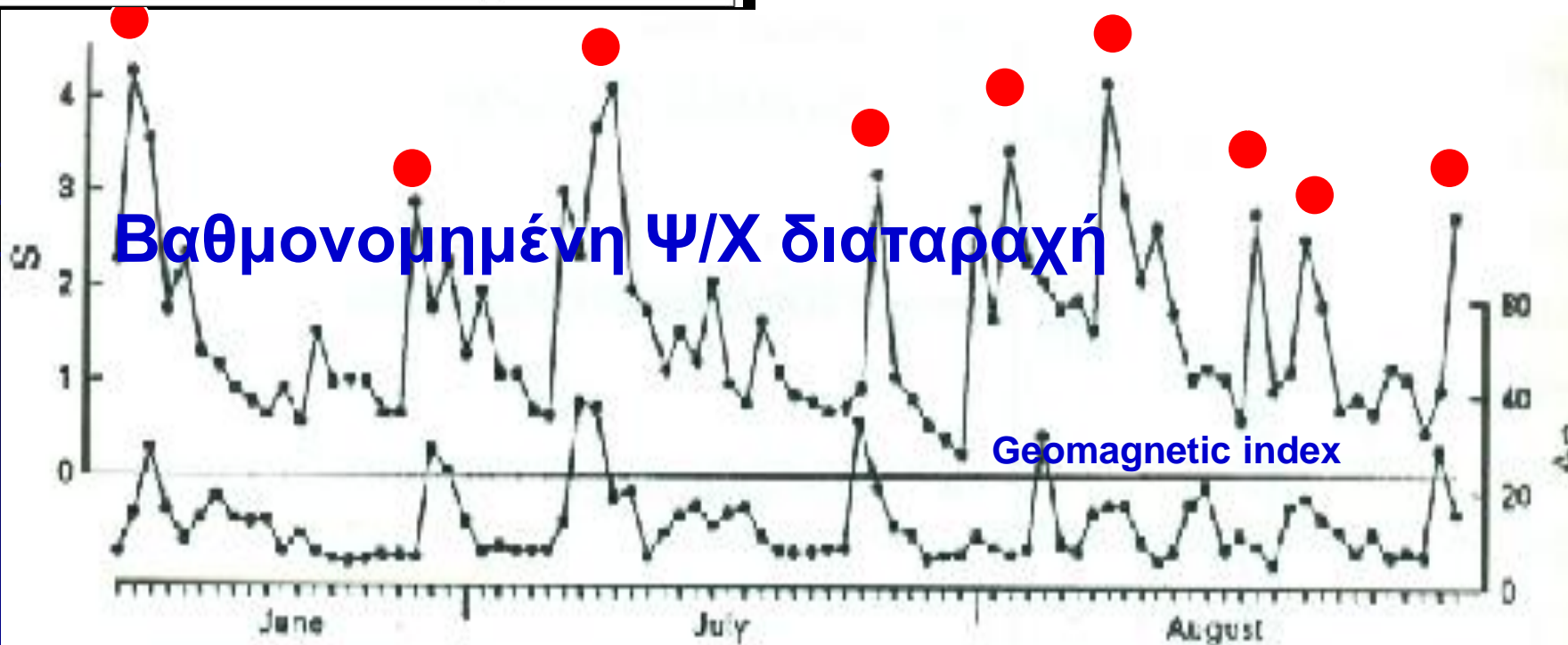
schizophrenia, bipolar disorders, multiple sclerosis (*Torrey et al. 1997*).

Parkinson's disease, mental-behavioral illnesses and probably human lifespan (*Cornelissen et al. 2002*).

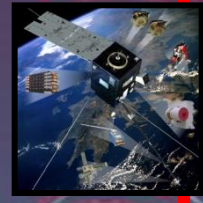
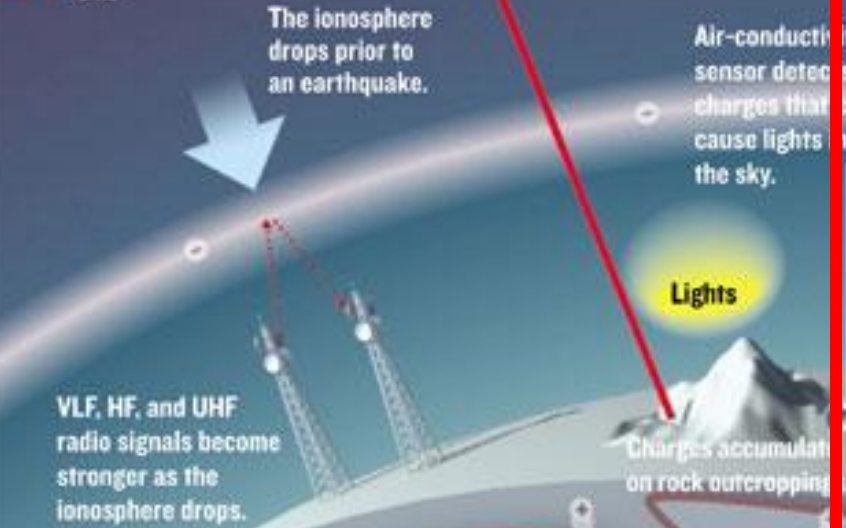


Induced EMF

the area ($\theta = 0$), then flux is high. Each turn in the coil (n) adds more area.

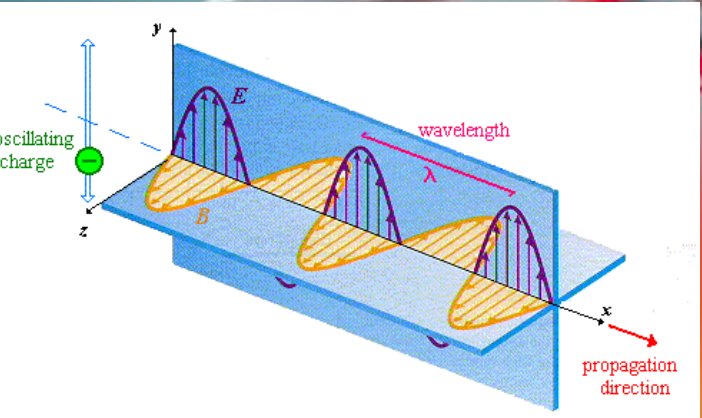
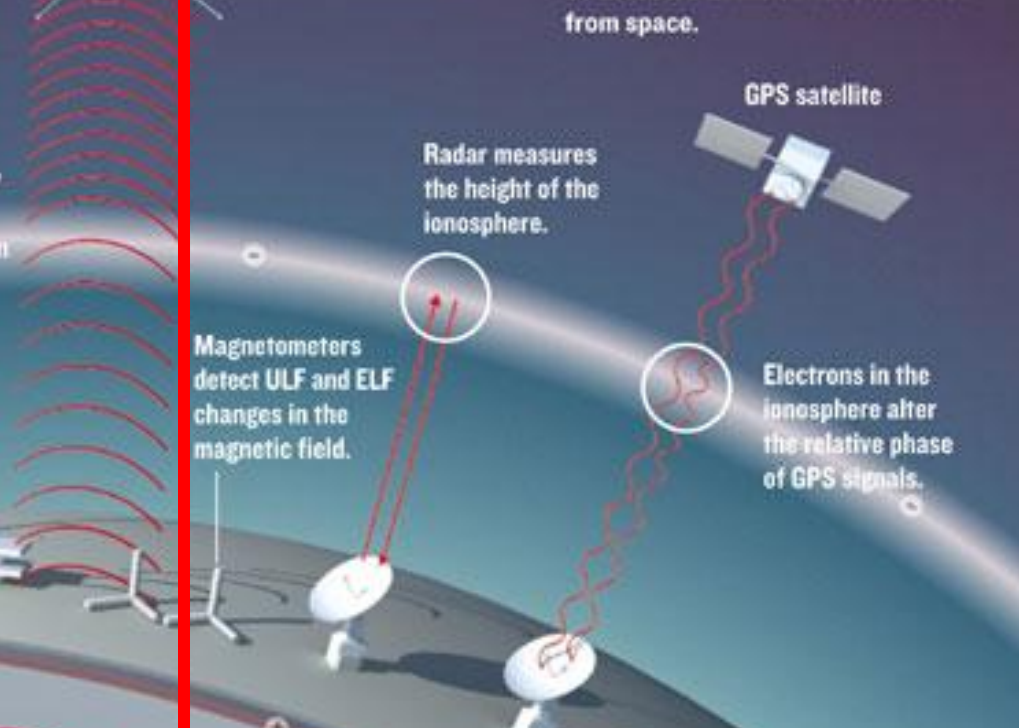


UHF	3 GHz
VHF	300 MHz
HF	30 MHz
MF	3 MHz
LF	300 kHz
VLF	30 kHz
VF	3 kHz
ELF	300 Hz
ULF	30 Hz
	0 Hz



DEMETER, COSMOS 1809, and QuakeSat satellites sense ELF magnetic disturbances.

SIGNS OF QUAKES TO COME: Rocks cracking before earthquakes cause positive charge to flow up toward the surface. The flow of charge leads to electromagnetic disturbances that can be detected at the surface and even from space.



Stress on rock preceding earthquake causes flow of charge.

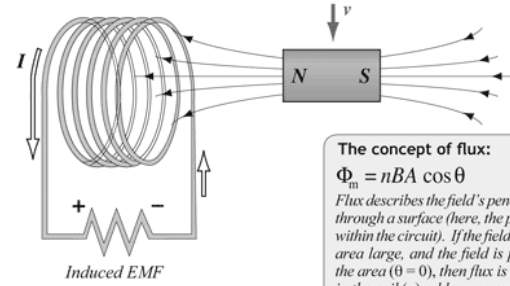
ELF (30-300Hz)
ULF (3-30 Hz)
 radiation from
EQ preparation region



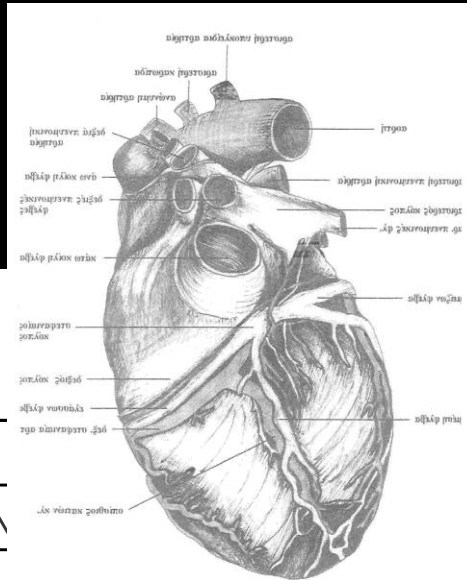
Faraday's Law

$$\epsilon = - \frac{\Delta\Phi_m}{\Delta t}$$

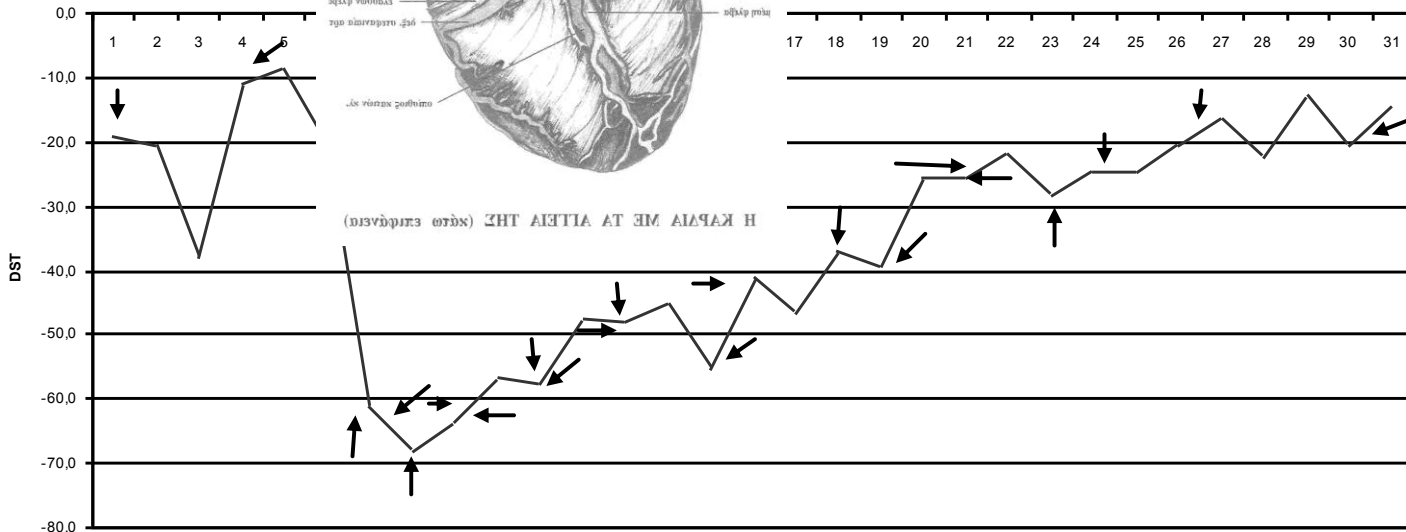
ϵ = induced emf
 $\frac{\Delta\Phi_m}{\Delta t}$ = rate of change of magnetic flux through the circuit

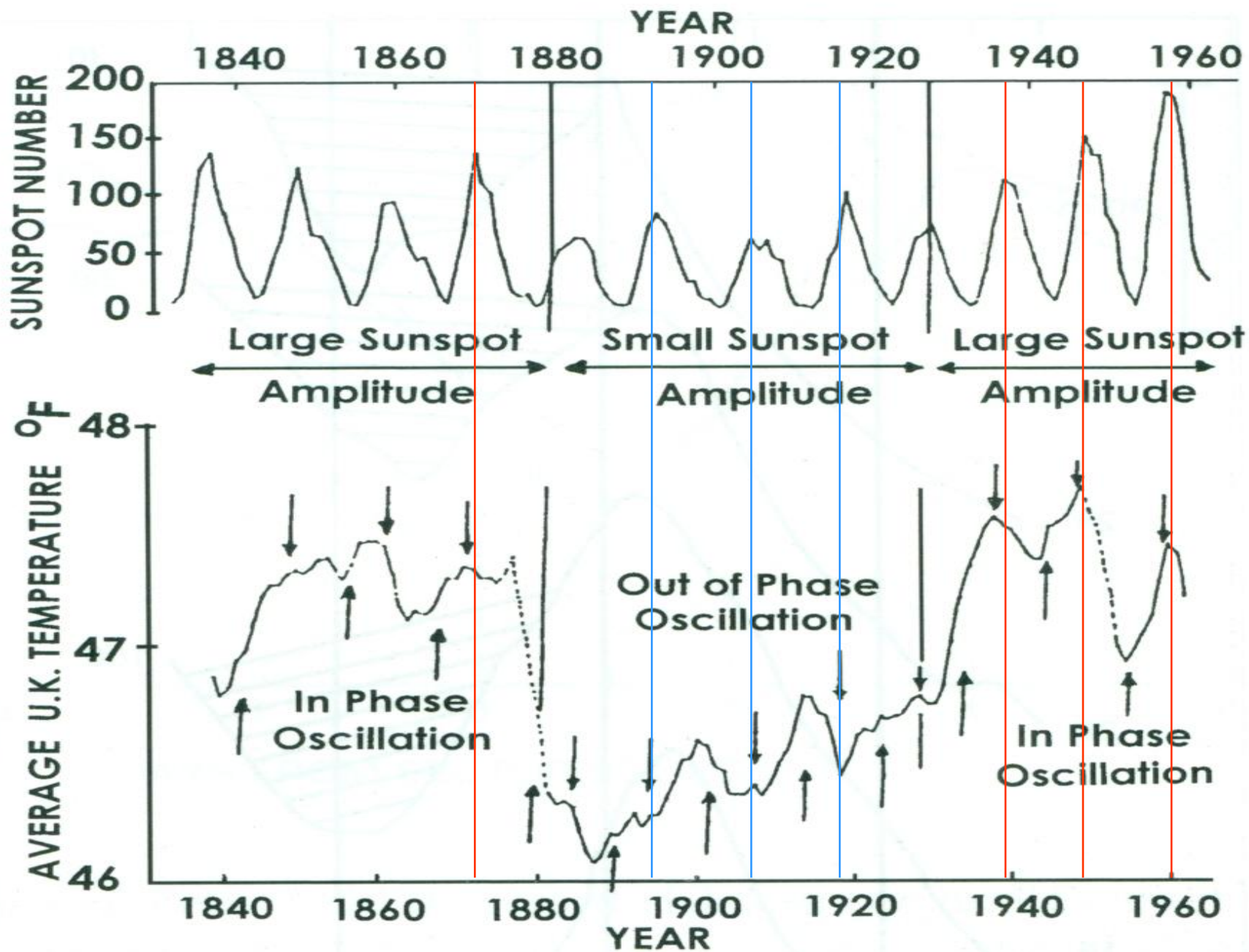


The concept of flux:
 $\Phi_m = nBA \cos \theta$
 Flux describes the field's penetration (or flow) through a surface (here, the plane of the loops within the circuit). If the field is strong and the area large, and the field is perpendicular to the area ($\theta = 0$), then flux is high. Each turn in the coil (n) adds more area.



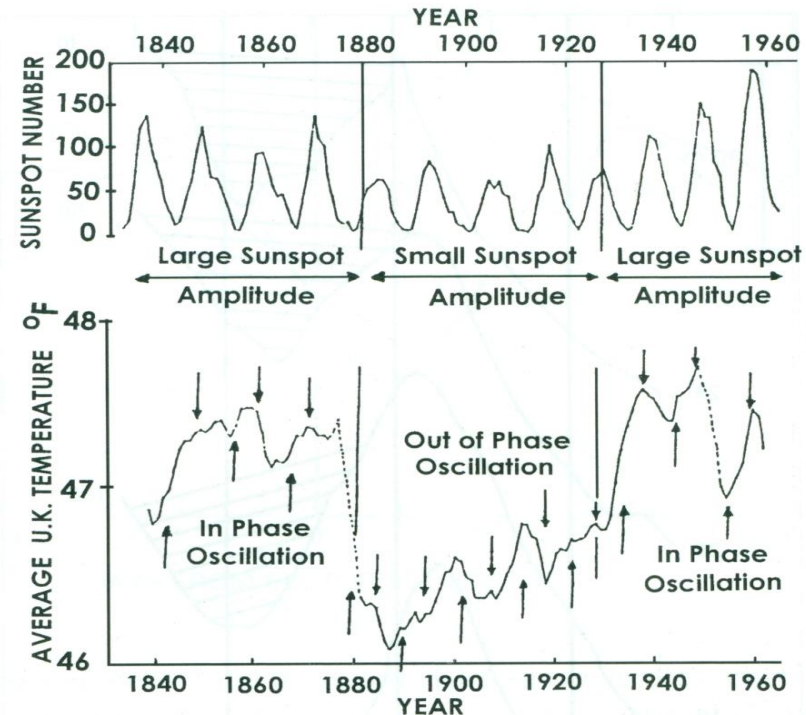
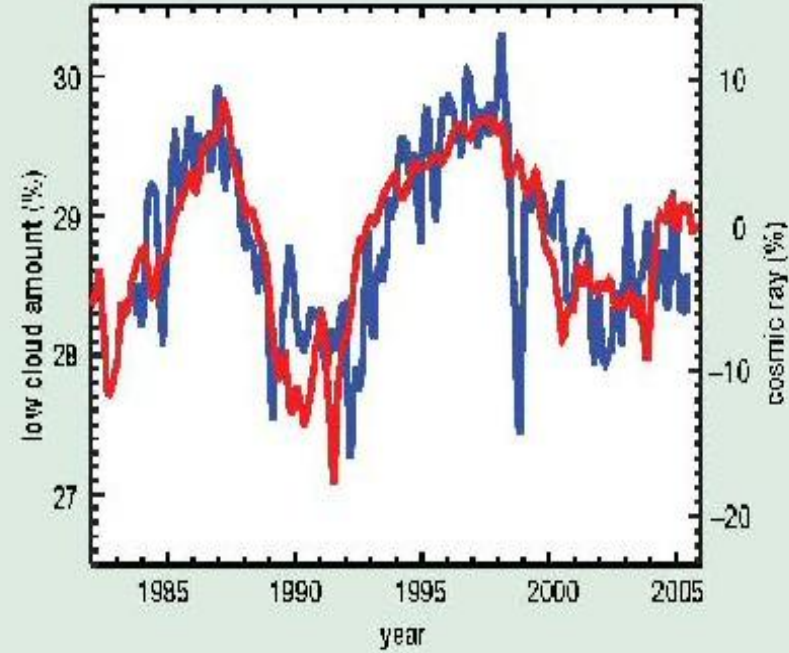
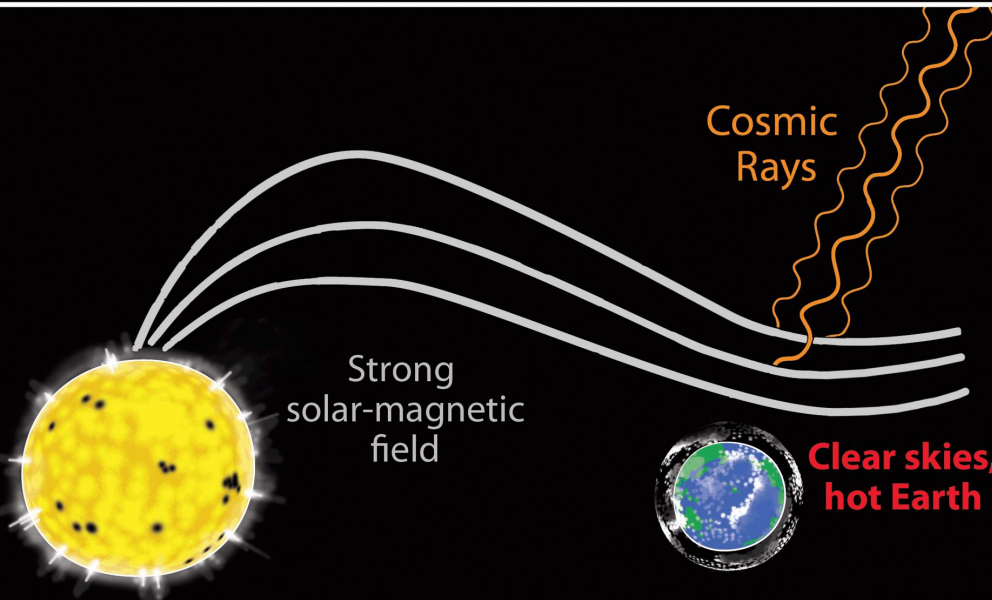
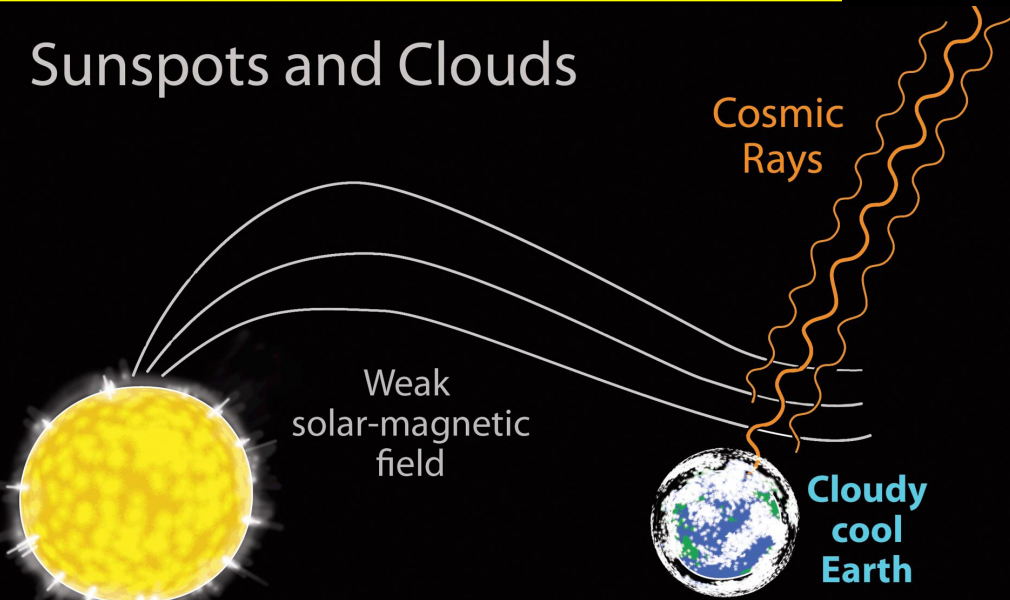
4

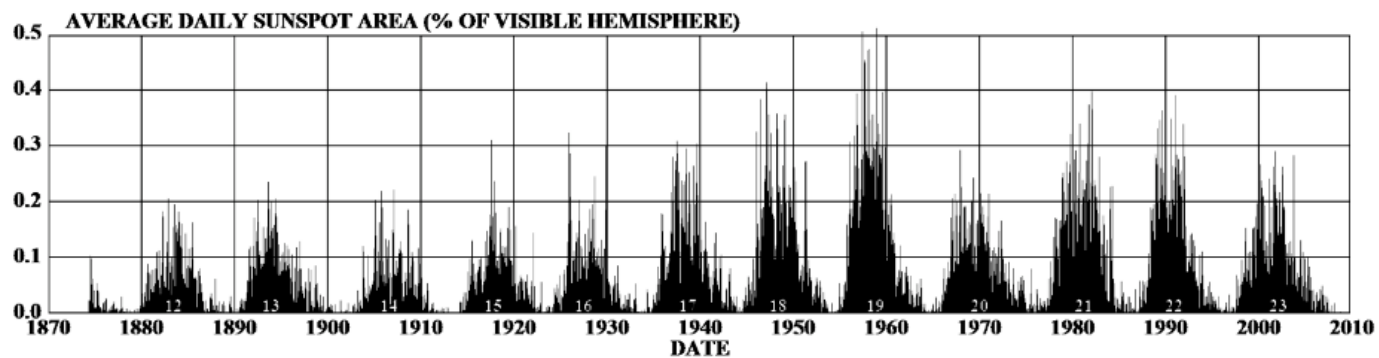
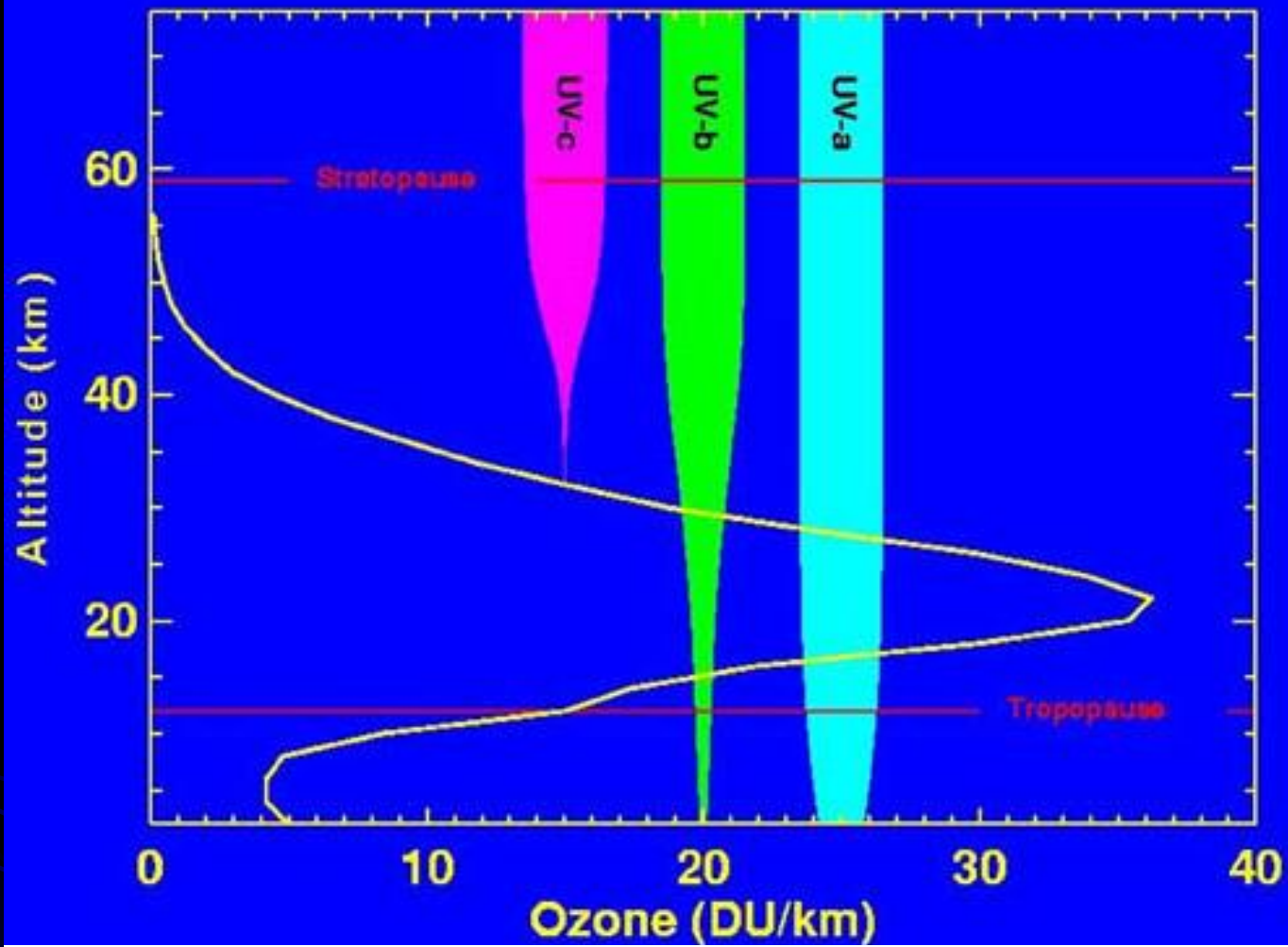




1. Ηλιακός (11 ετής) κύκλος & Βίωση

Sunspots and Clouds





Does Geomagnetic Activity Influence Human Longevity?

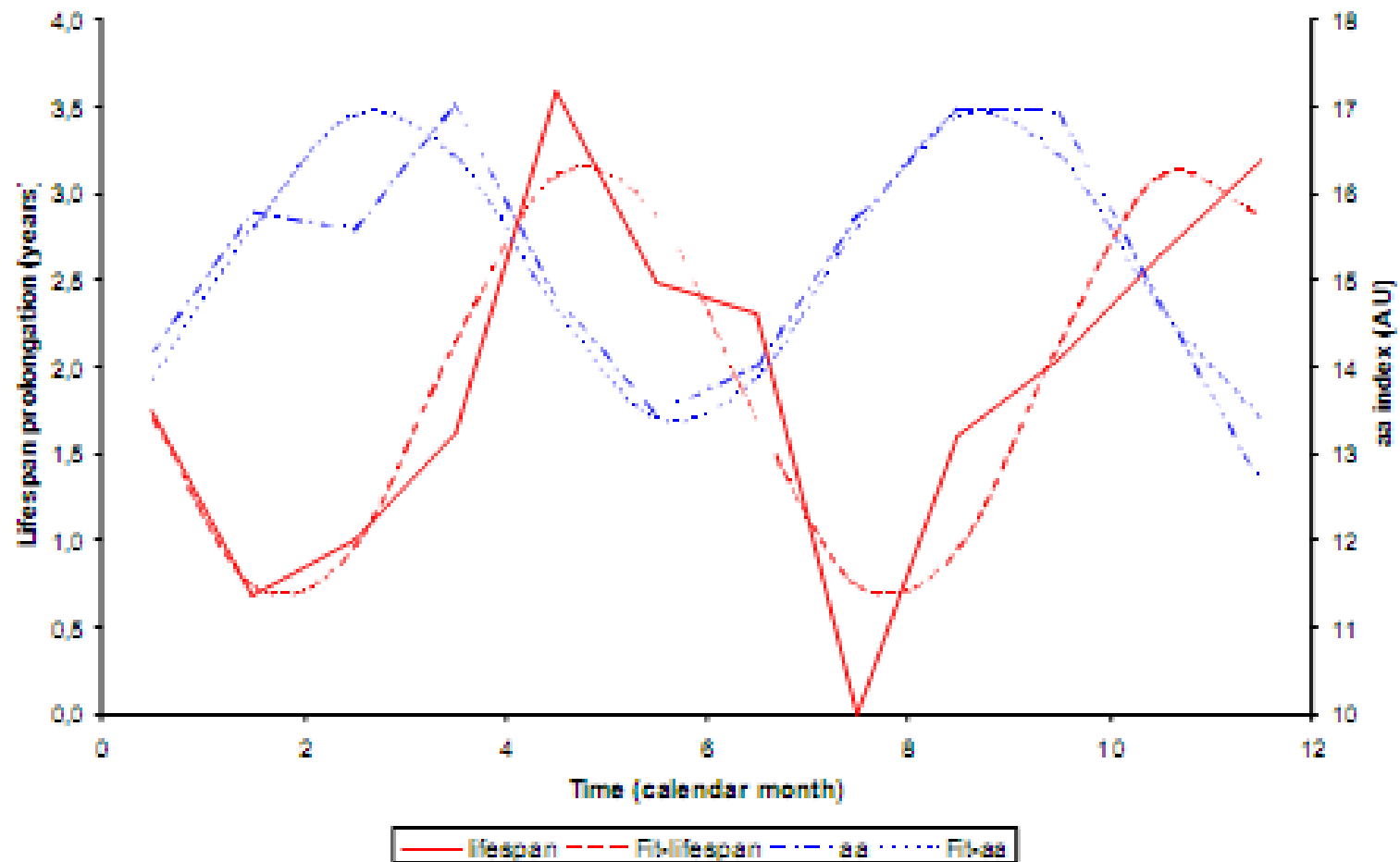


Figure 1. Human longevity studied by Gavrilov and Gavrilova (20) in adult women (30 years and older), in cohorts born in 1800-1880, expressed as a difference for the August value, used as reference, are plotted vs. the month of birth. For comparison, data from the geomagnetic index aa (1868-1880) are plotted after stacking over an idealized 1-year span.

Solar Proton Event August 1972

06:20 UT
Optical flare
observed

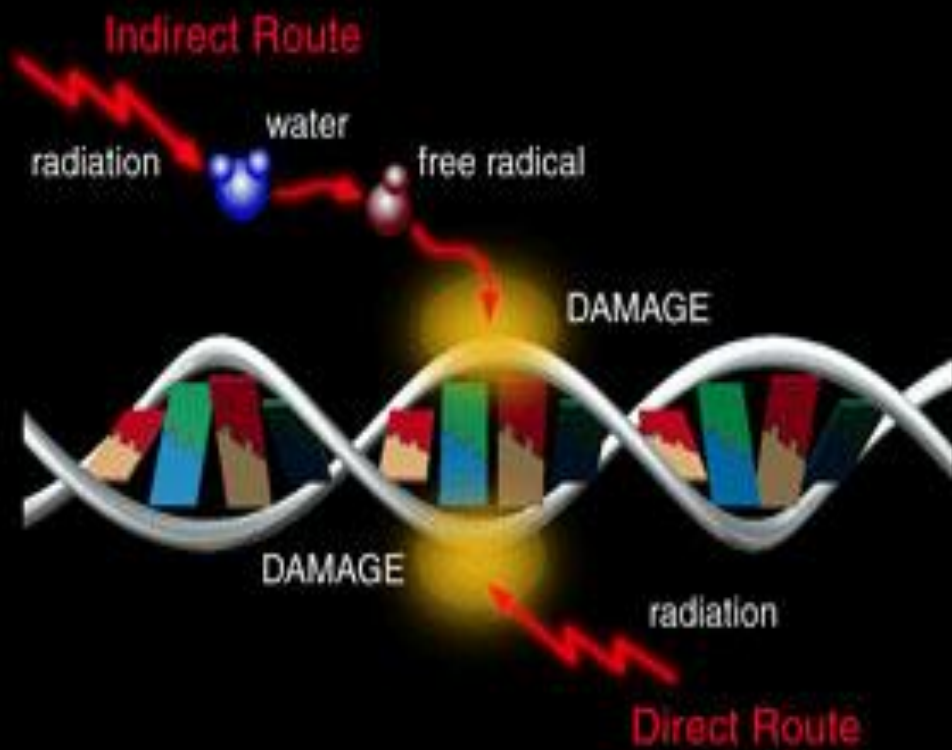
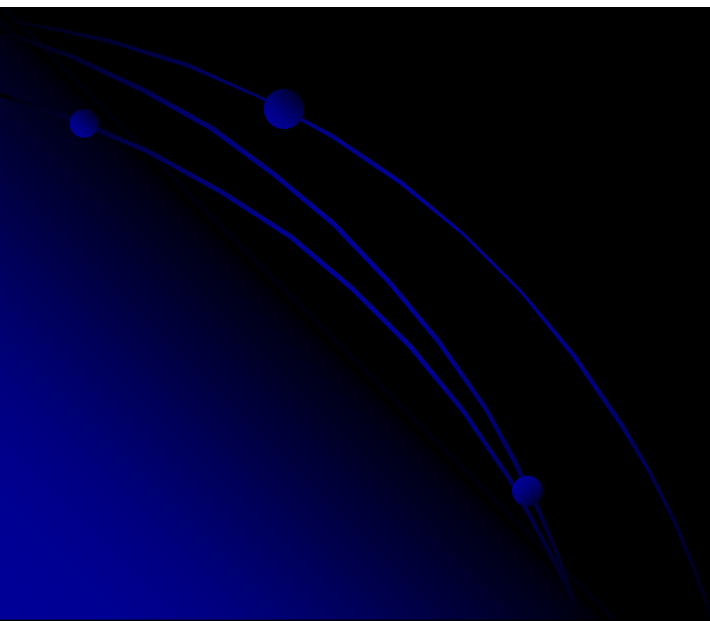
13:00 UT
Astronaut's allowable 30-day radiation exposure to skin & eyes exceeded

14:00 UT
30-day radiation exposure limit for blood-forming organs (BFO) and yearly limit for eyes exceeded

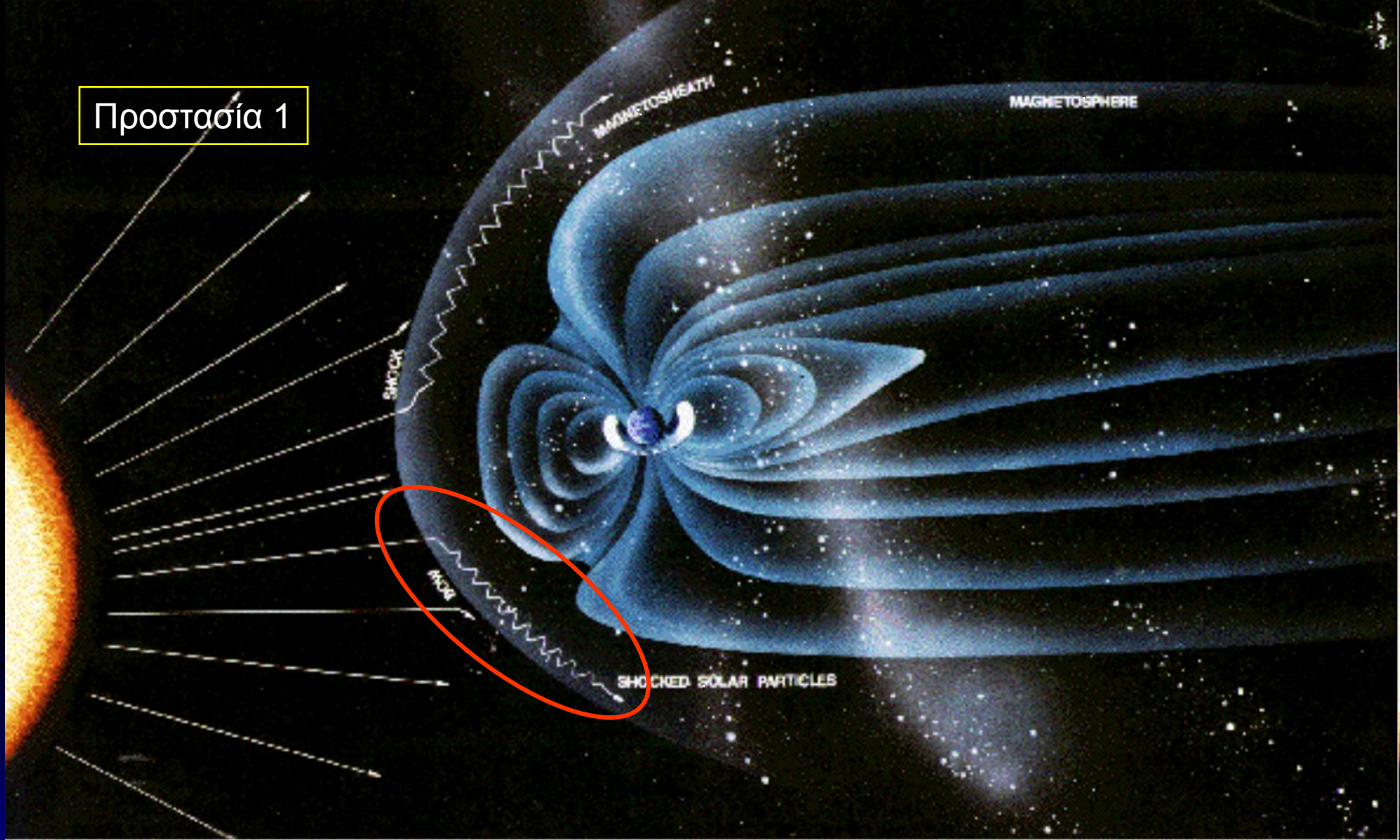
16:00 UT
yearly limit for blood-forming organs and career limit for eyes exceeded

15:00 UT
yearly limit exceeded for skin

17:00 UT
Career radiation limit for skin exceeded



Προστασία 1



Το μαγνητικό πεδίο της Γης μας προστατεύει από τις κοσμικές ακτίνες

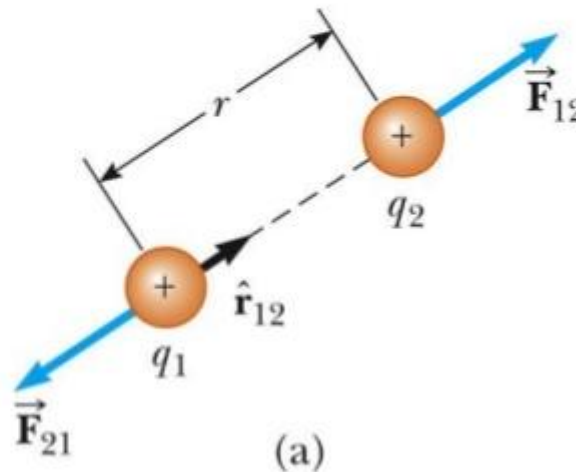
Vector Nature of Electric Forces



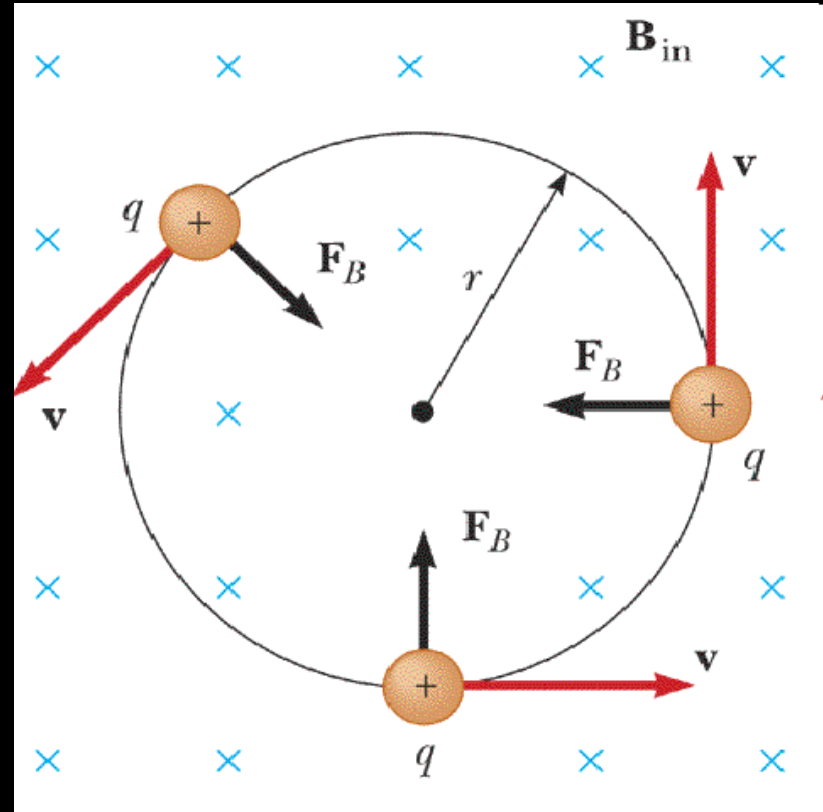
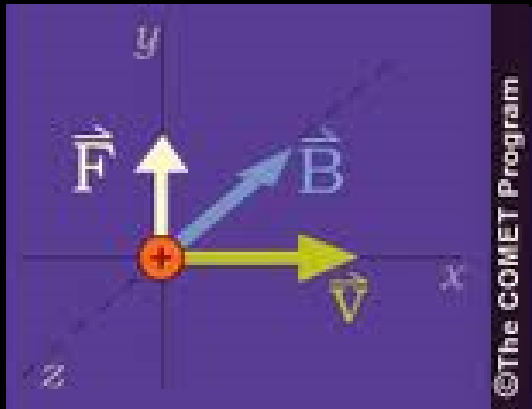
- In vector form,

$$\vec{\mathbf{F}}_{12} = k_e \frac{q_1 q_2}{r^2} \hat{\mathbf{r}}_{12}$$

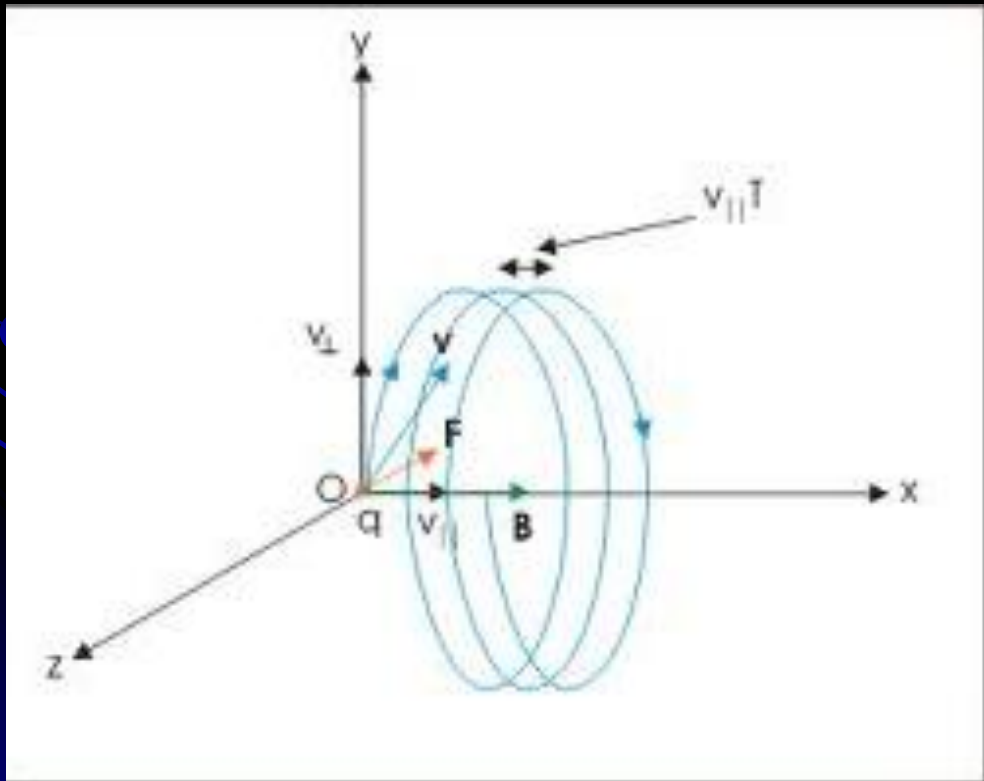
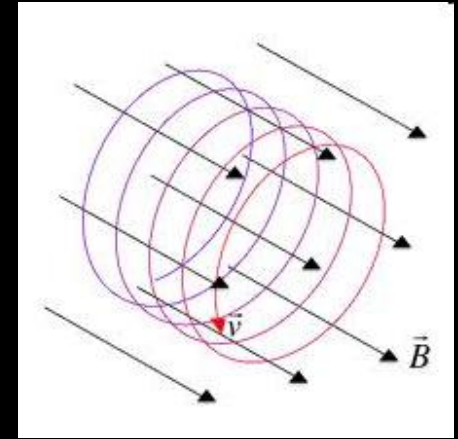
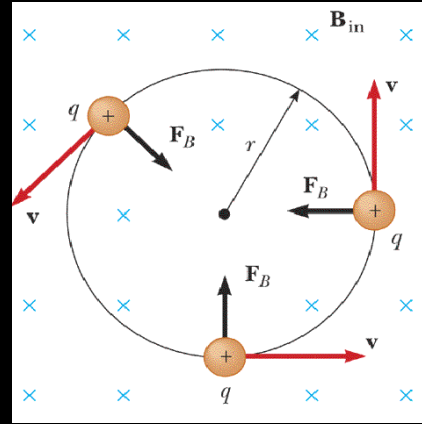
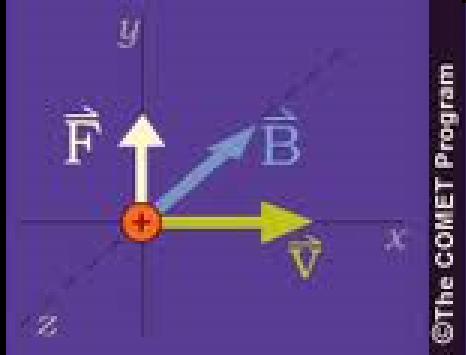
- $\hat{\mathbf{r}}_{12}$ is a unit vector directed from q_1 to q_2
- The like charges produce a repulsive force between them
- Use the active figure to move the charges and observe the force

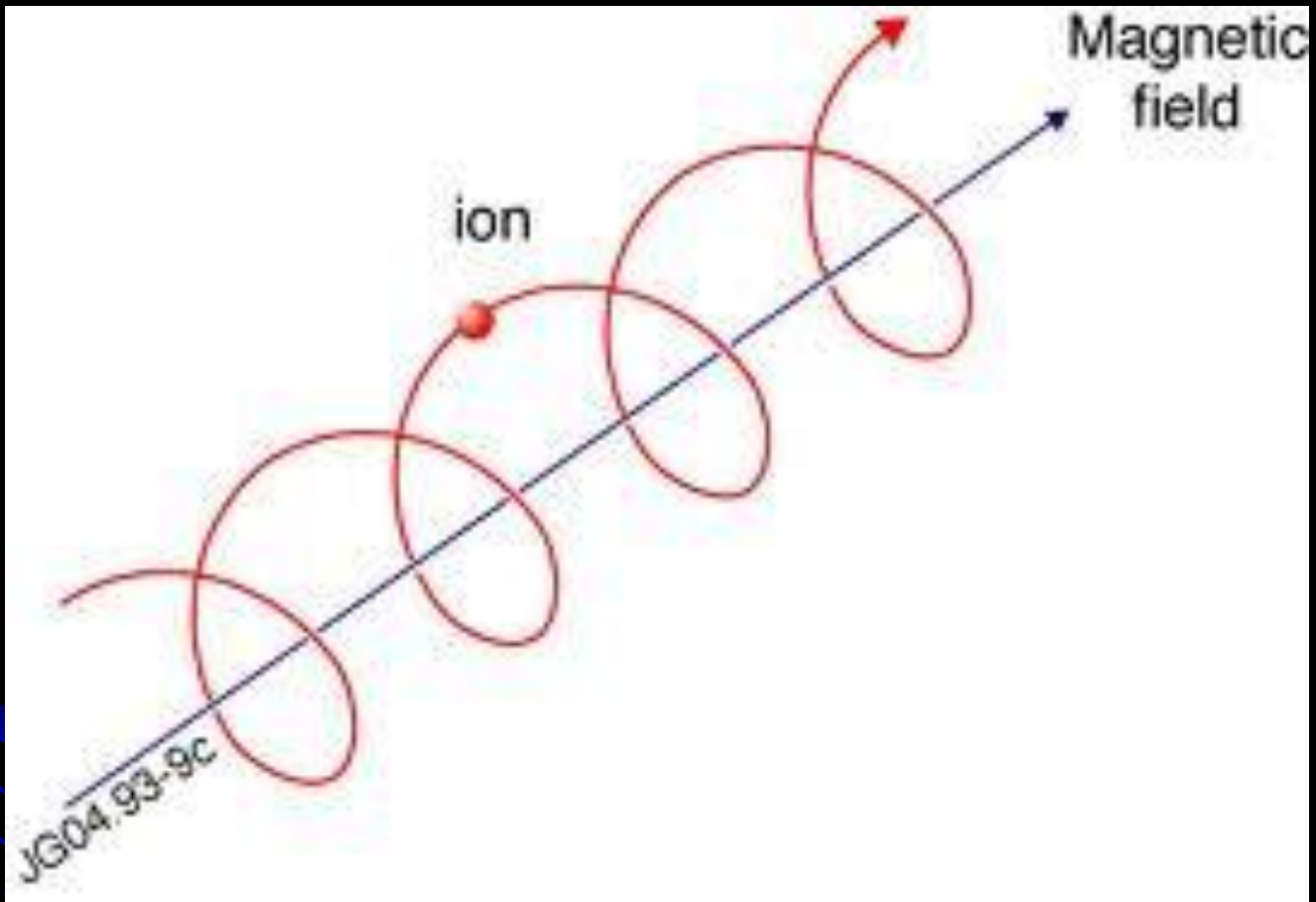


Μαγνητική δύναμη

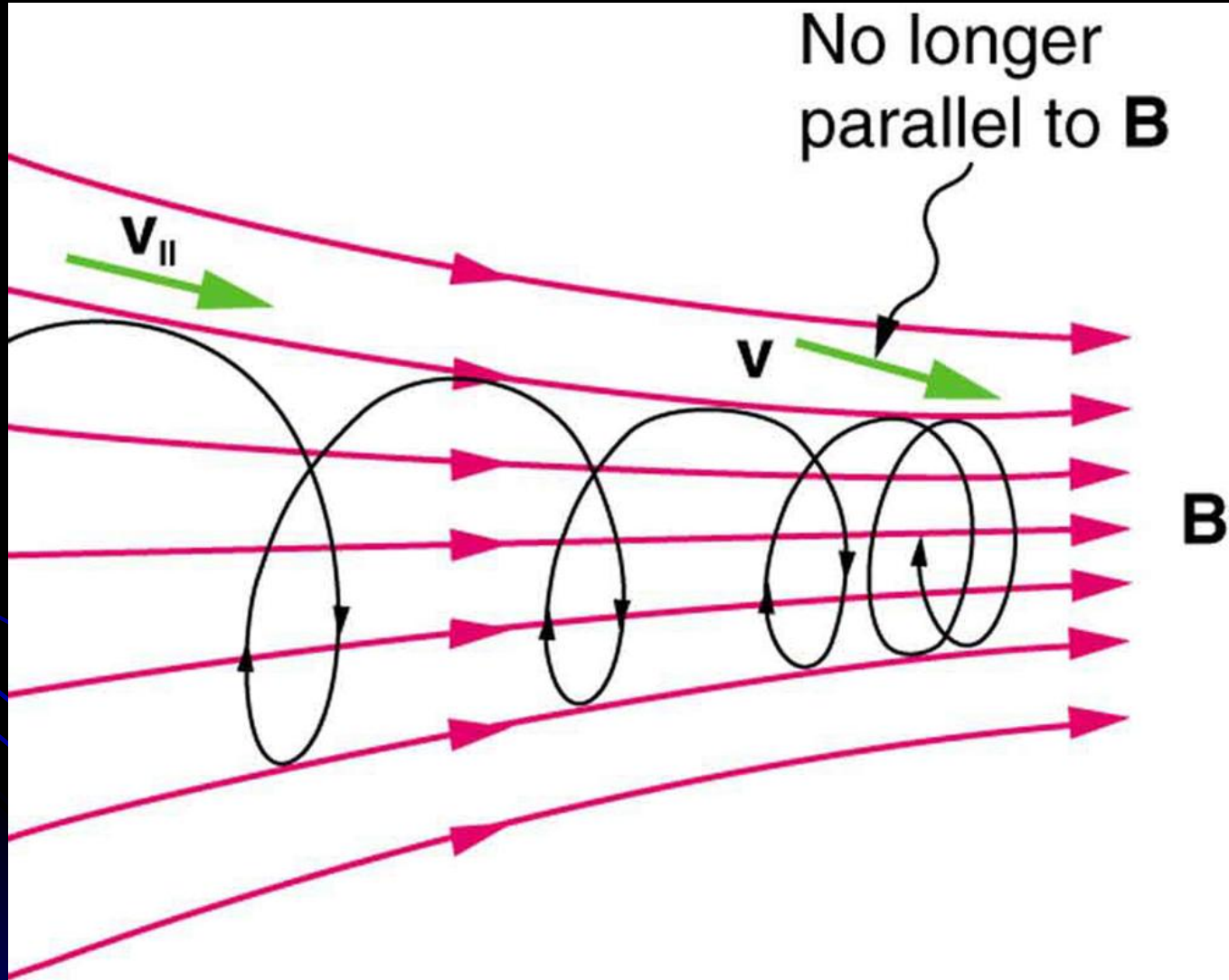


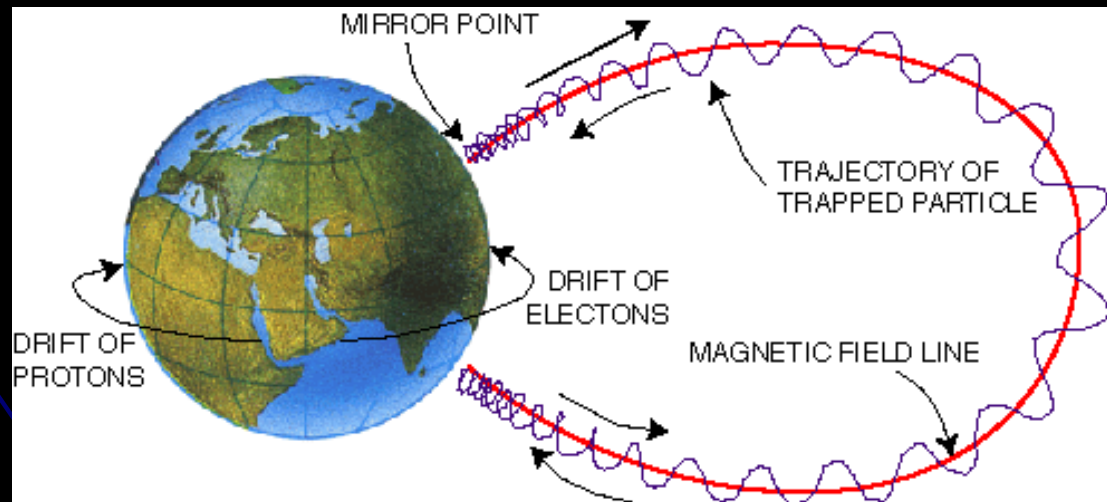
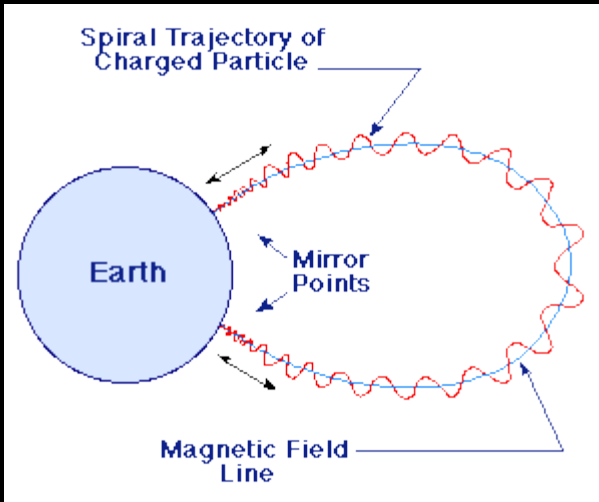
Κίνηση φορτίου σε Μαγνητικό Πεδίο

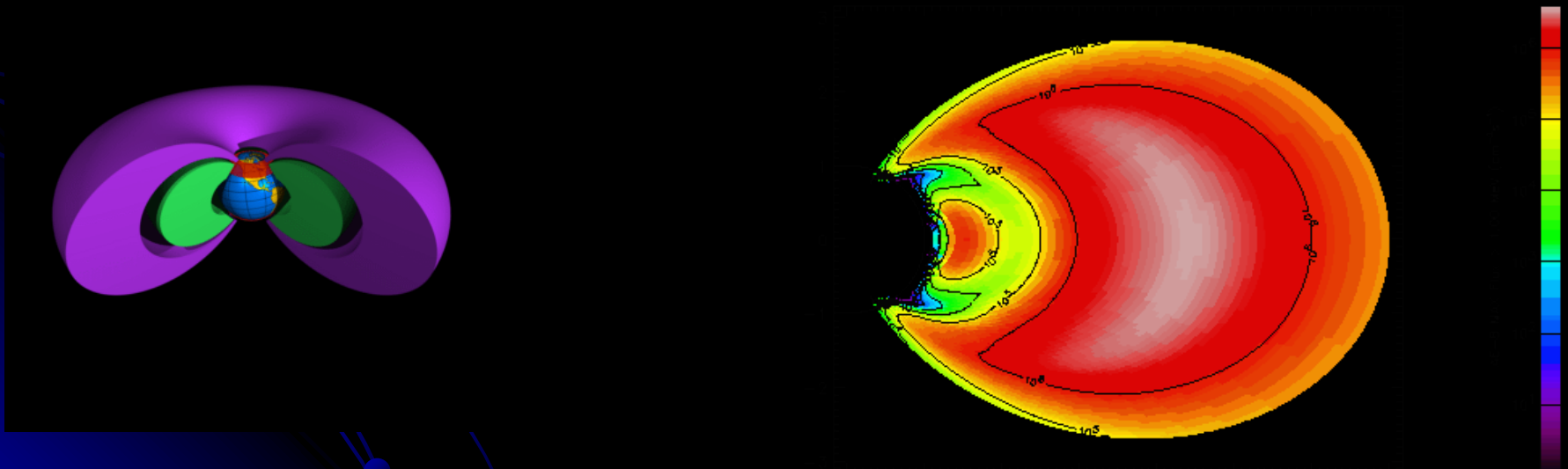
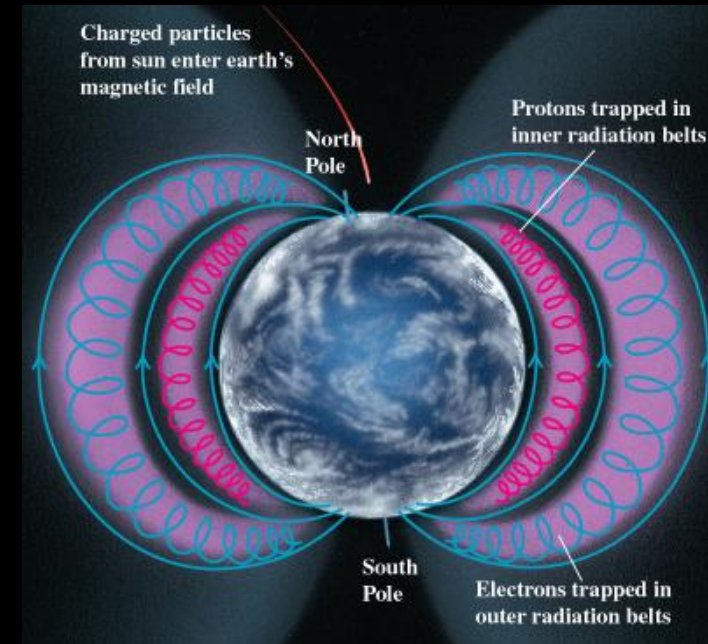
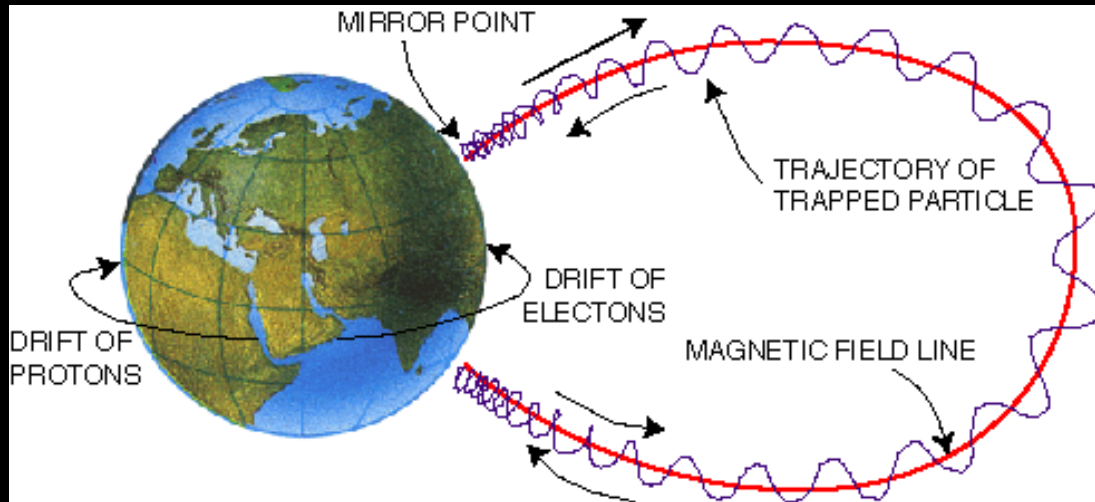




Μαγνητικός καθρέπτης

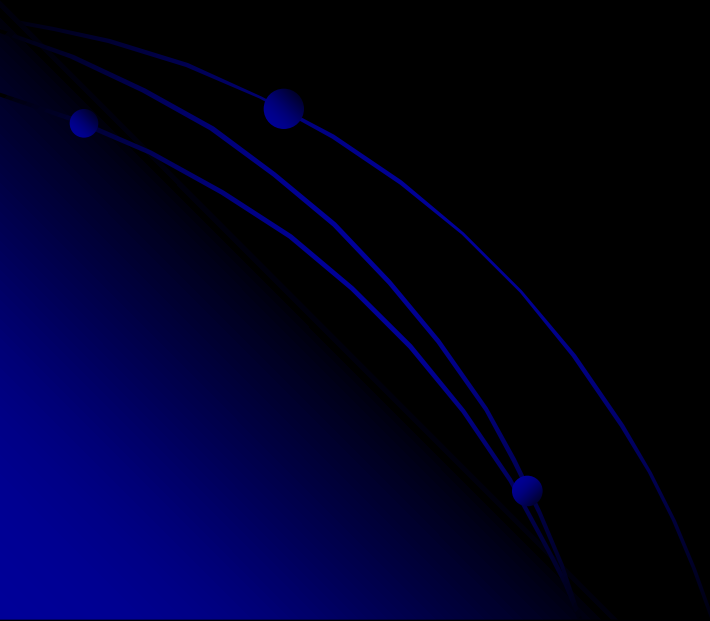


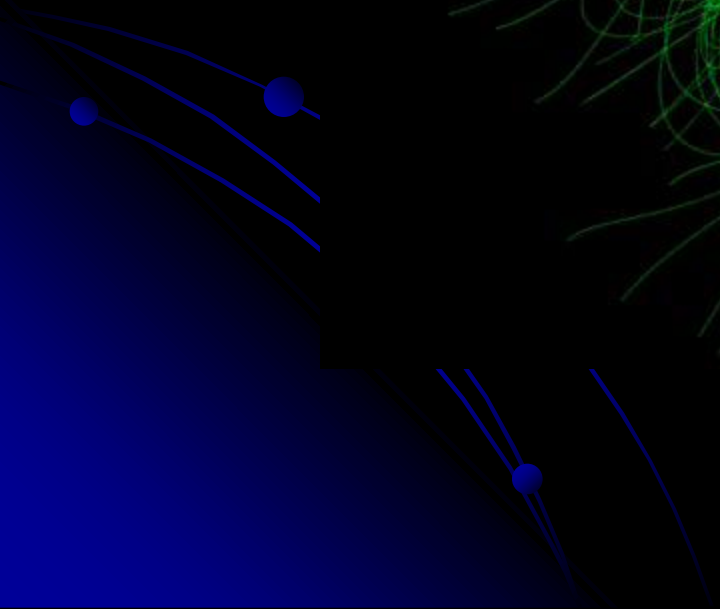
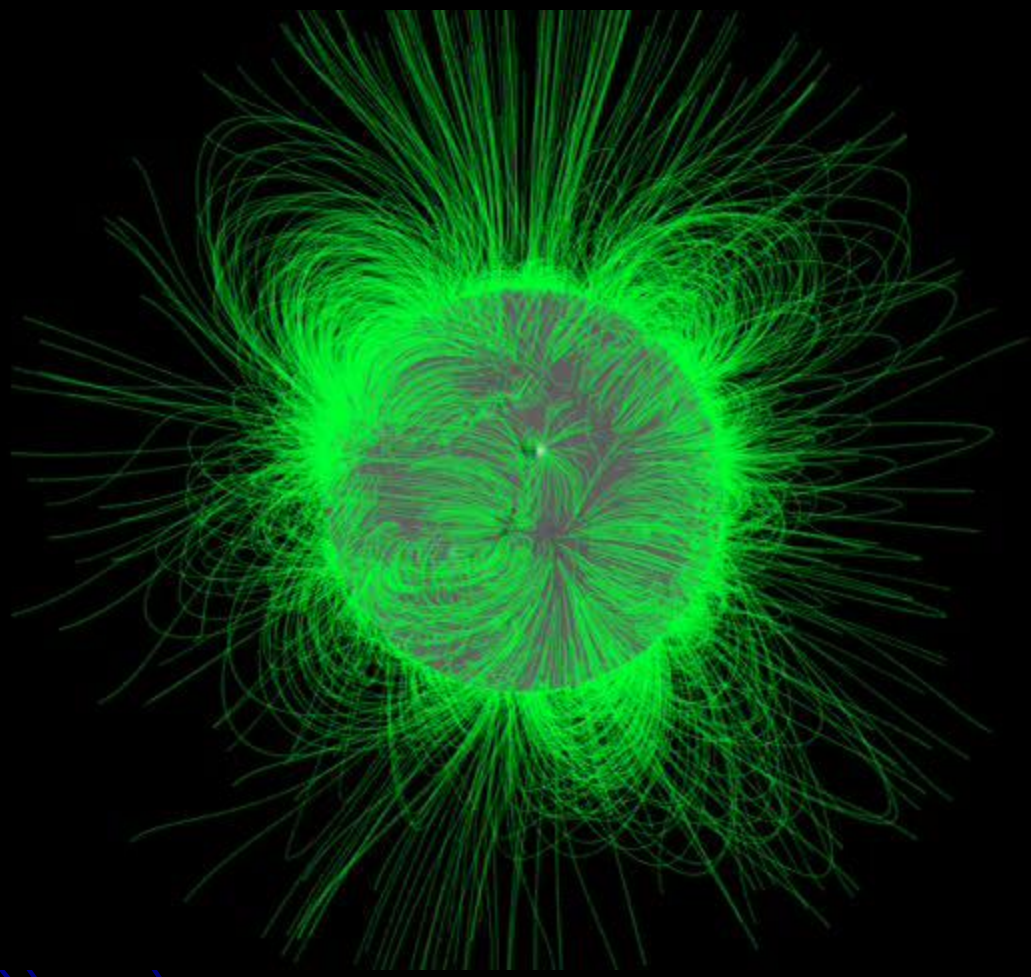


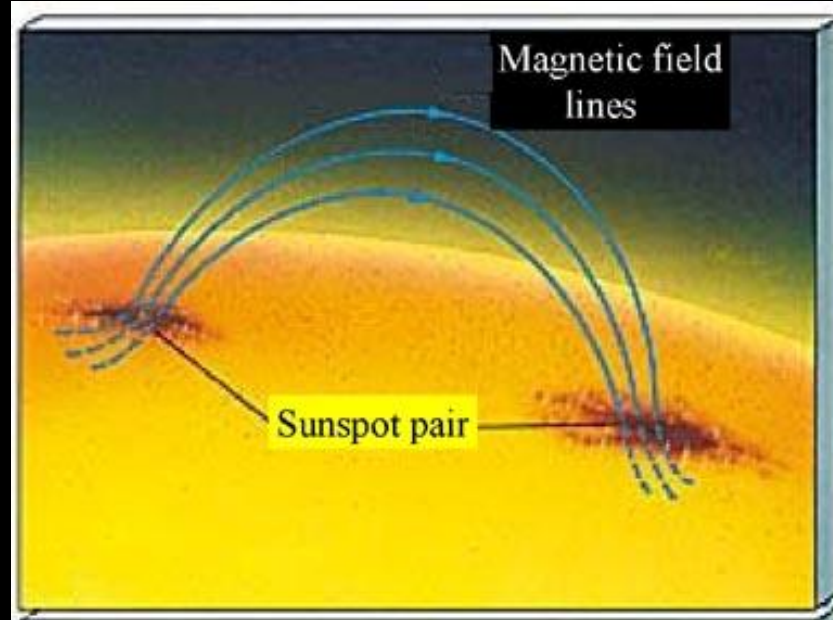


Ζώνες Van Allen ή παγιδευμένων σωματιδίων

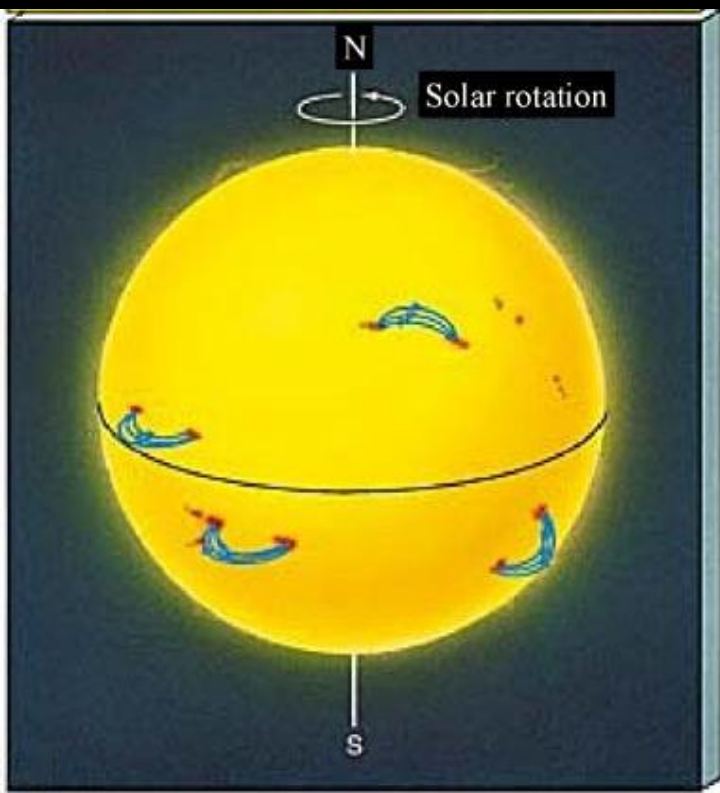
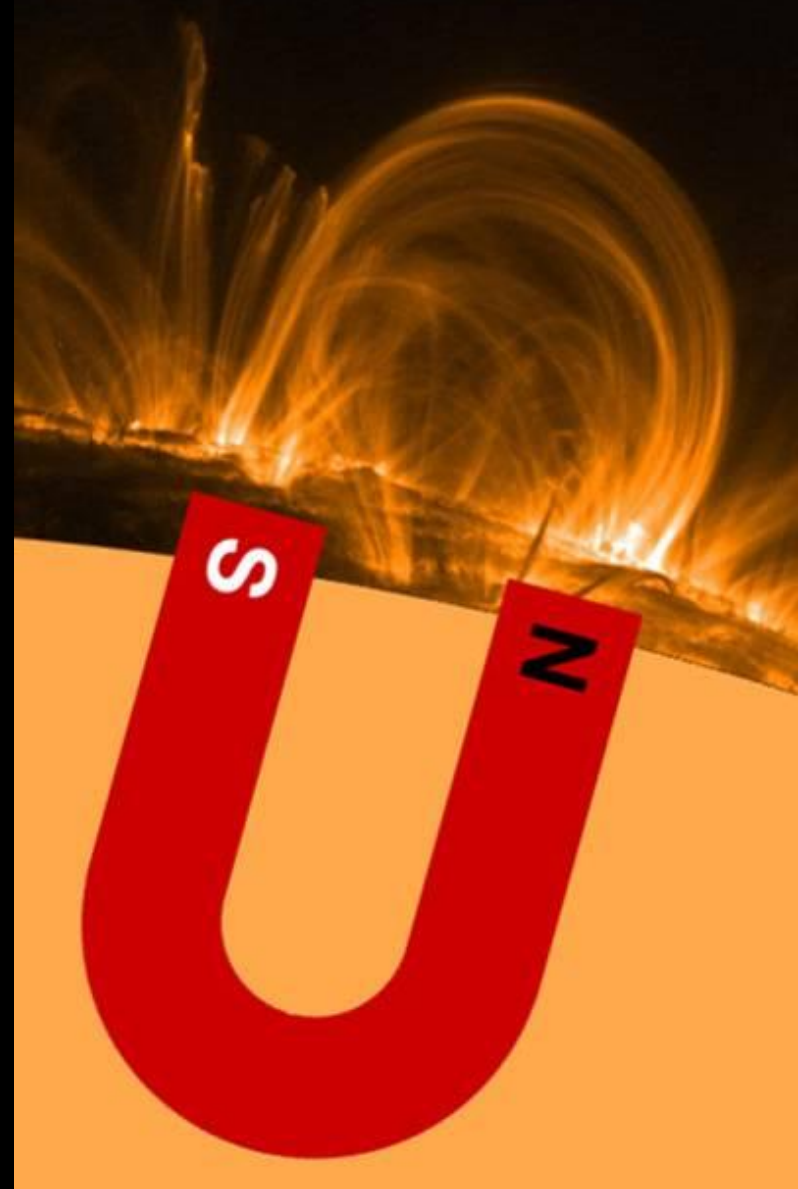
ΗΛΕΚΤΡΟΜΑΓΝΗΤΙΣΜΟΣ ΤΟΥ ΠΕΡΙΒΑΛΛΟΝΤΟΣ-1







Ηλιακές κηλίδες (sunspots)



Coronal Loops



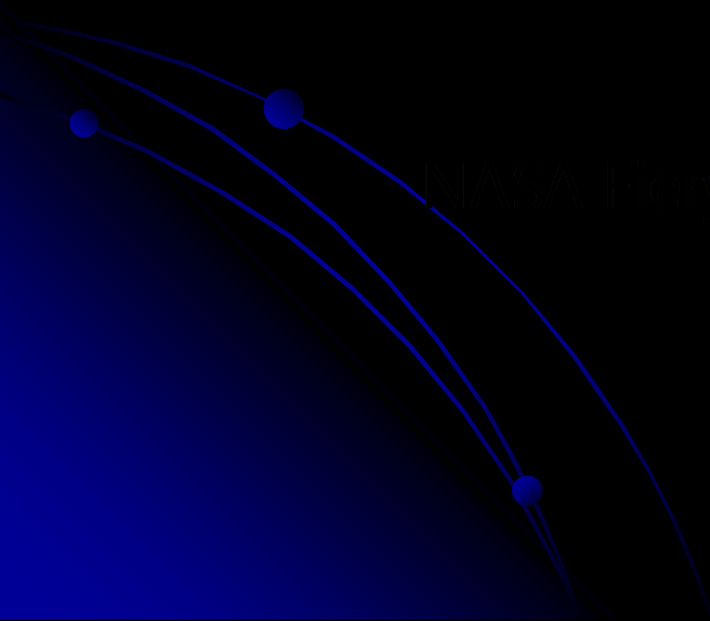
Ηλιακή & γεωμαγνητική δραστηριότητα (βλ. βίντεο)



NASA: Heavy Ionospheric Rain on the Sun



NASA: Heavy Ionospheric Rain on the Sun



Sunspots and the Sunspot Cycle

