# Supplementary Information

Includes XLS files:

| Filename | Description |
|---|---|
| Random Sample of 3000 Papers.xlsx | The randomly selected 3,000 records each graded manually with score and research category. |
| Initial Data With Random Order Added.xlsx | A full set of the original data used with a random number added to randomise order. |
| wordAnalysis-flagged.csv | The words that the software found to be predictive of a sceptical paper. |
| Studies predicted to be sceptical by manually selected predictive keywords.xlsx | All papers with predictive score based upon keywords with the first 1,000 graded manually. |

**Code and statistical calculations**

We calculate the exact limits or Clopper-Pearson limits with a confidence level of 0.95 using the following R code:

```
require(MASS)
rm(list = setdiff(ls(), lsf.str()))

r_obs = 4   #number of sceptical papers found
n = 2718    #number of papers assessed

btest=binom.test(r_obs, n, p = 0.5, alternative = c("two.sided",
"less", "greater"),conf.level = 0.95)

pLow=btest$conf.int[1]
pLow
pHigh=btest$conf.int[2]
pHigh

# check these values
tail1=pbinom(r_obs,n,pHigh)
tail2=1-pbinom(r_obs,n,pLow)+dbinom(r_obs,n,pLow)
#These two tails both give tail areas as 0.025
tail1
tail2

#Convert pLow and pHigh to percentage of consensus papers
consensusPercentageLow = 100 * (1-pHigh)
consensusPercentageHigh = 100 * (1-pLow)

consensusPercentageLow
consensusPercentageHigh
```

Where:

| | |
|---|---|
| r_obs | The observed number of sceptical papers in the sample. |
| n | The size of the sample, i.e., the total number of papers assessed. |

| | |
|---|---|
| pLow | The lower limit of the confidence interval the proportion of sceptical papers. |
| pHigh | The higher limit of the confidence interval of the proportion of sceptical papers. |
| consensusPercentageLow | A conversion of pHigh to show the lower limit of the confidence interval of consensus papers, expressed as a percentage. |
| consensusPercentageHigh | A conversion of pLow to show the lower limit of the confidence interval of consensus papers, expressed as a percentage. |

Which returns the result:

```
> require(MASS)
> rm(list = setdiff(ls(), lsf.str()))
>
> r_obs = 4  #number of sceptical papers found
> n = 2718    #number of papers assessed
>
> btest=binom.test(r_obs, n, p = 0.5, alternative = c("two.sided",
"less", "greater"),conf.level = 0.95)
>
> pLow=btest$conf.int[1]
> pLow
[1] 0.0004011216
> pHigh=btest$conf.int[2]
> pHigh
[1] 0.003763736
>
> # check these values
> tail1=pbinom(r_obs,n,pHigh)
> tail2=1-pbinom(r_obs,n,pLow)+dbinom(r_obs,n,pLow)
> #These two tails both give tail areas as 0.025
> tail1
[1] 0.025
> tail2
[1] 0.025
>
> #Convert pLow and pHigh to percentage of consensus papers
> consensusPercentageLow = 100 * (1-pHigh)
> consensusPercentageHigh = 100 * (1-pLow)
>
> consensusPercentageLow
[1] 99.62363
> consensusPercentageHigh
[1] 99.95989
```

Our estimate of the proportion of consensus papers was 1-(4/2718) = 99.85%. The 95% confidence limits for this proportion are 99.62% to 99.96%, therefore it is likely that the proportion of climate papers that favour the consensus is at least 99.62%.

Repeating the above code at the 99.999% confidence level gives us the interval 99.212% to 99.996%, therefore it is almost guaranteed that the proportion of climate papers that favour the consensus is above 99.212%.

C13 excluded papers that did not implicitly or explicitly reject or agree with the consensus. We can re-run the R code excluding all papers categorised as 4a with the following set up data:

```
n=3000-2104-4-43 #number of papers assessed
r_obs=4          #number of sceptical papers found
```

Using C13's categorisation we estimate the proportion of consensus papers to be 99.53% with the 95% confidence interval being 98.80% to 99.87%.

**Keywords indicating scepticism**

Using the list of categorised studies in the list from C13, we wrote software to extract all of the unique words from the titles, author list and extract of all the papers classified as 5, 6 and 7. We extracted a list of words that appeared in at least two of those papers, and then counted how many sceptical papers (endorsement categories 5,6 & 7) and how many non-sceptical papers (endorsement categories 1,2,3 & 4) they appeared in they appeared in.

The software then gave us a list of words in order of how predictive they were of a paper being sceptical. These words are listed in *wordAnalysis-flagged.csv*.

We then went through the first 150 words in this list, flagging those that we believed were just noise in the data (e.g. (e.g "walk" and "nearest") with an n flag in the "FlagNForIgnore" column, leaving in words such as "cosmic" and "rays". After the most likely 150 words, we set all to ignore.

We then wrote software to look through the 88,125 papers from Web of Science, using the predictive words to try to identify sceptical papers. Each paper was assigned a 50% likelihood of being sceptical, and the probability was adjusted with each word identified.

Obviously, as we were only looking at the words most predictive of scepticism and ignoring the words that predict non-scepticism, this probability could only realistically move in one direction. The probability figures are not meant to be genuine probabilities – but merely a number in which to order the papers from most to least likely to be sceptical. The studies ordered by this number are available in Studies predicted to be sceptical by manually selected predictive keywords.xlsx.

**Supplementary Table 1**

| Title | Author | Journal | Year | Score | Research category |
|---|---|---|---|---|---|
| Impact of the geomagnetic field and solar radiation on climate change | Dergachev, V. A.; Vasiliev, S. S.; Raspopov, O. M.; Jungner, H. | GEOMAGNETISM AND AERONOMY | 2012 | 6 | Paleoclimate |
| Solar activity imprints in tree ring-data from northwestern Russia | Kasatkina, Elena A.; Shumilov, Oleg, I; Timonen, Mauri | JOURNAL OF ATMOSPHERIC AND SOLAR-TERRESTRIAL PHYSICS | 2019 | 5 | Methods |
| Impacts of multi-scale solar activity on climate. Part II: Dominant timescales in decadal-centennial climate variability | Weng, Hengyi | ADVANCES IN ATMOSPHERIC SCIENCES | 2012 | 5 | Methods |

| | | | | | |
|---|---|---|---|---|---|
| A shared frequency set between the historical mid-latitude aurora records and the global surface temperature | Scafetta, Nicola | JOURNAL OF ATMOSPHERIC AND SOLAR-TERRESTRIAL PHYSICS | 2012 | 7 | Methods |
| Changes of space weather and space climate at Earth orbit: An update | Ahluwalia, H. S. | ADVANCES IN SPACE RESEARCH | 2019 | 5 | Methods |
| INFLUENCE OF SOLAR ACTIVITIES ON CLIMATE CHANGE | Anoruo, Chukwuma Moses; Okeke, Francisca Nneka | ENVIRONMENTAL ENGINEERING AND MANAGEMENT JOURNAL | 2020 | 5 | Methods |
| ACRIM total solar irradiance satellite composite validation versus TSI proxy models | Scafetta, Nicola; Willson, Richard C. | ASTROPHYSICS AND SPACE SCIENCE | 2014 | 5 | Methods |
| Testing an astronomically based decadal-scale empirical harmonic climate model versus the IPCC (2007) general circulation climate models | Scafetta, Nicola | JOURNAL OF ATMOSPHERIC AND SOLAR-TERRESTRIAL PHYSICS | 2012 | 7 | Methods |
| Evidence for cosmic ray modulation in temperature records from the South Atlantic Magnetic Anomaly region | Frigo, E.; Pacca, I. G.; Pereira-Filho, A. J.; Rampelloto, P. H.; Rigozo, N. R. | ANNALES GEOPHYSICAE | 2013 | 5 | Methods |
| COSMIC-RAY-DRIVEN REACTION AND GREENHOUSE EFFECT OF HALOGENATED MOLECULES: CULPRITS FOR ATMOSPHERIC OZONE DEPLETION AND GLOBAL CLIMATE CHANGE | Lu, Q. -B. | INTERNATIONAL JOURNAL OF MODERN PHYSICS B | 2013 | 5 | Methods |
| Comparison of Decadal Trends among Total Solar Irradiance Composites of Satellite Observations | Scafetta, Nicola; Willson, Richard C. | ADVANCES IN ASTRONOMY | 2019 | 5 | Methods |
| The inter-annual distribution of cloudless days and nights in Abastumani: Coupling with cosmic factors and climate change | Didebulidze, G. G.; Todua, M. | JOURNAL OF ATMOSPHERIC AND SOLAR-TERRESTRIAL PHYSICS | 2016 | 5 | Methods |
| Long-term global temperature variations under total solar irradiance, cosmic rays, and volcanic activity | Biktash, Lilia | JOURNAL OF ADVANCED RESEARCH | 2017 | 5 | Methods |
| Cosmic rays and space weather: effects on global climate change | Dorman, L. I. | ANNALES GEOPHYSICAE | 2012 | 5 | Paleoclimate |
| Attribution analysis for the failure of CMIP5 climate models to simulate the recent global warming hiatus | Wei Meng; Qiao FangLi | SCIENCE CHINA-EARTH SCIENCES | 2017 | 6 | Methods |
| Study of the influence of solar variability on a regional (Indian) climate: 1901-2007 | Aslam, O. P. M.; Badruddin | ADVANCES IN SPACE RESEARCH | 2014 | 5 | Methods |

| | | | | | |
|---|---|---|---|---|---|
| Solar activity, cosmic rays, and earth temperature reconstructions for the past two millennia. Part 2. Analysis of the relation between the global temperature variations and natural processes | Dergachev, V. A. | GEOMAGNETISM AND AERONOMY | 2015 | 5 | Methods |
| Solar Radiation Change and Climatic Effects on Decennial-Centennial Scales | Dergachev, V. A.; Volobuev, D. M. | GEOMAGNETISM AND AERONOMY | 2018 | 5 | Methods |
| Bicentennial decrease of the solar constant leads to the Earth's unbalanced heat budget and deep climate cooling | Abdusamatov, Kh. I. | KINEMATICS AND PHYSICS OF CELESTIAL BODIES | 2012 | 5 | Methods |
| Possible Contribution of Variations in the Galactic Cosmic Ray Flux to the Global Temperature Rise in Recent Decades | Ogurtsov, M. G.; Veretenenko, S. V. | GEOMAGNETISM AND AERONOMY | 2017 | 7 | Methods |
| Solar activity, cosmic rays, and earth temperature reconstructions for the past two millennia. Part 1. Analysis of temperature reconstructions | Dergachev, V. A. | GEOMAGNETISM AND AERONOMY | 2015 | 6 | Methods |
| Causality of global warming seen from observations: a scale analysis of driving force of the surface air temperature time series in the Northern Hemisphere | Yang, Peicai; Wang, Geli; Zhang, Feng; Zhou, Xiuji | CLIMATE DYNAMICS | 2016 | 5 | Methods |
| Problems of climate as a problem of optics | Avakyan, S. V. | JOURNAL OF OPTICAL TECHNOLOGY | 2013 | 6 | Methods |
| Examination of space-based bulk atmospheric temperatures used in climate research | Christy, John R.; Spencer, Roy W.; Braswell, William D.; Junod, Robert | INTERNATIONAL JOURNAL OF REMOTE SENSING | 2018 | 5 | Methods |
| Polynomial cointegration tests of anthropogenic impact on global warming | Beenstock, M.; Reingewertz, Y.; Paldor, N. | EARTH SYSTEM DYNAMICS | 2012 | 7 | Methods |
| Geomagnetic South Atlantic Anomaly and global sea level rise: A direct connection? | De Santis, A.; Qamili, E.; Spada, G.; Gasperini, P. | JOURNAL OF ATMOSPHERIC AND SOLAR-TERRESTRIAL PHYSICS | 2012 | 5 | Methods |
| Evidences for a quasi 60-year North Atlantic Oscillation since 1700 and its meaning for global climate change | Mazzarella, Adriano; Scafetta, Nicola | THEORETICAL AND APPLIED CLIMATOLOGY | 2012 | 6 | Methods |
| Multifractal detrended cross correlation analysis of Land-surface temperature anomalies and Soil radon concentration | Kar, Alpa; Chatterjee, Sucharita; Ghosh, Dipak | PHYSICA A-STATISTICAL MECHANICS AND ITS APPLICATIONS | 2019 | 6 | Methods |
| Problem of the length of the current interglacial | Dergachev, V. A.; Raspopov, O. M. | GEOMAGNETISM AND AERONOMY | 2013 | 5 | Paleoclimate |

| | | | | | |
|---|---|---|---|---|---|
| Length of the current interglacial period and interglacial intervals of the last million years | Dergachev, V. A. | GEOMAGNETISM AND AERONOMY | 2015 | 5 | Paleoclimate |
| Global surface temperature change analysis based on MODIS data in recent twelve years | Mao, K. B.; Ma, Y.; Tan, X. L.; Shen, X. Y.; Liu, G.; Li, Z. L.; Chen, J. M.; Xia, L. | ADVANCES IN SPACE RESEARCH | 2017 | 5 | Methods |