Global-Warming Correlations

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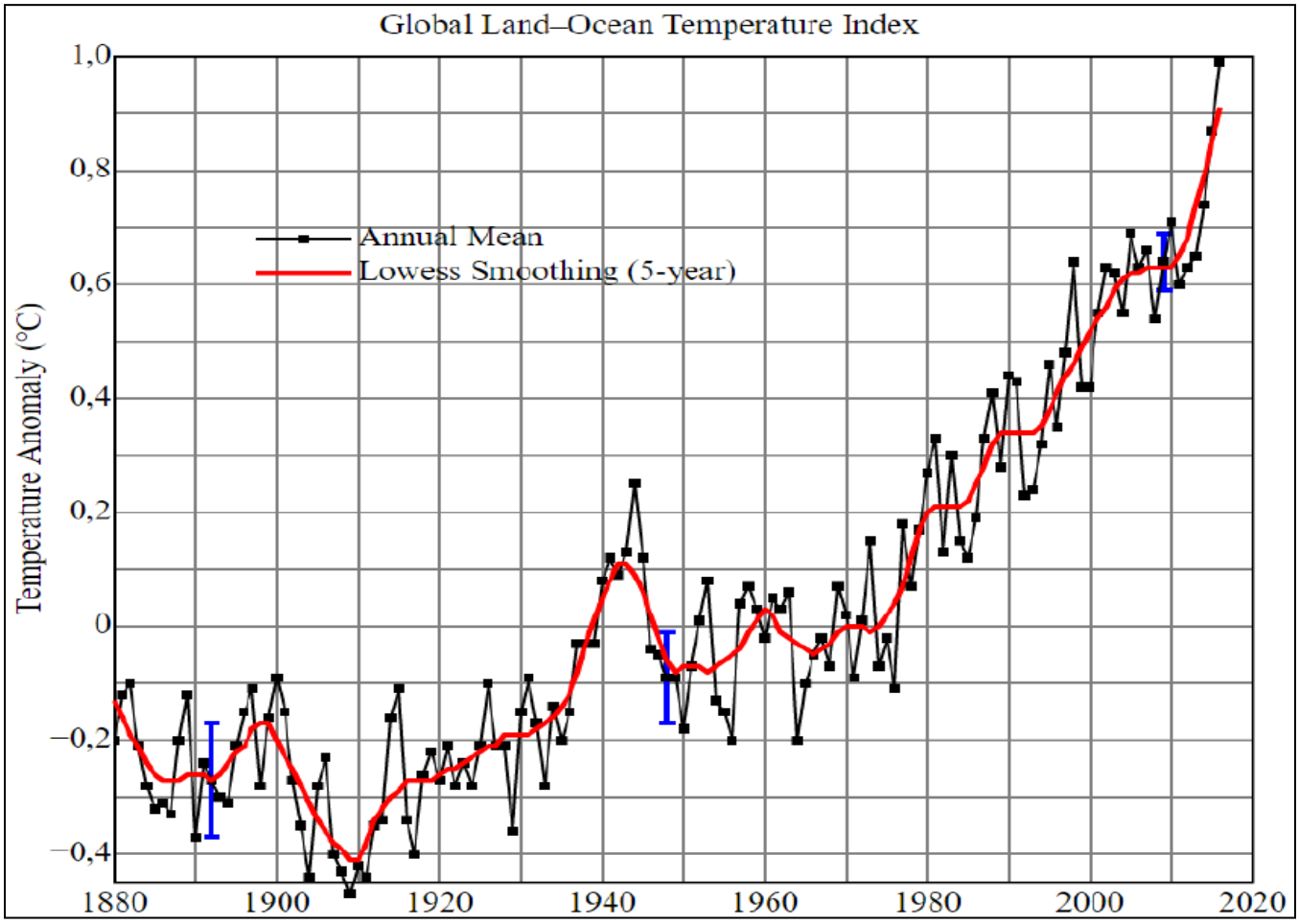
Introduction

Global warming implies that the average surface earth temperature has been and is increasing. Here are the data:



Only since ~1970 has the global temperature consistently increased. Prior to then there was cooling pollution that was cut back by U.S. and U.K. Clean-Air acts in the 1950s and 1960s.

The main causes of global warming are the extraction and burning of fossil fuels which emit carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O).

There are many climate effects and changes to the earth due to global warming. This article shows the correlations between carbon dioxide, methane, Nitrous oxide, global surface temperature, and other climate effects and changes to the earth

Data

The data references are:

- Average global surface temperature
- Carbon dioxide in the atmosphere
- Methane in the atmosphere
- Nitrous oxide in the atmosphere
- CFC-12 in the atmosphere
- Sea-level rise
- Accumulated cyclone energy
- Earthquakes
- Global land precipitation
- U.S. Climate-Extremes Index (CEI)
- U.S. Forest Fires

The data used are at http://www.roperld.com/Science/GWCorrelationsData.pdf .

Correlations

The correlation matrix for the ten items studies here is:

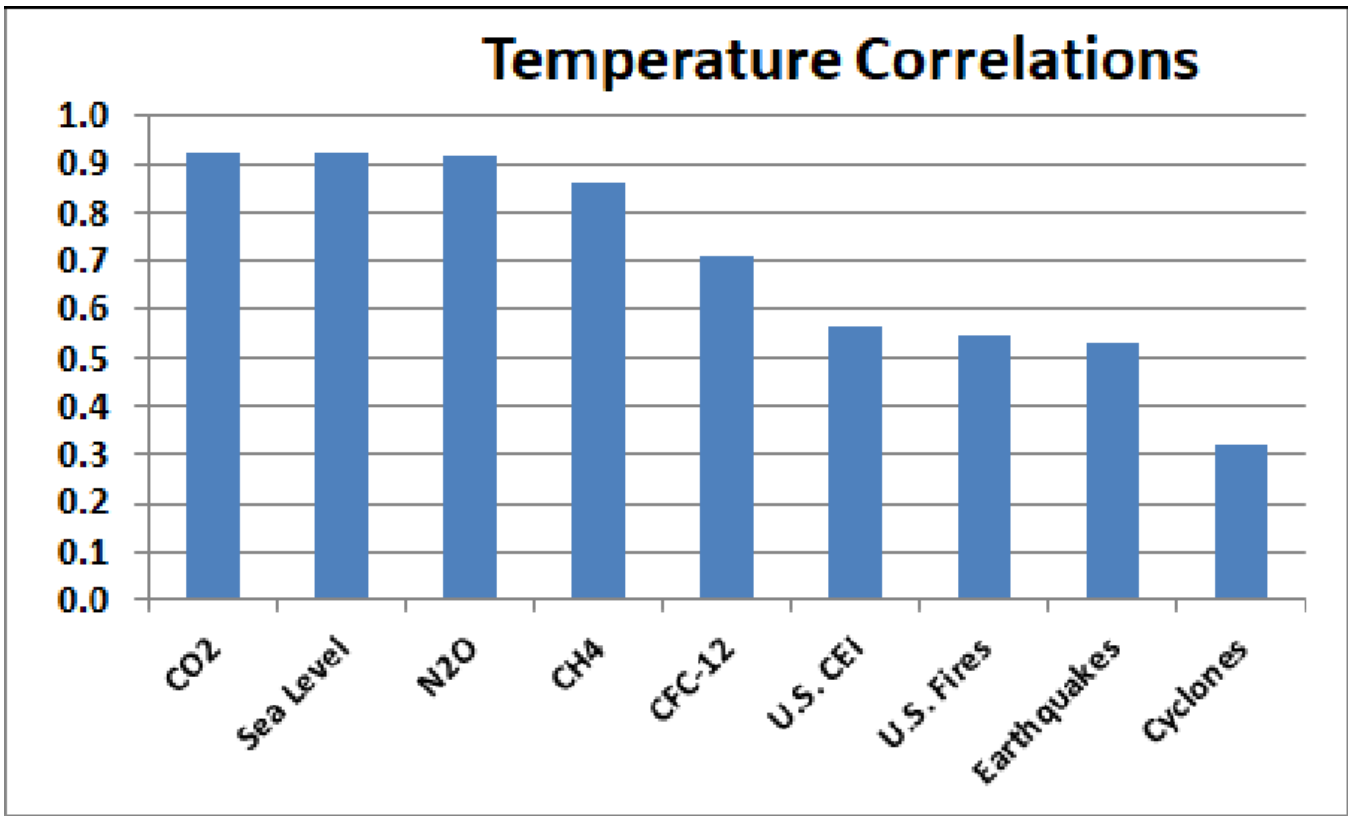
Correlations:	Temperature	CO_2	CH_4	N_2O	CFC-12	Sea Level	Earthquakes	Cyclones	Precipitation	U.S. Fires	U.S. CEI
Temperature	1.000	0.926	0.862	0.920	0.709	0.923	0.529	0.322	0.110	0.549	0.564
CO_2		1.000	0.932	0.998	0.780	0.996	0.640	0.307	0.206	0.603	0.557
CH_4			1.000	0.938	0.856	0.951	0.553	0.075	0.391	0.557	0.524
N_2O				1.000	0.813	0.997	0.618	0.286	0.176	0.596	0.503
CFC-12					1.000	0.826	0.407	0.206	0.222	0.409	0.274
Sea Level						1.000	0.615	0.319	0.190	0.596	0.536
Earthquakes							1.000	0.014	0.440	0.667	0.339
Cyclones								1.000	-0.111	0.130	0.349
Precipitation									1.000	0.422	0.095
U.S. Fires										1.000	0.428
U.S. CEI											1.000

Some of these correlations may increase if a time lag were built in.

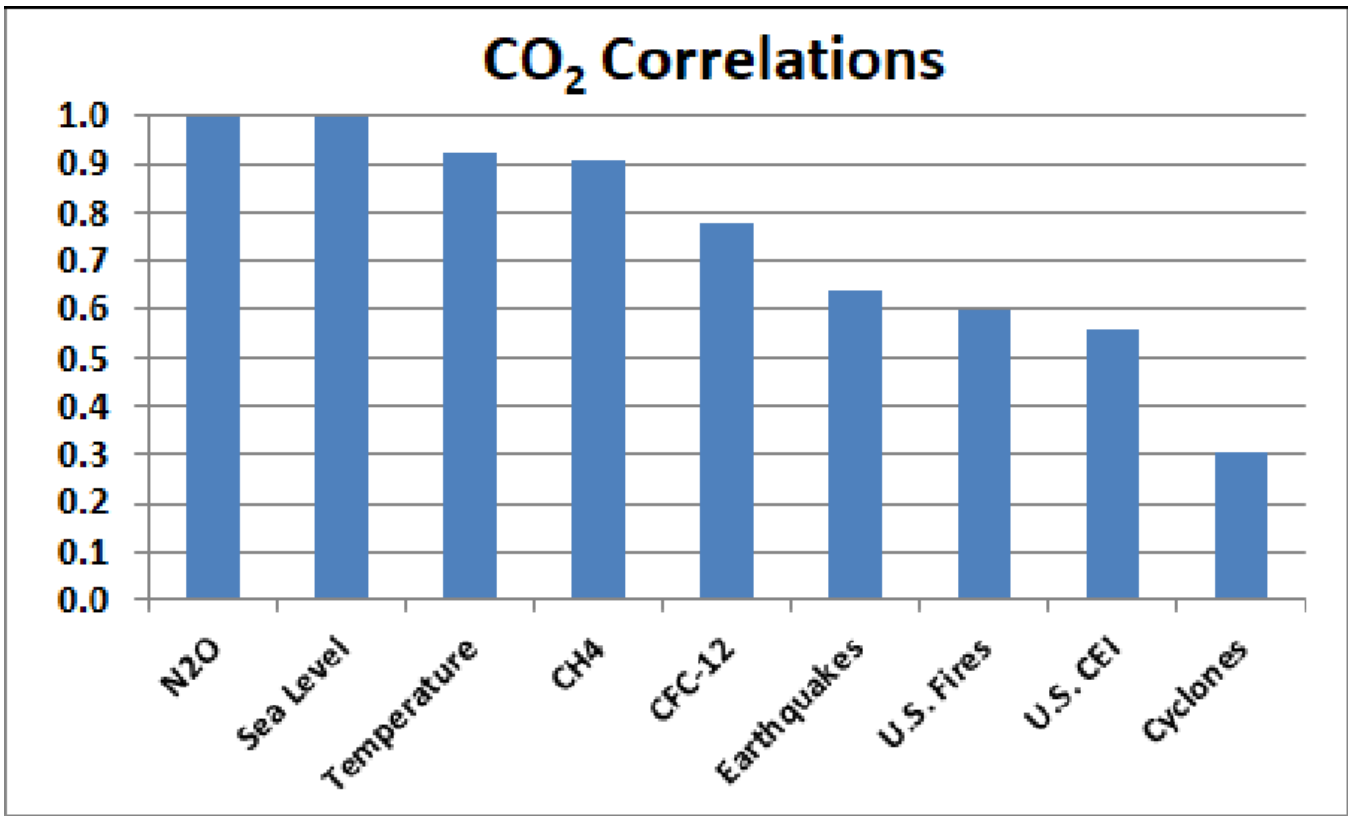
Note that the only negative correlation is between global cyclones and land precipitation. This is probably due to the fact that hurricanes/cyclones precipitate mostly over the oceans instead of on land. So, more energy that goes into cyclones reduces the energy available to cause land precipitation.

Correlations greater than 0.5 are in **green**. It is interesting that earthquakes have higher correlations with the other items than do cyclones and global precipitation.

Here is a graph of correlations with global surface temperature:



Here is a graph of correlations with global carbon dioxide in the atmosphere:



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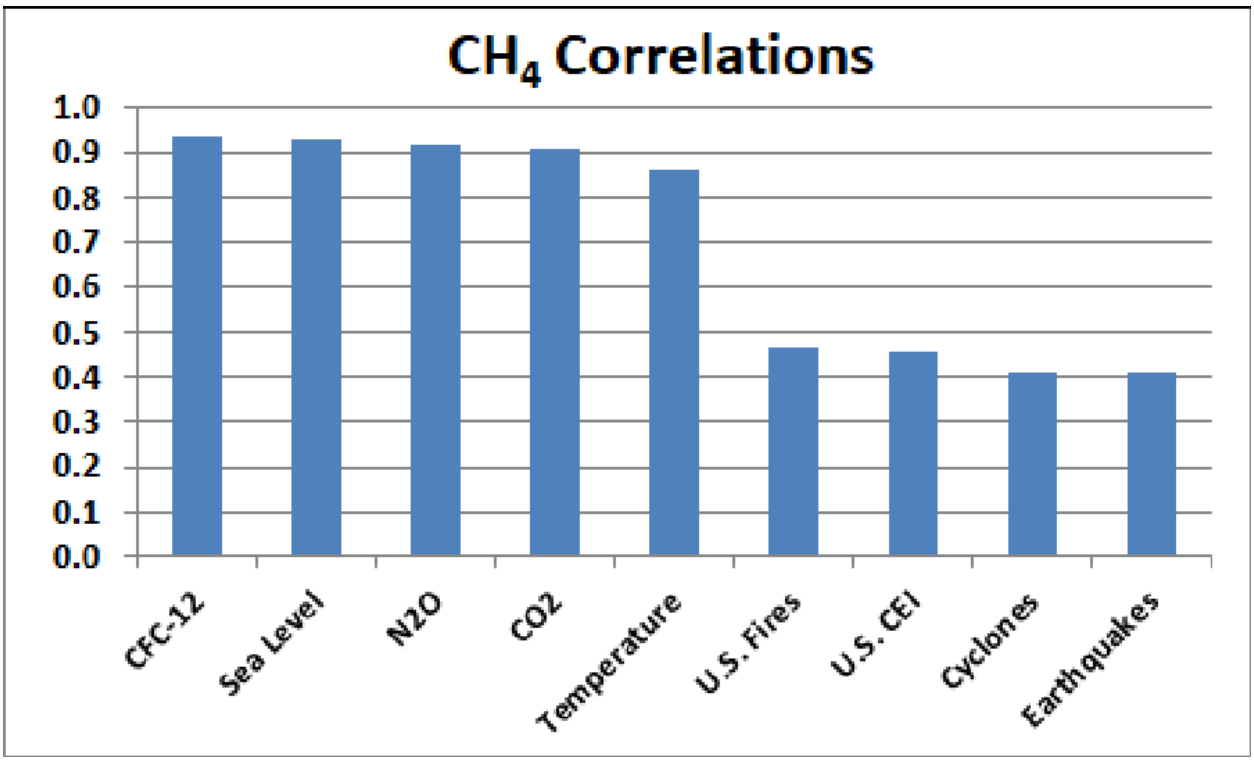
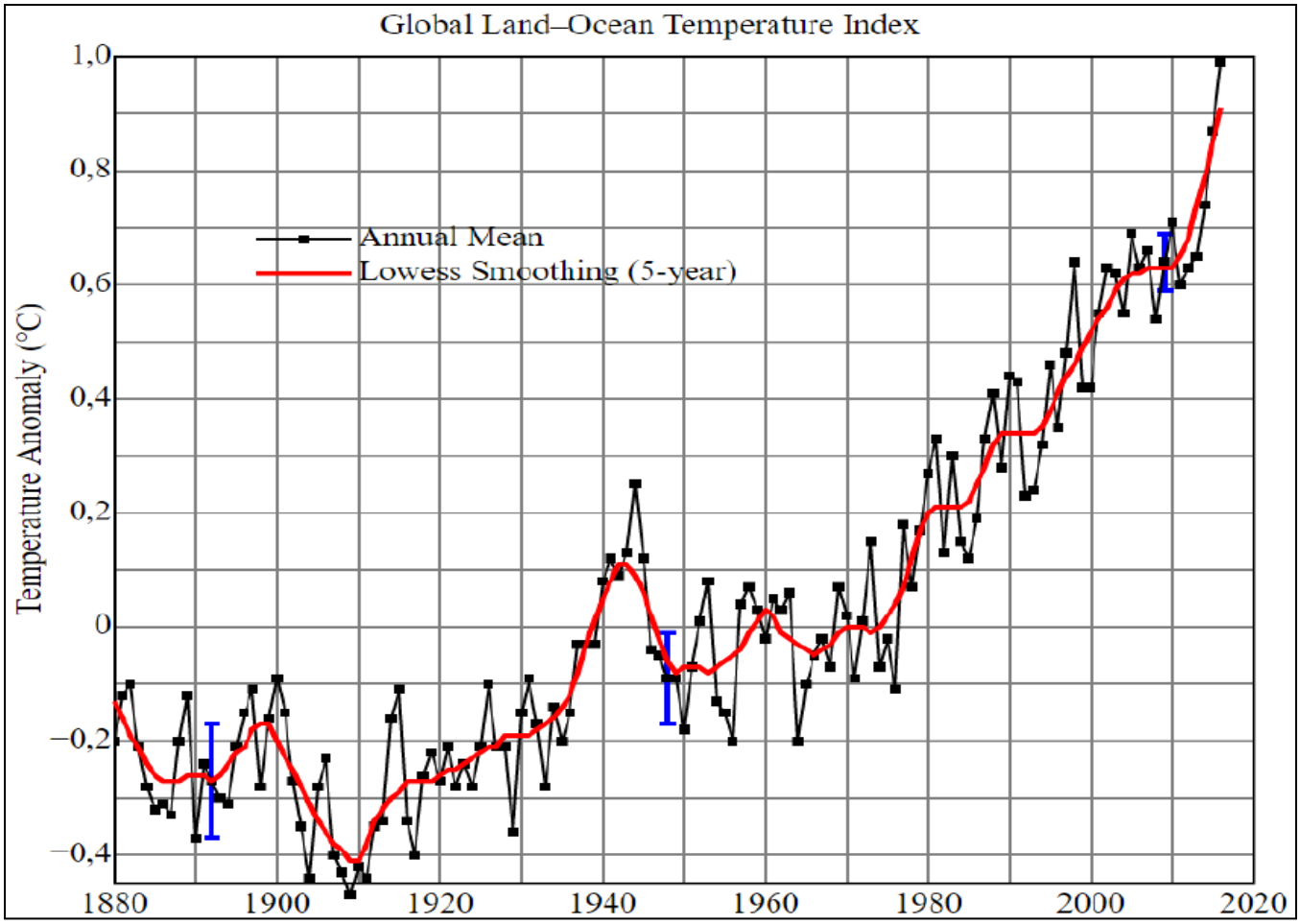


Conclusions

The eleven items chosen for study here are generally highly correlated.

Consider again the global-surface-temperature data:



There appear to be two phase changes:

1. At about 1975 after the U.K. (1956) and U.S. (1963) Clean Air Acts.
2. At about 2010 when methane emissions started a fast increase.

References

- http://www.roperld.com/science/GlobalWarmingRoper.htm
- http://www.roperld.com/science/GlobalTempDueToCarbon.pdf
- http://www.roperld.com/science/sealevelvstemperature.htm
- http://www.roperld.com/science/HurricanesEnergy.pdf