

# INSIGHT

DISTANCE FROM EARTH



It takes light from the sun about 8 minutes to reach Earth.

Less than **5%** of the stars in the Milky Way are brighter or more massive than the sun.

**IMPACT**  
Interactions between the sun and Earth drive the seasons, ocean currents, weather, climate, radiation belts and auroras.

**93 million miles**  
(1 astronomical unit)

**THE SUN**  
**Diameter** 864,337.2 miles  
**Star type** Yellow dwarf  
**Surface temperature** 10,000 F  
**Composition** Hydrogen, helium

**EARTH**  
**Diameter** 7,917.6 miles (109.2 times smaller than the sun)  
If the sun were as tall as a typical front door, Earth would be the size of a nickel.

## THE HEART OF OUR SOLAR SYSTEM

The sun is a star — a hot ball of glowing gases — in the center of our solar system. Its gravity holds the entire solar system together, keeping everything in its orbit. The sun is by far the largest object in the solar system, making up 99.8% of its mass. Without the sun's energy, there would be no life on Earth.

### THICKNESS OF THE SUN'S LAYERS

The scale to the left shows the thickness of the sun's layers — both internal and in the solar atmosphere.

\*If the yellow line to the left, representing the corona's thickness, were to scale, it would be 17 times longer than it is here.

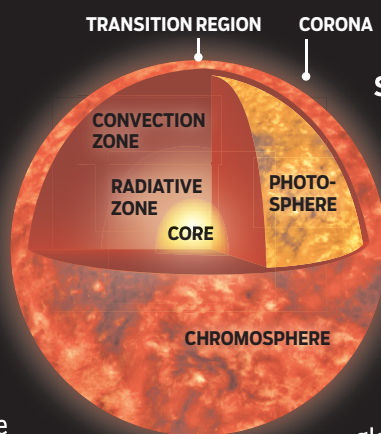
18 million miles\*

### ANATOMY INTERNAL STRUCTURE

**Core:** This is the central region of the sun where nuclear reactions consume hydrogen to form helium.

**Radiative zone:** This zone extends from the core to the convection zone. In this zone, energy from the core is carried outward by photons before being absorbed by gas molecules.

**Convection zone:** This is the outermost layer of the sun's interior. In this zone, energy moves toward the surface through convection currents of heated and cooled gas.



### SOLAR ATMOSPHERE

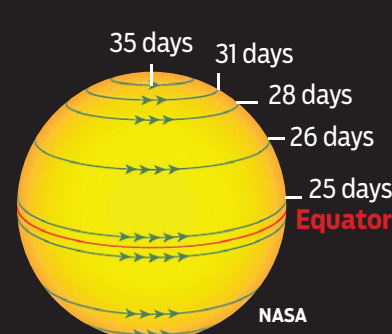
**Photosphere:** The sun does not have a solid surface. The visible layer is called the photosphere. This is where the sun's energy is released as light.

**Chromosphere:** As hydrogen burns off, the chromosphere emits a reddish glow that can be seen only during a total solar eclipse.

**Transition region:** This is a thin, irregular layer of the sun's atmosphere that separates the chromosphere from the corona.

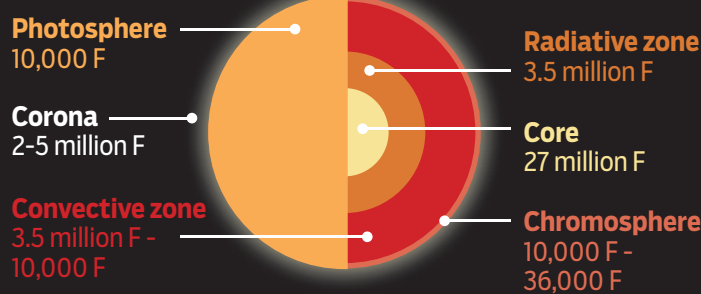
**Corona:** This is the sun's outer atmosphere. It appears as white plumes of ionized gas that flow outward into space.

### ROTATION



The sun rotates, but it moves at a much slower pace than the Earth. Since the sun is a ball of gas with no solid form, different regions rotate at different rates. At the equator, the sun spins once about every 25 days, but at its poles, it rotates once about every 35 days.

### TEMPERATURE



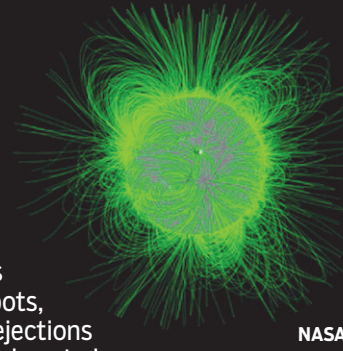
**ENERGY** — The sun generates its energy by nuclear fusion of hydrogen into helium. It sends different kinds of energy to Earth: infrared radiation, visible light and ultraviolet light. Infrared waves have less energy, while ultraviolet waves have more energy.



### SOLAR ACTIVITY

The electric currents in the sun generate powerful magnetic fields that extend out into space. These forces are constantly moving, which creates what is known as solar activity. This includes phenomena such as sunspots, solar flares, coronal mass ejections (CME), prominences and solar wind.

(Find details on solar activity on Page C2.)



### SOLAR CYCLE

The sun doesn't behave the same way all the time. It goes through cycles of high and low activity that repeat approximately every 11 years. A solar minimum refers to a period of several Earth years when the sun's activity is lowest. During the solar maximum, activity on the sun and the effects of space weather on Earth are high.

**TRANSITION ZONE** 60 miles

**CHROMOSPHERE** 1,050 miles

**PHOTOSPHERE** 250 miles

**CONVECTION ZONE** 124,000 miles

### SOLAR ACTIVITY

Learn more about the types of phenomena produced by the sun and how they can affect the Earth. **INSCIENCE, PAGE C2**

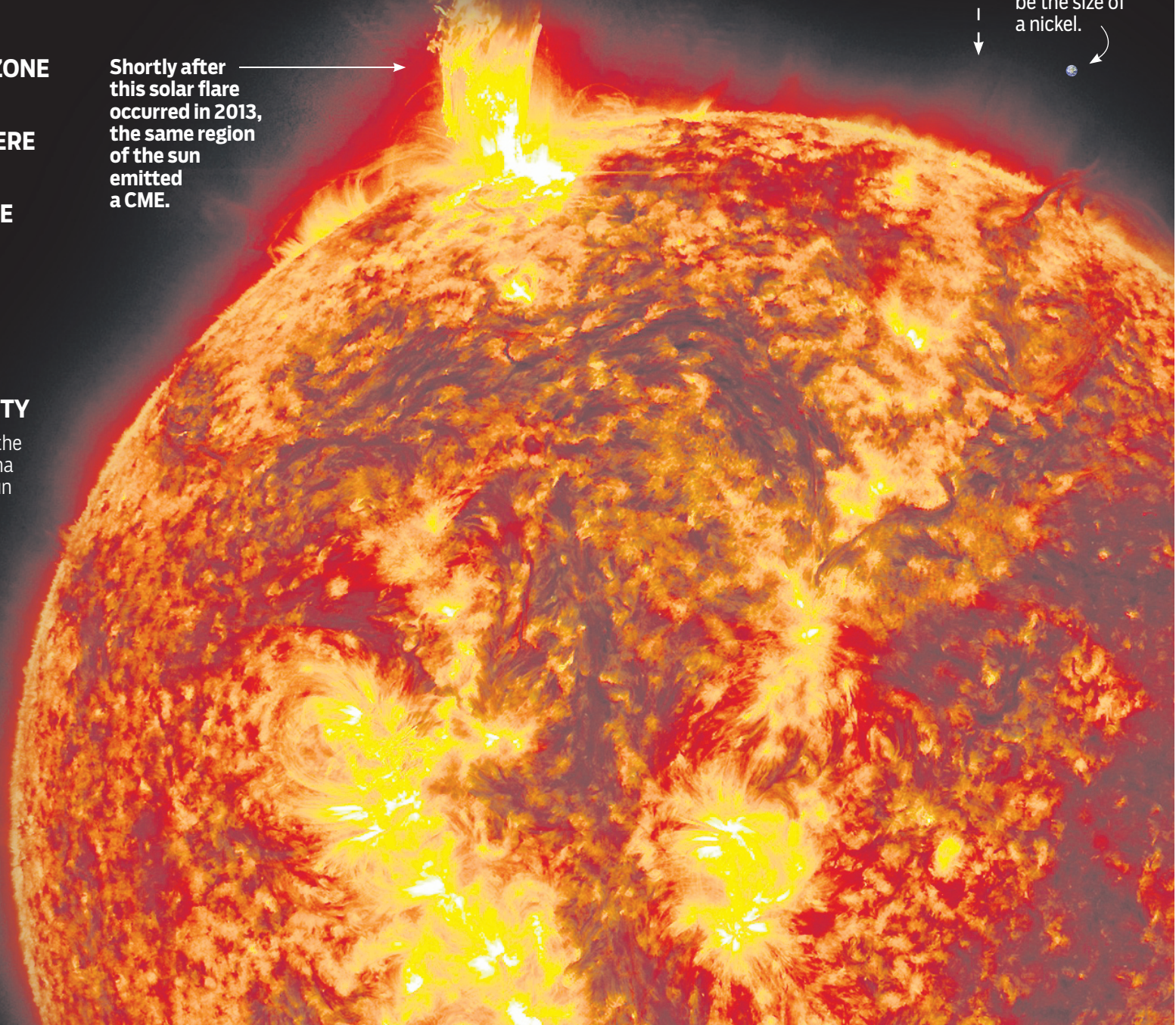
**RADIATIVE ZONE** 233,000 miles

Sources: NASA, Live Science, space.com, nineplanets.org

COMPILED BY KIRA RIDER/TIMES-DISPATCH

**CORE** 86,000 miles

NASA



Shortly after this solar flare occurred in 2013, the same region of the sun emitted a CME.

CORONA

CONVECTION ZONE

RADIATIVE ZONE

CORE