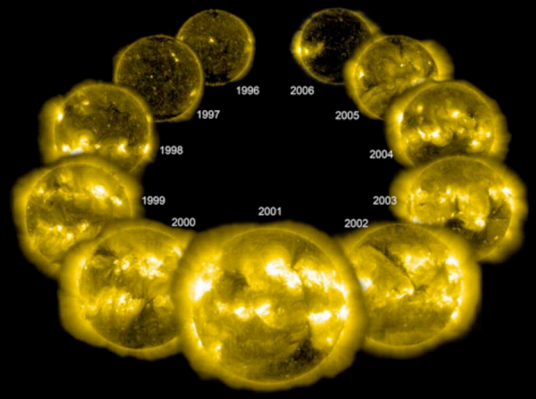
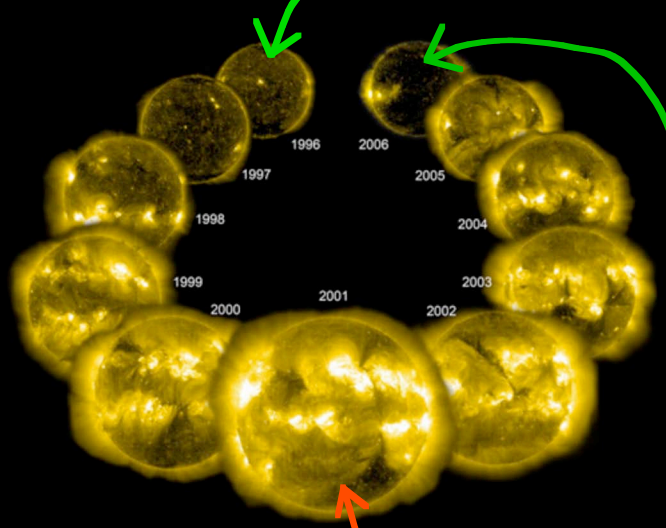
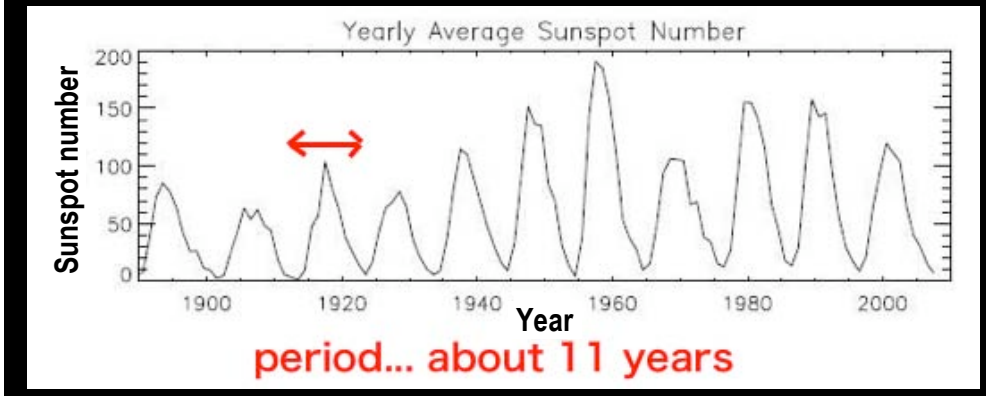
Dynamic Sun II

(long time-scale phenomena: ~ years)

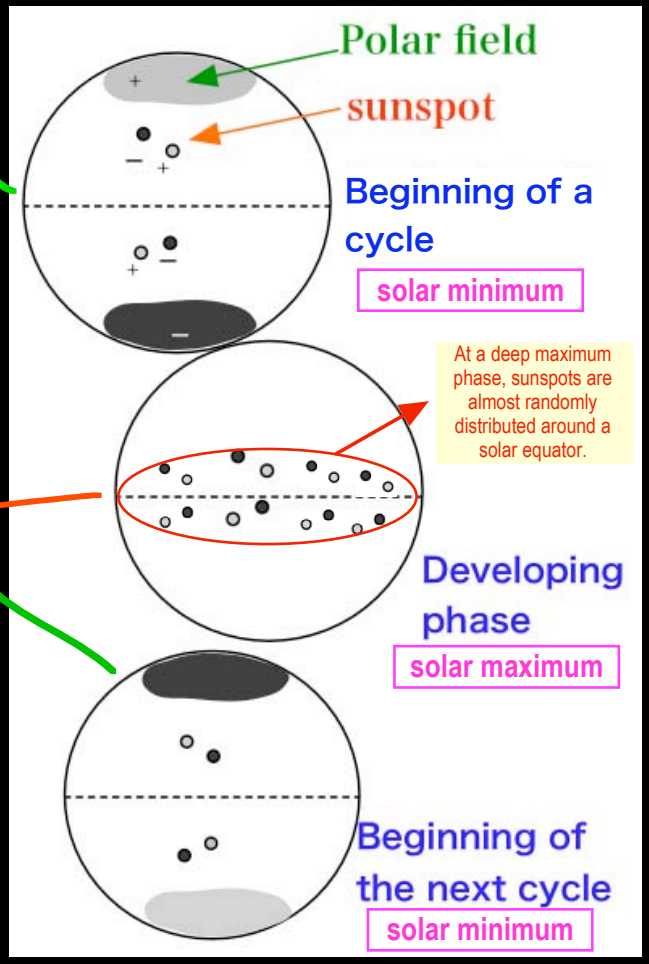


Solar cycle: periodic variations of solar global activity



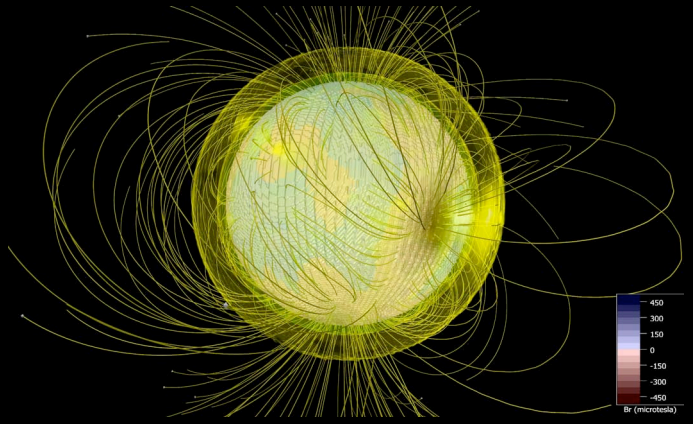


Hale's law on solar magnetic cycle



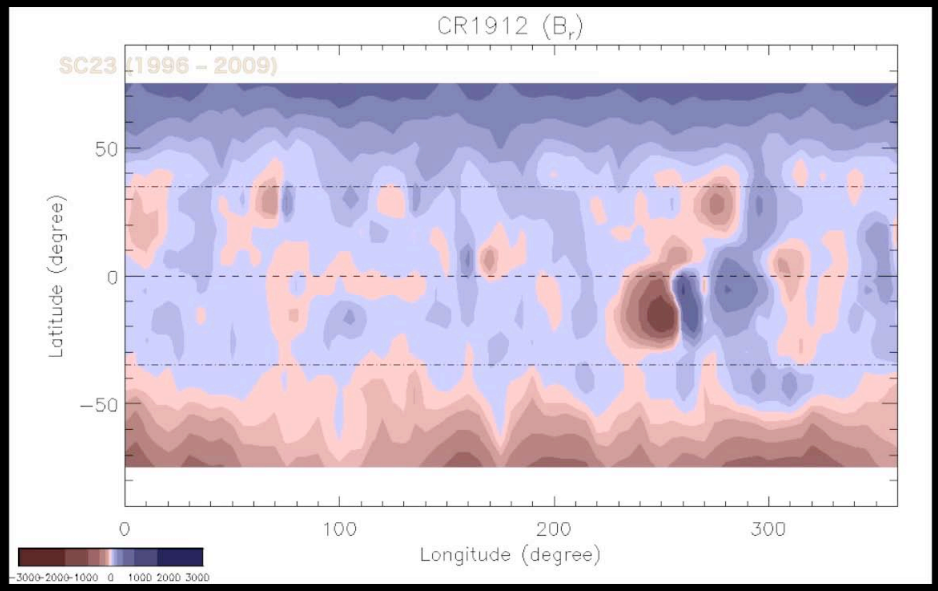
Variations of the Sun's large-scale magnetic field

http://163.180.179.74/~magara/Download/SDMS-2021-02d.pdf



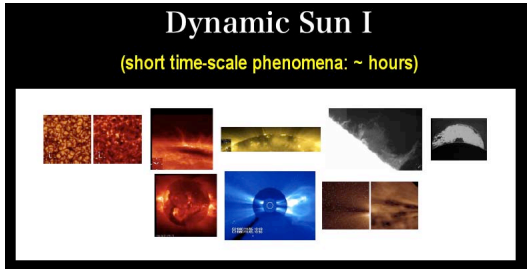
CR1912
(1996 07/25 - 08/21)

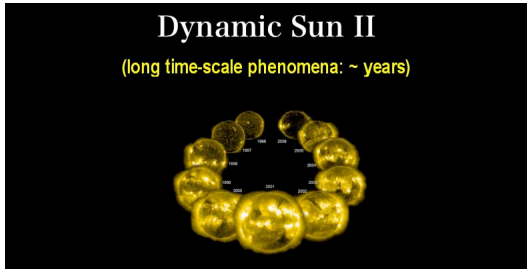
WSO synoptic map



unit: μT

What produces solar dynamic phenomena?





***Magnetic fields* play important roles in producing solar dynamic phenomena.**

- **Cyclic amplification of magnetic fields in the solar interior (dynamo)**
  => **Produces long-term activity variations** known as solar cycle

- **Transport of magnetic fields through the convection zone (magnetoconvection)**
  => **Lifts magnetic fields against solar gravity** via magnetic buoyancy

- **Emergence of magnetic fields into the solar atmosphere (flux emergence)**
  => **Forms magnetic structure on the Sun** (e.g. sunspot, sigmoid, prominence/filament)

- **Diffusion of magnetic fields in the solar atmosphere (release of magnetic energy)**
  => **Produces explosive phenomena** via magnetic reconnection (e.g. flare, jet, coronal heating?)

- **Ejection of magnetic fields into the interplanetary space (removal of magnetic fields from the Sun)**
  => **Produces outflow/eruptive phenomena** (e.g. solar wind, coronal mass ejection)