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0.0.1 Test for validation of climate models from observational evidence

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How much of current warming is due to natural causes and how much is manmade? This requires a comparison of the patterns of observed warming with the best available models that incorporate both anthropogenic (greenhouse gases and aerosols) as well as natural climate forcings (solar and volcanic). Fortunately, we have the just published U.S.-Climate Change Science Program (CCSP) report

(www.climatescience.gov/Library/sap/sap1-1/finalreport/default.htm),

based on best current information. As seen in Fig. 1.3F of the report, modeled surface temperature trends change little with latitude, except for a stronger warming in the Arctic. The observations, however, show a strong surface warming in the northern hemisphere but not in the southern hemisphere (see Fig. 3.5C and 3.6D). The Antarctic is found to be cooling and Arctic temperatures, while currently rising, were higher in the 1930s than today.

Although the Executive Summary of the CCSP report claims “clear evidence” for anthropogenic warming, based on comparing tropospheric and surface temperature trends, the report itself does not confirm this. Greenhouse models indicate that the tropics should provide the most sensitive location for their validation; trends there should increase by 200-300% with altitude, peaking at around 10 kilometers. The observations, however, show the opposite: flat or even decreasing tropospheric trend values (see Fig. 3.7 and also Fig. 5.7E). This disparity is demonstrated most strikingly in Fig. 5.4G, which shows the difference between surface and troposphere trends for a collection of models (displayed as a histogram) and for balloon and satellite data. [The disparities are less apparent in the Summary, which displays model results in terms of “range” rather than as histograms.]

There may be several possible reasons for the disparity: Instrumental and other effects that exaggerate or otherwise distort observed temperature trends. Or, more likely: Shortcomings in models that result in much reduced values of climate sensitivity; for example, the neglect of important negative feedbacks. Allowing for uncertainties in the data and for imperfect models, there is only one valid conclusion from the failure of greenhouse models to explain the observations: The human contribution to global warming is still quite small, so that natural climate factors are dominant. This may also explain why the climate was cooling from 1940 to 1975 – even as greenhouse-gas levels increased rapidly.

An overall test for climate prediction may soon be possible by measuring the ongoing rise in sea level. According to my estimates, sea level should rise by 1.5 to 2.0 cm per decade (about the same rate as in past millennia); the U.N.-IPCC (4th Assessment Report–Reviewer draft) predicts 1.4 to 4.3 cm per decade. Using a "semi-empirical" approach, Rahmstorf (in SciencExpress Dec 12, 2006) obtains 5 to 14 cm/decade. In the New York Review of Books (July 13, 2006), however, James Hansen suggests 20 feet or more per century – equivalent to about 60 cm or more per decade.