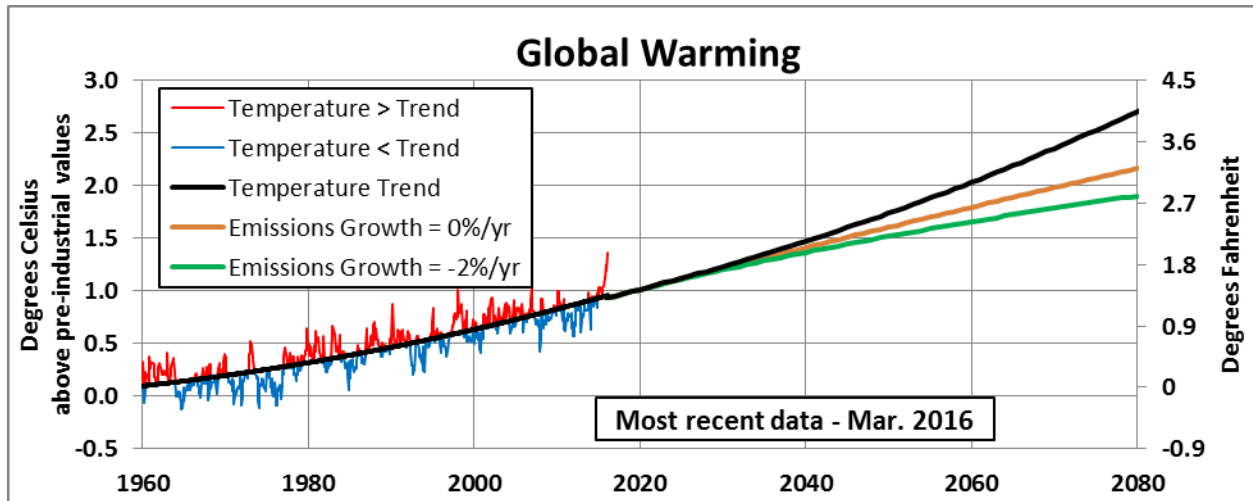


Global Warming Data, Trend and Projections
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Updated April, 2016



Update Note – Another monthly temperature record. A new monthly record has been established in each of the preceding 11 months! According to NOAA data released April 19, March 2016 was the warmest March on record with an average global temperature of **1.37 °C above pre-industrial values** (see data note below.) This year’s value was a whopping 0.33 °C (0.59 °F) higher than March 2015, previously the warmest March. While the latest value of 1.37 °C is well above the historical trend, it should be noted that it is dangerously close to the 2.0 °C target limit established by the recent Paris agreement. March temperatures were likely still influenced by El Niño whose effects are expected to continue for a few more 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 **0.15 °C** has been added to the NOAA values to account for the difference between the 20th century average and pre-industrial values.

Temperature Trend –The temperature trend is evaluated using a new methodology based a model suggested by [Hansen, et al.](#). Global temperature, **T_{global}**, is the sum of the temperature change due to atmospheric emissions

from fossil fuels, **T_{fossil}**, and a small adjustment using temperature changes due to all other factors, **T_{other}**, which is projected from historical data.

Temperature Projections – Projections are now be made using fossil emission scenarios, assuming that the historical trend in **T_{other}** continues into the future and calculating **T_{fossil}** 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 2041 and +2.0 °C around 2059. Also shown are scenarios in which emissions remain at current 2015 levels (i.e. no growth, orange line), and one in which emissions *decline* by 2% per year (green line). Even in this scenario, global temperatures exceed +2.0 °C relative to pre-industrial values before the end of this century.