Global Warming Data, Trend and Forecast
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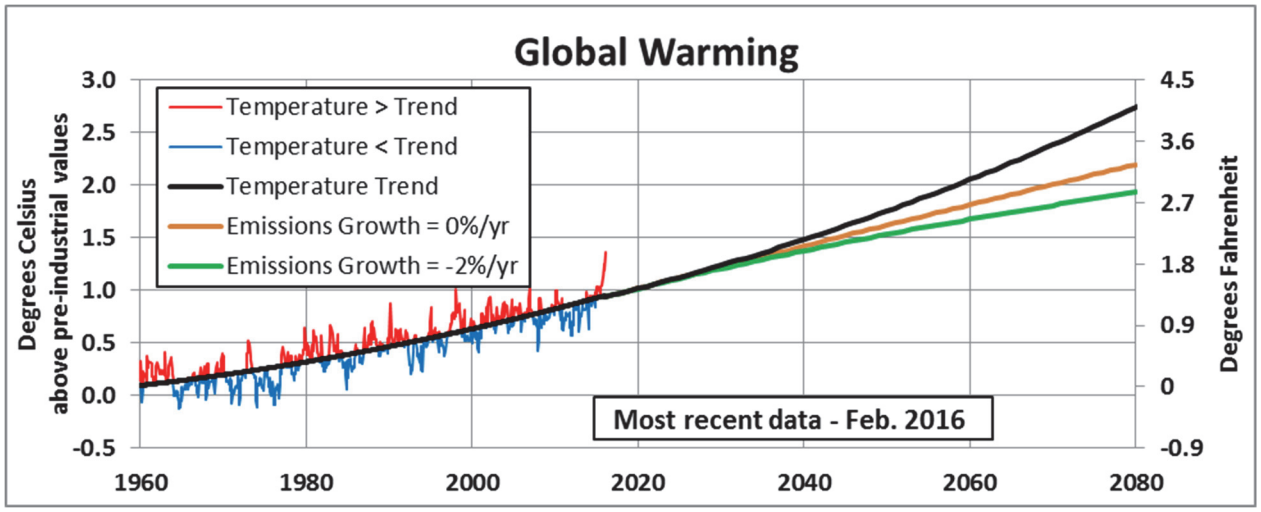

Update Note – **Another monthly temperature record.** According to NOAA data released March 17, February 2016 was the warmest February on record with an average global temperature of **1.36 °C above pre-industrial values** (see data note below.) This year's value was a whopping 0.32 °C (0.58 °F) higher than February 2007, previously the warmest February. While the latest value of 1.36 °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. February 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. 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, **Tglobal**, is the sum of the temperature change due to atmospheric emissions

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

Temperature Projections – Projections are now be made using fossil emission scenarios, assuming that the historical trend in **Tother** continues into the future and calculating **Tfossil** 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.