Sun Stuff

textcolorbluelink!

A

active regions

Alfvén waves

B

Bright points

C

coronal holes

coronal loops

- *Modelled* as flux tubes; probably consist of many flux tubes.

coronal mass ejections (CMEs)

Release of magnetic energy; reach Earth in a few days.

faculae

Aka. "little torch"

- Appear in *photosphere*; same thing as plage (which appear in the chromosphere).
- Bright spots — reason why total brightness is higher at solar maximum.
- small scale bright points in the vicinity of sunspots; appear hours before the sunspots, but can remain for months after the sunspots are gone.
- visible only near limb.

filament

- Viewed on disk; same thing as prominences.

- Thin, cool, dark ribbons

flares

flux tubes

- Formed deep in the convection zone.
- Rise by magnetic buoyancy in an Ω-shaped loop.
- Magnetic field lines can be thought of as infinitely thin flux tubes.

frozen-in flux

In a perfectly conducting material (i.e. $\eta = 0$), Ohm's law goes from $\vec{E} + \vec{v} \times \vec{B} = \vec{J}\eta$ to $\vec{E} + \vec{v} \times \vec{B} = 0$ Nothing can be perpendicular to the field lines ... See Alfvén's Theorem.

1 J

jets

Word for rapid burst of emission? Rapid upflows, plasma ejections... UV spectral emission requires high temperatures. For UV: flux from photospheric continuum is low. Chromosphere: temp is lower and background is higher (compared to ...?) so lines are in absorption. Low flux: radiative excitation doesn't occur. High temps allow for collisional excitation and emission upon returning to the ground state. $\Delta v = \sqrt{v_{th}^2 + v_{Nth}^2}$.

2 K

3 L

4 M

5 N

6 O

7 P

plage

- Appear in *chromosphere*; same thing as faculae.
- Bright spots caused by light emitted by clouds of hydrogen or calcium (specifically Hα and Ca H and K lines.

plume

Apparently help to shield Earth from solar storms. They are long thin streamers that project outward from the Sun's north and south poles. We often find bright areas at the footpoints of these features that are associated with small magnetic regions on the solar surface. These structures are associated with the *open* magnetic field lines at the Sun's *poles*. The plumes are formed by the action of the solar wind in much the same way as the peaks on the helmet streamers.

pores

Small sunspots with an umbra, but no penumbra. Size on order of upper limit of magnetic bright points ($\sim$ 1700 km).

prominence

- Viewed on the limb; same thing as filaments.
- May erupt sometime during its life and be associated with a CME

8 Q

9 R

10 S

solar wind

Stream of energized, charged particles, primarily protons and electrons, flowing outward from the sun at $v \leq 900$ km s^{-1} and T $= 10^6$ K. Solar wind plasma originates in thin, intense flux tubes at granule and supergranule boundaries. Fast (steady) vs. slow (variable) wind.

spicules

Dynamic jet of about 500 km diameter in the *chromosphere* of the Sun. It moves upward at about 20 km/s from the photosphere. Generated in the chromosphere, where magnetic flux is concentrated, which outline boundaries of supergranule network.

sunspots

Dark regions of intense magnetic field.

supergranules

Show up most clearly as a pattern of horizontal motions.

- Doppler measurements near limb
- local correlation tracking of granules near center

Above a supergranule cell

- 750 km active regions
- 1600 km quiet regions

Magnetic field spreads out to fill the chromosphere and form a horizontal canopy or partial canopy.

surges