

D Kelly O'Day and Andy Long

Data Source: <http://data.giss.nasa.gov/gistemp/tabledata/GLB.Ts+dSST.txt>
Data updated through Aug 2016

10/04/2016

Some people wonder what mathematics has to do with climate change.

But they don't have any problem imagining that mathematics has a lot to do with business. Take, for example, this time series of the Exxon/Mobil company valuation, in 1950 adjusted dollars, for the last hundred years or so.

Company reports give annual valuations. But stock prices reflect deviations from that, perceptions of others as to a company's current worth. So, between the annual valuations, come the fluxuations that we have come to expect.

Investors want to know how the company has done over the past five years, say, and so we smooth out the data with an averaging function (a running mean – here five years). This helps us to see a trend – the forest for the trees.

Sometimes a stock will soar; sometimes it will tank. But, on average, we hope that our stocks are going up over time. We call that a trend – what it's doing "on average". Most of us are in stocks for the long term.

What do you think of Exxon/Mobil's trend? What do you think of its future – do we hold on to it for the long term, or do we sell it off?

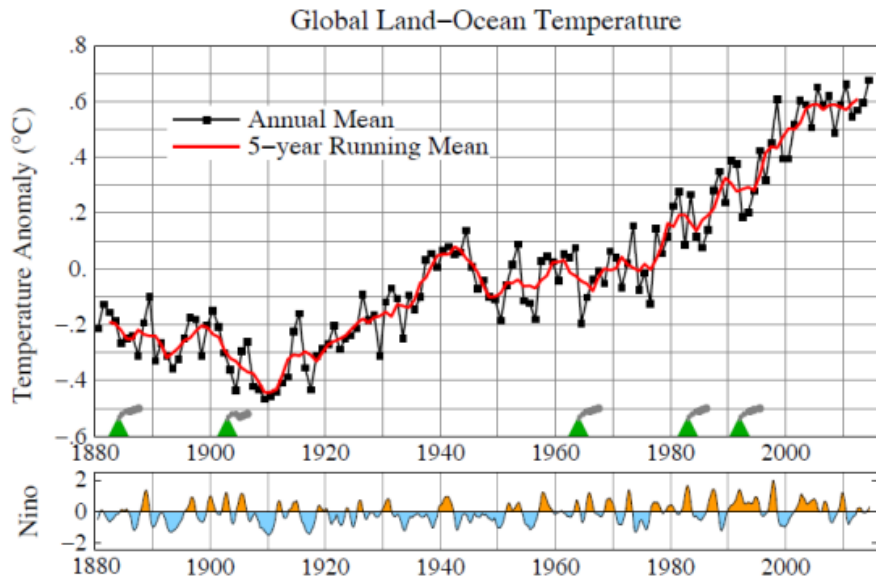
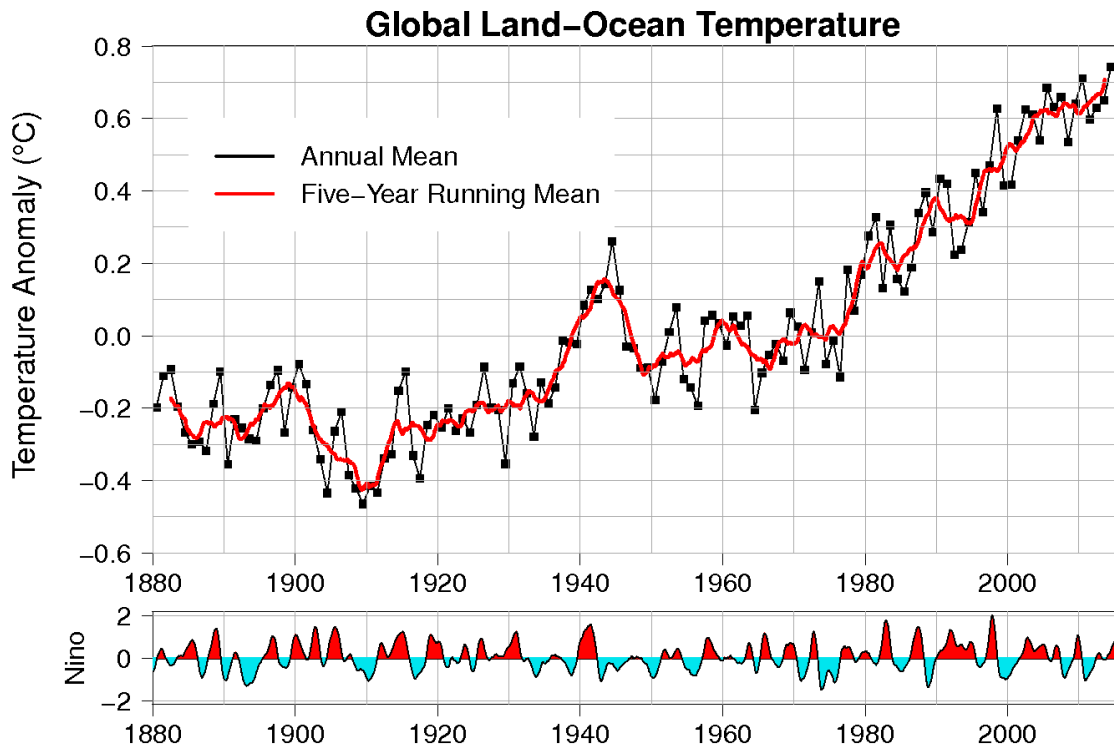
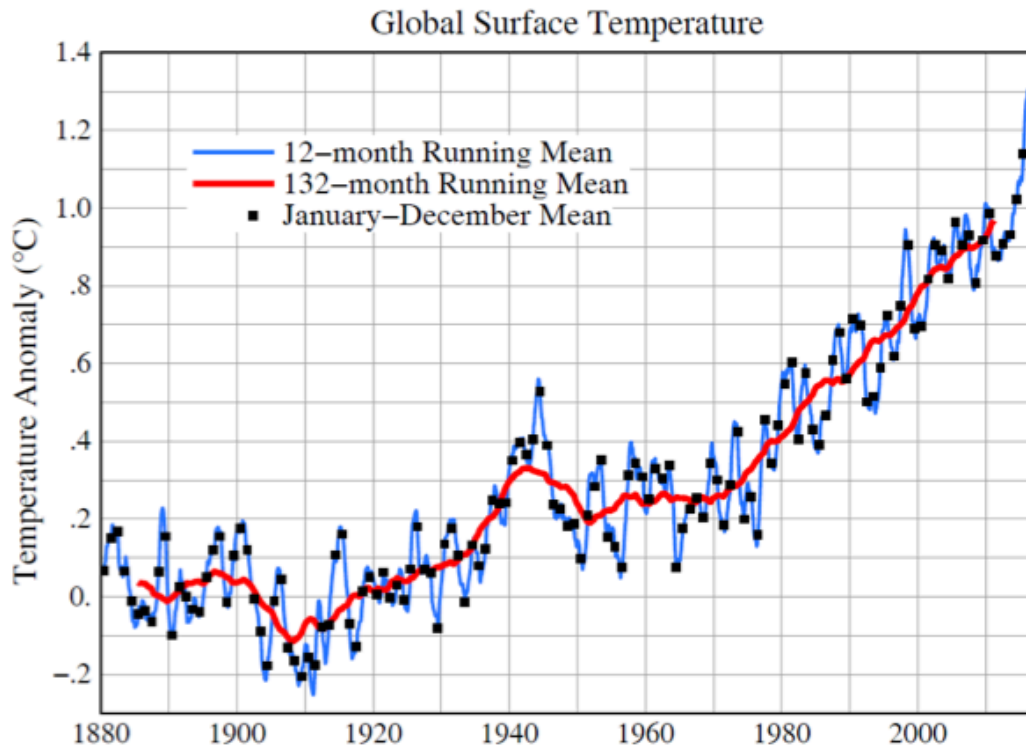


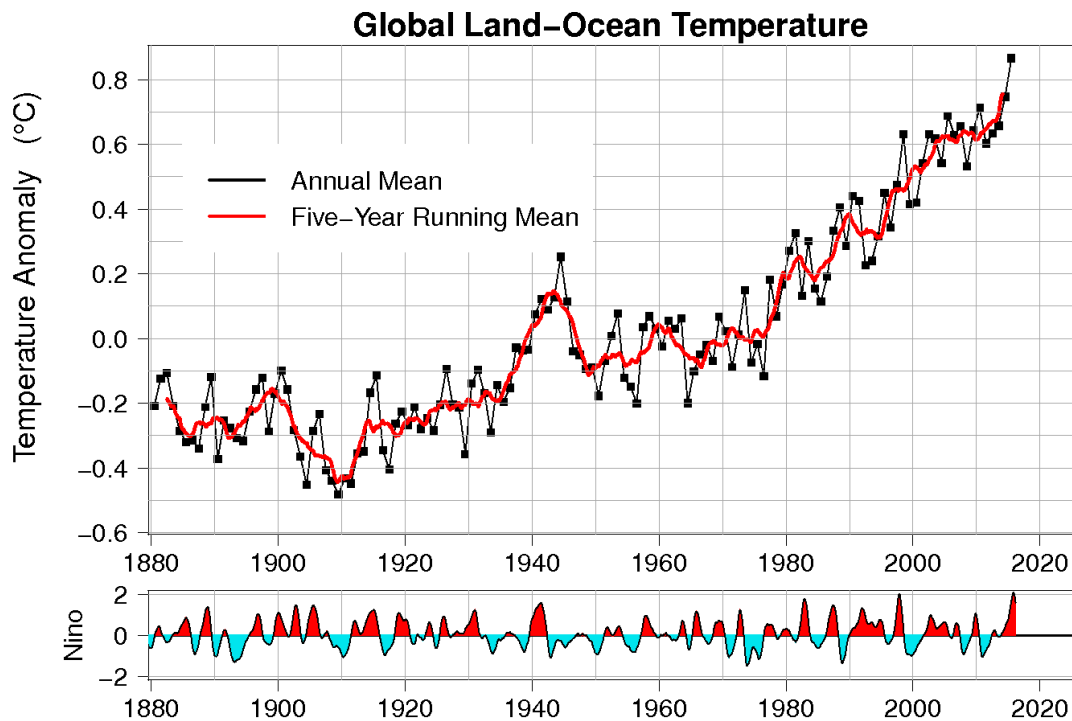
Fig. 1. Global surface temperatures relative to 1951-1980. ENSO index (12-month running mean) is based on sea surface temperature in Niño 3.4 area (5N-5S, 120-170W) in tropical Pacific³ for 1951-1980 base period. Green triangles mark volcanic eruptions producing an extensive stratospheric aerosol layer.



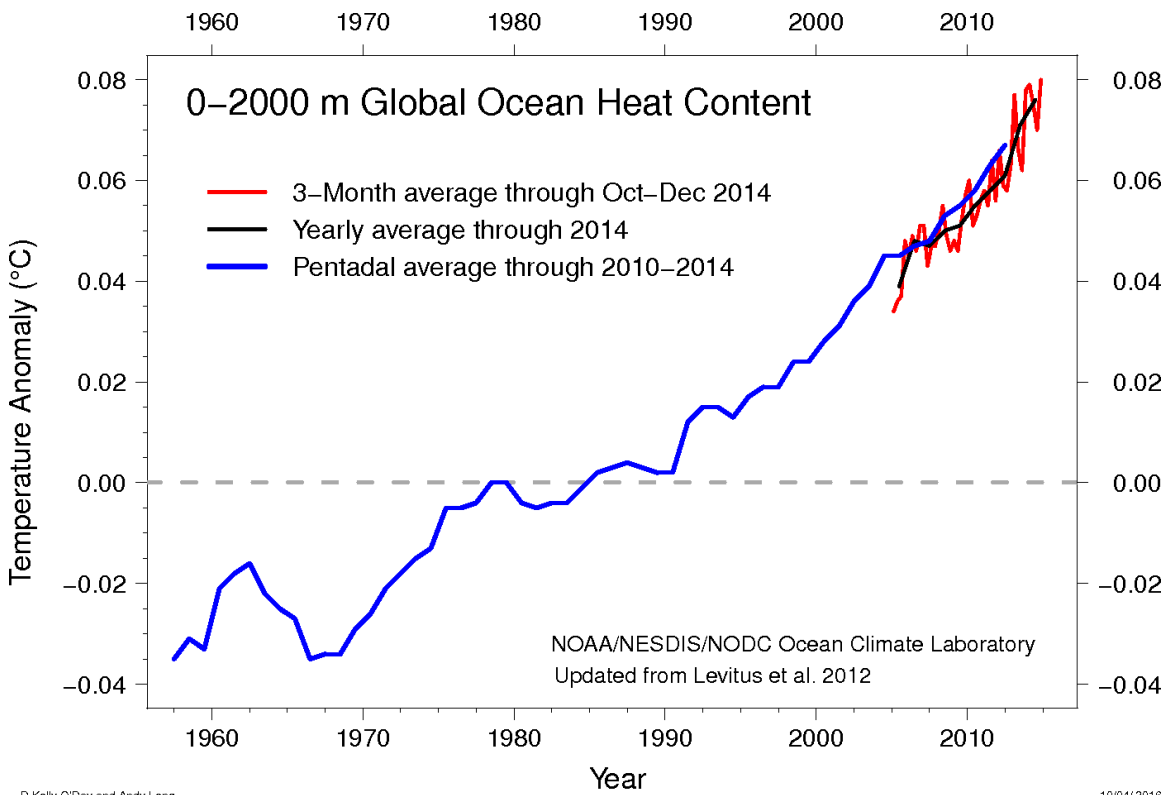
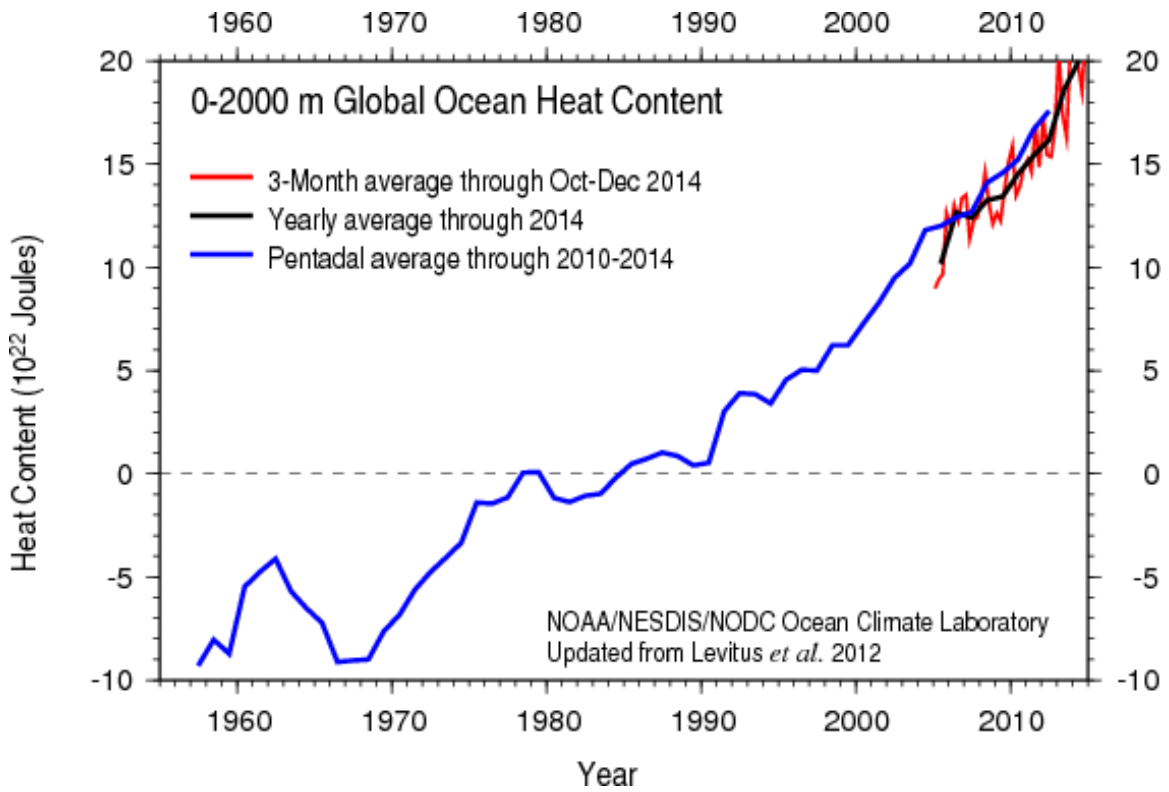
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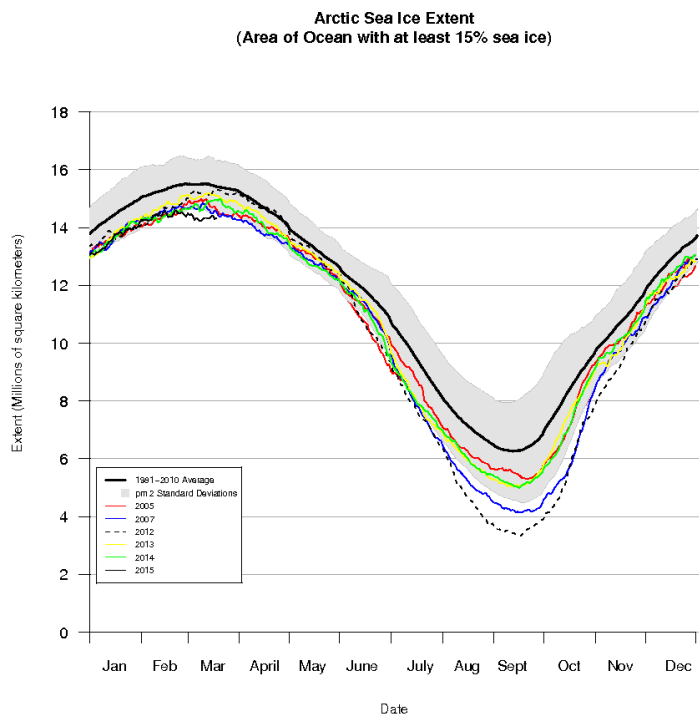
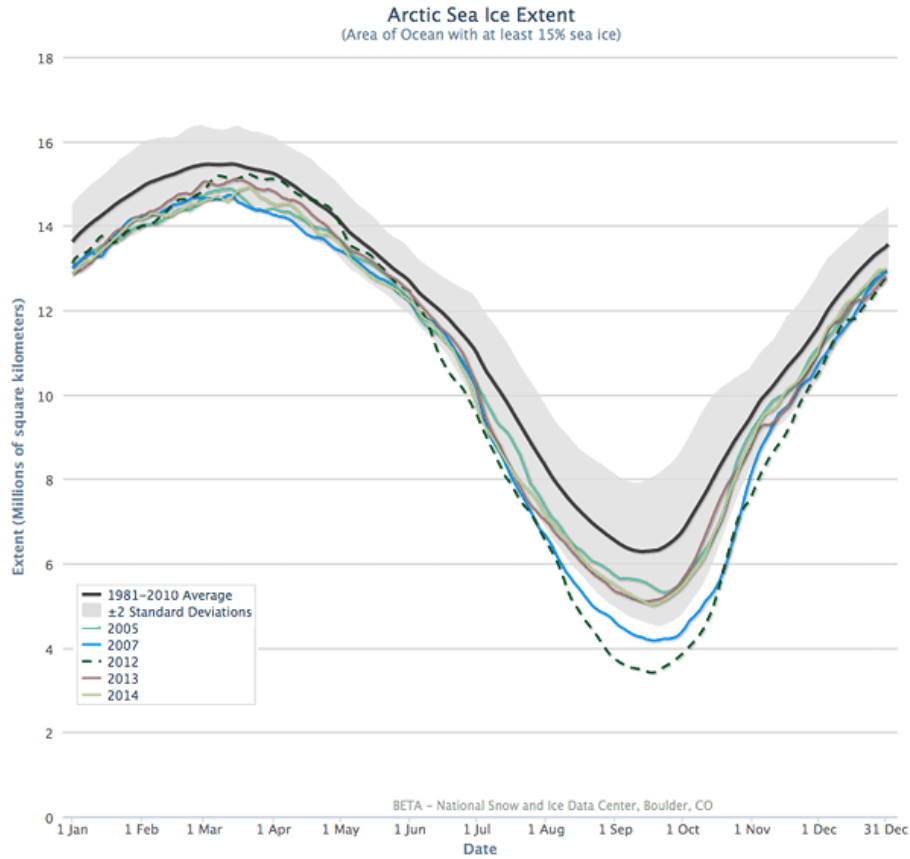


surface temperature relative to 1880-1920 based on GISTEMP analysis (mostly NOAA data, M Sato, and K Lo, 2010: [Global surface temperature change](#). *Rev. Geophys.*,



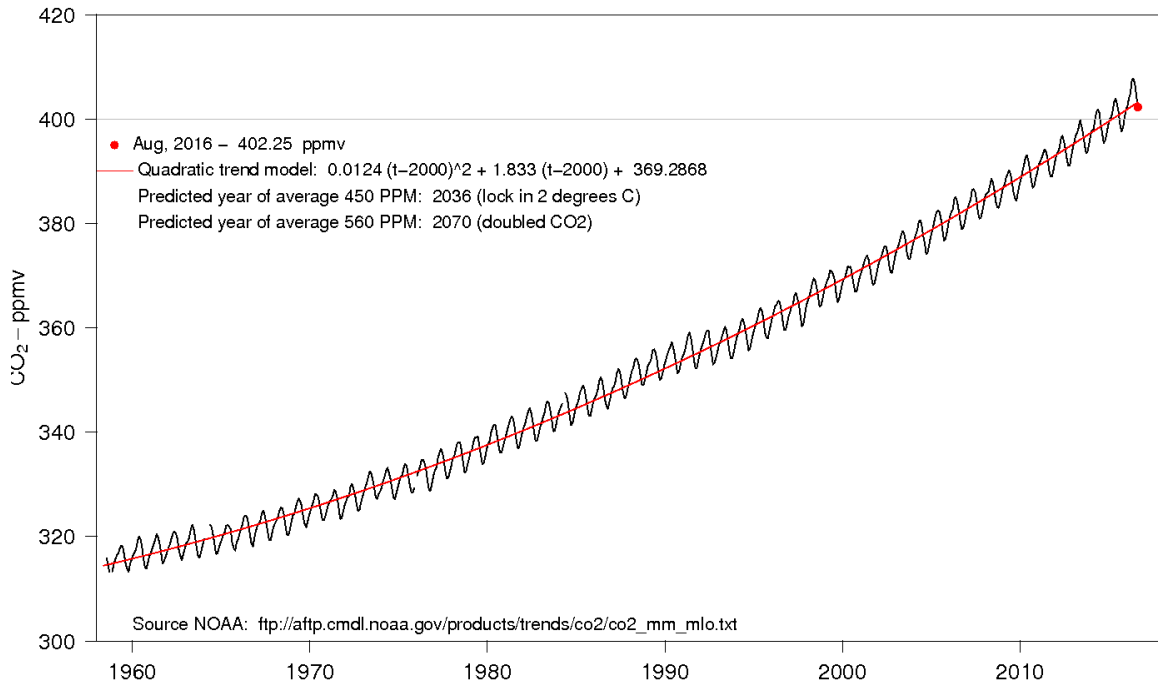
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Data Source: <http://sid.sci.edu/DATASETS/NOAA/G02135/north/daily/data/>

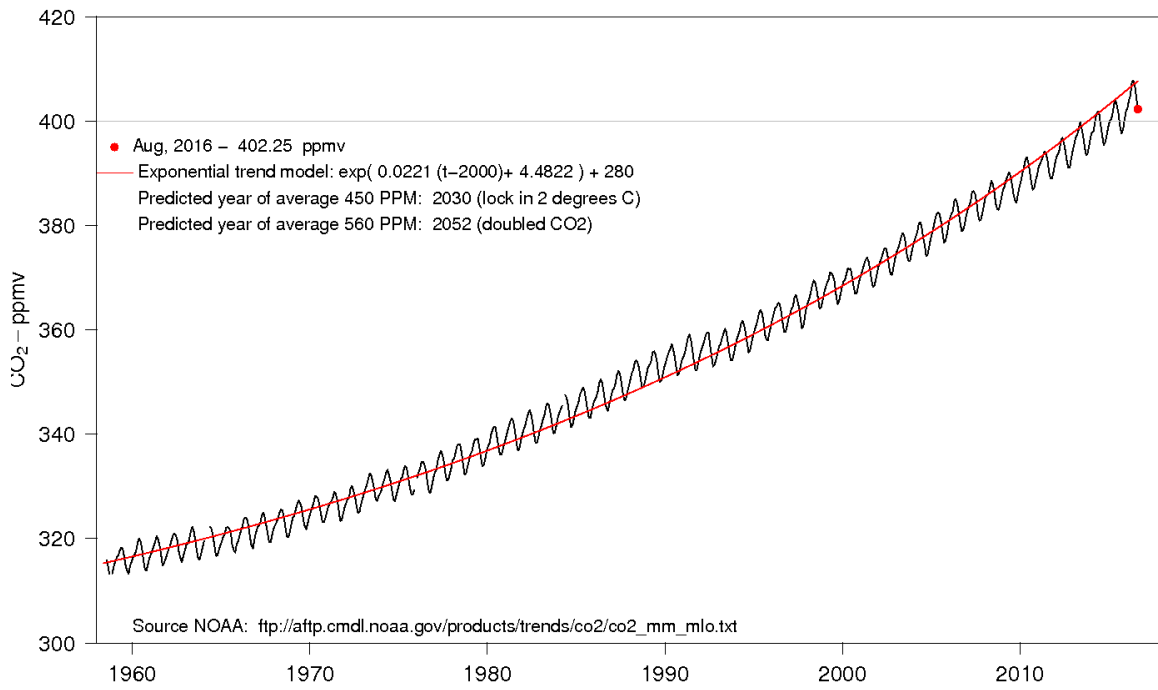
CO₂ (ppmv) Trends Since 1958, Mauna Loa, Hawaii
Data Updated Through Aug, 2016



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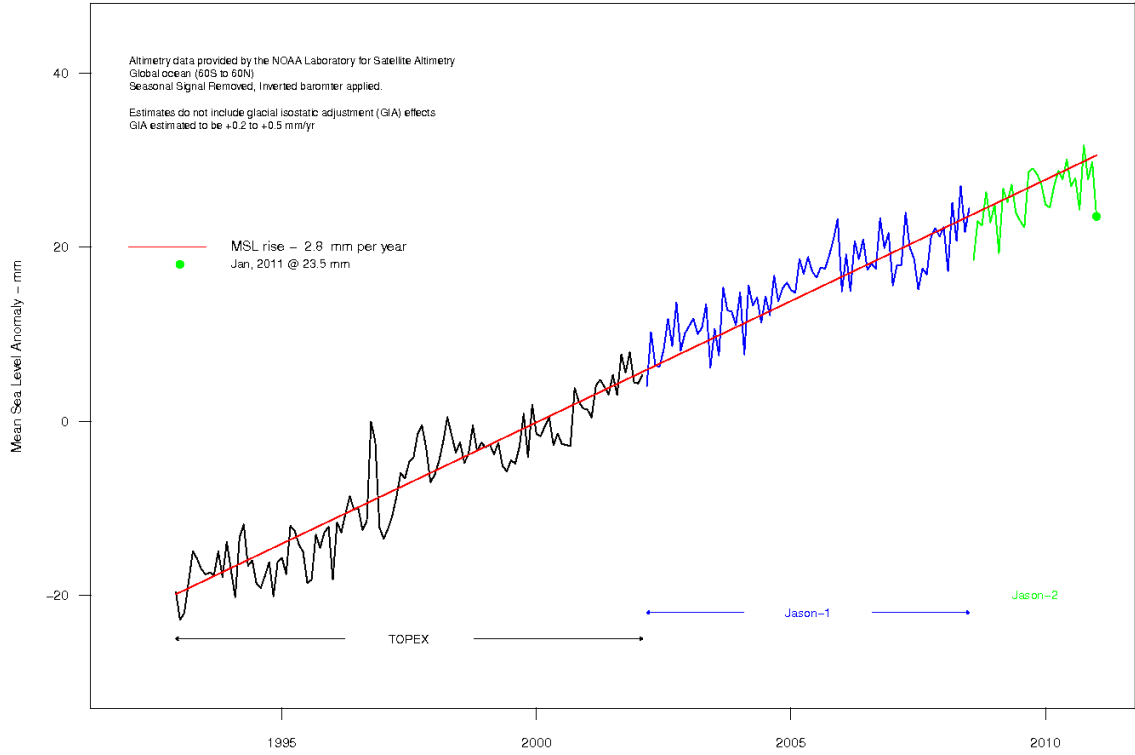
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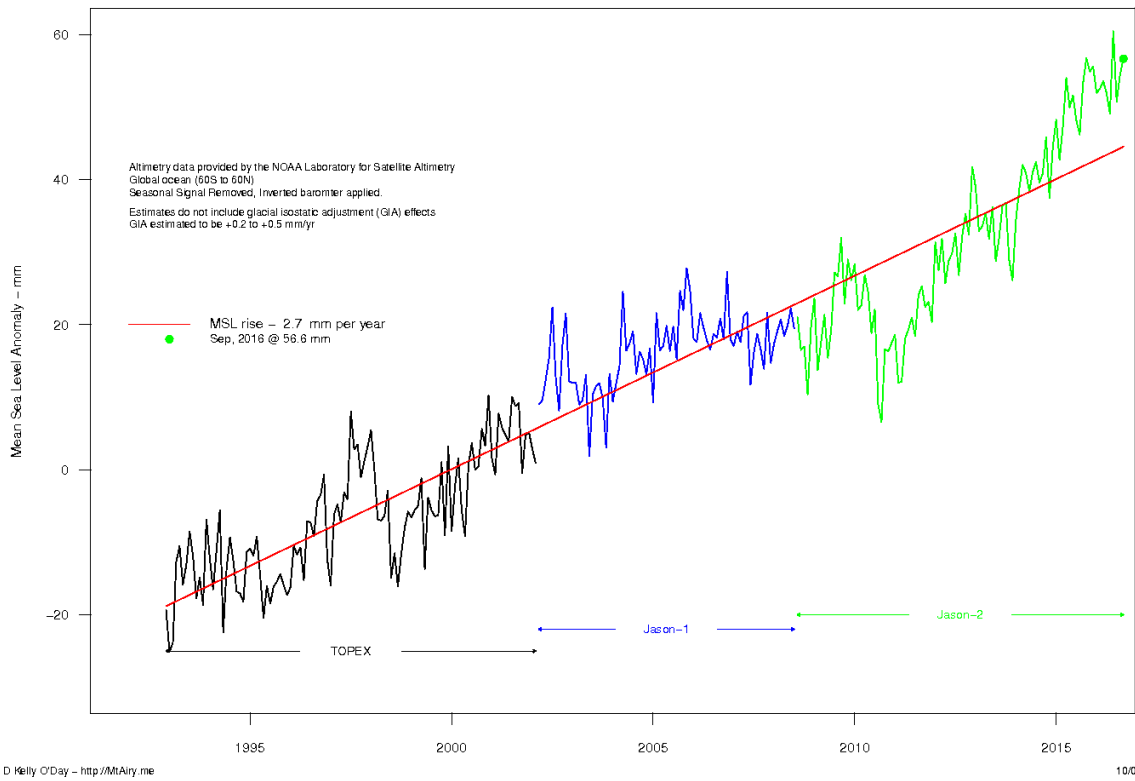
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Mean Sea Level Trend: 1993 to 2010



Mean Sea Level Trend: 1993 to 2016



(b) Holocene: Last 11,700 Years

