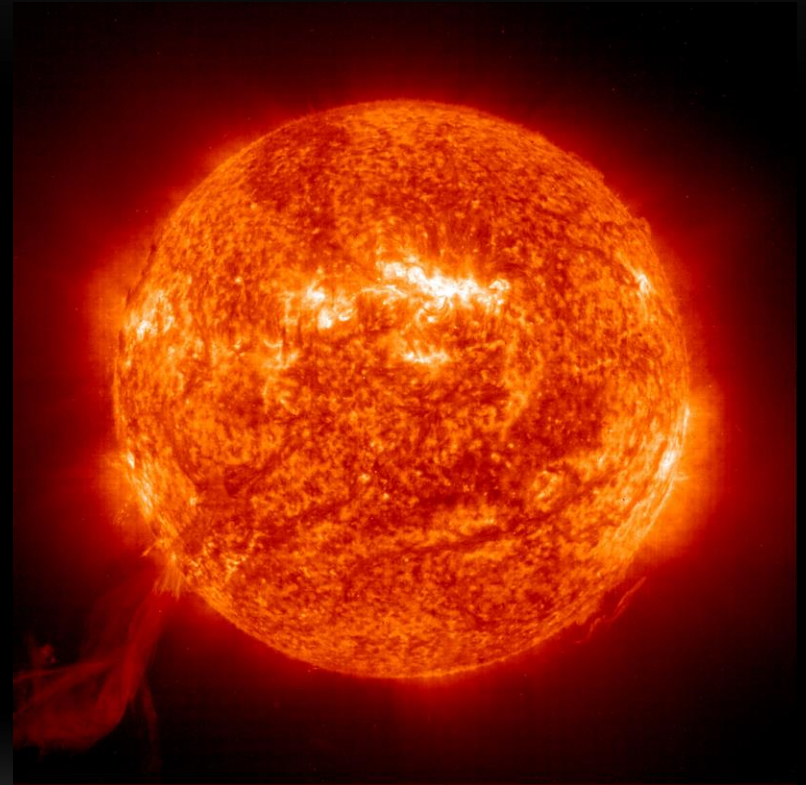
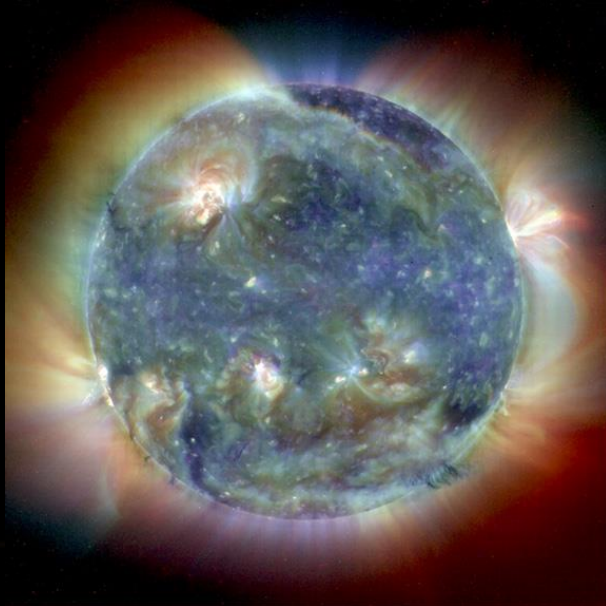


# THE SUN

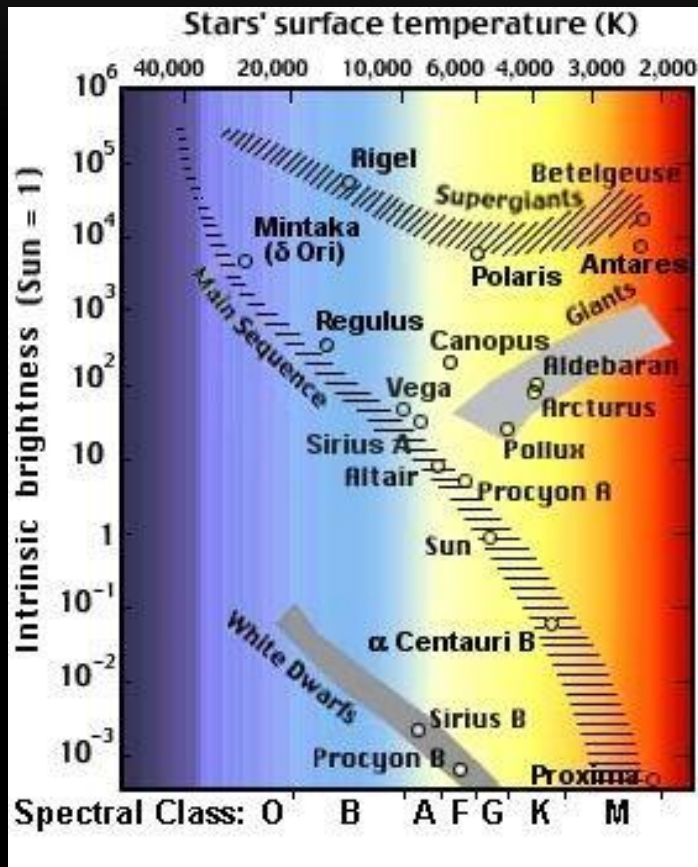
A thin, horizontal, glowing orange-yellow line that spans across the width of the page, positioned below the text.

# WHY STUDY THE SUN?

- Dominant source of energy for processes on Earth that sustain us.
- SOHO (Solar & Heliospheric Observatory) is currently collecting wide range of images of the Sun

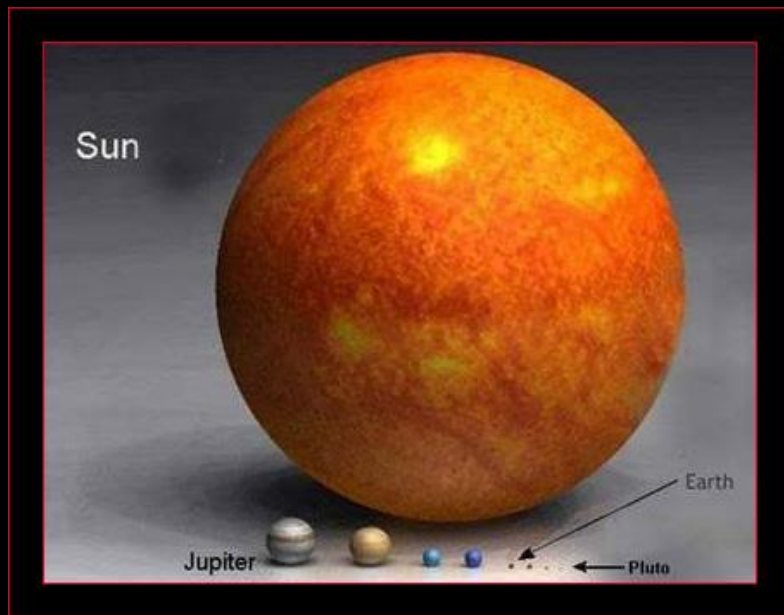


# WHAT KIND OF STAR IS IT?



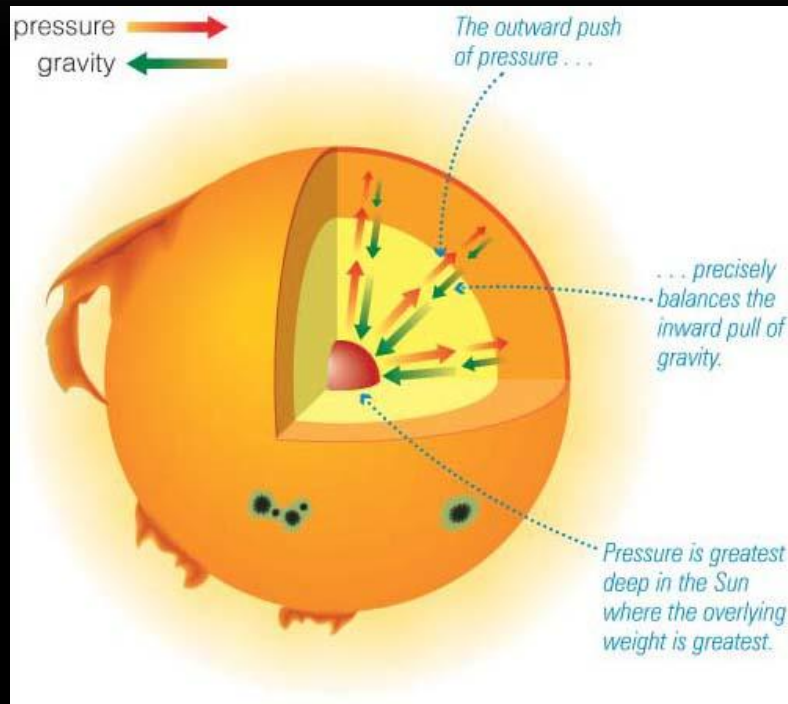
- Spectral classification G2 V
  - G – Yellow/ White Star (on the cooler side of stars – 5-6000K)
  - 2 – Temperature (0=hottest, 9=coolest)
  - V – Luminosity (amount of radiation) determined by size (I – Supergiants, VII – Subdwarfs)

# THE SUN'S MASS



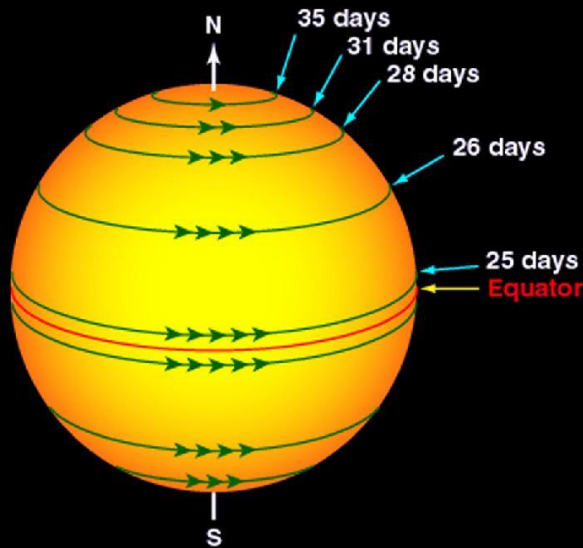
- Dominates gravitational field of the solar system
  - Sun – 99.85%
  - 8 planets – 0.135%
  - Comets, asteroids, moons etc – 0.015%

# FUSION



- Extreme heat and pressure in the Sun's core allow for thermal nuclear fusion (Hydrogen to Helium)
- Converts 4 billion kg of mass to energy every second
- Energy from the core takes over a million years to reach the surface as heat and light
- <https://www.youtube.com/watch?v=3JdWISF195Y>

# ROTATION

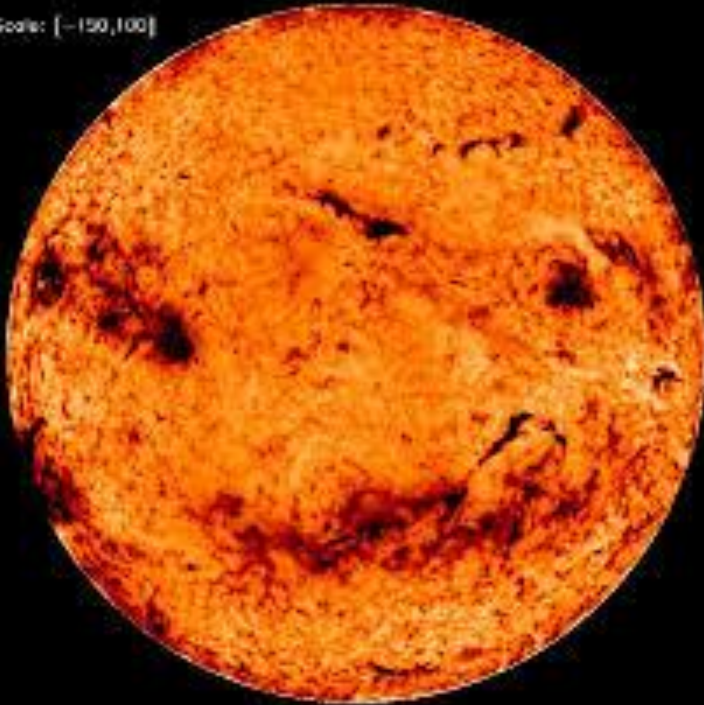


- The Sun rotates once every 25.4 days.
- Rotates slower at the poles (30 days) because the Sun is a gaseous body
- Tilted on its axis (7 degrees compared to Earth's 23)



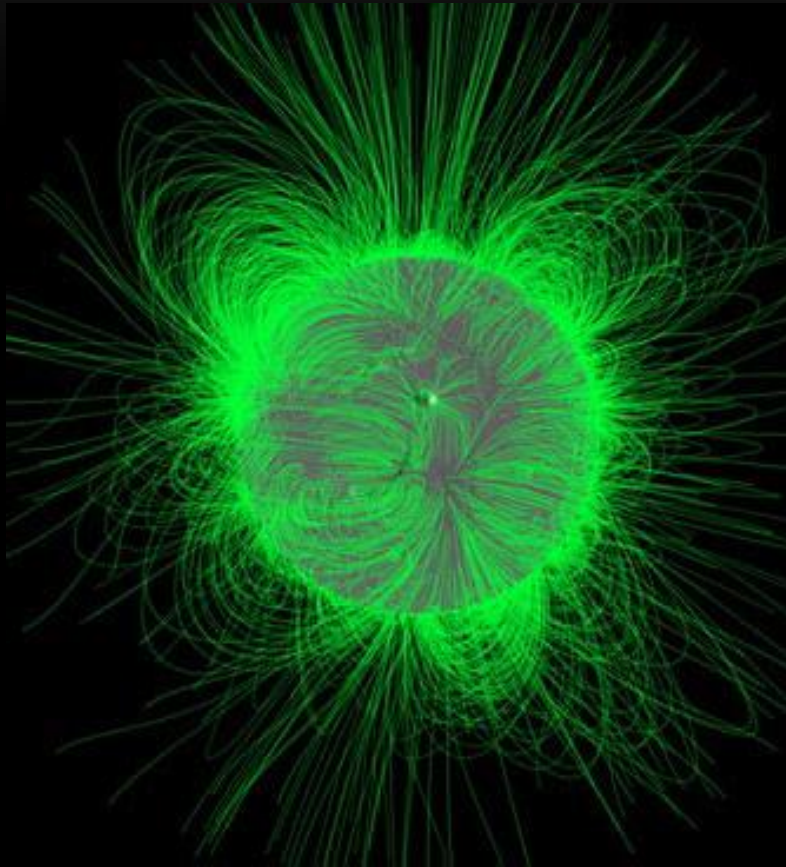
# MAGNETIC FIELD

Scale: [-150,100]



- Magnetism is produced by the flow of charged particles – ions and electrons.
- Sunspots – cooler regions on the surface where with intense magnetic force
- Surface features all generated by Sun's magnetic field
- Influences all charged particles in interplanetary space

# MAGNETIC FIELD



- 22 year cycle – ‘Hale’ Cycle
- 11 years – solar maximum – lots of sunspot activity – magnetic poles flip



# MASS EJECTIONS

- Coronal Mass Ejections (CMEs) are huge magnetic bubbles of plasma that expand away from the Sun at 2000 km/s
- Can be 10 billion tons
- Can cause fluctuations in the Earth's magnetic field that upset electrical power distribution

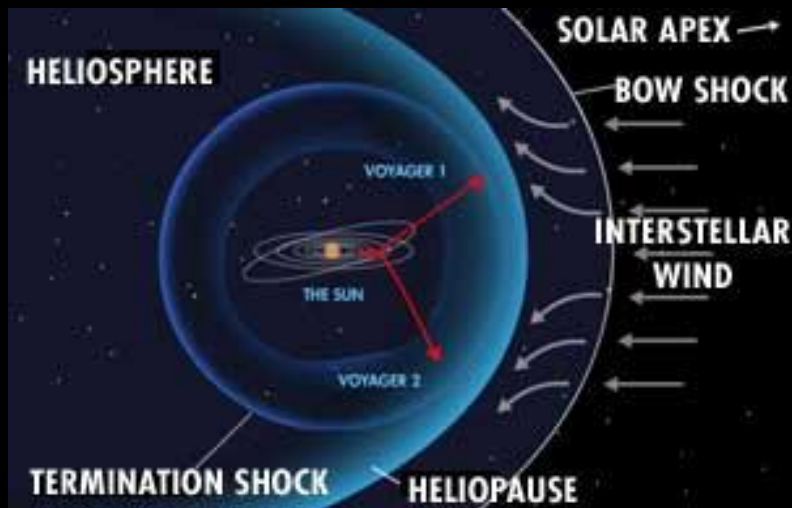


# SOLAR WIND



- Made of lightweight ions and electrons
- Streams off the Sun in all directions
- Comes from Sun's corona – so hot that the Sun's gravity cannot hold onto it.
- Flow fastest when there are few sun spots
- Discovered in 1958 by Eugene Parker
- Visible effect on comet tails, blowing the charged component away from the Sun

# SOLAR WIND



- 'inflates' the heliosphere like a bubble in the interstellar medium
- Heliopause – boundary where our solar wind meets that of other stars. Sun's magnetic field stops
- Tear-drop shaped because of the Sun's motion
- Voyager 1 (launched 1977) is still in contact with NASA and reached the heliopause this year!!

# SOLAR WIND



- Shape of heliosphere changes with the 11 year solar cycle and interstellar medium
- Cannot take measurements of the Sun's magnetic field from Earth because our own magnetic field acts as a shield