

Feedback Loops & Climate Change 8.10

Cause = an event

Effect = something happens because of the event.

Feedback Loop – is a situation in which the effect affects the original cause. (It loops back).

Positive Feedback Loop – when the effect increases the original cause. Ie: if warm temperatures are the 'cause', temperature gets warmer. If cool temperatures are the 'cause', temperature gets cooler.

Negative Feedback Loop – when the effect decreases the original cause. Ie: if warm temperatures are the 'cause', then temperatures get cooler. If cool temperatures are the 'cause', temperatures get warmer.

Albedo – is a measure (or a percentage) of the amount of sunlight reflected off a surface.

Snow reflects a lot of sunlight and has an albedo of 0.85. That means 85% of sunlight reflects off snow. Ice has an albedo of 0.75 or 75% of sunlight reflects off it. Grass is only 0.20...or only 20% of grass reflects off grass. The rest is absorbed by grass.

The fact that snow and ice reflect a great amount of sun's energy means that it helps drive global warming and cooling through positive feedback loops. Both warming and cooling are positive feedback loops since the original cause is increased. (warm temperatures get warmer & cool temperatures get cooler).

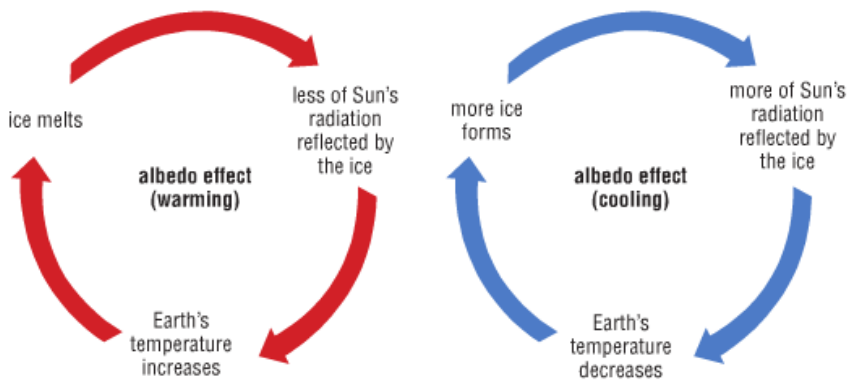


Figure 3 The albedo effect is the relationship between ice and Earth's temperature.

Cloud Cover and Feedback Loops

Unlike the albedo effect, clouds can help drive positive AND negative feedback loops.

Positive Loop - Warm temperatures → more water evaporation & more clouds → if clouds are low, they increase the greenhouse effect which....increases temperature more!

Negative Loop - Warm temperatures → more water evaporation & more clouds → if clouds are high, they reflect more sunlight which....decreases temperature.