



## Central Coast Climate Science Education

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Misperception 2: Since water vapor is a more powerful greenhouse gas than carbon dioxide (CO<sub>2</sub>) what is the point of worrying about CO<sub>2</sub>?

Response:

This point was discussed in some detail in [Lesson 3](#) of the Tutorials on the Greenhouse Effect and if you have not yet read that Lesson, I suggest you do so.

But here is a brief summary of the situation:

The heat-trapping effect due to the average amount of water vapor in the Earth's atmosphere is about twice that of the greenhouse gases that scientists are concerned about: Primarily CO<sub>2</sub>, but also methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) as well as other rarer gases. So the first thing to note is that even though water vapor traps more heat than CO<sub>2</sub>, the contribution from CO<sub>2</sub> is still very significant. Moreover, the amount of CO<sub>2</sub> is steadily increasing as more and more fossil fuel is consumed.

But there is a still more serious aspect to increased warming from CO<sub>2</sub> which involves water vapor: The amount of water vapor that can exist in the atmosphere before it condenses into a liquid or solid before falling to Earth as rain or snow depends strongly on the temperature of the air. This is not the case for CO<sub>2</sub> which is steadily increasing in amount and will linger in the atmosphere for a very long time.

Thus, the increasing warming caused directly by the trapping of infrared radiation due to increasing CO<sub>2</sub> is **amplified** by the increased water vapor that is in the air as the air temperature increases. This is one of the most important **positive feedbacks** discussed in [Lesson 2](#) on Forcings and Feedbacks.