

Illustration 2.3 - Evidence for the greenhouse effect

How we know the greenhouse effect is real

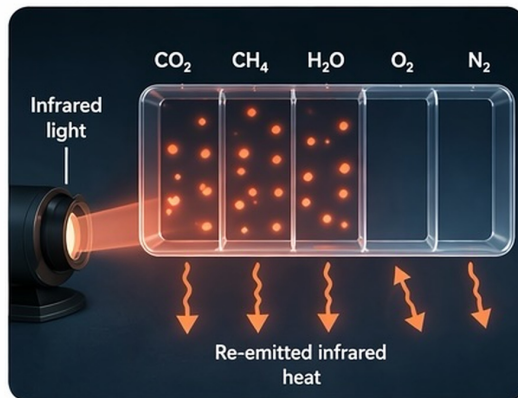
Scientists have several independent lines of evidence.
Together they tell the same story.

1

LABORATORY TESTS

The physics can be tested.

In the lab, scientists shine infrared light through different gases. Greenhouse gases absorb some of it and re-emit it. Oxygen and nitrogen mostly do not.



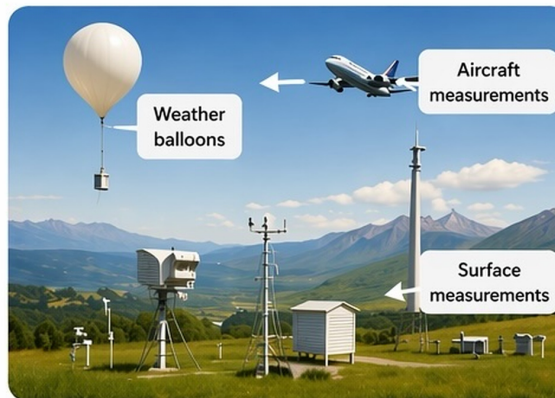
Many greenhouse gases absorb and re-emit infrared heat. Oxygen and nitrogen do not (or only extremely weakly).

2

MEASUREMENTS IN THE ATMOSPHERE

We can measure greenhouse gases.

Instruments on the ground, on balloons and on aircraft measure greenhouse gases directly. They also measure infrared radiation going up and down.



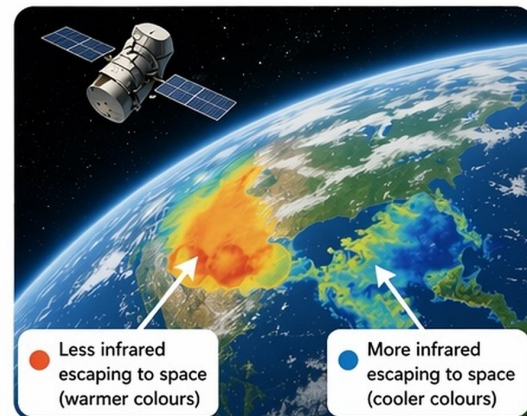
These measurements show that greenhouse gases are present, in the amounts we expect, and that they affect infrared radiation in the real atmosphere.

3

OBSERVATIONS FROM SPACE

Satellites see Earth's heat.

Satellites measure the infrared radiation leaving Earth. They see where more heat escapes to space and where less escapes. The pattern matches what the greenhouse effect predicts.



Satellites confirm that greenhouse gases are keeping some of Earth's heat from escaping to space.



THE BIG PICTURE

Lab physics, real-world measurements, and satellite observations are three independent lines of evidence. All three show the same thing: greenhouse gases absorb and re-emit infrared heat, which slows the loss of heat from Earth to space. **That is the greenhouse effect.**