Positive feedback

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Melt ponds on the sea ice in the Arctic. The water is darker than the ice and absorbs more sunlight, so the ice melts even faster. It is a positive feedback.

Kathryn Hansen, NASA. CC BY 2.0. Wikimedia Commons.

When a change in the state of a system, for example the climate, leads to additional and increased change.

Positive feedback mechanisms include:

Reduced albedo: When increased temperature melts more of the ice in the ocean and the glaciers, then the reflection, the so-called albedo, of the Earth's surface decreases. Absorbing more of the Sun's energy makes the temperature increase even more, and more ice melts.

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CO_2 absorption: The oceans absorb CO_2 gas from the atmosphere in their surface waters. But a warmer atmosphere increases temperature of the surface waters, which decreases the water's ability to absorb $C0_2$. When less of the CO_2 is absorbed from the atmosphere, the concentration of this greenhouse gas rises, and adds to global warming.

Atmospheric water vapor: In this scenario global warming leads to increased evaporation of water to the atmosphere. Water is the most important natural greenhouse gas, and will further increase the warming. Then more water evaporates and so on.

Methane gas released by melting permafrost is another positive feedback mechanism of concern.

Positive feedbacks are often linked to tipping points, where the mechanism becomes irreversible. Yet, it is possible to imagine some negative feedback mechanisms that may stop or reverse the effect. For example the heating by increased water vapor may be opposed by more clouds reflecting sunlight.

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