

## STARDOME OBSERVATORY & PLANETARIUM FACTS, RESOURCES AND ACTIVITIES ON...

# A HAVEN FOR LIFE

## WHY EARTH'S ATMOSPHERE IS SPECIAL

Atmospheres play a vital role in what a planet is like, and they give us things like weather and climate. Not only is Earth's atmosphere essential for us to breathe, its unique composition and thickness allows liquid water to exist on the surface.

Our neighbours, Venus and Mars, were once thought to hold oceans of water much like Earth. However, due to these planet's atmospheres, the outcome of these oceans are radically different to Earth's. Venus got too hot and Mars got too cold. Earth stayed somewhere in the middle, becoming a haven for life.

Unfortunately, humans have been slowly changing the climate and atmosphere by burning fossil fuels and adding carbon dioxide (CO<sub>2</sub>) to our atmosphere. CO<sub>2</sub> acts as an insulant, trapping heat, known as the greenhouse effect. It is essential for our planet, but too much will cause Earth to dramatically change.

Venus shows what too much CO<sub>2</sub> can do to a planet. The Venusian atmosphere is 96% CO<sub>2</sub>, making it the hottest place in our Solar System. Heat from the Sun is trapped in the thick blanket of CO<sub>2</sub>. Unable to escape, Venus got hotter and hotter over eons. The average temperature of present day Venus is over 460°C, day or night! Any oceans that once existed on Venus were boiled away because of this run-away greenhouse effect. In comparison, Earth's atmosphere is only made up of 0.04% CO<sub>2</sub>.

Mars suffered a very different fate. Like Venus, Mars also had oceans some 4 billion years ago. The atmosphere was stripped away over time from solar wind. It eventually did not have enough atmosphere and CO<sub>2</sub> to trap any heat and the pressure dropped. The oceans then

*Venus today is a hot, inhospitable world.*

*Credit: ESA*



*Mars' about 4 billion years ago would have looked strikingly similar to Earth today. Credit: ESO*



CO<sub>2</sub> is essential for Earth but too much of it will cause the planet to overheat

boiled away from the lack of atmosphere.

Water boils at different temperatures depending on how thick a planet's atmosphere and pressure is. On Earth, water boils at 100°C at sea level. At the top of Mt Everest, it boils at about 68°C. Mars' atmospheric pressure became too low for any water to exist in large bodies, and it turned into the dry, barren planet we know today.

CO<sub>2</sub> is important for Earth trapping heat and regulating our temperature. However, too much of it will have hugely negative impacts on how we live. It's important that we take care of Earth and that we make sure it always stays the haven for life that it is today for future generations.

Why is a planet's atmosphere so important?

If we put too much CO<sub>2</sub> into Earth's atmosphere, what could our future look like?

What makes Earth's current atmosphere so special?

DISCUSSION POINTS

Check out these other resources...

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