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## The Science behind Anthropogenic Global Warming (AGW): A Well Supported Hypothesis Based on Comparing Prediction with Observation

by

Robert Negrini - Dept. of Geology, CSU Bakersfield

### ABSTRACT

In 2007, the Intergovernmental Panel on Climate Change (IPCC) issued its fourth assessment report (\*AR4) on climate change. Its principal conclusion is summarized in the following two statements:

"Most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas (GHG) concentrations." (IPCC AR4 2007 SPM, p. 10)

"These changes took place over a time period when non-anthropogenic forcing factors (i.e., the sum of solar and volcanic forcing) would be likely to have produced cooling, not warming." (IPCC AR4 2007 TS, p. 60)

These statements are supported both by fundamental radiation and atmospheric physics and by a host of globally and temporally averaged observations pertaining to modern climate. The supporting observations include temperatures (land, sea, atmosphere, and borehole), snow and ice extents, sea level, geochemistry (atmosphere and ocean), and the radiation spectrum emitted by the earth. Global averaging cannot be overemphasized as a key concept nor can temporal averaging over a long enough period (i.e., ~10 years) to average out higher frequency climate change like the El Niño/La Niña oscillation and occasional volcanic eruptions of large magnitude.

Of particular interest is the sensitivity of global climate to trace greenhouse gases. The sensitivity is determined both by calculation using the laws of physics and through comparison of paleoclimate proxy data with estimates of GHG concentrations in the geologic past. Thus, AGW is consistent with the geologic record of climate change.