Forcing

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NASA on The Commons.

External factor that influences climate or a climate model.

Generally forcing is energy, often in the form of heat, entering or exiting a climate system. It can also be something that changes the balance between incoming and outgoing energy. In both cases, the result is climate change.

If the climate system is a model, forcings are those factors that are not internal to the model. The factors that are inside the climate model are instead referred to as positive and negative feedbacks. Because climate models can include different components there is no absolute distinction between forcings and feedbacks.

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There are several important types of forcings, because of the less-than-clear distinction between forcings and feedbacks some of the following may sometimes not be considered forcings.

The most important type is **radiative forcing**. It refers to the balance between incoming radiation energy and outgoing radiation energy. More (positive) forcing leads to more global warming, while less (negative) forcing leads to cooling. The IPCC regularly estimates radiative forcing.

Greenhouse gases, under some models, can also be considered a forcing. They interact with radiative forcing by determining the amount of heat that does not escape the atmosphere into space. Some coupled climate models have integrated carbon cycles. In those cases greenhouse gases are not a forcing. Greenhouse gases are the most anthropogenic component in radiative forcing.

Another very important forcing is **orbital forcing**. Changes in the Earth's tilt, and the shape of its orbit around the Sun, have important consequences for the distribution of incoming sunlight. This affects climate. It is commonly believed that this forcing is responsible for ice ages through the Milankovitch cycles.

Cloud forcing is related to radiative forcing. It describes the difference between the radiative forcing for average cloud conditions and cloud-free conditions. Most climate models treat clouds as a feedback mechanism more than a forcing.

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