Dear Sirs,

I have just emailed you a very long script with many attachments.

I fear that your spam removal methods may class it as unwanted spam, so I am sending this in the hope that if it does fall into that category you will be able to retrieve it.

The subject matter is an alternative interpretation of the data used by Professor Mann in his paper that made Page 3 of "Climate Change 2001 - The Scientific Basis".

If you take some time to look at the other email you will find some diagrams (and reasoning) that call Mann's interpretation into question.

I am prepared to enlarge at length on the contents of the other email should you or someone else wish it.

Yours sincerely,

G Robin Edwards Bromsgrove B60 1QB

Dear Sirs,

Please excuse this long email. There is quite a lot to write about.

I have recently learned of your call for evidence (courtesy Google, searched on Sir Nicholas Stern) so thought it would be appropriate to inform you of a different approach to the data presented and used by Professor Mann which resulted in his famous "Hockey Stick" curve. I regard this curve as having had the greatest single influence on "Policymakers", in part because it was presented in "Climate Change 2001 - the scientific basis", which I have in front of me, on Page 3.

My "evidence" is not in the field of economics, but rather an attempt to show that the "consensus" view (which embraces the notion that catastrophic temperature increases are taking place on a global scale) may have much shakier foundations than it is commonly supposed to have.
From the economic standpoint if the Kyoto agreement were found to be in fact resting on misinterpretation of climate data this could have a very significant impact on the attitude of politicians towards the undoubted costs of implementing "Kyoto". Our Prime Minister would be very interested in this, I feel sure, in the light of his now changed attitude towards installation of nuclear power stations.

You may not be interested in work done by a private individual. However, I have no axe to grind (I am now 77, and thus long retired, and non-political in my view of life) so can take a detached view of many issues. I do not sit around and accept what I read or hear at their face values. I need to investigate (numerical) data for myself, a practice that I learned to adopt from many years in industry.

This has led me to look very carefully indeed at literally thousands of data sets regarding climate. The sources have been very varied, and mainly obtained using the internet. I have, for example, much data published by the CRU of UEA. I have an ongoing email correspondence with Professor Phil Jones, who will be well known to you, and he has been kind enough to steer me towards sources of data sets, and has indeed provided me directly with climate time series. I have had contacts with several other scientists, who have also been able to supply me with data. Reverting to the topic of the data used by Professor Mann et al, it has for some time been impossible for me to access his data anew. It seems to have been withdrawn, but fortunately I have the complete data of the 1400 - 1980 series, together with the associated meta data that help in understanding what Mann thought fit to include in his investigations. I have never been able to find the second data set, covering about 1000 years, and have read that it suddenly disappeared from the Internet.

You will no doubt be aware that some workers, especially McKintyre and McKitrick, in Canada, have raised some critical points regarding Mann's data. It is not appropriate to go into this here, but basically they have shown that the set of 112 columns of assorted numbers, with up to 593 rows (writing in spreadsheet terms) contain some very suspicious values, and indeed have their share of "clerical" errors, including one that was immediately apparent to anyone who like me is familiar with the famous Central England Temperatures, published by the Hadley Centre. Leaving such relative trivialities aside, one can accept that Mann put forward (and used in his work) data that he regarded as being in some sense representative of the Northern hemisphere scene, albeit that some data are from the Southern hemisphere!

In my work I have accepted Mann's data as being "correct" - there is little else I can do, having no access to the phenomenal facilities that are available to academics and government scientists. (I still use dial-up on the internet, for example, and I use my own software for data analysis). Do not let this revelation cause you to discard this email without reading further!

You may or may not know just how disparate in scale Mann's data are. To my knowledge there do not exist publically available full details of the provenance and units of of his data. This is something that has made me wonder about the competence and diligence of the (presumed) peer reviewers of his paper. In case you do not have access to the data I have attached the simple univariate statistics for the first 15 of Mann's 112 data columns, which will make my point about the disparity of scales. (Univ.txt)

For an outsider, not privileged to know to the innermost secrets of the now closely guarded data, all that can be done is to assume that his 112 columns are directly related to "climate" - more specifically temperature - although he includes 13 columns of data that are to do with precipitation records! Strange, isn't it? So, I have had to assume that an increased value of his data items must be directly related to an increase in temperature (climate). Without this assumption any analysis would be nonsense.

In order to "average" the data in some sort of sensible manner it is necessary to ensure that all data columns have a similar "weight". There is no sense in averaging V1 and V3, for example. Thus I have converted all the data to standardised values, thus having mean zero, variance 1. This ensures that the "big number" columns do not dominate the averages. It also means that it will not be possible to form a direct temperature scale. Mann also used "areal weighting" in some manner that I have been unable to fathom, I presume in an attempt to get an improved overall value. How this can be done given the concentration of his "real" (and scaled) temperature data in North-west Europe, and much of the tree ring data from the Americas, with no data for the vast oceanic areas I fail to understand, I'm afraid.

My technique of standardising is simple and objective, reproducible by anyone with access to a spreadsheet or statistical software. I shall not present these data to save space, but they are available on request. Having standardised the data it is now reasonably legitimate to average across the data columns. Inspection of the attached Univ.txt file will instantly show that there are widely varying counts (N), so the derived Row averages will have varying numbers of components. It is illuminating to plot the numbers of data columns against the Year, but I shall not do it here. Mann goes into great (and to me confusing) detail about his methods for "calibration" of the proxy data. Unfortunately he refuses categorically to release his algorithms or software, so verification of his exact methods is impossible. However, it is useful to assemble the "real" temperature data, of which there are 13 (yes, just 13) columns, of which only one is actual thermometer data, the rest being scaled in various and unfathomable ways. These data are in columns 10, 11 and 21 to 31 of his data set, column 10 being Central England SUMMER temperatures, not annual temperatures as he states. He has admitted to this clerical error!

It is reasonable to expect that his "real" temperatures should clearly show the pattern that he published and which appears in the Summary for Policymakers of Climate Change

2001 (Page 3). Incidentally you will see that he uses his 1000 year data set, unfortunately again inaccessible to other workers, but irrelevant as far as the Hockey Stick diagram is concerned.

At this point it is necessary to tell you briefly about the analytical methods I use. These days the conventional methods for looking at (that is, plotting) time series data generally involve one of several types of smoothing technique. The simplest is the straightforward moving average, using a window length of suitable size. This and all other smoothing techniques have the property of disguising abrupt change and unusual values - this being indeed part of their purpose. Journalists and politicians seem to like smooth curves, and indeed they are a relatively simple means of getting across to the public some "science" in a painless manner. Unfortunately, the real world is not always simple and/or well behaved. In the climate world, the data are noisy, in that they exhibit large year to year (and indeed on other timescales) changes that most of us notice but rarely quantify. Smoothing techniques impose a model on the data, in that large fluctuations are averaged out to a great extent, but who is to say that this model is correct?

The method I use is the classical cumulative sum. It imposes no model, and thus has the great advantage that it cannot be used to try to forecast a future climate pattern. All that it does is to provide a viewable pattern of past events.

These can (and do) include periods of stability, periods of steady change, strong "pulses", and very importantly, evidence for abrupt change, The cumulative sum method is well known to practitioners of Industrial Quality Control - from the middle of the 20th century or perhaps earlier. It has fallen out of use (witness the relative paucity of information on it in internet search engines). However, it has the major advantage of requiring no access to the phenomenally computationally intensive techniques favoured by many current investigators - prime example Professor Mann. In contrast to his methods it does not obfuscate the

issues being addressed. Equally, and importantly, it is readily verifiable by anyone who has access to a computer. Cusums are formed by subtracting a constant value from each datum and summing (algebraically) successively the resulting differences. Usually the most convenient constant is the mean of the data over the period of interest, since it ensures that the cusum data end at zero and results in convenient plotting scales in most instances.

A most important attribute of cusum plots is that they very frequently produce simple patterns from apparently opaque and "noisy" data - exactly the properties of climate time series. I have produced several thousands of such cusum diagrams since 1994, when I was first in touch with Professor Jones. I have to say that they illuminate the raw data in a fashion that makes them a highly recommendable tool for examining historical climate records. Cusums segments that are close to a straight line indicate that the generating data were roughly stable over the period of interest. A downward curving segment indicates a sustained decrease in the data, and an upward curve shows a sustained increase. A angle indicates an abrupt change. Necessarily, interpretation is somewhat subjective, but the major features are frequently so obvious that different observers would arrive at closely similar conclusions.

Attached is a cusum plot (a GIF file) derived from the average of Mann's temperature data in standardised form, which covers the period 1820 to 1980, for which all 13 data columns are available. You will readily observe some major features of this plot. From 1840 to about 1887 a fairly stable segment is evident, although it has some downward curvature. A quite abrupt change, i.e. period of rapid increase then took place, stabilising in about 1900, and is succeeded at about 1919 by another sharp upward change with a gradual increase until around 1930 or 1932. Stabilisation returns until the early war years, which were markedly cool, and from 1942 to about 1980 the general pattern is of a downward curve, indicating a sustained quite gradual period of cooling. In the interests of saving space/time I have not attached a plot of the original data, though it is readily available and takes only seconds to produce.

What the cusum clearly shows is that the period from about 1930 onward exhibits no sign at all of the spectacular increase reported by Mann. By fitting some simple regressions over the periods identified in the cusum plot the presence (or absence) of changes can readily be verified. Mean levels are also readily arrived at directly from the cusum plot by adding its slope to the basis value - which I've not quoted here but which is readily available. For standardised data it is essentially zero. The shape of the cusum plot is of course entirely unaltered by standardisation of the data. So, this is the behaviour of the reference data set - the "real" temperatures. The next question is how the various groups of proxies behave. I have of course produced all the plots for individual data columns, but for general purposes it is convenient to group the data into types - as far as Mann's meta data allow - to reduce the number of diagrams to a manageable quantity. I have attached a number of GIF files for your perusal. They have been briefly annotated to aid interpretation.

The Groups I have assembled are detailed below.

Type	Column numbers	Group
Coral, tropical seas	1 - 9	A
Temperatures	10, 11, 21 - 31	B
Summit accumulations and cores	12 - 20	C
Precipitation	32 - 42, 62, 63, 64	D
Tree rings	65 - 68, 100 - 112	E
Principal components	69 - 99	F

Tree ring width??	43 - 50	H
Treeline data	51 - 61	I

By inspecting the plots of the group means you will I hope notice that only Group I ("Treeline data") show any sign of a marked increase in the 19th and 20th centuries and that this plot also shows signs of a decrease over its last few years. The data are, incidentally rather peculiar in that the cusum plot is remarkably smooth, indicating the possible pre-treatment of the data by some sort of smoothing technology.

The Group B cusum (real temperatures) has three "grand scale" features:-
a downward curve from its start to about 1890, and upward curve from then until perhaps the 1950s (with a brief interruption in the war years, and then a downward curve (decreasing temperatures!) up to the end of the plot. Group C has some very obvious break points, indicating extremely abrupt changes in level, such as about 1660 - a downward step - followed by a constant period to about 1870, with a very abrupt step to a higher value followed by about 60 years of slight steady increase and then an approximately constant value - and clearly no dramatic increase.

Group D - the precipitation data - have a rather complicated pattern,but show a period of very low and roughly constant values from about 1800 to around 1830, when an upward step occurred, and values maintained at this level with one major interruption - on the long term scale – to the end of the data. The most recent values appear to be quite high (a very steep slope).
Group E - the tree ring data - have some features resembling those of
Group B, in particular no sign of an increase after about 1930. The downward curve from then onward indicates a sustained decrease in the data values, completely at variance with Mann's interpretation.

Group F - Mann's data labelled principal components - indicates a prolonger (two and a half centuries) of stability with a very abrupt upward step at about 1870, maintained to about 1902. Then a downward step followed by a sustained increase to the end of the plot. This is partially in line with Mann's interpretation apart from the step at around 1900.

Group H - presumed to be related to tree ring width - presents a bizarre cusum plot which has the clear signs of a cyclic pattern. Apart from the sudden step at around 1930 the hypothesis of a steady increase from the late 19th century is clearly unsustainable.

Group I - "Treeline data" has been commented on earlier. It supports the idea of an increase from the mid 19th century to the mid 20th, but thereafter indicates a probable decrease. I have to admit that I have not been able to understand fully Mann's explanation of the value of the principal components (PCs) , and in particular I cannot rationalise the data in his columns. As far as I am aware, PCs can be computed only for a complete set of data. Any row of a matrix that is incomplete - due to a missing value - has to be omitted from the computations. Others have commented on this peculiarity, but Mann apparently refuses to disclose his methods and algorithms!

I hope that you have had the patience to follow this email through to the end. I know it is not Economics orientated, but I feel that economists should be aware that Mann's extremely influential Hockey Stick plot may be an artifact of his data treatment methods. It certainly does not concur with what appropriate plotting methods disclose, and in my own (humble!) opinion is a sad misinterpretation of the true state of affairs in understanding climate change. It would be a disaster if grossly expensive CO2 reduction techniques were to be demanded when the effort may well be based on a completely wrong interpretation of data.

I fear the worst.

Yours sincerely,
G Robin Edwards, Bromsgrove B60 1QB