Water Vapor

Water vapor is the most abundant greenhouse gas in the atmosphere. Changes in the concentration of water vapor in the atmosphere result from climate feedbacks related to the warming of the atmosphere. As air warms, it is able to hold more water; as a result, more water is taken into the air through evaporation.

As a greenhouse gas, water vapor in the atmosphere absorbs energy radiated from the earth, further warming the atmosphere. A positive feedback loop is created because the atmosphere, thus warmed, can hold even more water vapor.

Scientists have had difficulty in determining the importance of this feedback loop because the effect of clouds in the atmosphere is not certain. As more water vapor is taken into the atmosphere, more will eventually condense into clouds. Because these clouds reflect solar radiation, less energy reaches the Earth's surface (albedo).

Increased levels of water vapor in the atmosphere, along with changes in temperatures and winds, affect the amount of energy that is absorbed and reflected by the Earth, at some locations enhancing and at others diminishing the warming due to greenhouse gases.

It has been suggested that, as greenhouse gases accumulate, the atmospheric events that generate cumulus clouds in tropical areas would cause a drying of the upper layers of the troposphere, the lowest region of the atmosphere. However, observations of current atmosphere provide evidence for the conclusion that on a global scale, a warmed atmosphere will moisten, further enhancing greenhouse warming.

Although carbon dioxide in the atmosphere traps some heat near the Earth's surface, its effect is much less than that of water vapor. The small amount of warming caused by carbon dioxide may be greatly magnified by increased evaporation from the ocean surface as global temperatures rise. (Photograph copyright Corel)

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Water vapor, which is a greenhouse gas, warms the atmosphere, increasing global warming (and in this scenario, leading to ice sheet melting).

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Water vapor in the atmosphere leads to changes in precipitation, causing droughts and flooding, which affects plant growth and animal migration patterns.

Resources:
http://www.weatherquestions.com/What_is_evaporation.htm

http://www.ncdc.noaa.gov/oa/climate/gases.html

http://www.weatherquestions.com/What_is_global_warming.htm

http://www.nasa.gov/topics/earth/features/vapor_warming.html

http://earthobservatory.nasa.gov/Features/WaterVapor/water_vapor2.php