



Cycles Research Institute

<http://www.cyclesresearchinstitute.org/>

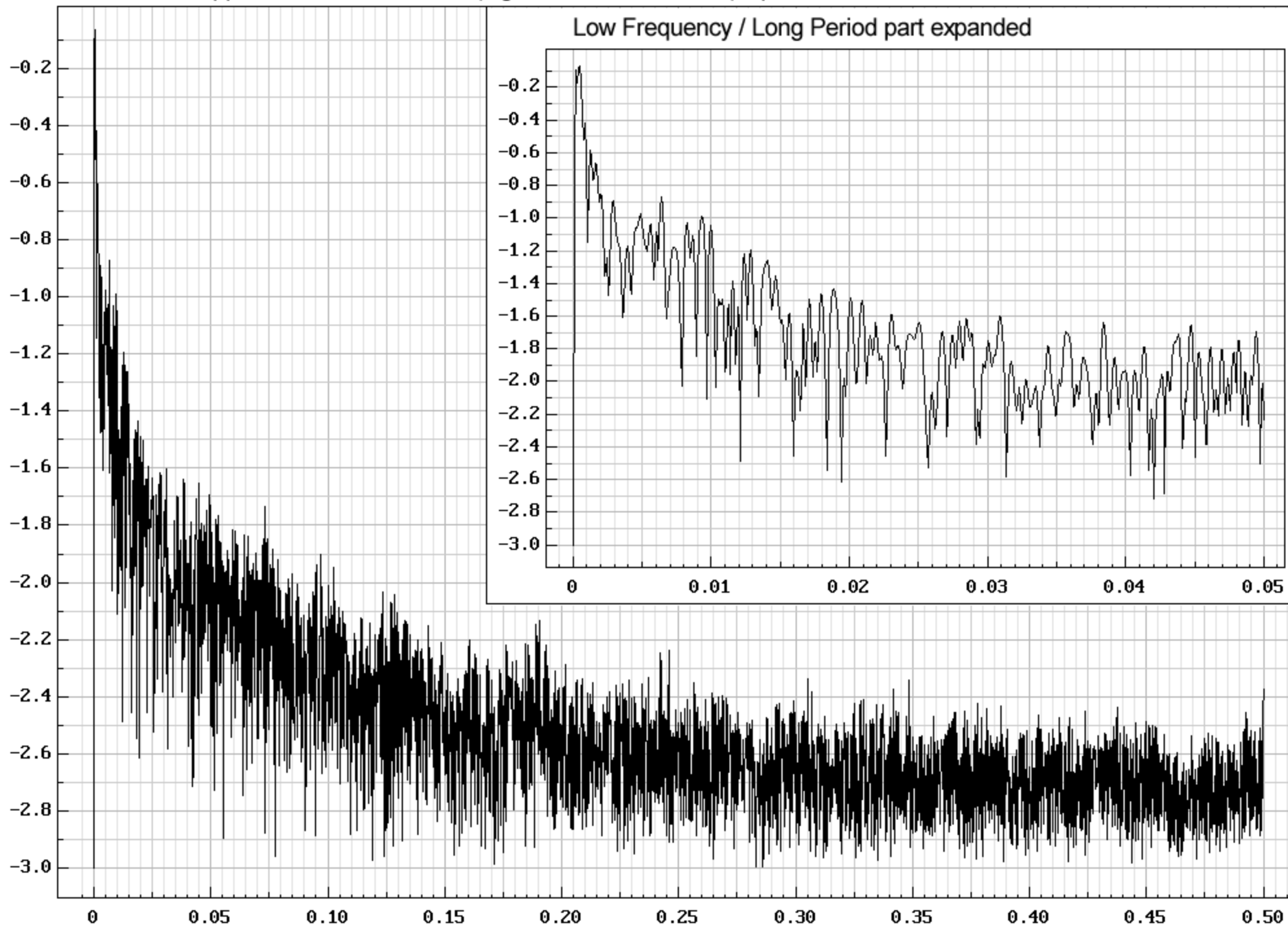
Cycles Analysis Report

Copper Prices Monthly
in USA 1784 - 2010

Price of Copper in USA 1784 - 2010 (log scale) $\log(\$/\text{T})$



Price of Copper in USA 1784 - 2010 (log scale and detrended) Spectrum (with log scale)



Notes on Data and Analysis

The data used in this analysis is CATS month series 28 spliced to series 219 which were compatible series. The older series 28 is reportedly spliced but the dates of changes are not given. The series 219 source is IMF: <http://www.imf.org/external/np/res/cmmmod/externaldata.csv>

There are some periods of fixed prices and some periods where there is missing data. Missing data has been replaced by linear trends joining to the nearest known prices.

This analysis was done using CATS which is free **Cycles Analysis Timeseries Software** available from <http://www.cyclesresearchinstitute.org/cats.html>

The copper price is marked by sudden rises in prices lasting several years every 6 to 12 years. The price was generally falling until the 1930s and has been generally rising ever since, reflecting the general movements in the value of money.

A number of significant cycles were found as well as some additional non-significant but possible real cycles.

Method

Logs of prices were used to overcome the price changes due to the value of money and to make equal percentage changes have equal numeric differences. The linear trend of prices was removed before the spectrum was calculated.

The following significant cycles were found based on Bartels test.

Period Months	Period Years	Ideal Crest
155.03	12.919	2006.9
107.02	8.918	2007.5
100.48	8.373	2007.1
77.65	6.471	2007.9
22.348	1.8623	2008.0
13.665	1.1387	2008.7

It is noteworthy that the 12.919 year cycle is almost exactly twice as long as the 6.471 year cycle. This means that alternate 6.471 year cycle peaks tend to be higher.

Because the two periods 8.918 and 8.373 years are rather close, these create beats with the two cycles alternately adding and cancelling over a cycle of about 137 years.

Fitting Cycles to Data

Below is shown a graph of the Copper prices variations from trend compared to an ideal 6.471 year cycle. The black line is a 25 month moving average less a 77 month moving average. This is best interpreted as removing all cycles longer than the cycle of interest from the data and smoothing the result to emphasize cycles of about the desired period.

Similar ideal cycle comparisons can be made for the other cycles found, but the two cycles of 8.918 and 8.373 obviously interfere with each other a lot. The shorter cycles are not easily seen on such a graph.

A comparison is made of the six cycles combined to the original copper prices on a log scale. No attempt is made to remove or follow the long term trends. The sum of cycles fits the data quite well since about 1950. A forecast is shown, but we cannot say how accurate this is likely to be. It indicates a low around early 2012 rising to a high in mid 2015.

Report by Ray Tomes
May 2010

Price of Copper in USA 1784 - 2010

Sum of six significant cycles

(155.0, 107.02, 100.48, 77.65, 22.348, 13.665 months)



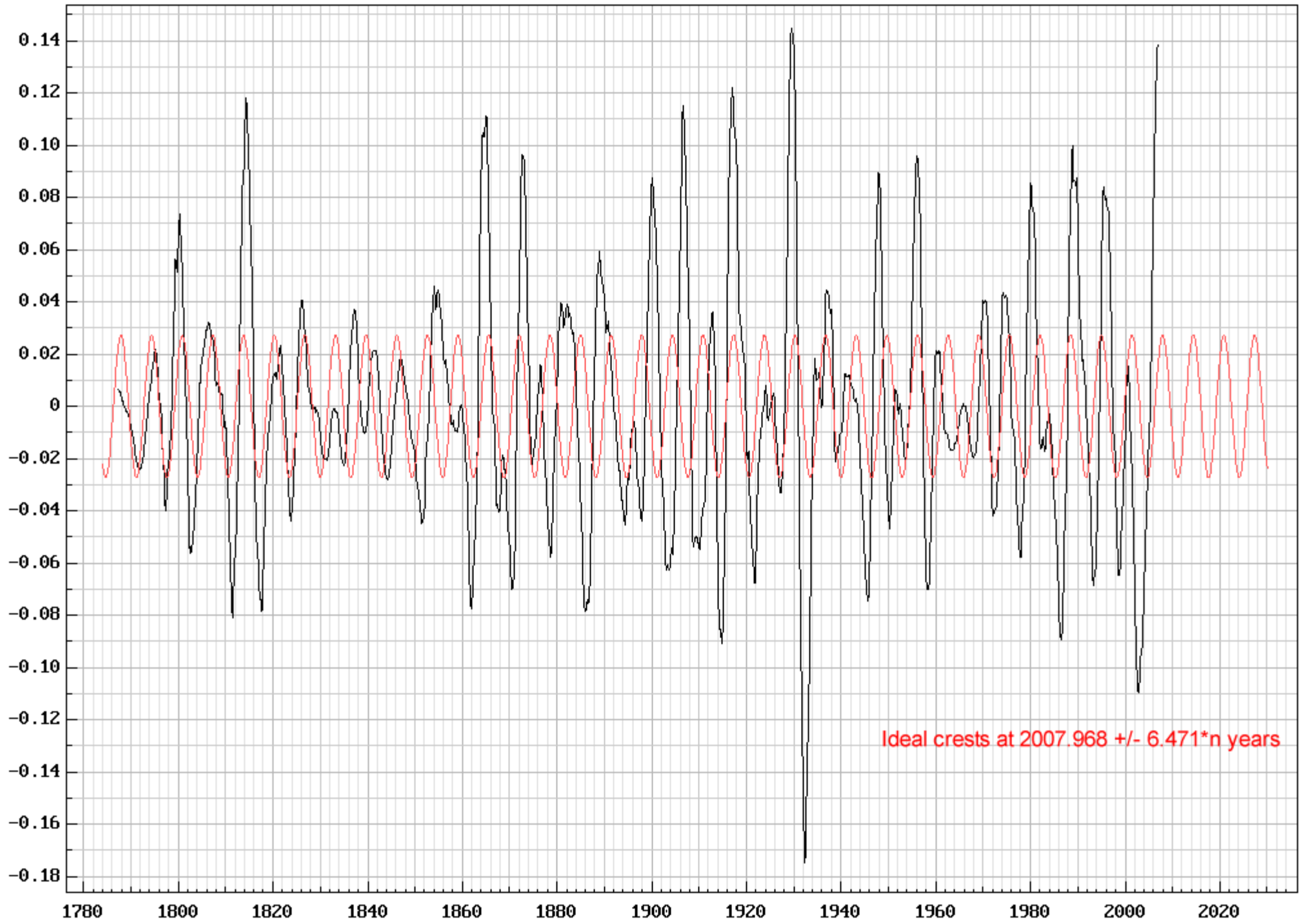
Price of Copper in USA 1784 - 2010 (log scale and detrended)

Sum of six significant cycles



Price of Copper in USA, 1784-2010 25 month mov.ave. less 77 month mov.ave.

Regular 77.65 month (6.471 year) cycle



Ideal crests at 2007.968 +/- 6.471*n years

Price of Copper in USA, 1784-2010 Smoothed 3 cycle filter of period ~155 months Regular 155.03 month (12.92 year) cycle

