Agenda week 35 : Chapter 3

Lecture 2

Sun Internal structure:

•Core, Radiative zone, Convection zone

Solar Atmospheric regions (phenomena):

•Photosphere (granule, sunspots, umbra, penumbra)

•Chromosphere (fibrils, spicules)

•Corona (Helmet streamers, coronal holes, CME, prominences, flares)

•Atmospheric temprature profile (simularties with Earth)

11Y and 22Y cycle

Lecture 3

Black body radiation:

•Planck's law : Spectral energy flux

•Stefan Bolzmann law : Energy flux

•Total Luminosity

Extinction of radiation:

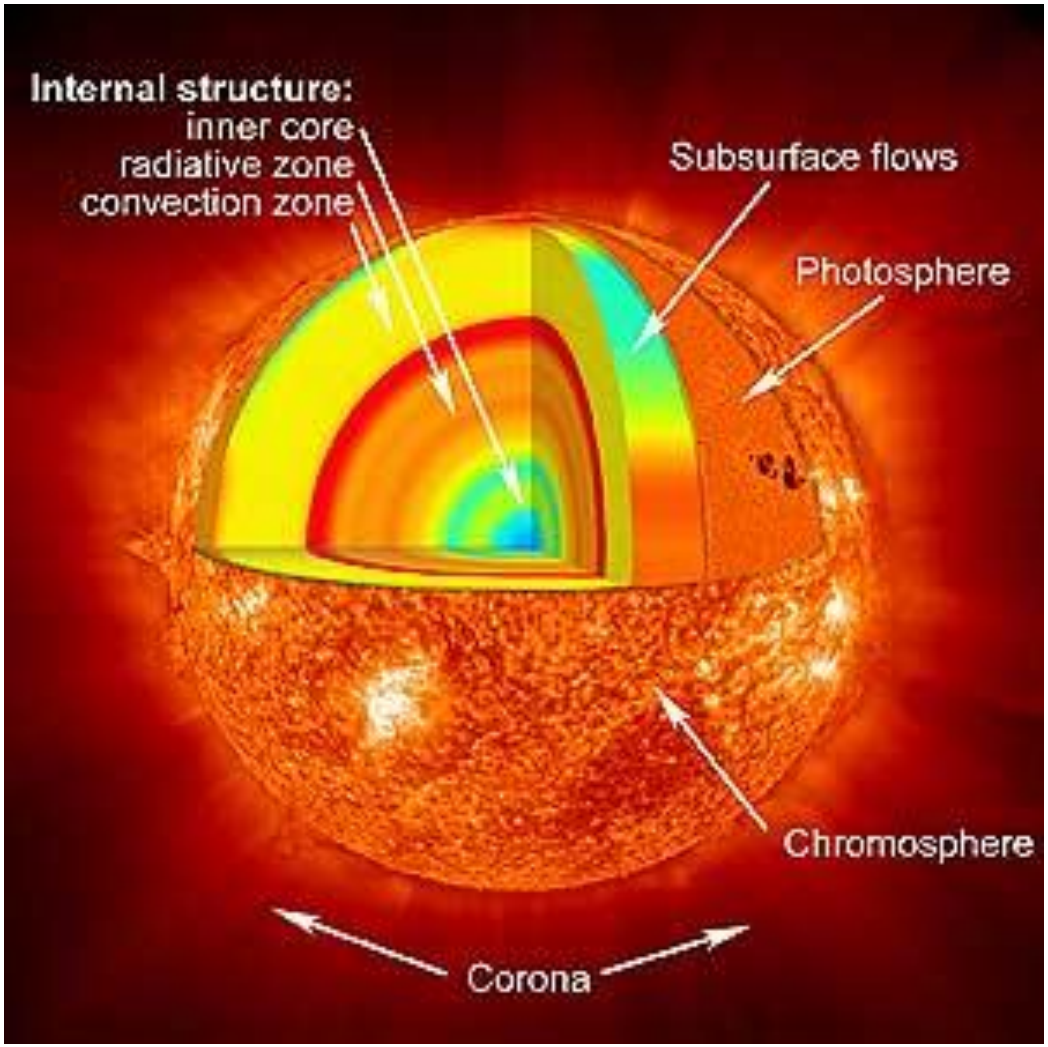
•Absorption processes

•Cross section

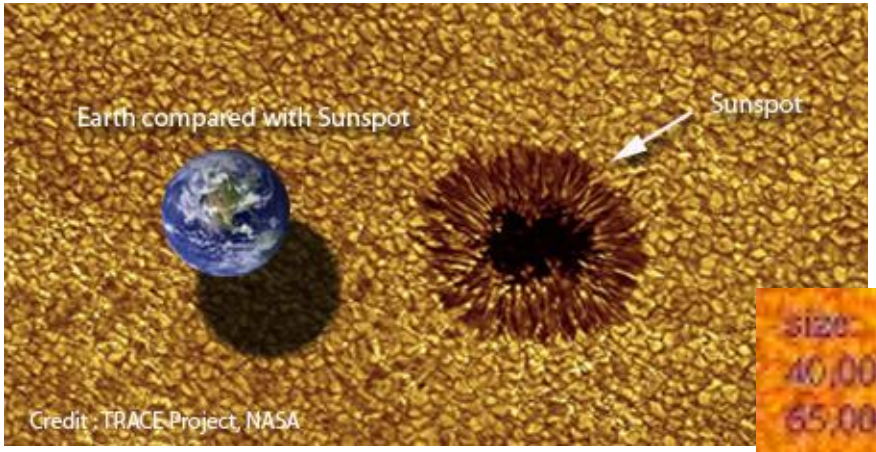
•Optical depth (derive it)

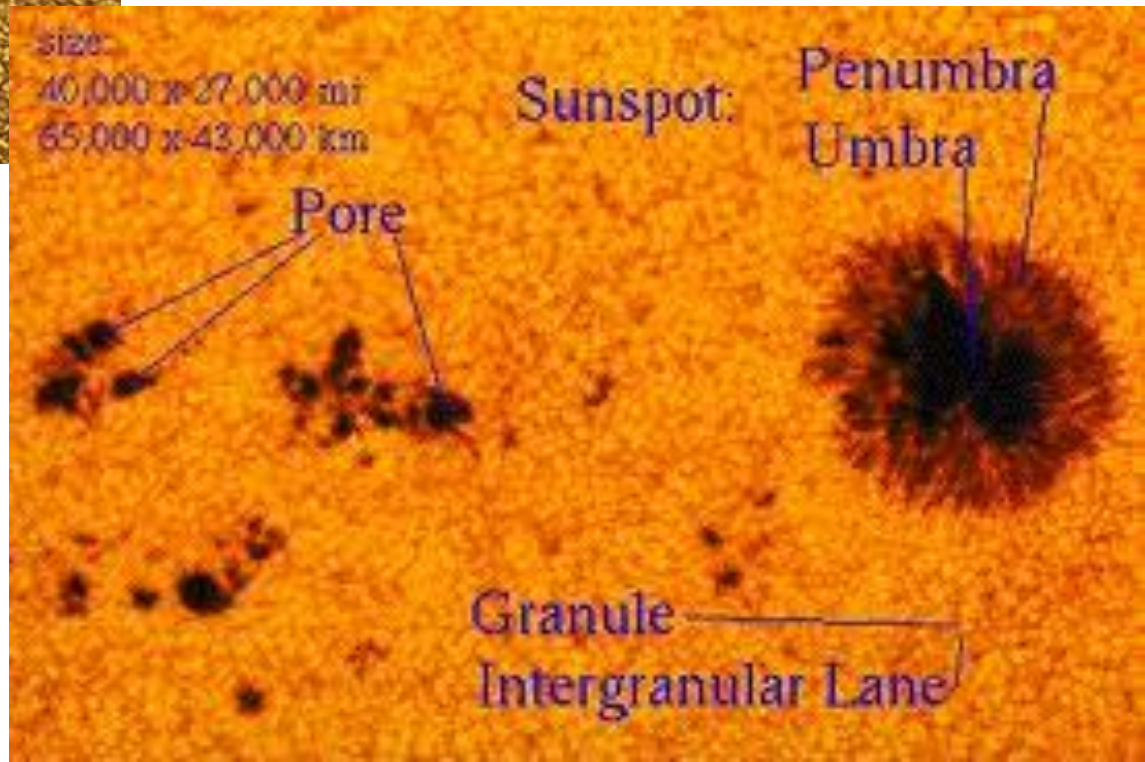
Energy deposition from radiation:

•Ion production- Chapman-profiles

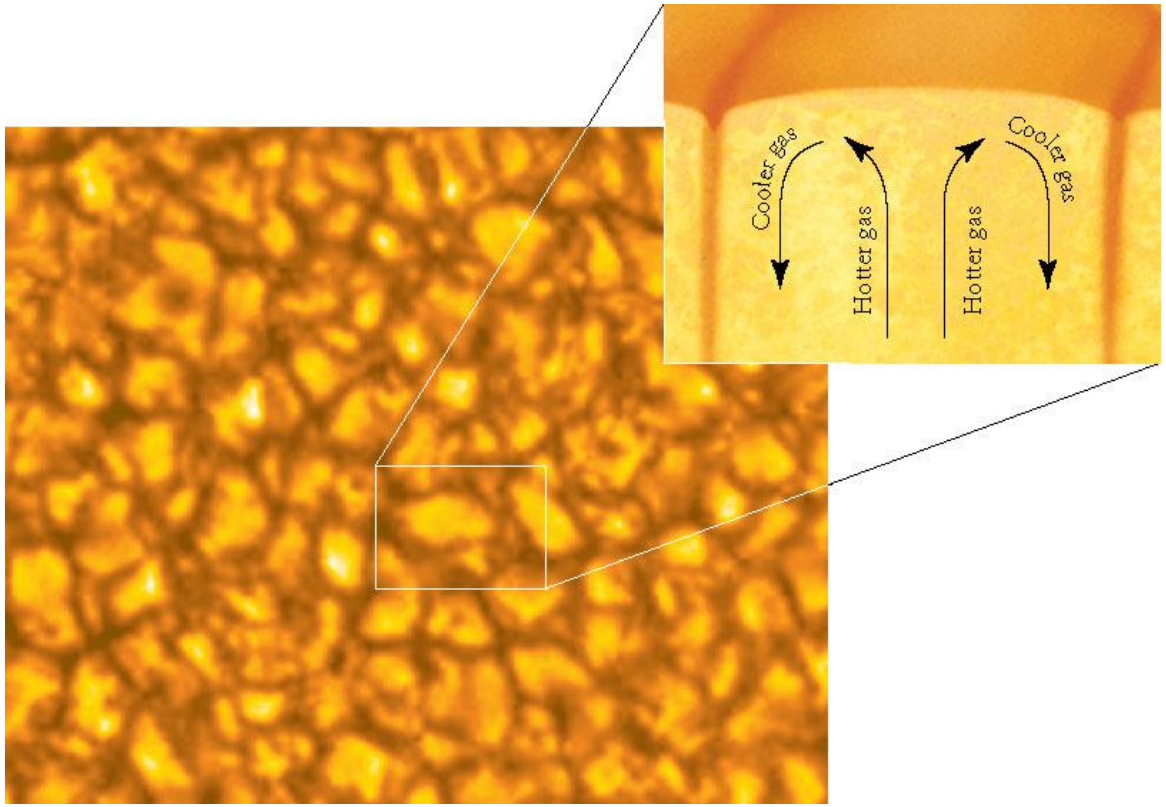

Internal structure:
inner core
radiative zone
convection zone
Subsurface flows
Photosphere
Chromosphere
Corona

Photosphere - phenomena

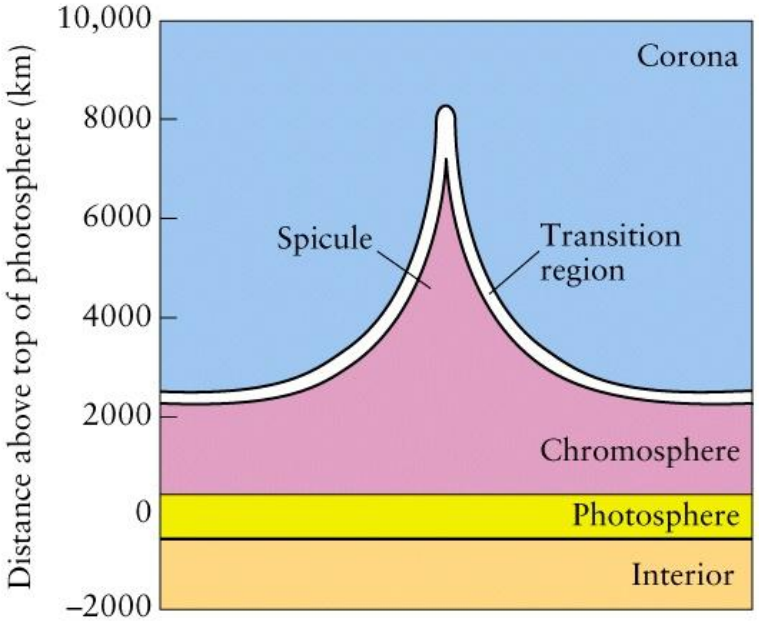


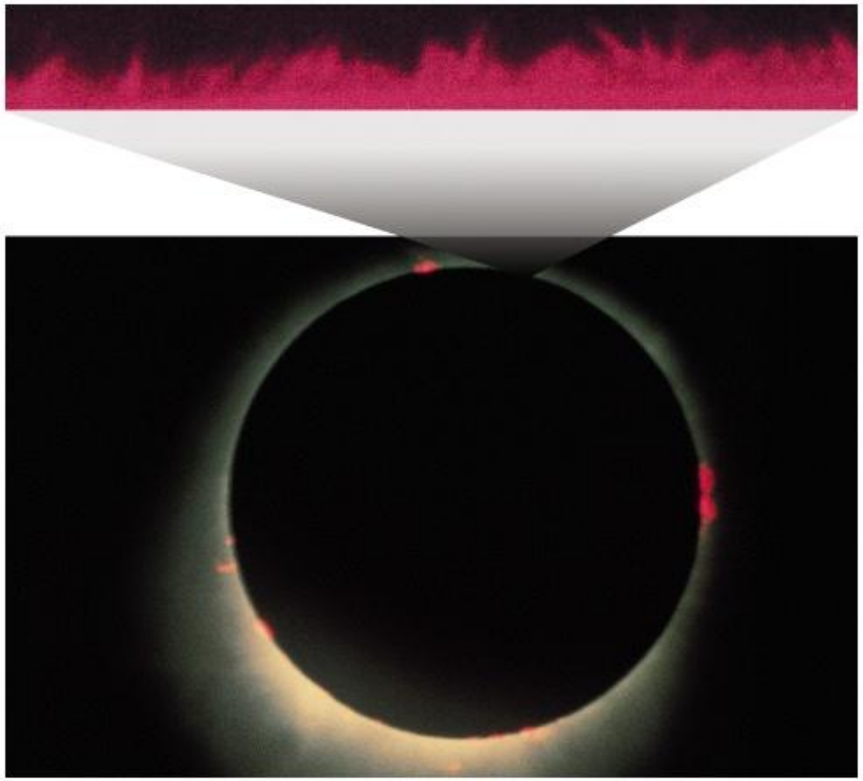


Photosphere - granulae



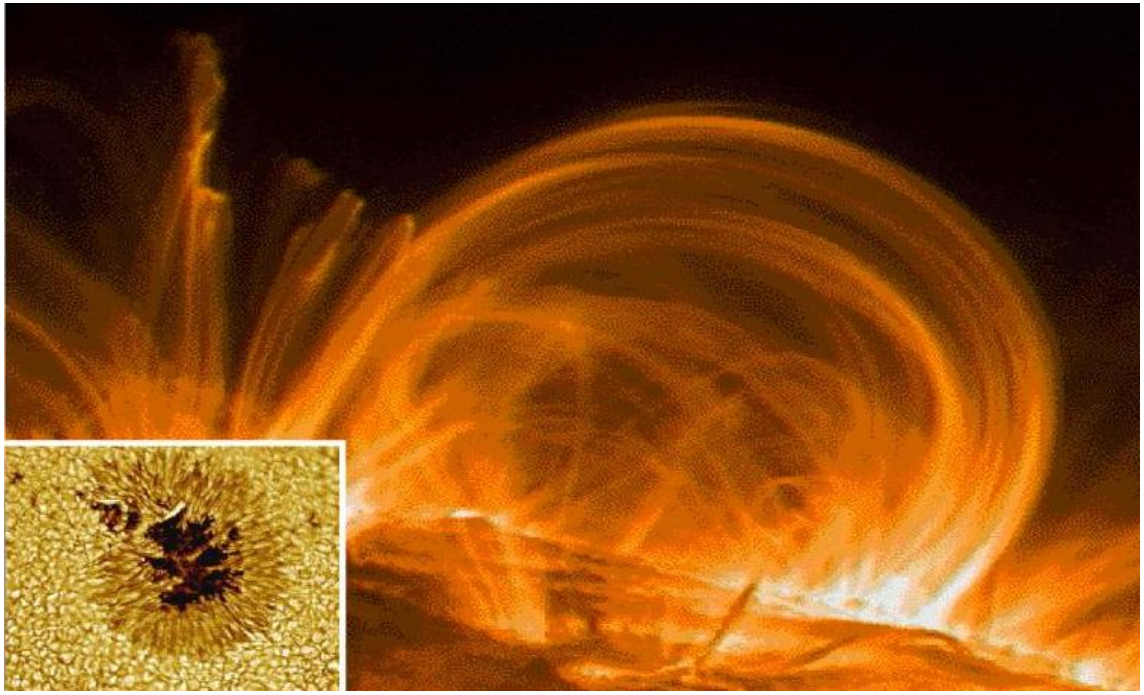
Chromosphere - spicule

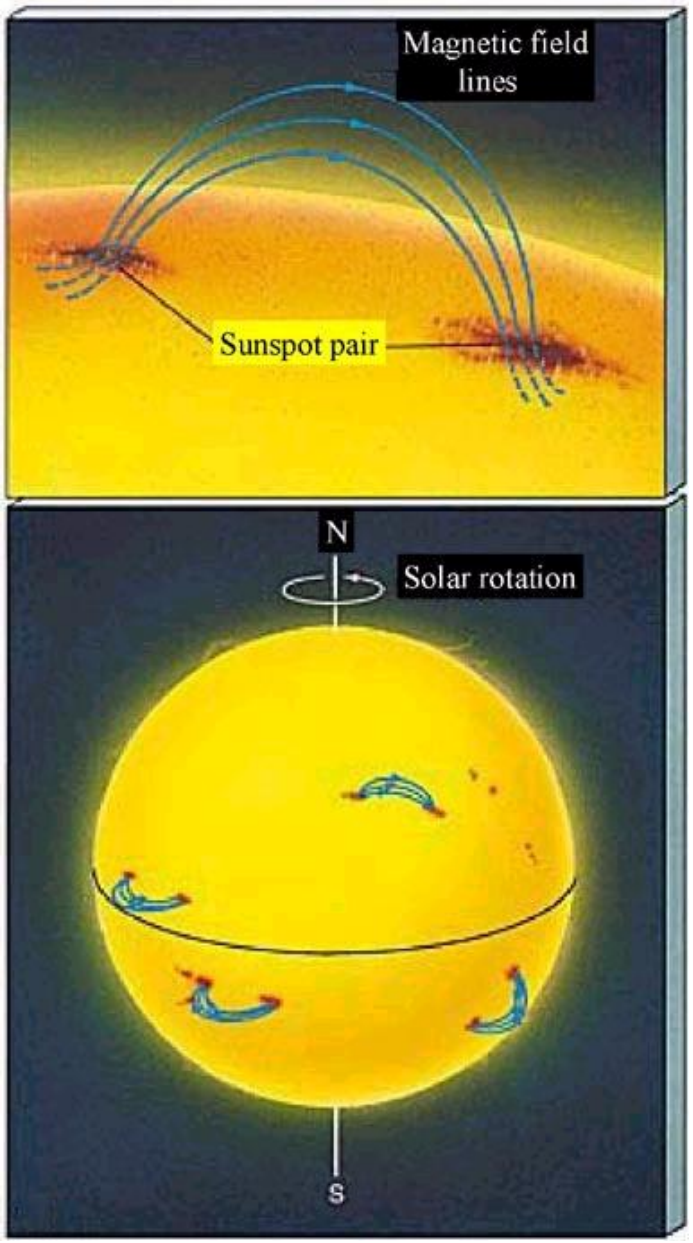


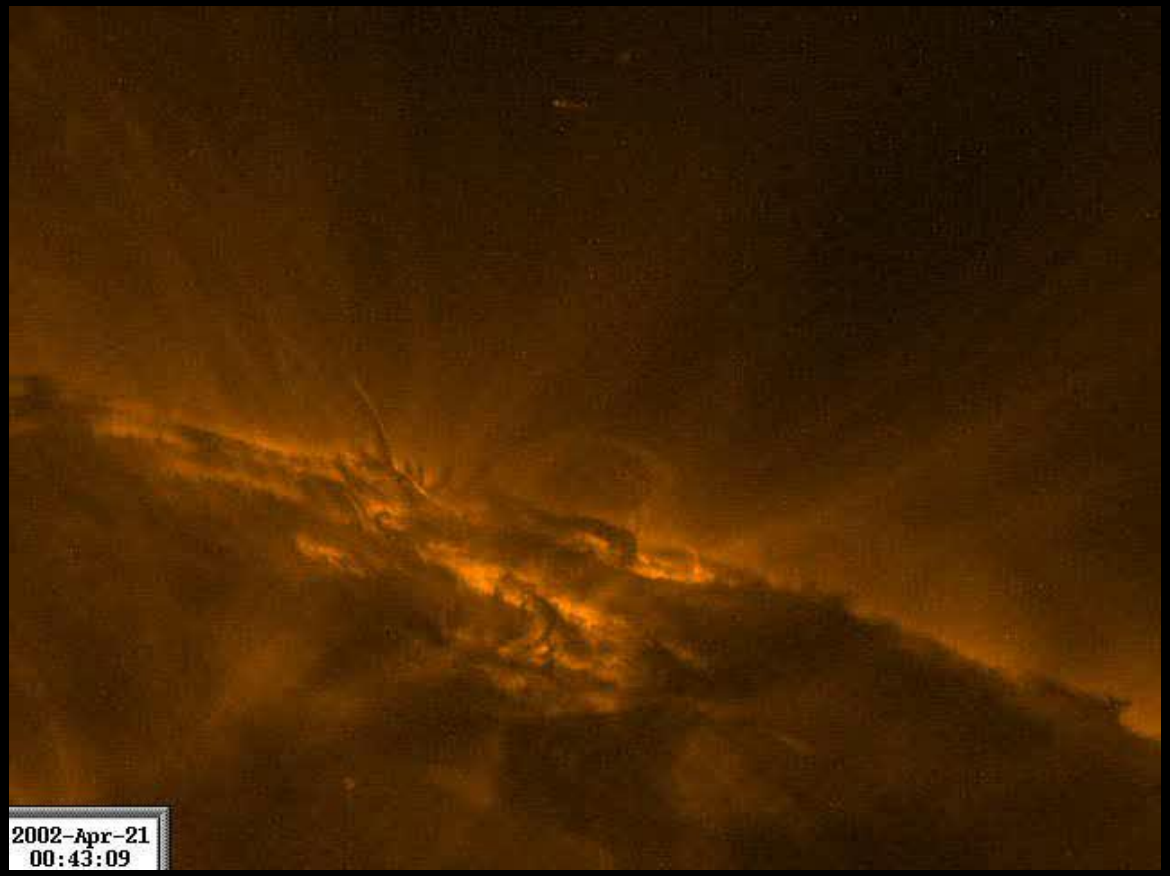


Solar corona

- Magnetic loops
- Sun spots occur in pairs connected by magnetic field lines



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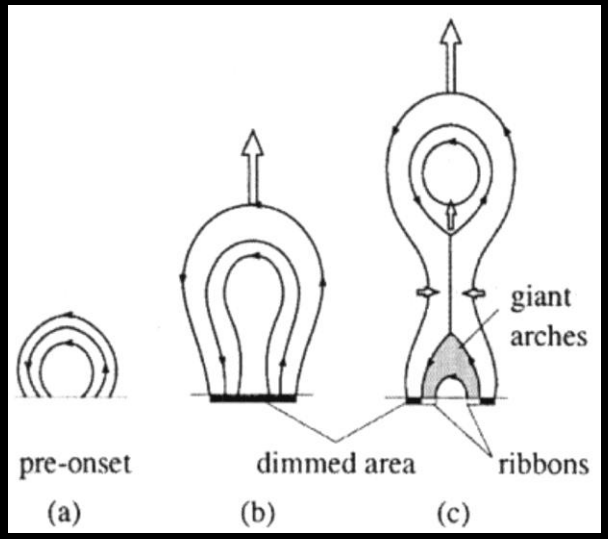
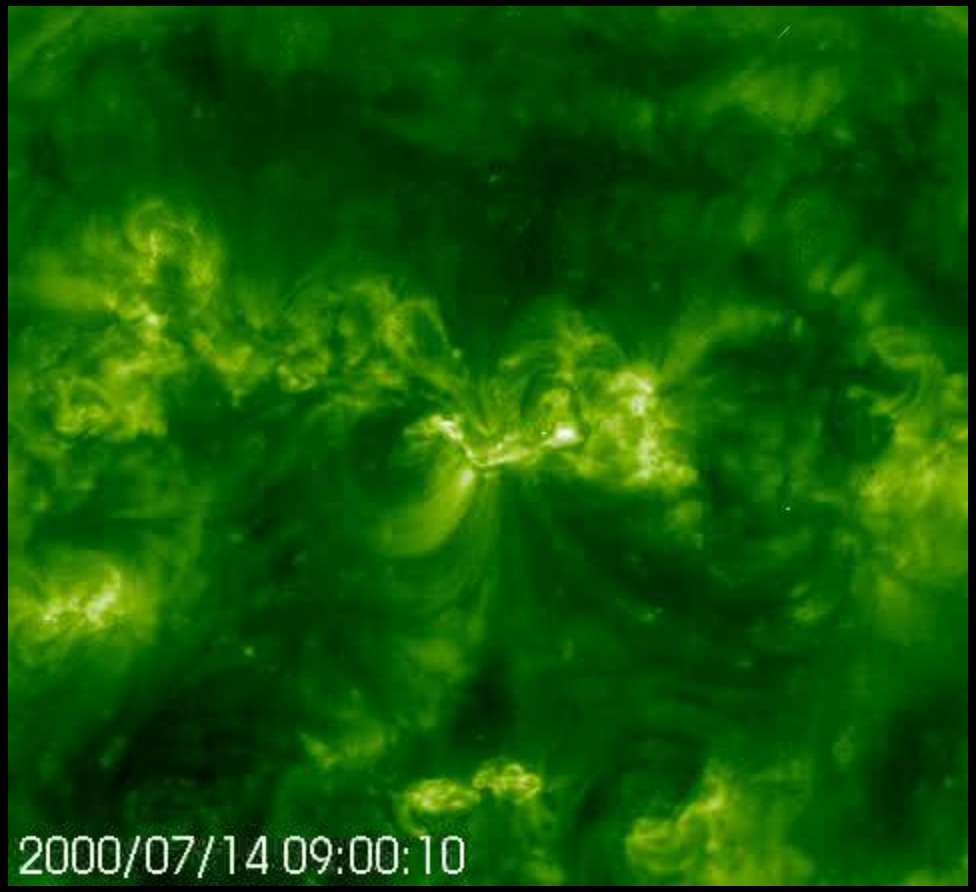
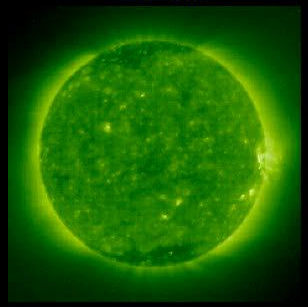
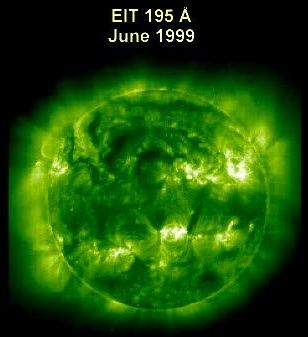

giant
arches
pre-onset
dimmed area
ribbons
(a)
(b)
(c)

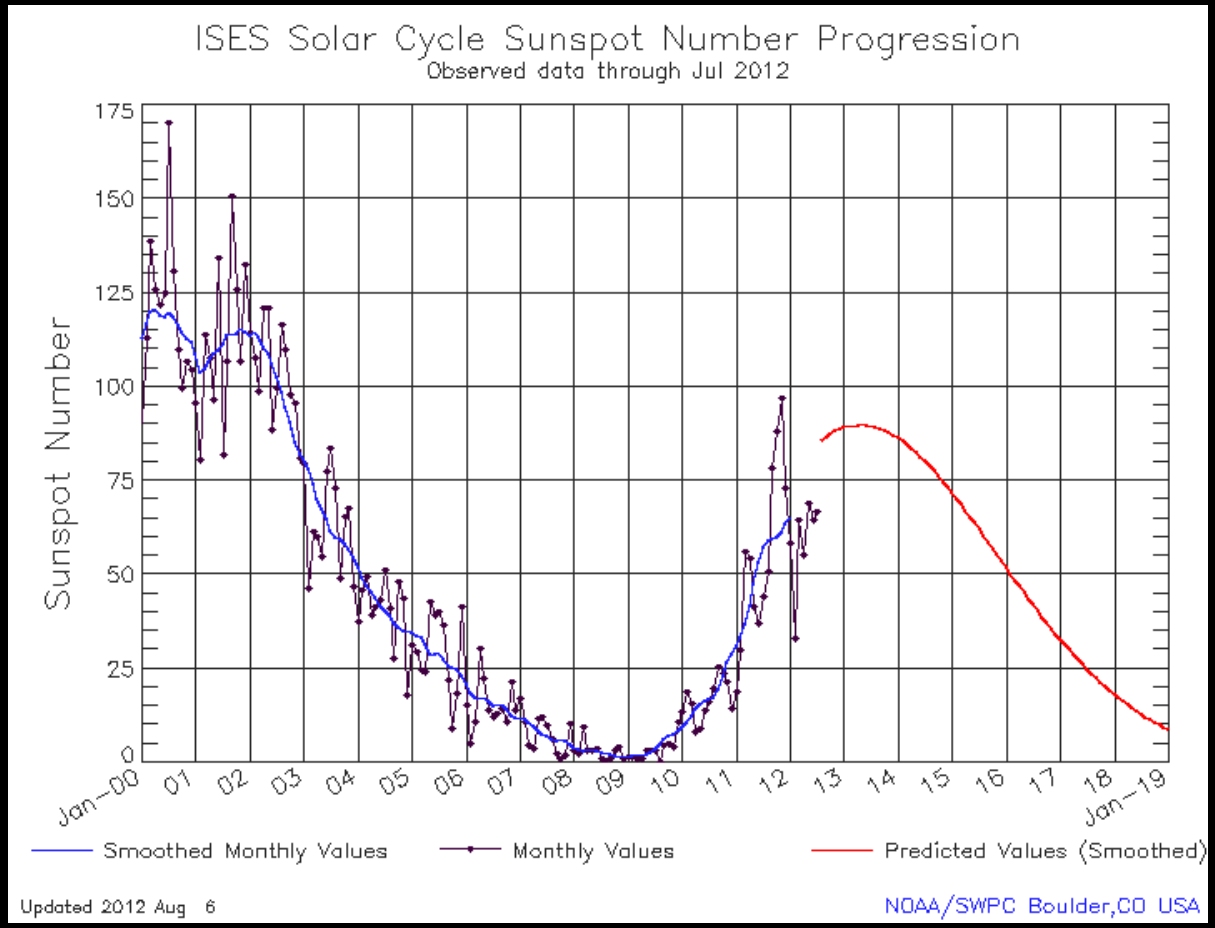
Close-up from SOHO EIT Sensor
Bastille Day 2000 Event (minutes later)



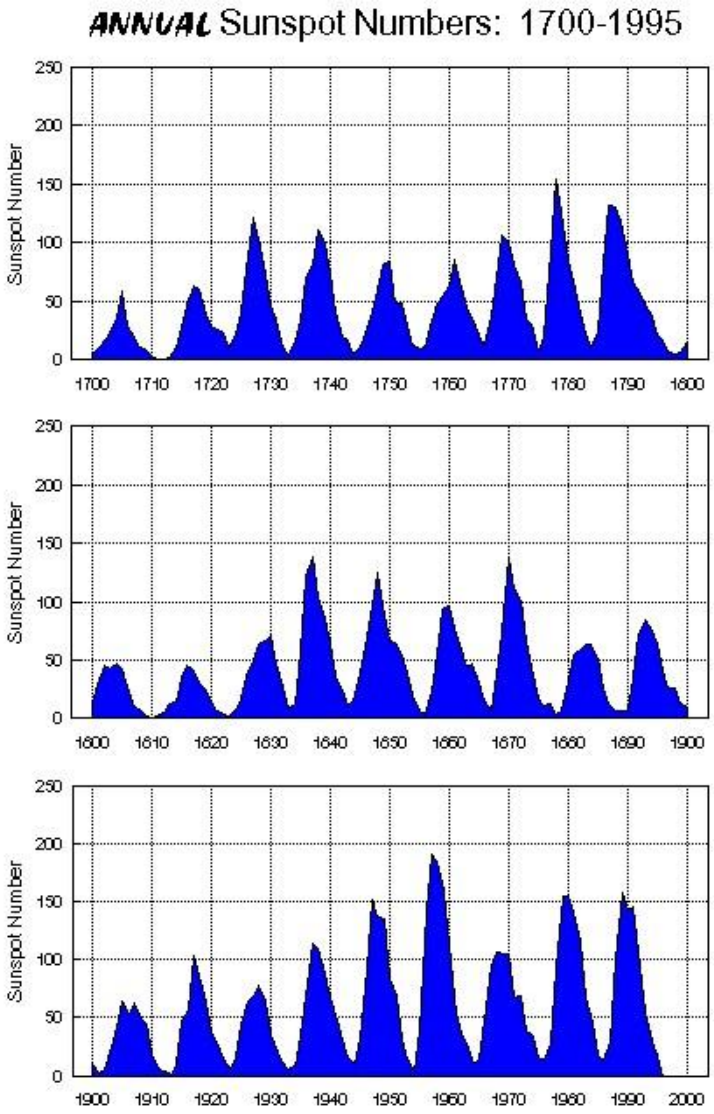




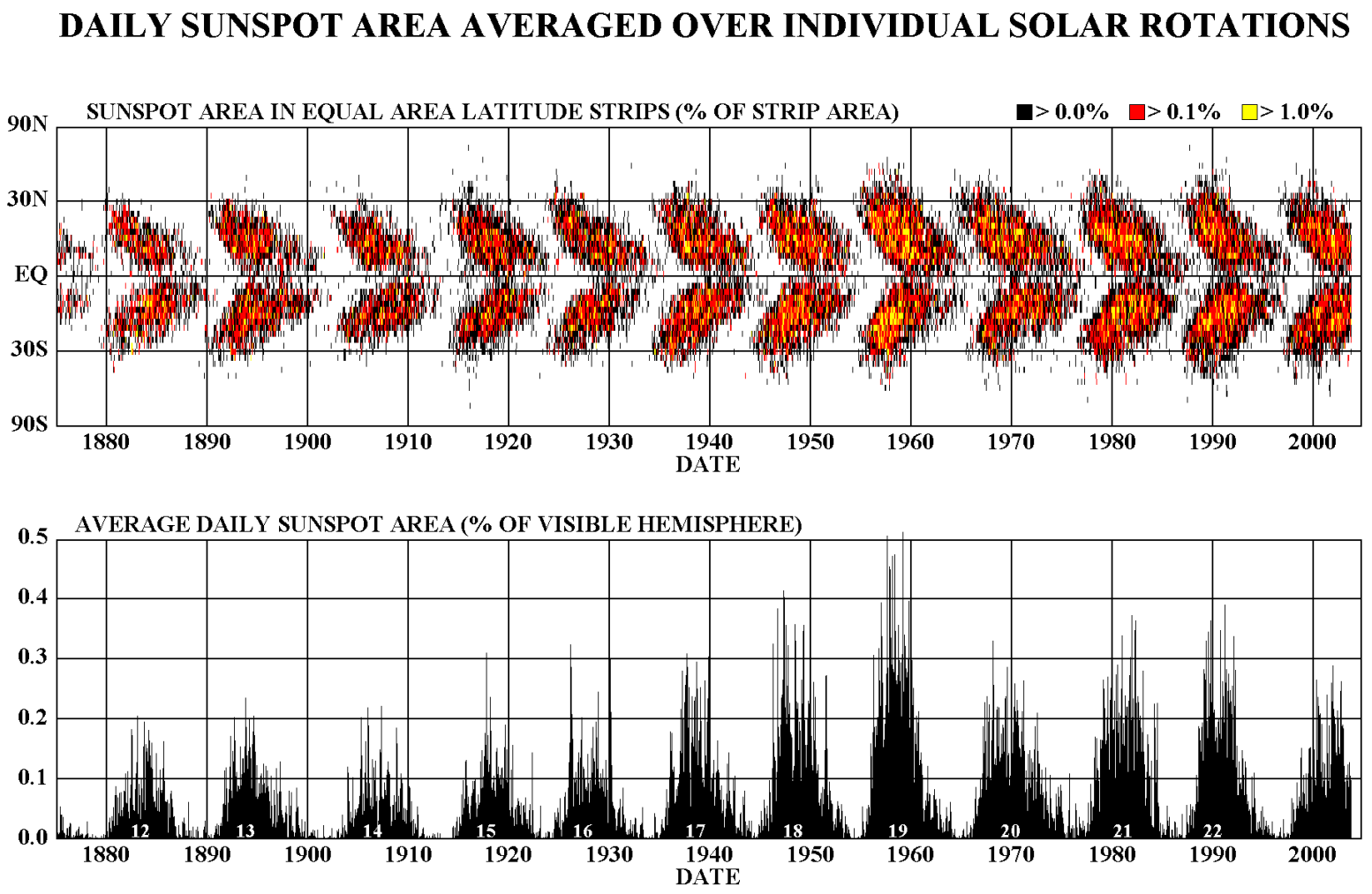
How large is the next solar maximum going to be?



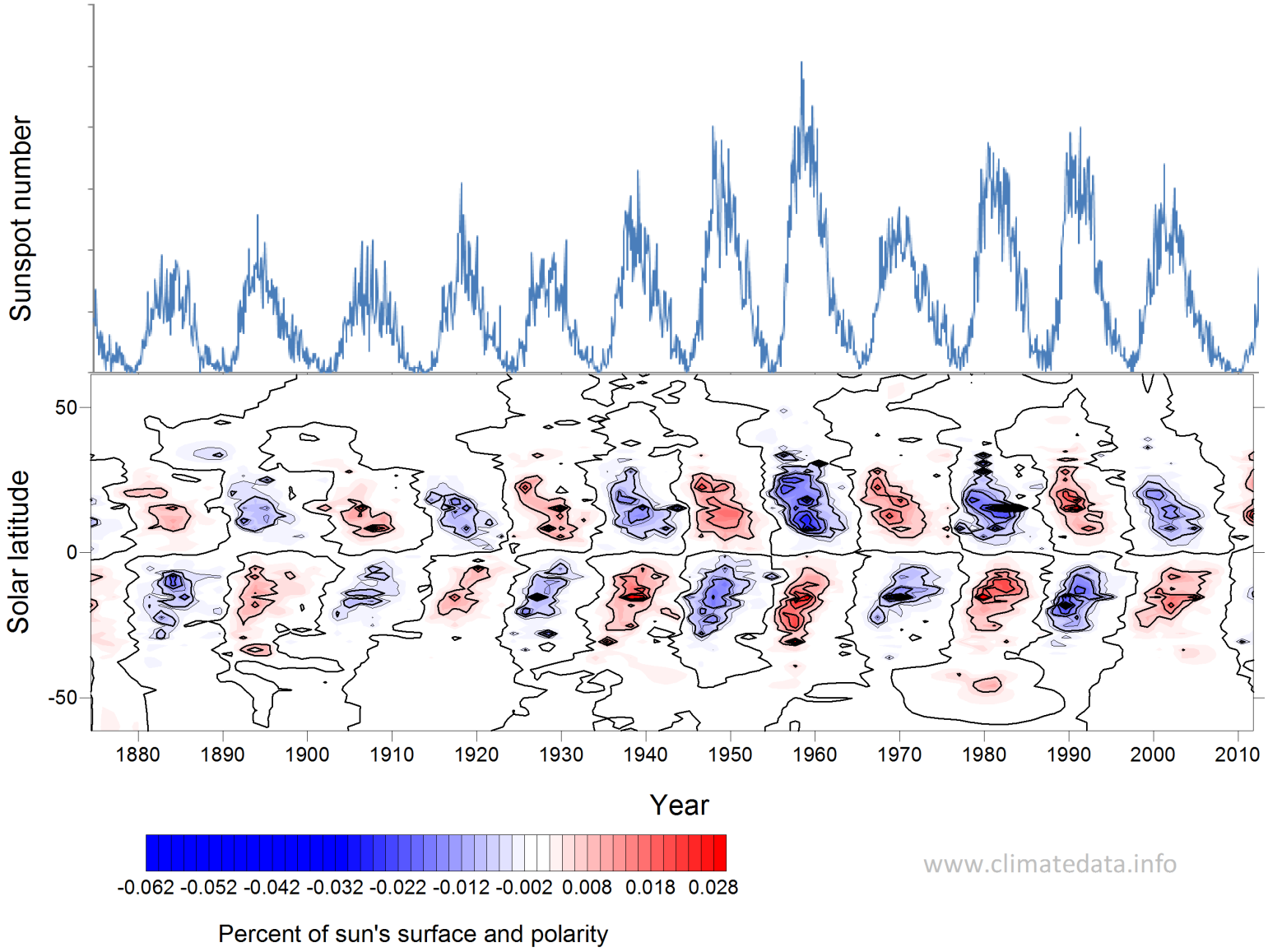
~11 year sunspot cycle

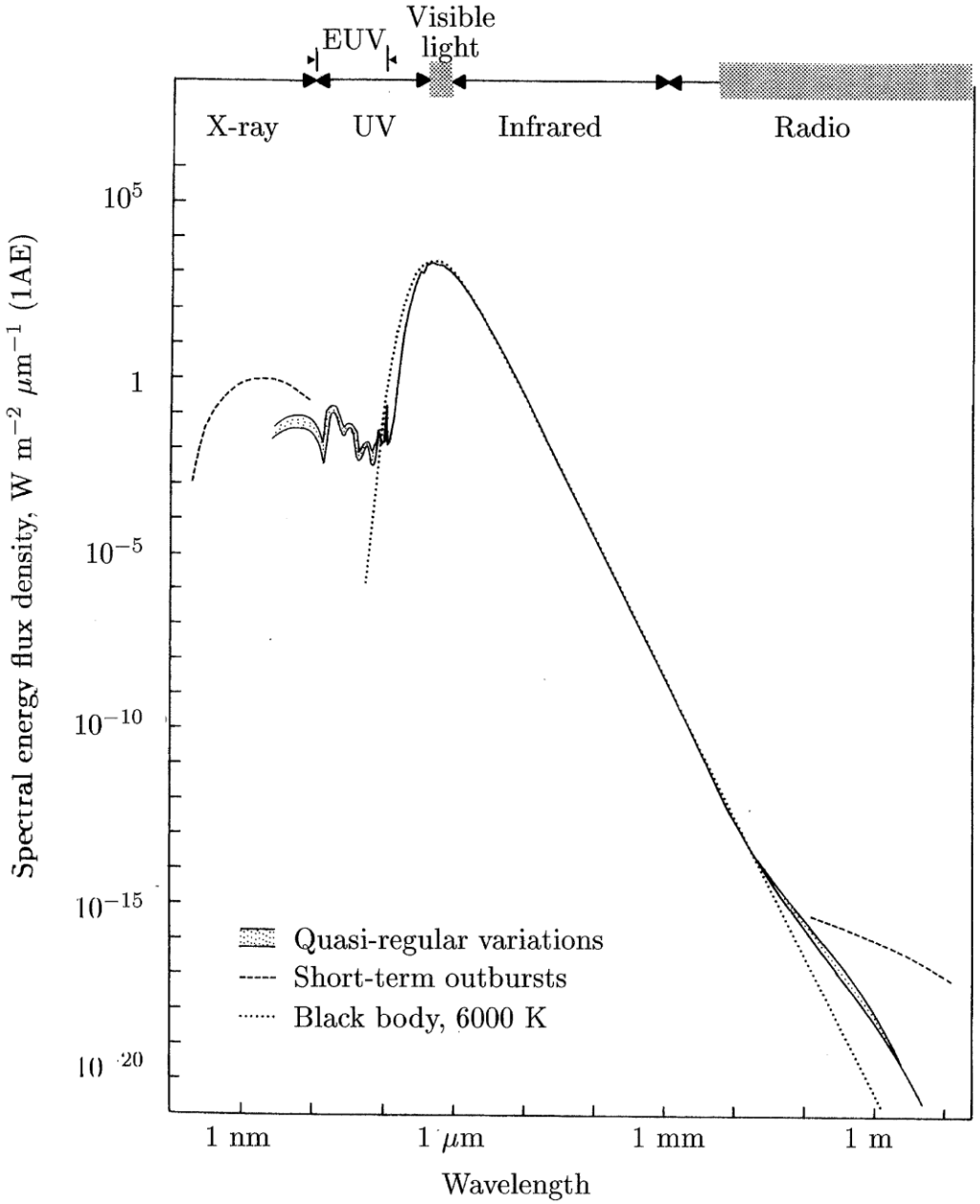


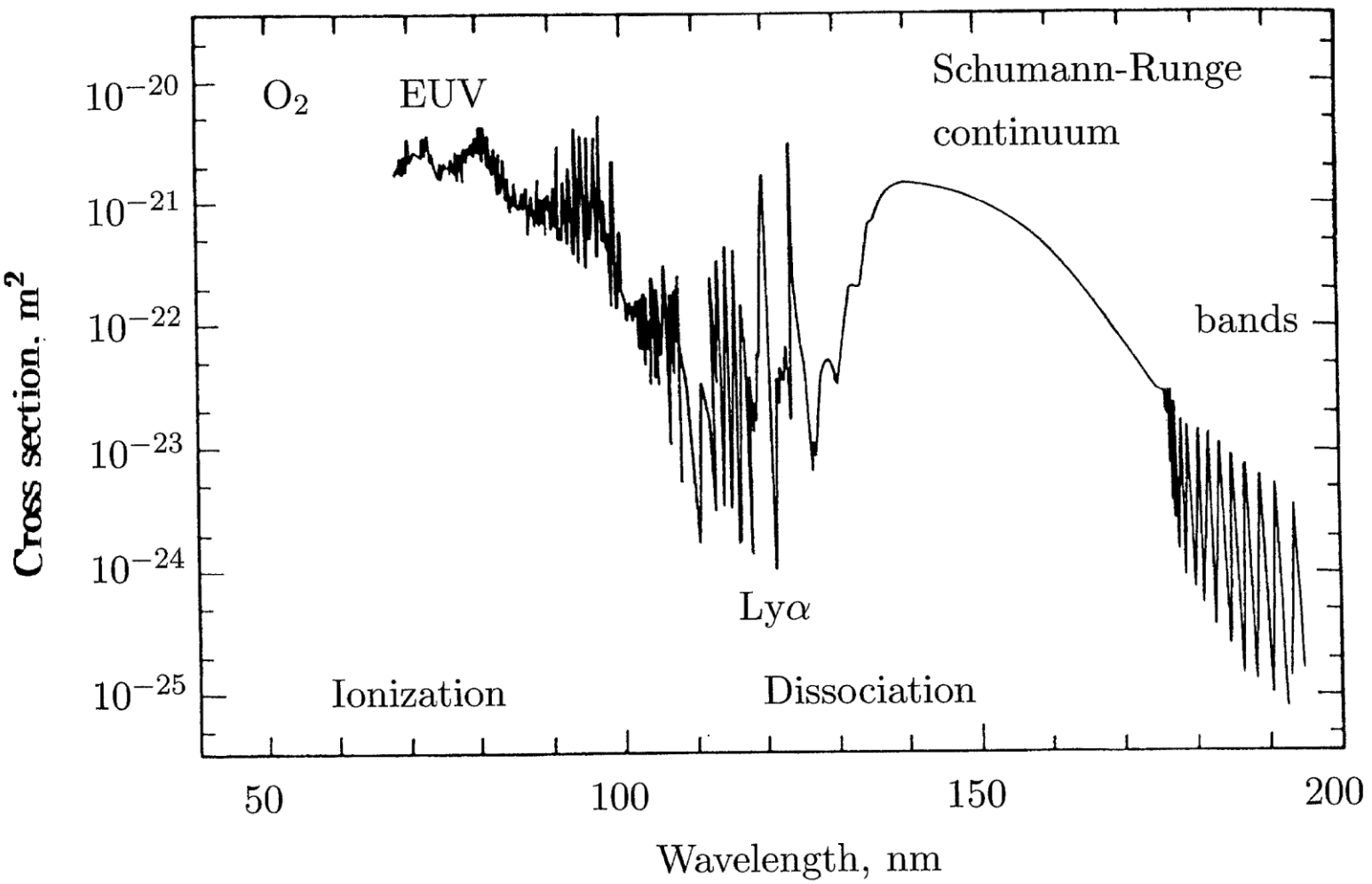
Butterfly diagram

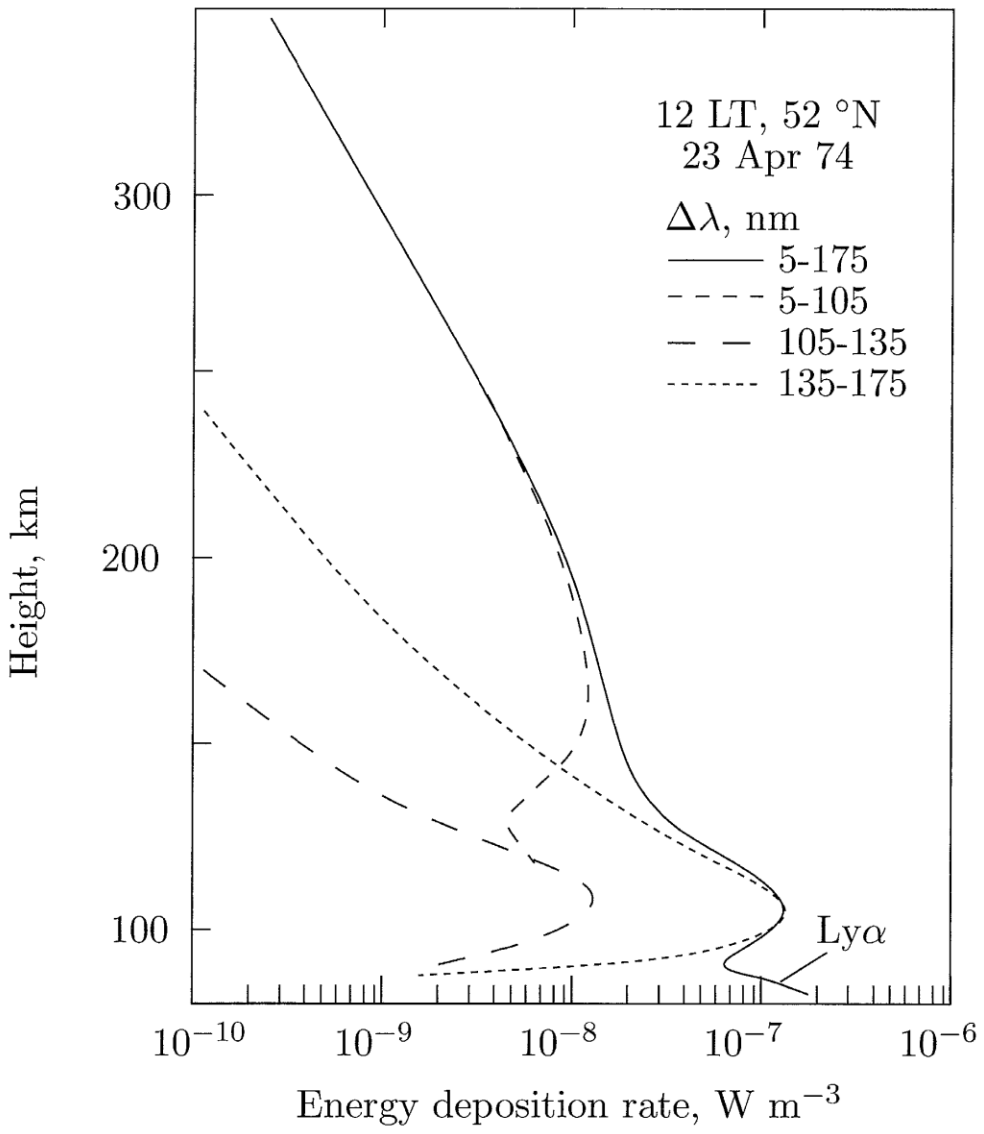


Solar cycles - variation with solar latitude and time




EUV
Visible light
X-ray
UV
Infrared
Radio
10^5
1
10^{-5}
10^{-10}
10^{-15}
10^{-20}
Spectral energy flux density, W m^{-2} μm^{-1} (1AE)
Quasi-regular variations
Short-term outbursts
Black body, 6000 K
1 nm
1 μm
1 mm
1 m
Wavelength


O_2
EUV
Schumann-Runge
continuum
bands
Lyα
Ionization
Dissociation
10^{-20}
10^{-21}
10^{-22}
10^{-23}
10^{-24}
10^{-25}
Cross section, m^2
50
100
150
200
Wavelength, nm


12 LT, 52 °N
23 Apr 74
Δλ, nm
5-175
5-105
105-135
135-175
Lyα
300
200
100
Height, km
10^−10
10^−9
10^−8
10^−7
10^−6
Energy deposition rate, W m^−3