

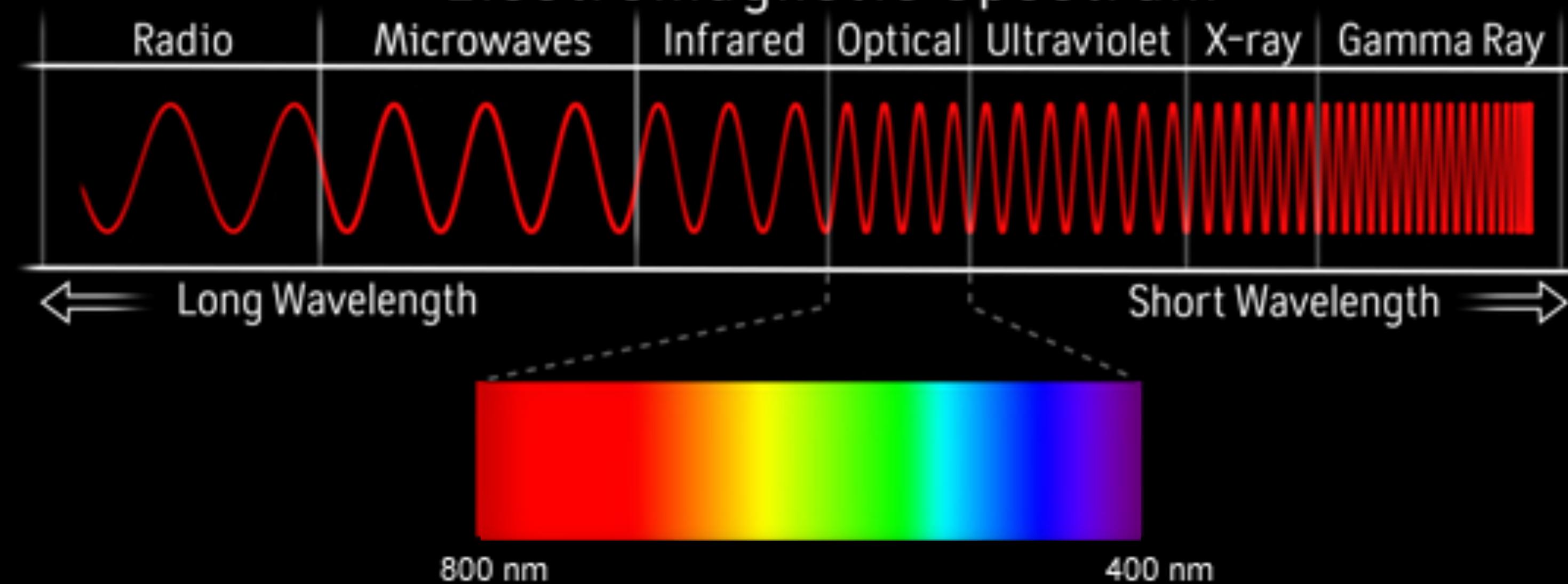


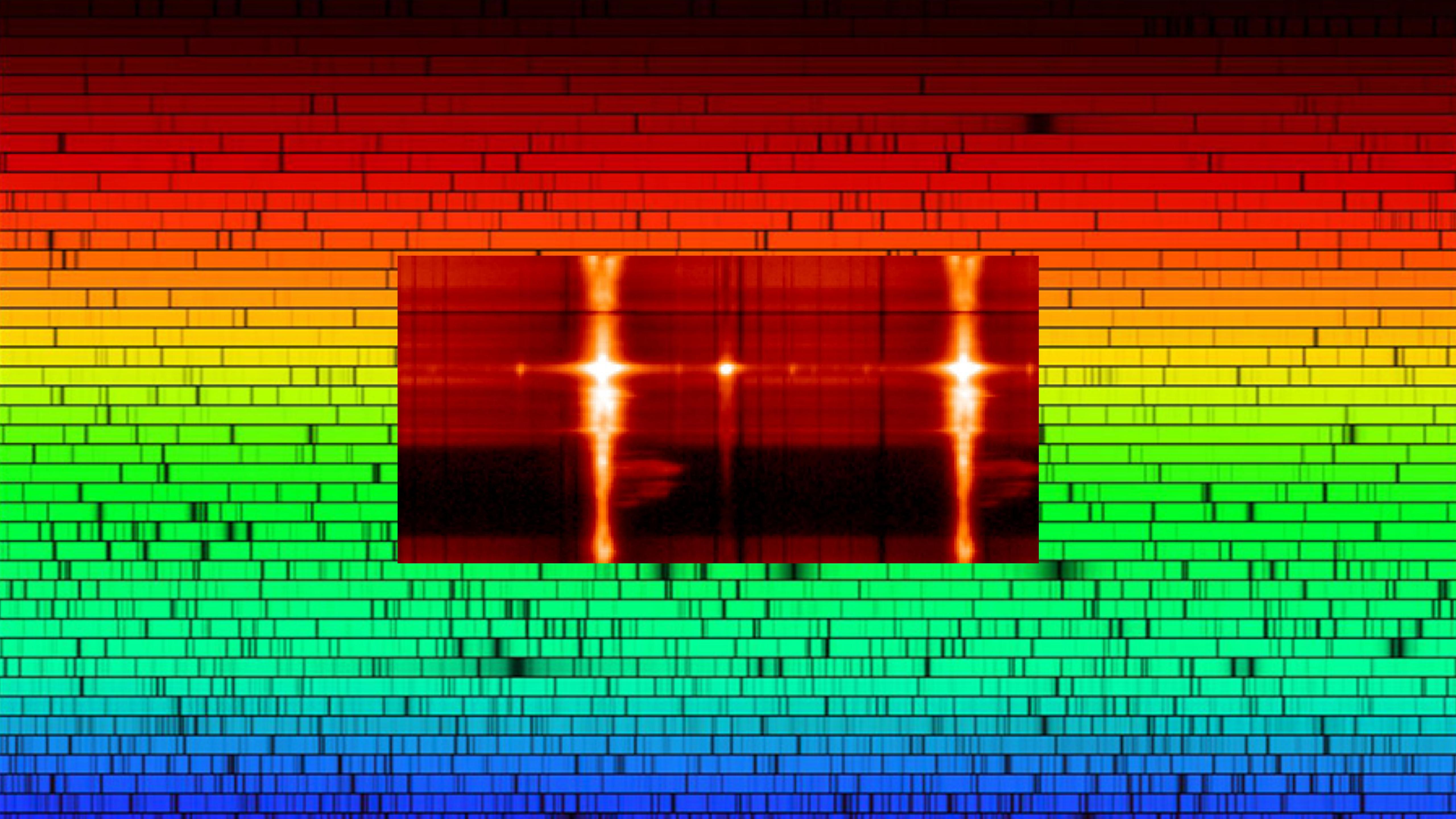
GRAHAM KERR (CUA / NASA GSFC)

THE SUN'S DYNAMIC ATMOSPHERE

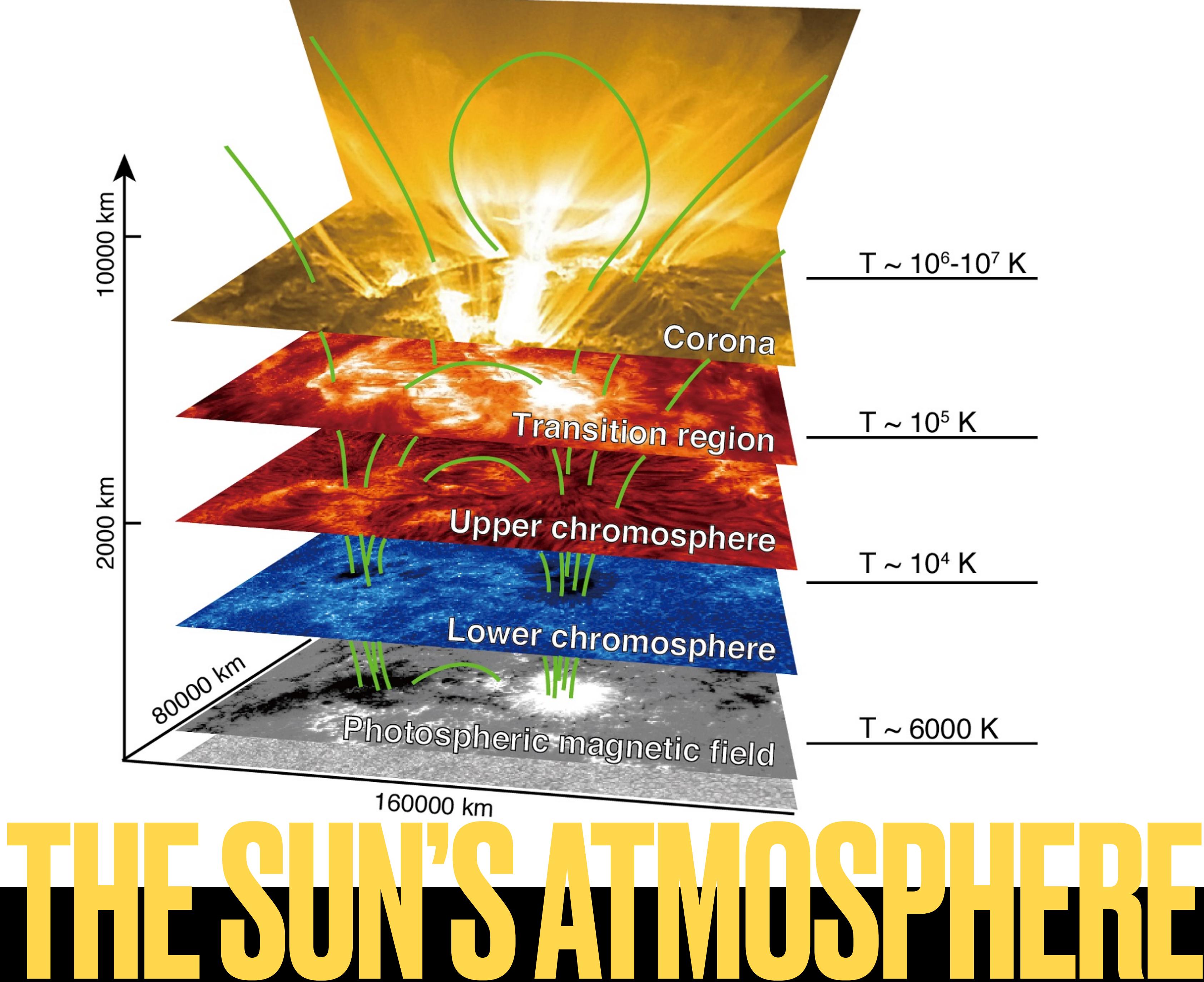


Electromagnetic Spectrum





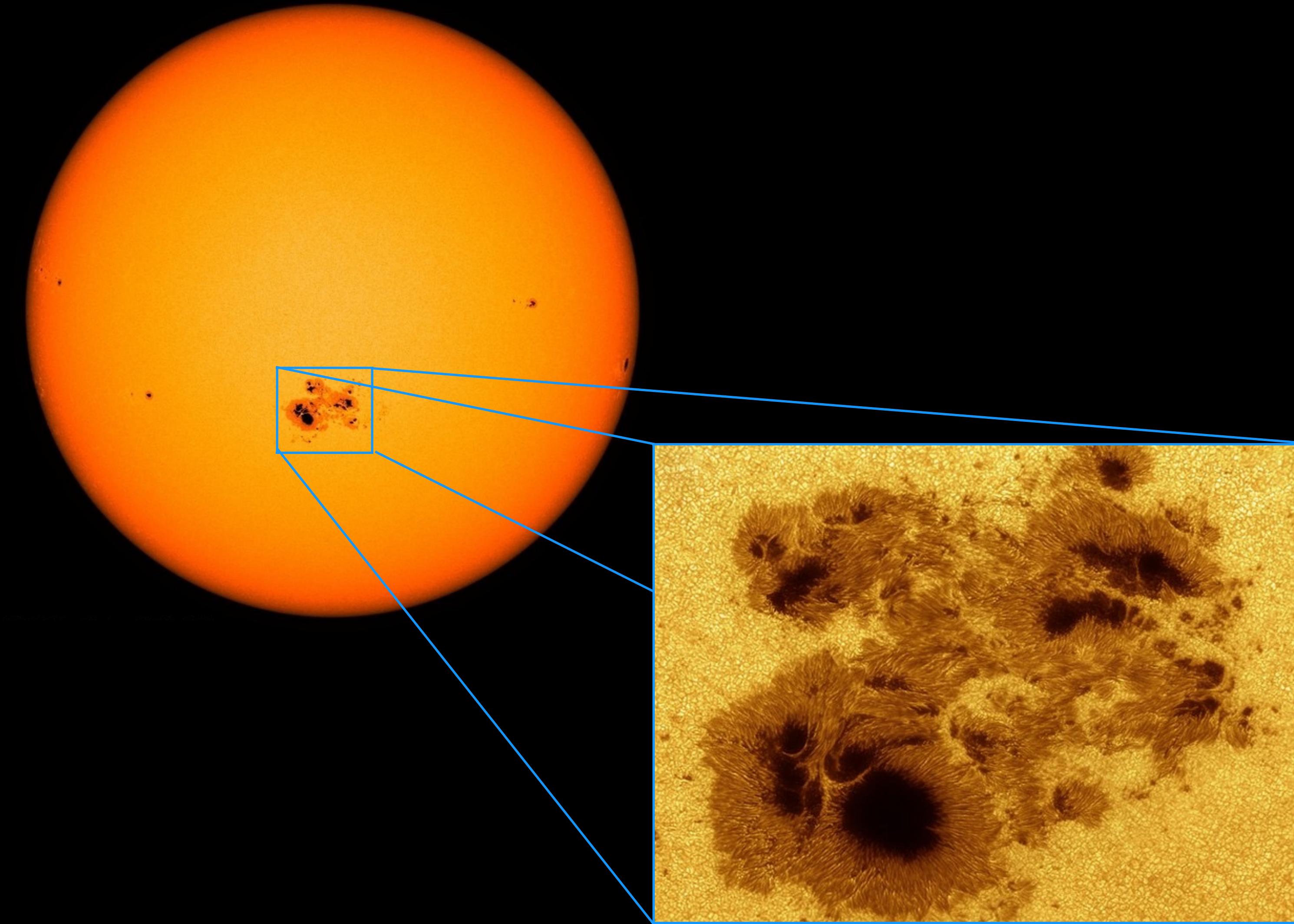
THE STRATIFIED SOLAR ATMOSPHERE



THE SUN'S STRATIFIED ATMOSPHERE

BY OBSERVING DIFFERENT WAVELENGTHS (COLOURS) WE PROBE DIFFERENT TEMPERATURES.

IN THIS WAY WE SEE THE DIFFERENT LAYERS OF THE SUN'S ATMOSPHERE, FROM PHOTOSPHERE THROUGH TO THE CORONA.



PHOTOSPHERE

THE SUN'S 'SURFACE'

~ 5800 K (~10,000F)

0.01% the density of air.

Granulation pattern shows convection carrying hot gas to the surface (like a boiling pot of water).

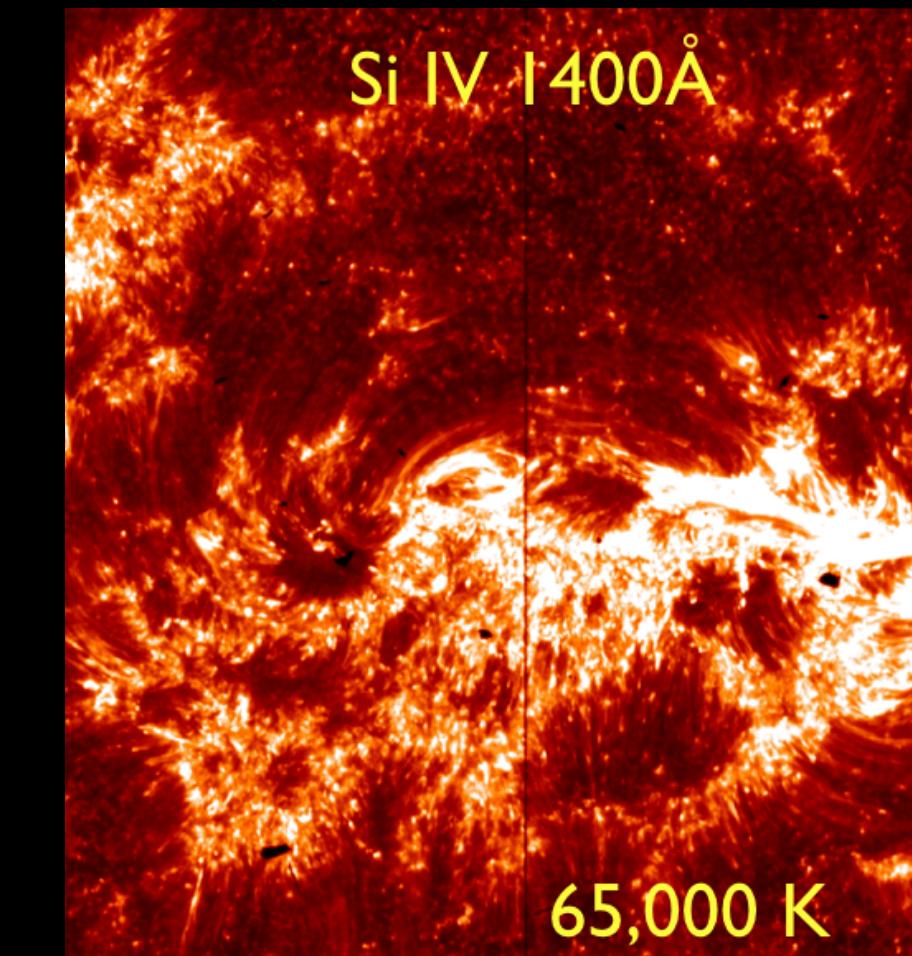
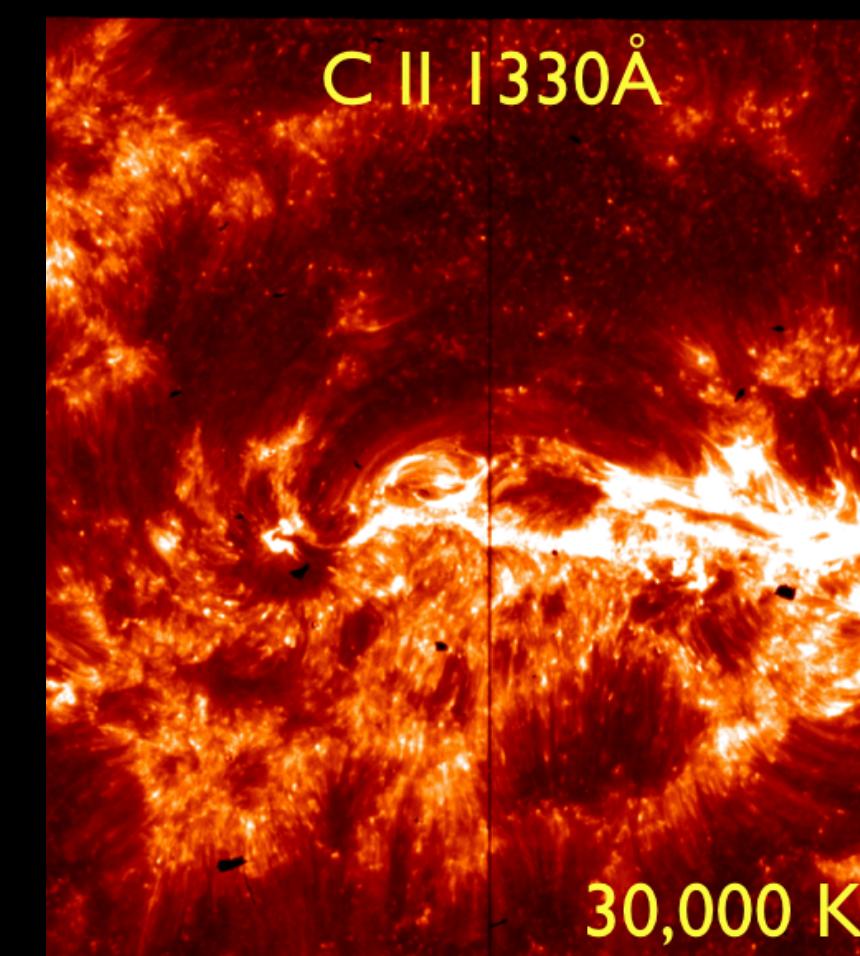
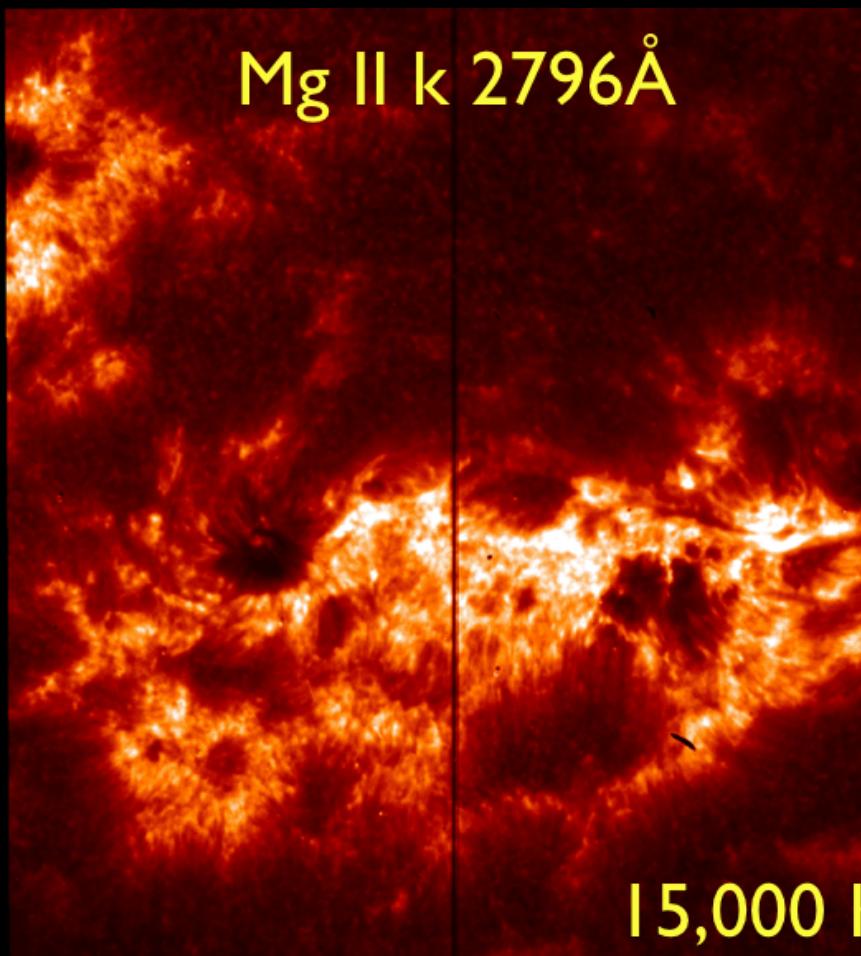
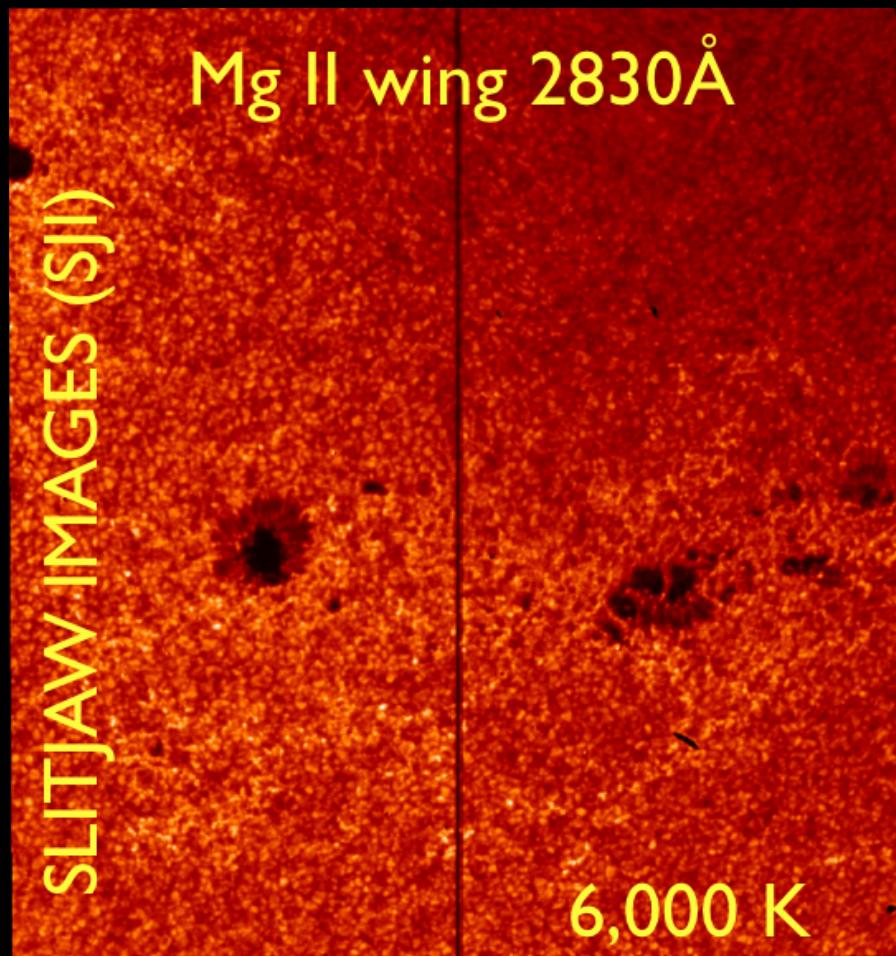
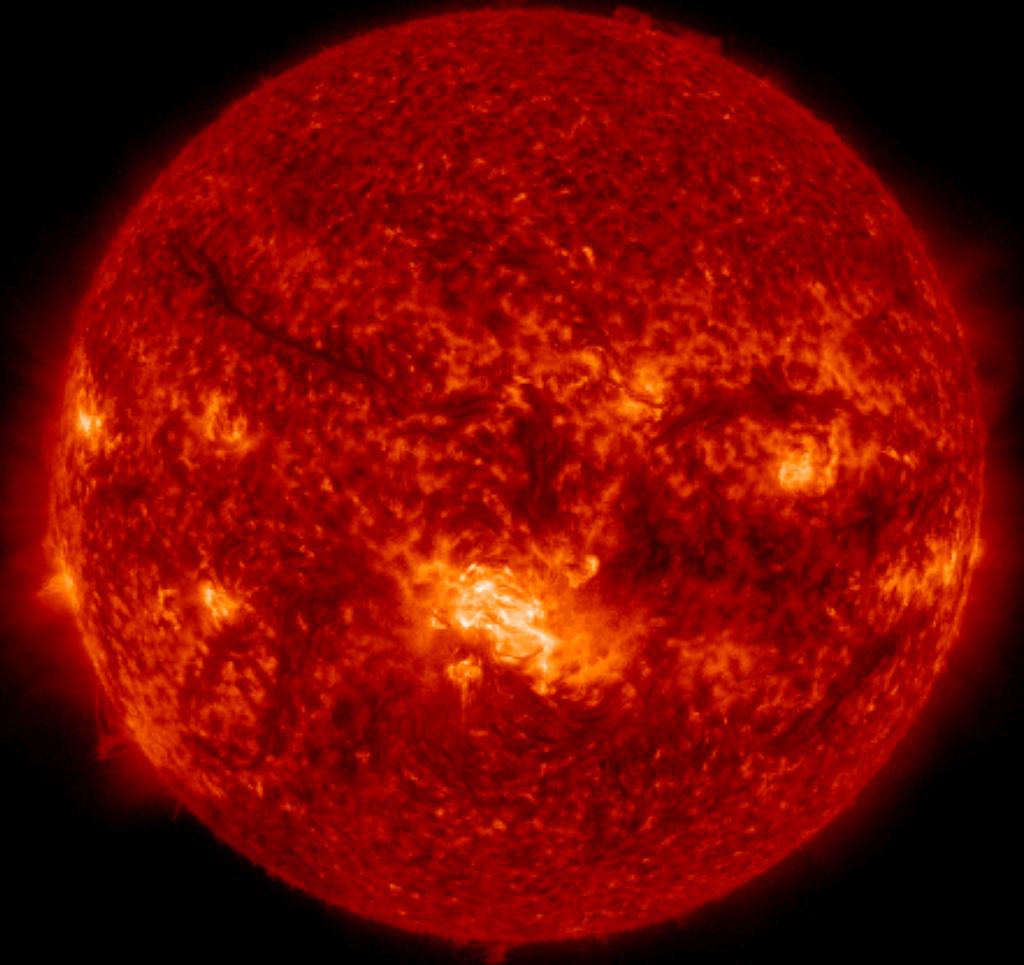
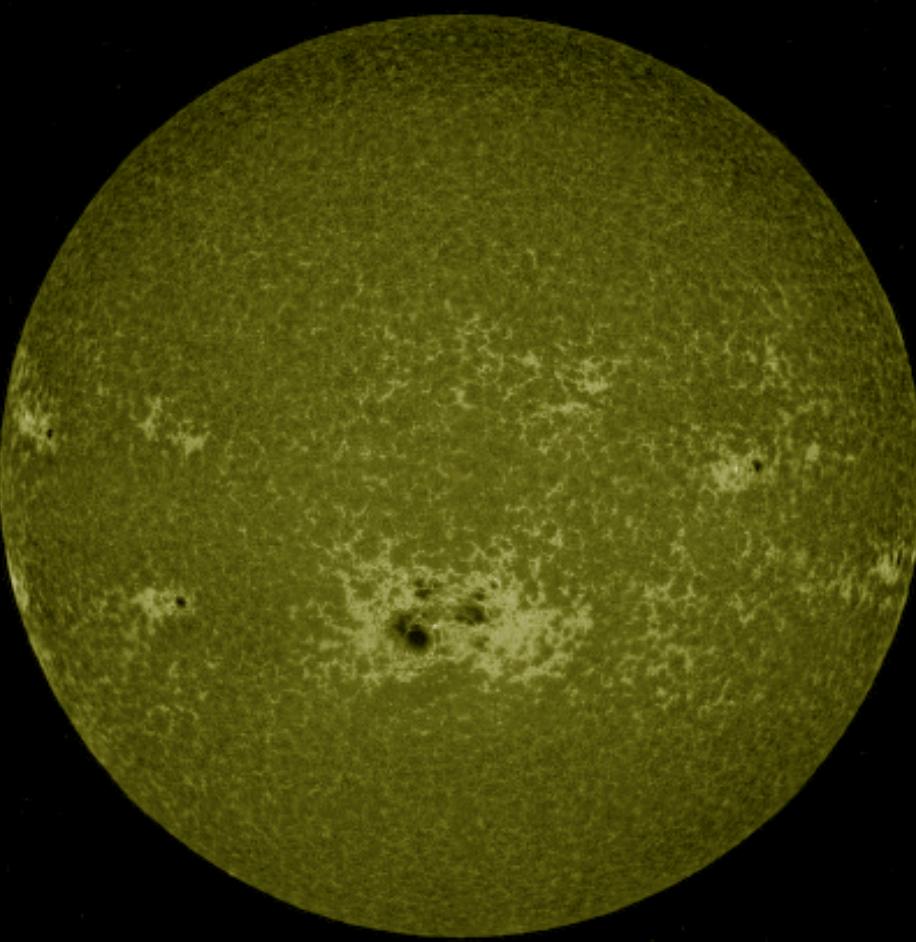
Magnetic features are darker as convection is inhibited.

THE COMPLEX INTERFACE REGION

Chromo: ~ 6000-15000 K

TR: ~ 15000-500,000 K

< 1 Millionth the density of air.



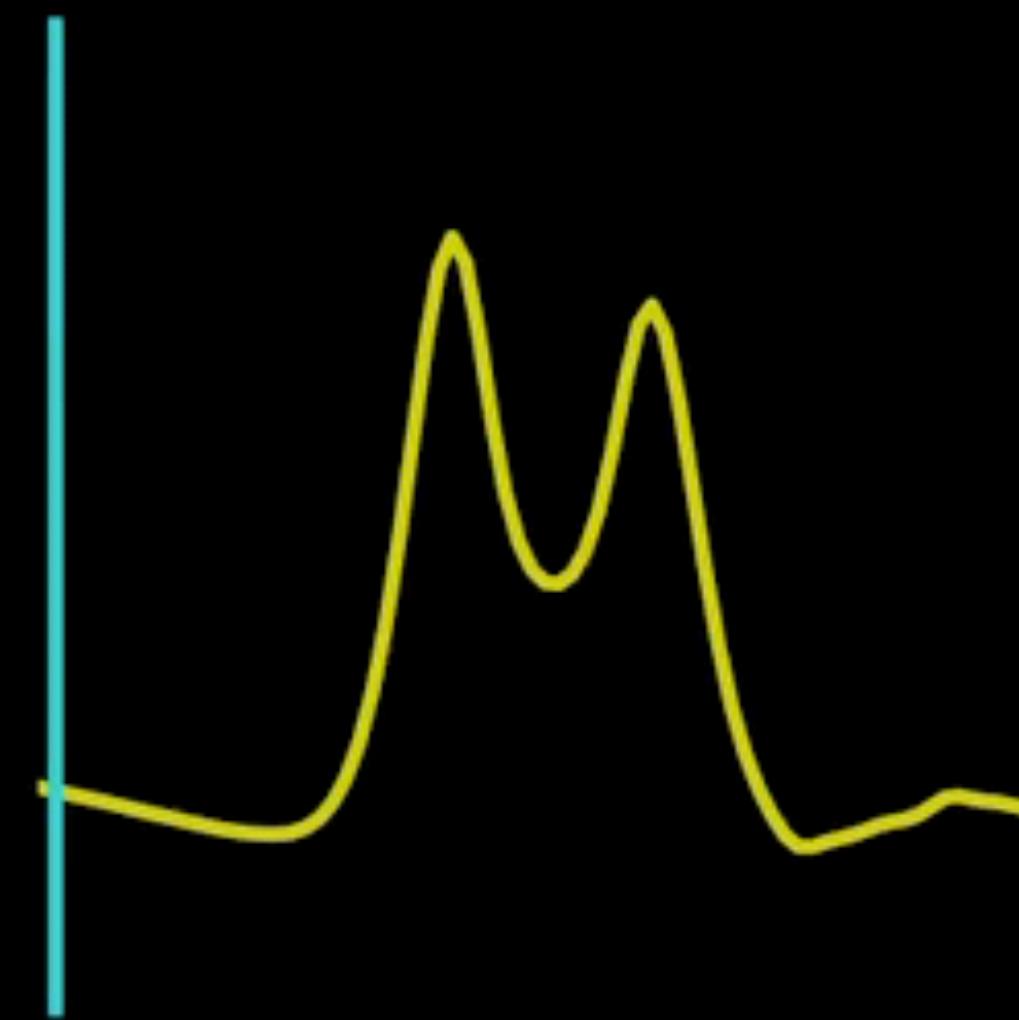
Temperature rises, density falls, the plasma is partially ionised, and radiation becomes important.

TR is vanishingly thin.

Magnetic field begins to dominate and both regions are full of fine-scale dynamics and structure.

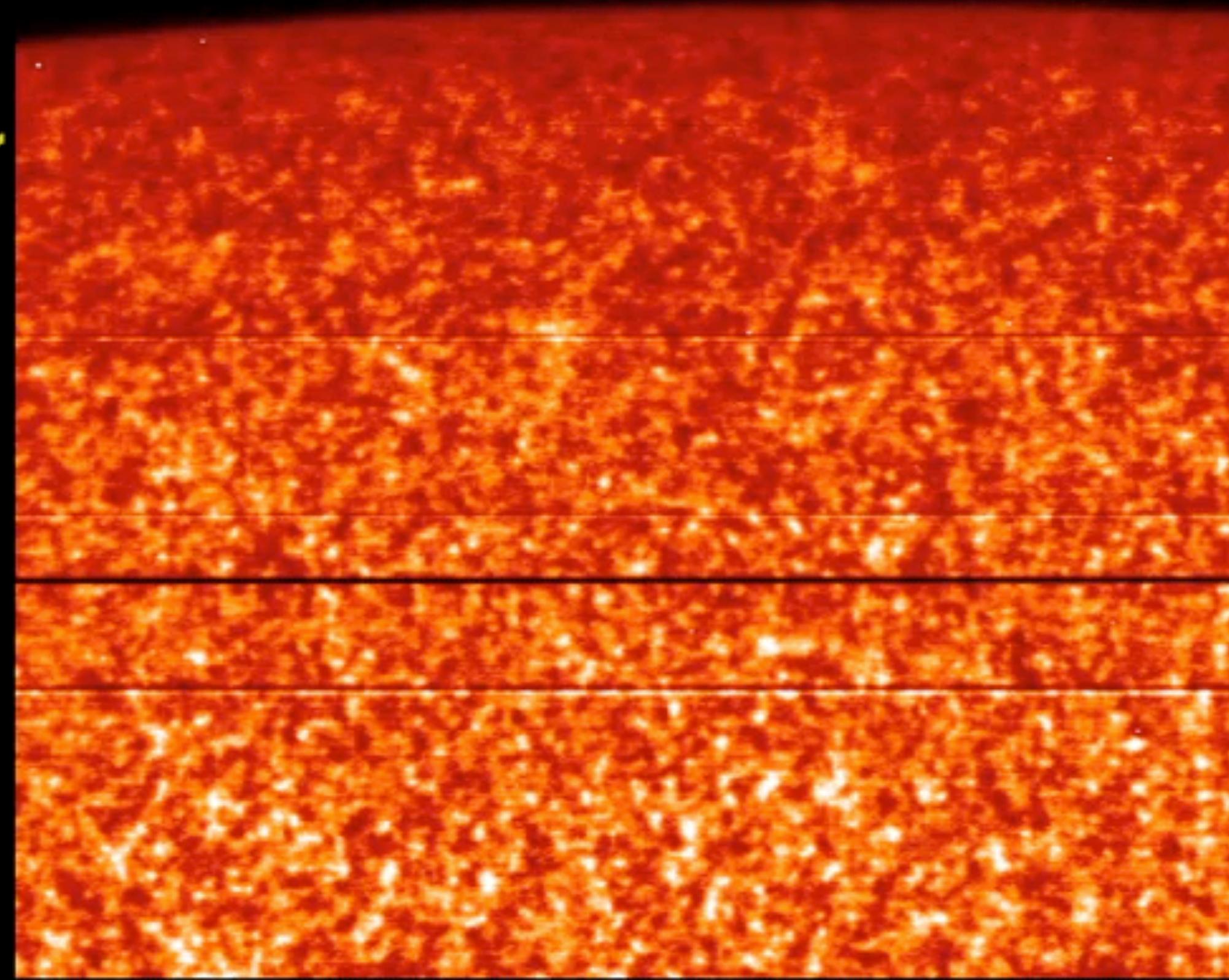
CHROMOSPHERE & TRANSITION REGION

Mg II h



280.262 nm

102.4 km s⁻¹



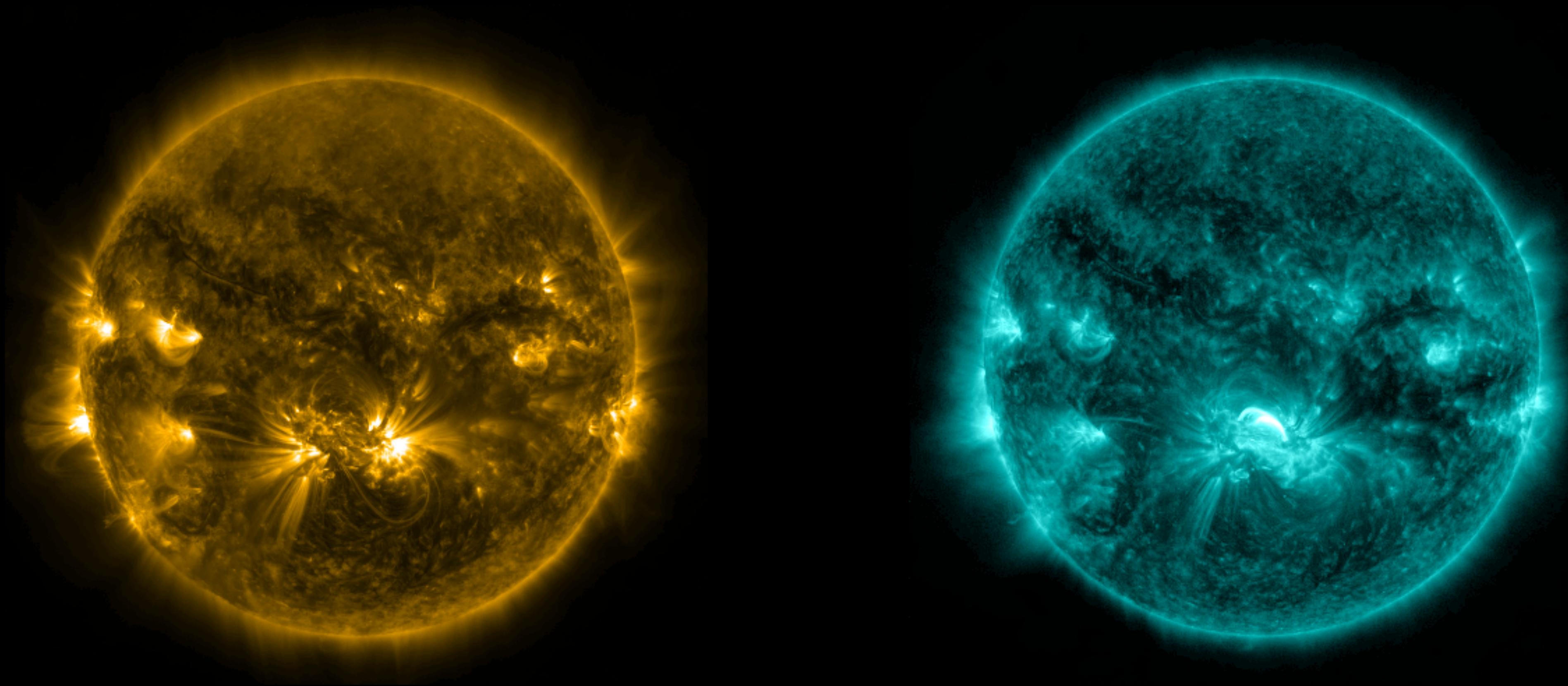
THE COMPLEX INTERFACE REGION

Different parts of spectral lines form at different heights (temperatures/densities).

By stepping through wavelength of a line we can see the transition from lower to upper chromosphere.

CHROMOSPHERE & TRANSITION REGION

THE OUTER ATMOSPHERE



CORONA

> 1-3 Million K

< 0.000000000001% the density of air.

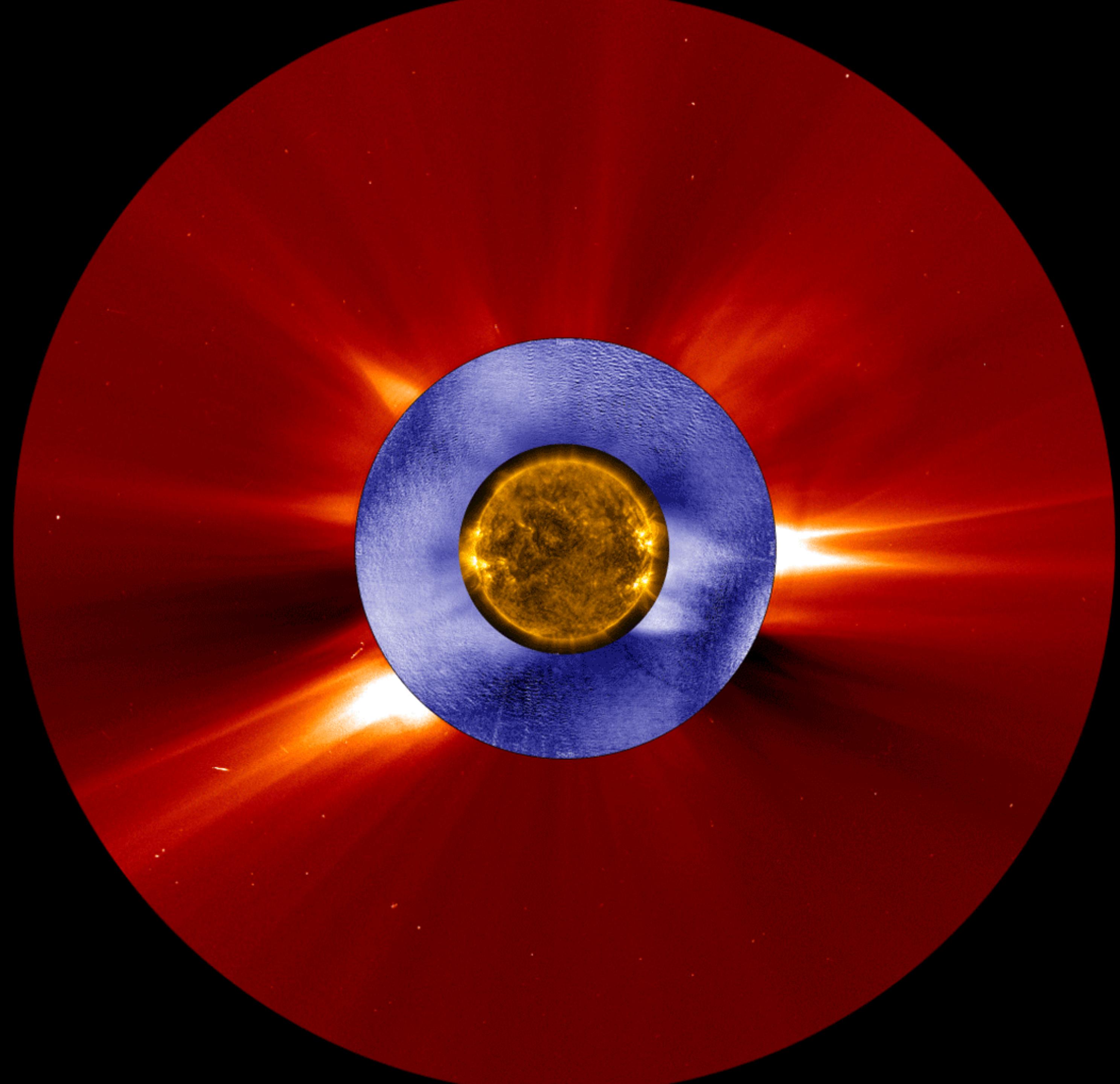
Active regions are bright areas dominated by loop structures — sources of activity.

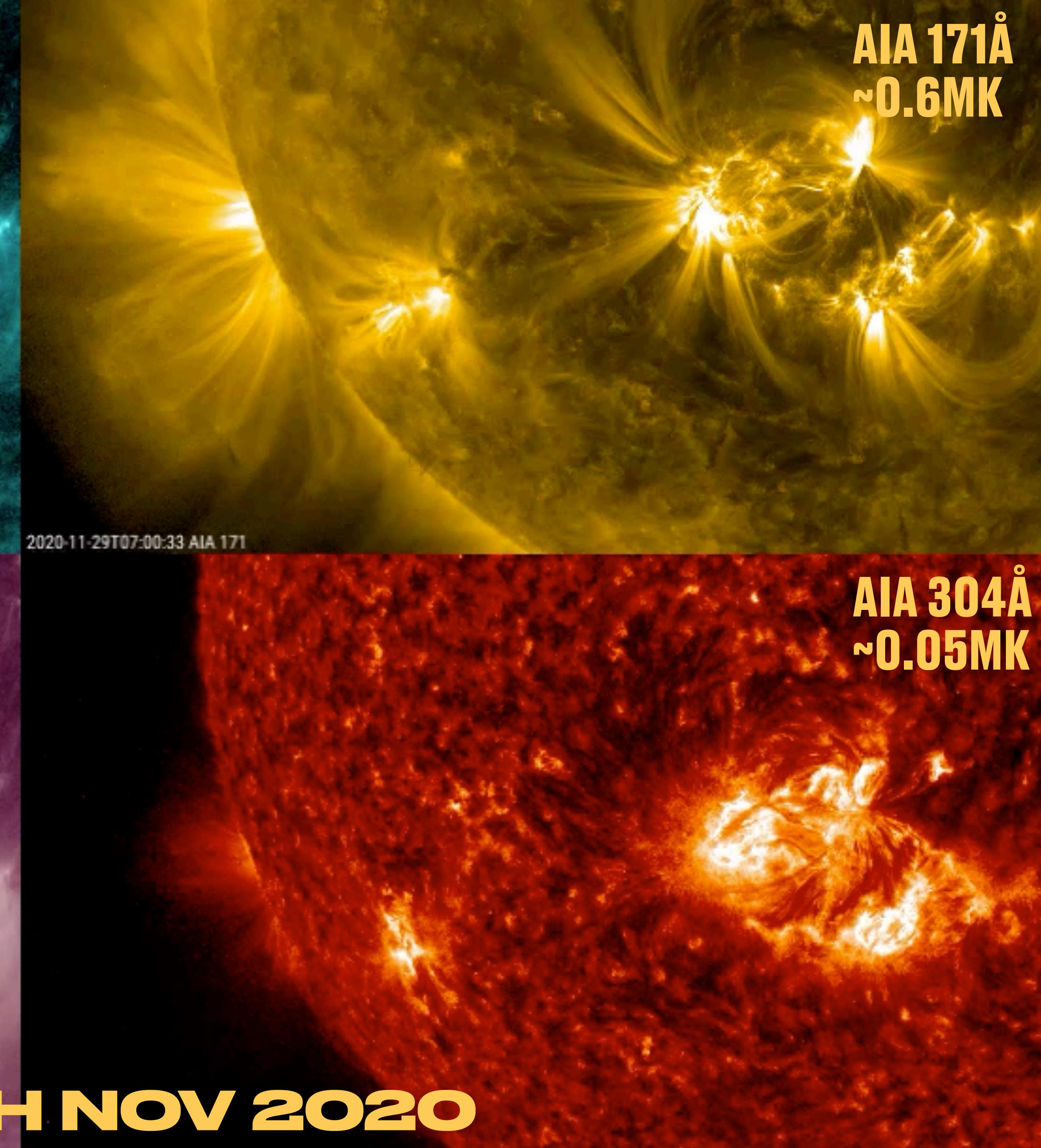
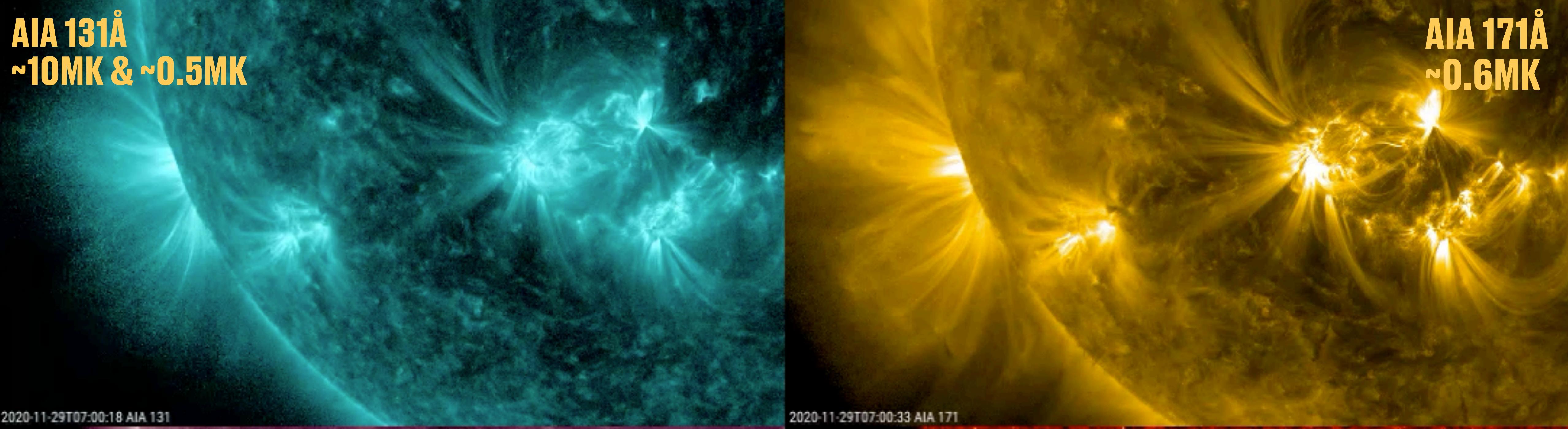
Large streamers form, and open magnetic fields beside them extend out into the Solar System.

Darker areas are 'coronal holes' (thought to be connected to the solar wind) or filaments (dense, cool material).

SOLAR ERUPTIONS

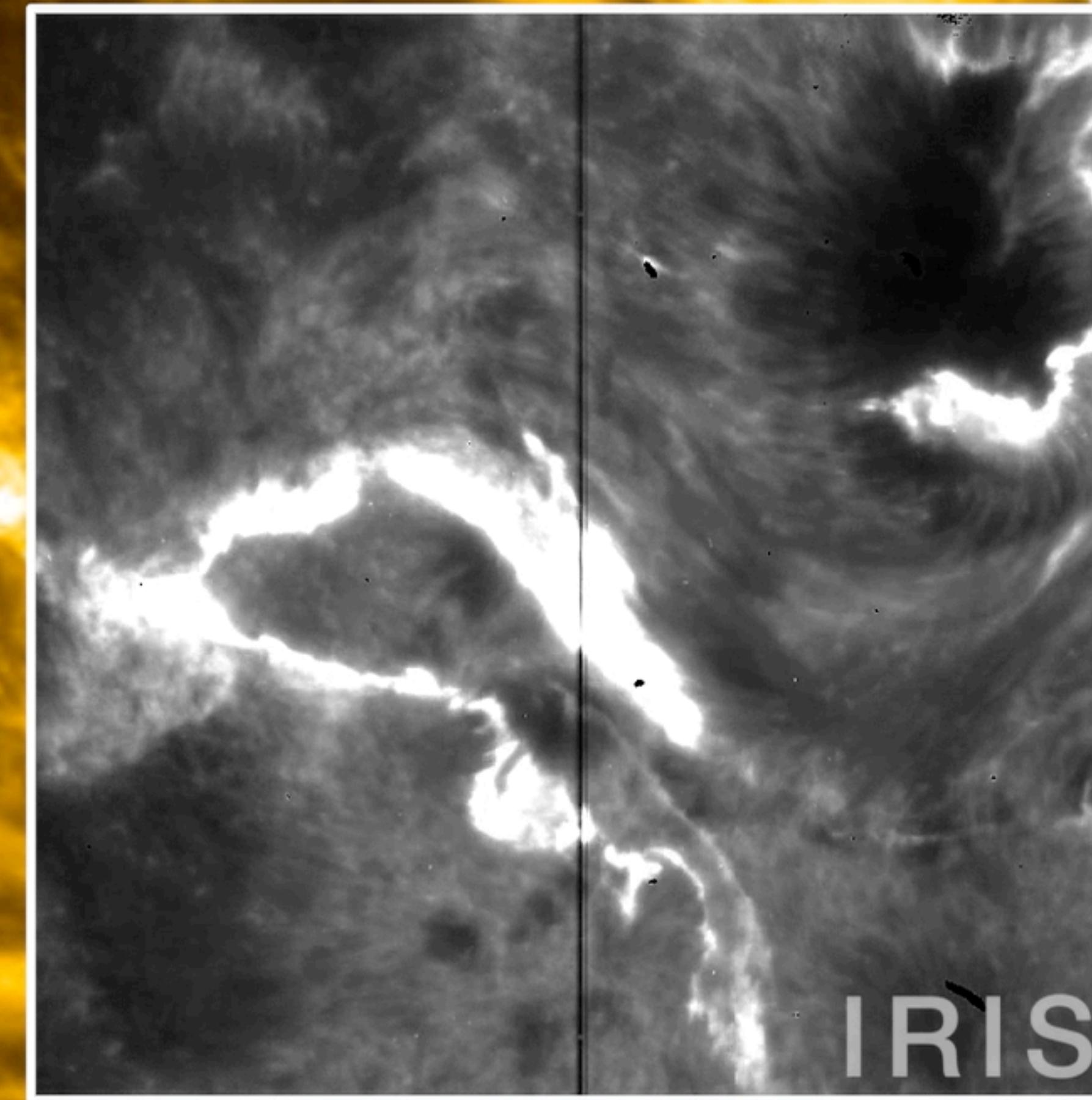
**SOLAR FLARES,
CORONAL MASS EJECTIONS,
SOLAR ENERGETIC PARTICLES**





M4.4 CLASS FLARE 29TH NOV 2020

SDO



X1.6 CLASS FLARE 10TH SEPT 2014

Example Solar Eruptive Event

