Scientific Method and Peer Review

Biogeography
Geography 410
Jeff Hicke

Media Do Not Decide About Scientific Conclusions

THE MYTH OF THE 1970s GLOBAL COOLING SCIENTIFIC CONSENSUS

BY THOMAS C. PETERSON, WILLIAM M. CONNOLLEY, AND JOHN FLECK

There was no scientific consensus in the 1970s that the Earth was headed into an imminent ice age. Indeed, the possibility of anthropogenic warming dominated the peer-reviewed literature even then.

THE MYTH. When climate researcher Reid Bryson stood before the members of the American Association for the Advancement of Science in December 1972, his description of the state of scientists'understanding of climate change sounded very much like the old story about the group of blind men trying to describe an elephant. The integrated enterprise of climate science as we know it today was in its infancy, with different groups of scientists feeling blindly around their piece of the lumbering climate beast. Rigorous measurements of increasing atmospheric carbon dioxide were available for the first time, along with modeling results suggesting that global warming would be a clear consequence. Meanwhile, newly created global temperature series showed cooling since the 1940s, and other scientists were looking to aerosols to explain the change. The mystery of waxing and waning ice ages had long entranced geologists, and a cohesive explanation in terms of orbital solar forcing was beginning to emerge. Underlying this discussion was a realization that climate could change on time scales with the potential for significant effects on human societies, and that human activities could trigger such changes (Bryson 1974).

Bryson laid out the following four questions that still stand today as being central to the climate science enterprise:

i) How large must a climate change be to be important?
ii) How fast can the climate change?
iii) What are the causal parameters, and why do they change?
iv) How sensitive is the climate to small changes in the causal parameters?

AFFILIATIONS: PETERSON—NOAA/National Climatic Data Center, Asheville, North Carolina; CONNOLLEY—British Antarctic Survey, National Environment Research Council, Cambridge, United Kingdom; FLECK—*Albuquerque Journal*, Albuquerque, New Mexico
CORRESPONDING AUTHOR: Thomas C. Peterson, NOAA/ National Climatic Data Center, 151 Patton Avenue, Asheville, NC 28803
E-mail: Thomas.C.Peterson@noaa.gov

The abstract for this article can be found in this issue, following the table of contents.
DOI:10.1175/2008BAMS2370.1
In final form 8 February 2008

PERPETUATING THE MYTH

The following are examples of modern writers perpetuating the myth of the 1970s global cooling scientific consensus.

and Avery (2007) indicate that the National Academy of Science (1975) experts exhibited "hysterical fears" about a "finite possibility" that a serious worldwide cooling could befall the Earth, and that Ponte (1976) captured the "then-prevailing mood" by contending that the Earth may be on the brink of an ice age.

Balling (1992) posits,

> Could the [cold] winters of the late 1970s be the signal that we were returning to yet another ice age? According to many outspoken climate scientists in the late 1970s, the answer was absolutely yes—and we needed action now to cope with the coming changes . . . However, some scientists were skeptical, and they pointed to a future of global *warming*, not cooling, resulting from a continued build up of greenhouse gases. These scientists were in the minority at the time.

According to Horner (2007), the massive funding of climate change research was prompted by " 'consensus' panic over 'global cooling'." This was "three decades ago—when the media were fanning frenzy about global cooling" (Will 2008) or, as Will (2004) succinctly put it, "the fashionable panic was about global cooling." "So, before we take global warming as a scientific truth, we should note that the opposite theory was once scientific verity" (Bray 1991).

In a narrative, Crichton (2004) put it this way:

> "Just think how far we have come!" Henley said. "Back in the 1970s, all the climate scientists believed an ice age was coming. They thought the world was getting colder. But once the notion of global *warming* was raised, they immediately recognized the advantages. Global warming creates a crisis, a call to action. A crisis needs to be studied, it needs to be funded . . ."

According to Michaels (2004),

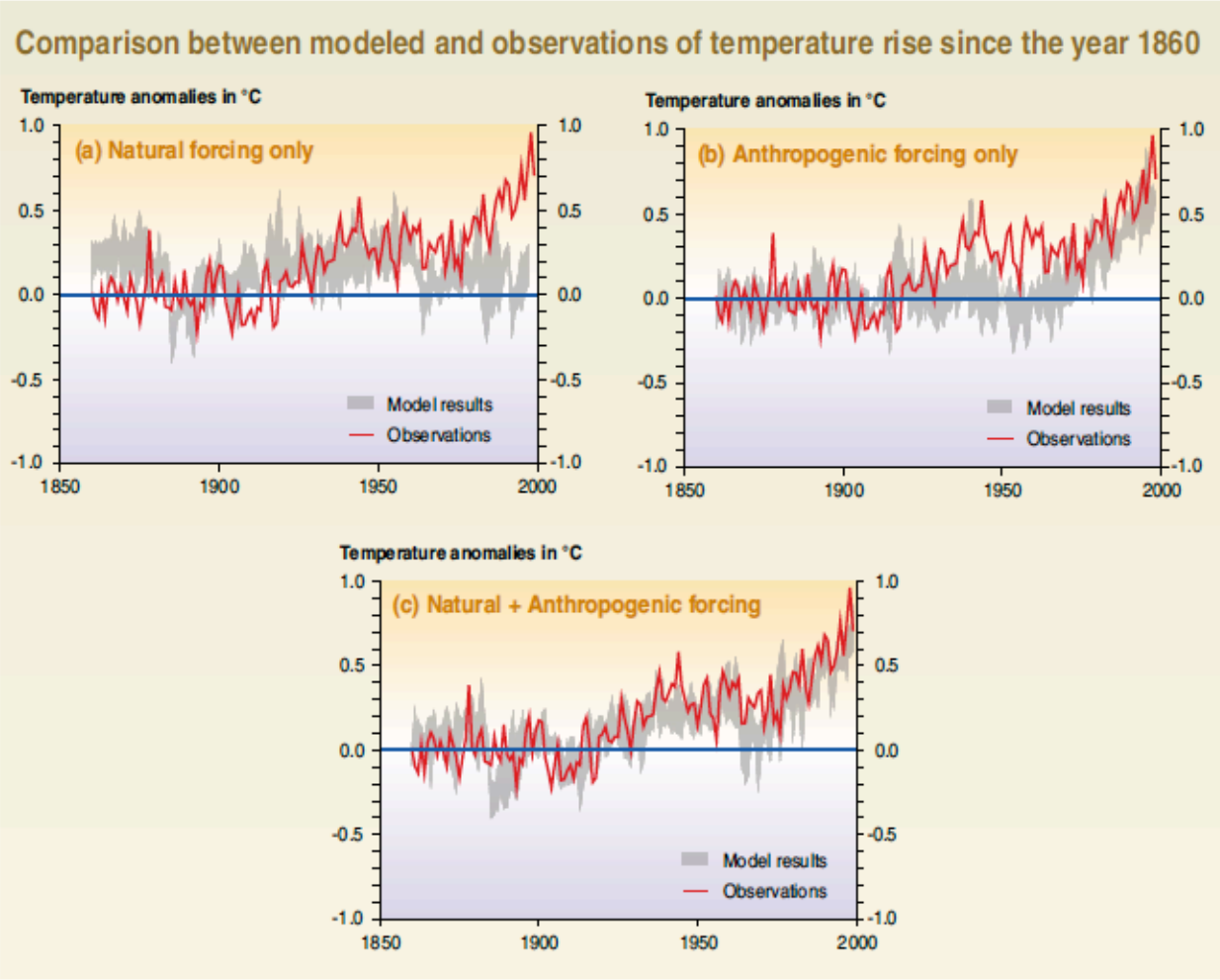
> Thirty years ago there was much scientific discussion among those who believed that humans influenced the . . . reflectivity [which would] cool the earth, more than . . . increasing carbon dioxide, causing warming. Back then, the "coolers" had the upper hand because, indeed, the planet was cooling . . . But nature quickly shifted gears . . . Needless to say, the abrupt shift in the climate caused almost as abrupt a shift in the balance of scientists who predictably followed the temperature.

Giddens (1999) states,

How Science Works

3. Science advances by steps

IPCC, 2001: Global mean T observations, modeling



IPCC Working Group I Summary for Policy Makers, 2001

How Science Works

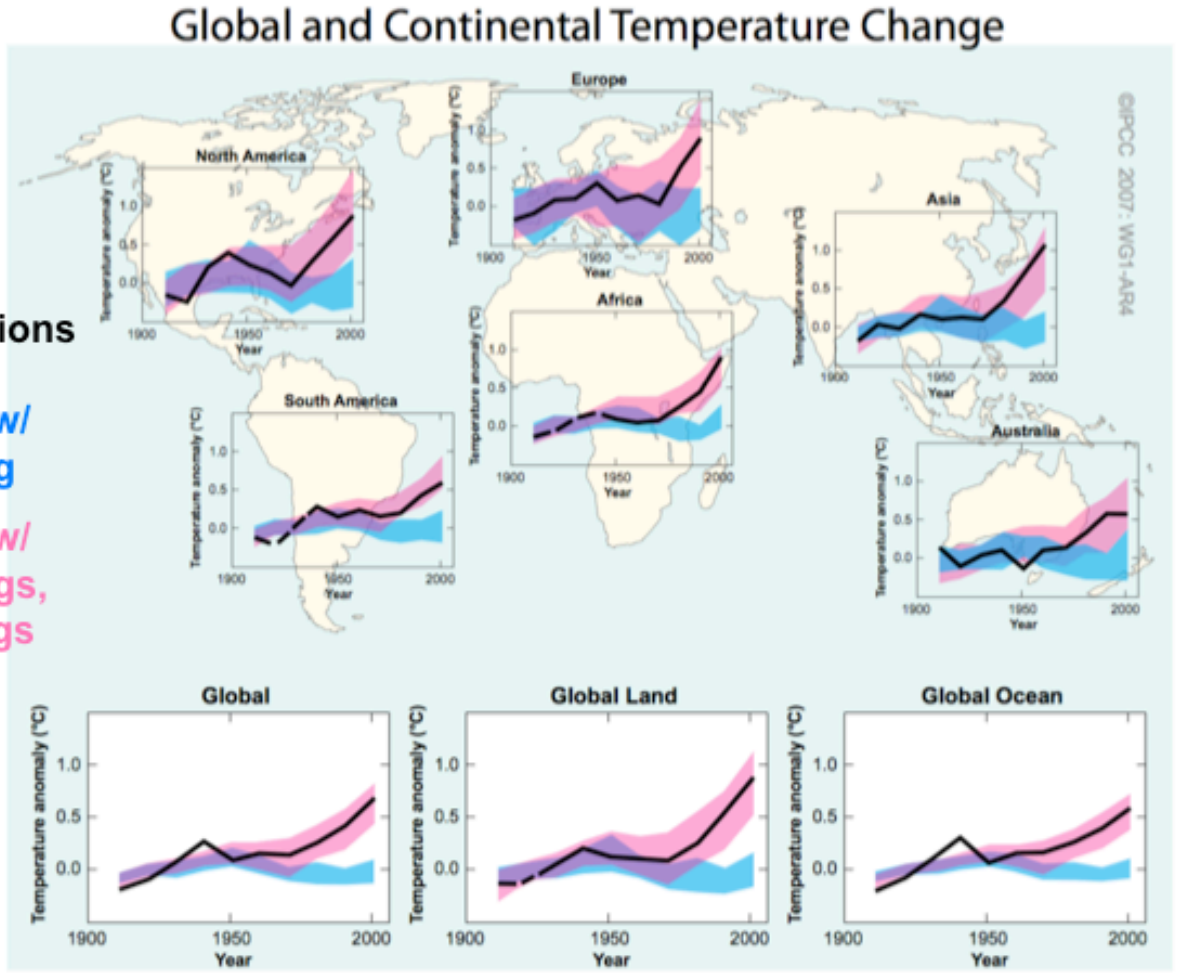
3. Science advances by steps

IPCC, 2007: Continental mean T observations, modeling

Line: Observations

Band: Models w/ natural forcing

Band: Models w/ natural forcings, human forcings



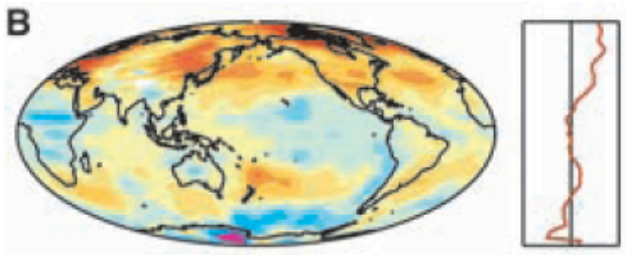
IPCC Working Group I Summary for Policy Makers, 2007

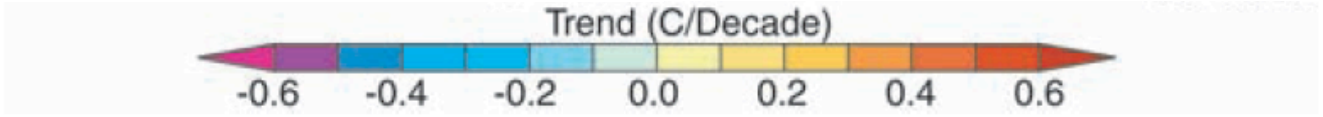
How Science Works

3. Science advances by steps

Example 2: Mismatch between radiosondes, satellite observations of lower atmospheric temperature trends

Fig. 3. Global maps and zonal averages of linear temperature trends (1979–2003). Missing data are shown as white areas. (**A**) TLT temperature trends from this work. (**B**) TLT temperature trends from Christy *et al.* (*5*). (**C**) Surface temperature trends from (*28*). Trend difference, surface minus TLT, (**D**) this work and (**E**) Christy *et al.* (**F**) TLT trend difference, this work minus Christy *et al.*





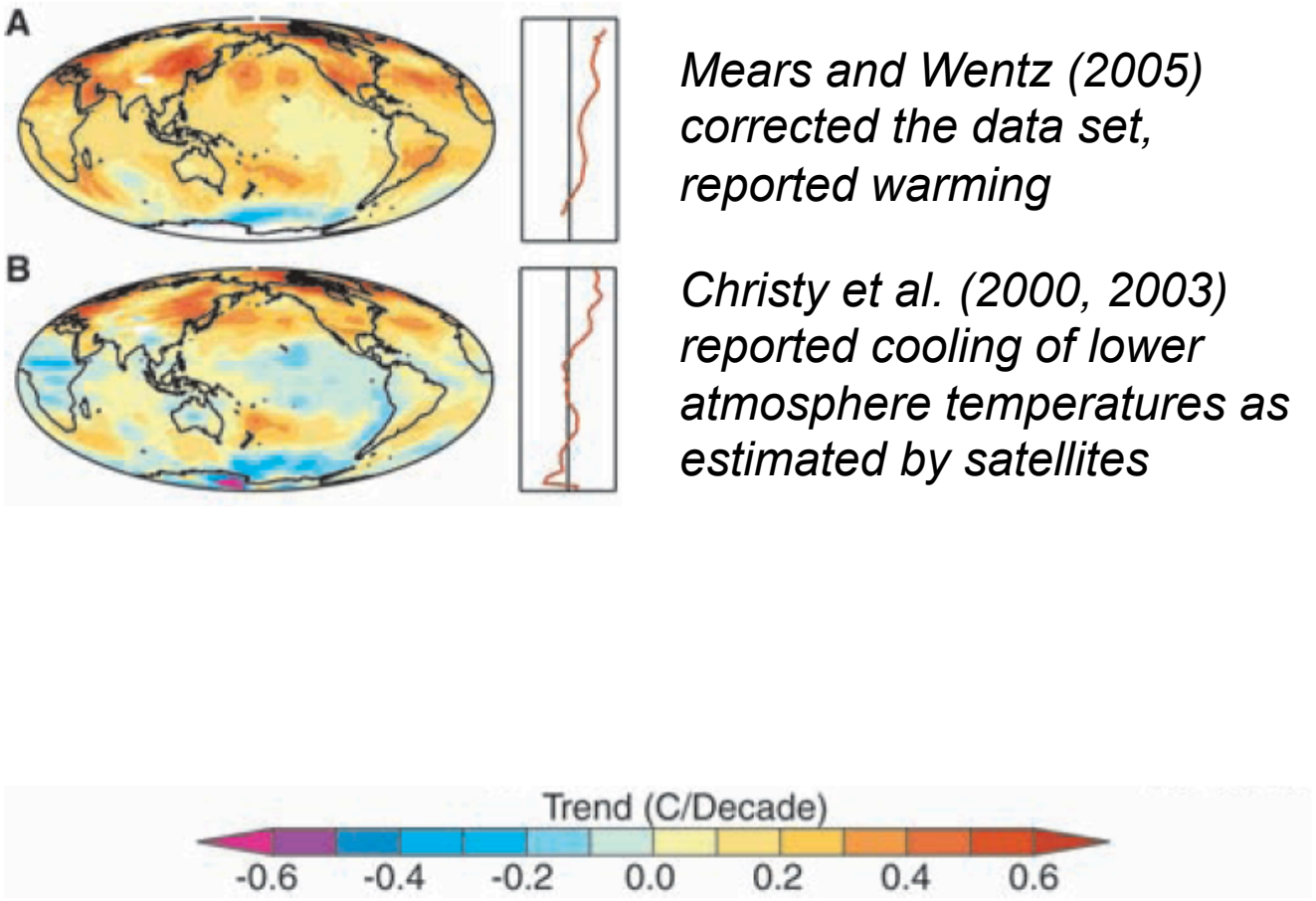
Christy et al. (2000, 2003) reported cooling of lower atmosphere temperatures as estimated by satellites

How Science Works

3. Science advances by steps

Example 2: Mismatch between radiosondes, satellite observations of lower atmospheric temperature trends

Fig. 3. Global maps and zonal averages of linear temperature trends (1979–2003). Missing data are shown as white areas. (**A**) TLT temperature trends from this work. (**B**) TLT temperature trends from Christy *et al.* (*5*). (**C**) Surface temperature trends from (*28*). Trend difference, surface minus TLT, (**D**) this work and (**E**) Christy *et al.* (**F**) TLT trend difference, this work minus Christy *et al.*



Mears and Wentz (2005) corrected the data set, reported warming

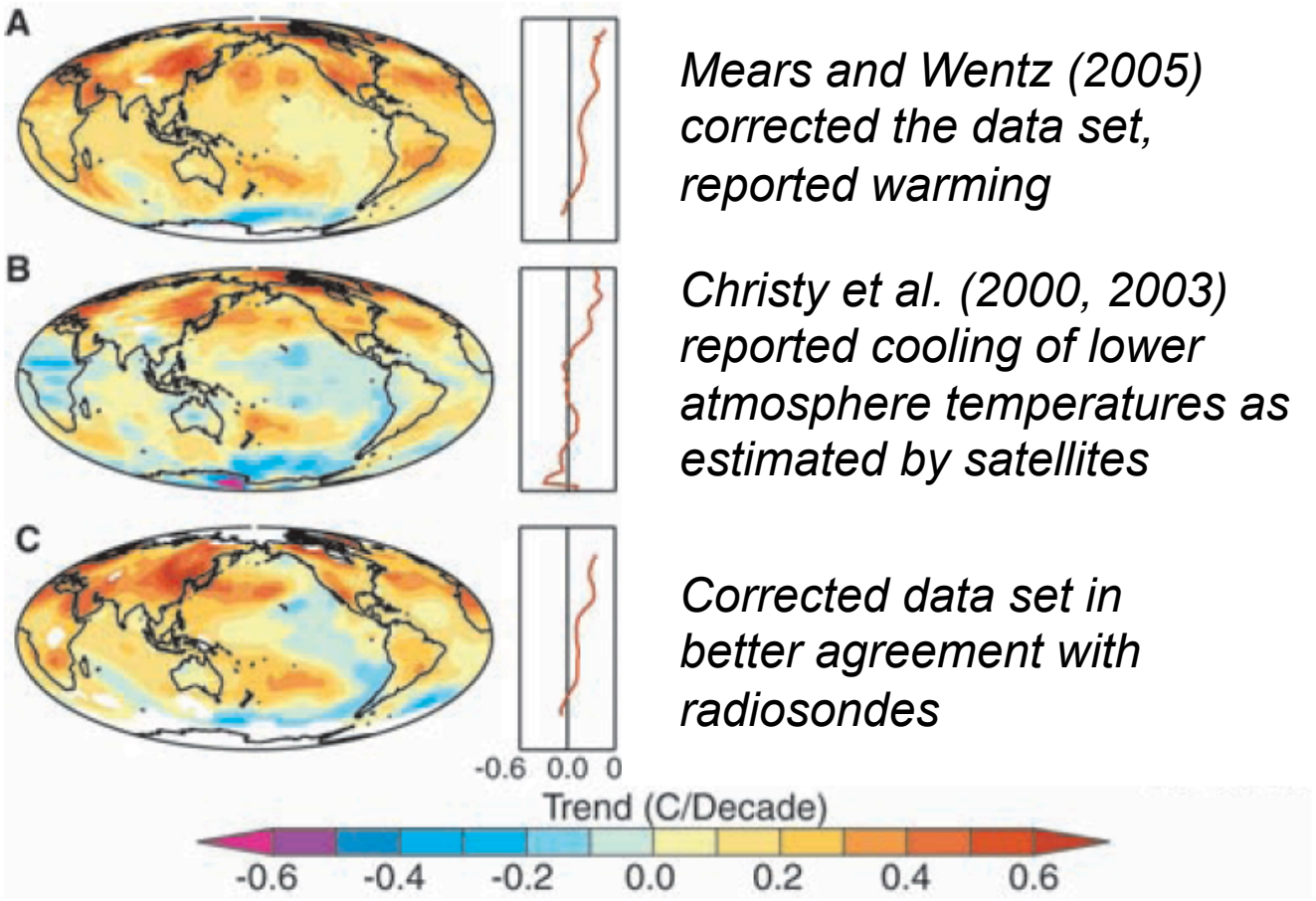
Christy et al. (2000, 2003) reported cooling of lower atmosphere temperatures as estimated by satellites

How Science Works

3. Science advances by steps

Example 2: Mismatch between radiosondes, satellite observations of lower atmospheric temperature trends

Fig. 3. Global maps and zonal averages of linear temperature trends (1979–2003). Missing data are shown as white areas. (**A**) TLT temperature trends from this work. (**B**) TLT temperature trends from Christy *et al.* (*5*). (**C**) Surface temperature trends from (*28*). Trend difference, surface minus TLT, (**D**) this work and (**E**) Christy *et al.* (**F**) TLT trend difference, this work minus Christy *et al.*



Mears and Wentz (2005) corrected the data set, reported warming

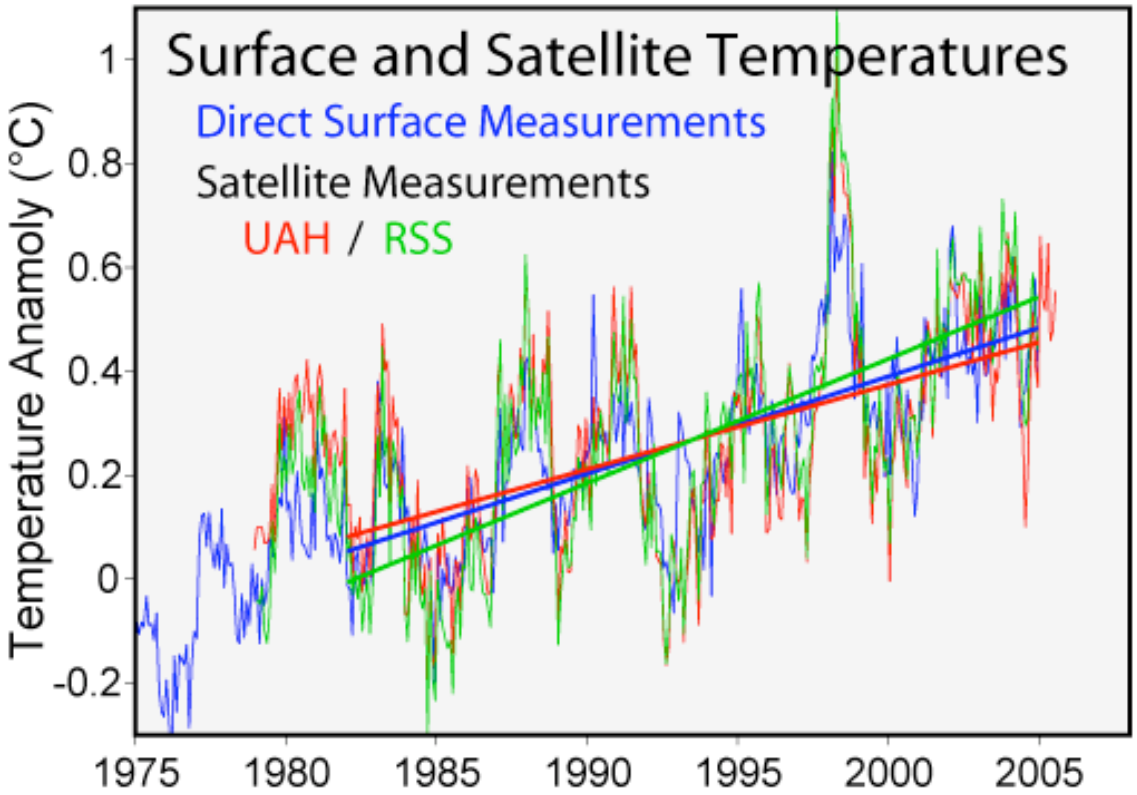
Christy et al. (2000, 2003) reported cooling of lower atmosphere temperatures as estimated by satellites

Corrected data set in better agreement with radiosondes

How Science Works

3. Science advances by steps

Example 2: Mismatch between radiosondes, satellite observations of atmospheric temperature trends



globalwarmingart.com/wiki/Image:Satellite_Temperatures_png

Once new analyses are considered, trends in atmosphere and at surface match!