**13 things that make life on Earth possible**

**1 Our planet recycles life-friendly carbon over time**

Carbon dioxide is one of many greenhouse gases that trap heat and keep Earth’s surface warm enough to support life. The static surfaces of Venus and Mars keep carbon locked in the air and rocks. But over million of years, Earth dynamically cycles this vital element through its air, land and sea due to the constant action of planet’s tectonics.

**2 We have an ozone layer to block harmful rays**

Ancient plantlike organisms in the oceans added oxygen to the atmosphere and created a high-altitude layer of ozone that shielded early land species from lethal radiation.

**3 We have a big moon to stabilize our axial wobble**

Earth is tilted with respect to the sun, and teeters as it spins. This tiny wobble can shift the climate from hot to icy every 41,000 years—and might vary more without the moon’s stabilizing pull.

**4 Earth’s varied surfaces support many life-forms**

The dramatic effects of plate tectonics formed different surface habitats and terrains. This spurred adaptation, helping life diversify and survive several mass extinctions.

**5 Our magnetic field deflects solar tempests**

Sparked by charged particles from the sun, mesmerizing auroras are a visual reminder of our magnetic field, which deflects the bulk of our star’s damaging radiation and solar outbursts.

**6 We are at just the right distance from the sun**

Earth orbits in the so-called Goldilocks zone, where the planet receives enough energy to allow water to exist as a liquid on its surface. Too far, and the vital compound stays locked up as ice. Too close, and the water would rapidly evaporate into the atmosphere.

**7 We are situated safely away from gas giants**

If the orbits of the solar system’s biggest planets were much closer, tugs from their powerful gravity could cause disastrous fluctuations in Earth’s distance from the sun.

**8 The sun is a stable, long-lasting star**

Stars more massive than the sun burn hotter and usually don’t live long enough for planets to develop life. Less massive, younger stars are often unstable and are prone to blasting their planets with bursts of radiation.

**9 We have the right stuff to host a dynamic core**

The interstellar cloud of gas and dust that gave rise to Earth contained enough radioactive elements to power a churning core for billions of years. This creates a magnetic field that protects the planet from dangers like solar flares.

**10 We have giant planets that protect us from afar**

Jupiter’s strong gravity sent water-rich asteroids crashing into early Earth. Today the massive planet thins out the asteroid belt, protecting Earth from overly frequent collisions that might trigger extinction.

**11 Our sun offers protection from galactic debris**

The sun engulfs its planets in a bubble of charged particles that repel dangerous radiation and harmful materials coming from interstellar space.

**12 Our galactic path steers us clear of hazards**

The solar system is comfortably nestled in a safe harbor between major spiral arms, and its nearly circular orbit helps it avoid the galaxy’s perilous inner regions.

**13 Our location is far from stellar crowds**

There are relatively few stars near the sun, reducing risks to Earth from gravitational tugs, gamma-­ray bursts, or collapsing stars called supernovae.