

EPISODE 4

# The Earth is a complex connected system



## 2 ANSWERS TO SCEPTICAL QUESTIONS

“Why should I worry about the Arctic’s changes? It’s far away and doesn’t affect me.”

**The Earth is a complex, connected system.** When one part of the Earth’s system changes, it can set off a chain reaction with far-reaching and potentially catastrophic consequences. When sea ice melts, it exposes dark ocean surfaces. These dark surfaces absorb more solar energy, warming the Earth’s surface, and further melting sea ice. These changes can affect weather patterns and climate around the globe.

“If the climate is really so inert, why don’t we still have plenty of time to stop climate change?”

While the climate system may seem slow to respond, it’s important to understand that there are **irreversible tipping points**. Once crossed, these thresholds can set off **uncontrollable changes**, leading to catastrophic consequences. Take, for example, permafrost thaw, which triggers a **vicious amplifying loop**: As it thaws, it releases CO<sub>2</sub> and methane, warming the atmosphere and causing more thawing – a self-reinforcing cycle that rapidly accelerates global warming. The challenge for us is to **avoid** pushing the Earth’s system past **these tipping points** by taking timely and effective action.

3 FAST FACTS

1.2 trillion

– this is how many tons of ice the planet is losing each year. That is more than the combined weight of all living things on Earth<sup>1</sup>.

90 %

– the amount of incoming solar energy that sea ice and snow are able to reflect due to their high albedo. In contrast, the dark surface of the ocean reflects only about 10 %<sup>2</sup>.

2 x

– the amount of carbon currently stored in permafrost is double the amount in our entire atmosphere<sup>3</sup>.

<sup>1</sup> Mulhern 2022, <sup>2</sup> Chen et al. 2023, <sup>3</sup> NSIDC 2023

## 3 KEY TAKEAWAYS

- ▶ Because we live in a connected Earth system, changes can create vicious amplifying loops.
- ▶ For now, human action can minimise the potential for these loops to cross irreversible tipping points.
- ▶ But time is of the essence – we must take action now, while human action can still prevent runaway changes.

## 3 ESSENTIAL RESOURCES

- ▶ In this [video](#), the renowned climate scientist Johan Rockström explains the framework of planetary boundaries.
- ▶ [Tipping Elements](#): This website by the Potsdam Institute for Climate Impact Research gives a concise overview of 16 identified tipping elements.
- ▶ [Quick facts about sea ice](#), provided by the National Snow and Ice Data Center.