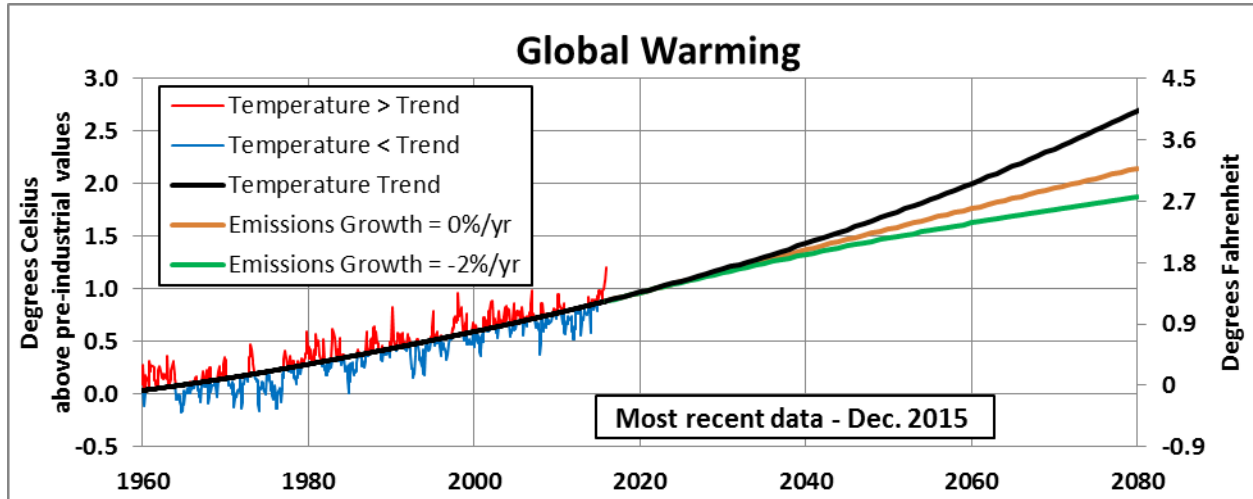


**Global Warming Data, Trend and Forecast**  
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**Updated January 2016**



**Update Note – New Annual Global Temperature Record!** According to NOAA data released January 20, the year of 2015 was the warmest year on record, 0.16 °C (0.29 °F) higher than 2014, previously the warmest year. The 2015 temperature was 1.0 °C above pre-industrial values. December 2015 continued to break monthly records as the warmest December on record at 13.31 °C (55.96 °F), a monstrous 0.27 °C higher than December 2014, previously the warmest December on record. December temperatures were no doubt influenced by El Niño whose effect is expected to continue for several months. Note that projections are now being made from fossil carbon emissions scenarios, as discussed below.

**Data** – Monthly global surface temperature anomaly data (red and blue lines) are monthly differences from the average temperature *for that month* during the years 1901-2000 and are available from [NOAA](http://www.noaa.gov). The red (blue) lines represent monthly temperatures warmer (cooler) than the trend. Note that **0.1 °C** has been added to the NOAA values to account for the difference between the 20<sup>th</sup> century average and pre-industrial values.

**Temperature Trend** – Beginning this month, the temperature trend is evaluated using a new methodology. Global temperature, **T<sub>global</sub>**, is the sum of the temperature change due to atmospheric emissions from fossil fuels, **T<sub>fossil</sub>**, and temperature change due to all other factors, **T<sub>other</sub>**. Using a model suggested by

[Hansen, et al.](#), historical values of **T<sub>fossil</sub>** can be calculated from historical fossil emissions and atmospheric CO<sub>2</sub> concentrations.

**Temperature Projections** – Projections can now be made using fossil emission scenarios, assuming that the historical trend in **T<sub>other</sub>** continues into the future and calculating **T<sub>fossil</sub>** using the Hansen model. The projected black line in the chart shows global temperatures if emissions continue to grow at the recent historical rate, about 2.2% per year. In this scenario +1.5 °C above pre-industrial values is reached around 2042 and +2.0 °C around 2060. Also shown are scenarios in which emissions remain at current 2015 levels (i.e. no growth), and one in which emissions decline by 2% per year. Even in this scenario, global temperatures exceed +2.0 °C relative to pre-industrial values before the end of this century.