

**anthropogenic** climate change event in question might have been classified as an *extreme climate* or total that is itself extreme (season).

**Faculae** Bright patches of greater during periods of high

**Feedback** See *Climate feedback*

**Fingerprint** The *climate* specific forcing is commonly used to detect the presence are typically estimated using

**Flux adjustment** To avoid Ocean General Circulation unrealistic *climate* state, atmosphere-ocean fluxes of surface stresses resulting (surface) before these fluxes atmosphere. Because they are therefore independent of uncorrelated with the anomalies Chapter 8 of this report of report (Fourth Assessment adjustments, and that in general

**Forest** A vegetation type of the term *forest* are in differences in biogeophysical economics. For a discussion such as *afforestation, reforestation* Report on Land Use, Land-Use Change and Forestry (IPCC, 2000). See also the Report on Definitions and Methodological Options to Inventory Emissions from Direct Human-induced Degradation of Forests and Devegetation of Other Vegetation Types (IPCC, 2003).

**Fossil fuel emissions** Emissions of *greenhouse gases* (in particular *carbon dioxide*) resulting from the combustion of fuels from fossil carbon deposits such as oil, gas and coal.

**Framework Convention on Climate Change** See *United Nations Framework Convention on Climate Change* (UNFCCC).

#### Free atmosphere

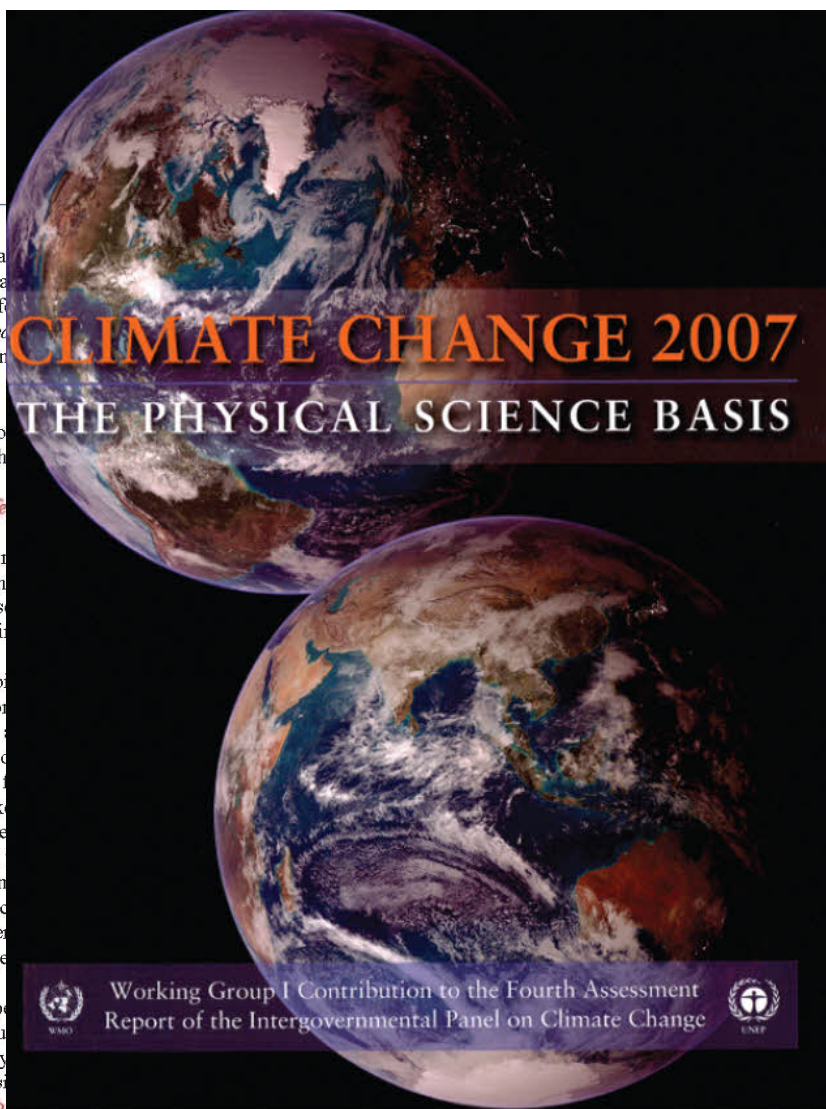
The atmospheric layer that is negligibly affected by friction against the Earth's surface, and which is above the *atmospheric boundary layer*.

**Frozen ground** Soil or rock in which part or all of the *pore water* is frozen (Van Everdingen, 1998). Frozen ground includes *permafrost*. Ground that freezes and thaws annually is called *seasonally frozen ground*.

**General circulation** The large-scale motions of the *atmosphere* and the ocean as a consequence of differential heating on a rotating Earth, which tend to restore the *energy balance* of the system through transport of heat and momentum.

**General Circulation Model (GCM)** See *Climate model*.

**Geoid** The equipotential surface (i.e., having the same gravity potential at each point) that best fits the mean sea level (see *relative sea level*) in the absence of astronomical tides; ocean circulations;



Earth rotation  
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The geoid is  
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zero-frequency  
is the surface  
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the Earth from

temperature is  
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rtures from a  
area-weighted

global average of the *sea surface temperature* anomaly and *land surface air temperature* anomaly.

**Global Warming Potential (GWP)** An index, based upon radiative properties of well-mixed *greenhouse gases*, measuring the *radiative forcing* of a unit mass of a given well-mixed greenhouse gas in the present-day *atmosphere* integrated over a chosen time horizon, relative to that of *carbon dioxide*. The GWP represents the combined effect of the differing times these gases remain in the atmosphere and their relative effectiveness in absorbing outgoing *thermal infrared radiation*. The *Kyoto Protocol* is based on GWPs from pulse emissions over a 100-year time frame.

**Greenhouse effect** *Greenhouse gases* effectively absorb *thermal infrared radiation*, emitted by the Earth's surface, by the *atmosphere* itself due to the same gases, and by clouds. Atmospheric radiation is emitted to all sides, including downward to the Earth's surface. Thus, greenhouse gases trap heat within the surface-*troposphere* system. This is called the *greenhouse effect*. Thermal infrared radiation in the troposphere is strongly coupled to the temperature of the atmosphere at the altitude at which it is emitted. In the troposphere, the temperature generally decreases with height. Effectively, infrared radiation emitted to space originates from an altitude with a temperature of, on average,  $-19^{\circ}\text{C}$ , in balance with the net incoming *solar radiation*, whereas the Earth's surface is kept at a much higher temperature of, on average,  $+14^{\circ}\text{C}$ . An increase in the concentration of greenhouse gases leads to an increased infrared opacity of the atmosphere, and therefore to an effective radiation into space from a higher altitude at a lower temperature. This causes a *radiative forcing* that leads to an enhancement of the greenhouse effect, the so-called *enhanced greenhouse effect*.





Animation

## Der Treibhauseffekt

### Der Treibhauseffekt

tagesschau.de<sup>1</sup>

#### Prinzip des Treibhauseffekts

Ohne den natürlichen Treibhauseffekt würde auf der Erde eine Durchschnittstemperatur von -18 Grad Celsius herrschen. Gegenwärtig ist es durchschnittlich 15 Grad warm.

Grund dafür ist, dass nicht alles an Sonneneinstrahlung von der Erde wieder in den Weltraum abgegeben wird, sondern von der Atmosphäre wie in einem Treibhaus "gefangen" wird.

Besonders zum Treibhauseffekt tragen Gase wie Kohlendioxid, Kohlenwasserstoffe aber auch Wasserdampf bei.