

Interactive comment on “On the scaling effect in global surface air temperature anomalies” by C. A. Varotsos and M. N. Efstathiou

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Anonymous Referee: #1

1. We agree with the first two referee's comments about the improvement of our manuscript concerning the addition of discussion on the error bounds of the derived DFA slopes. We had not focused on the error estimates, because the error bounds analysis performed had shown that these bounds do not affect the results presented in the paper. Nevertheless, we intend to include error estimates accompanied with relevant discussion and clarifications in the revised version of our paper.

We guess that instead of the “fractional Gaussian motion” the referee means the “fractional Brownian motion”, a matter that will be discussed in the revised version.

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2. Regarding the third referee's comment/suggestion that “Anthropogenic greenhouse gas emissions are driving the surface temperature”:

We shall slightly revise our sentence accordingly in the revised manuscript, but we prefer to avoid the suggested expression “Anthropogenic greenhouse gas emissions are driving the surface temperature” because if we consider so, then we assume that there is no natural atmospheric greenhouse effect which is not the case.

3. About the fourth and fifth referee's comment we shall briefly discuss in the revised version the deseasonalization and detrending process applied to the data, as requested.

Anonymous Referee: #2

We are afraid of a misunderstanding, because the three general comments made by this referee were mainly based on his/her incorrect calculations when using the data presented in our figures. We just quote two examples of the mistakes in his/her calculations presented in his/her report:

1. Page C4596 of his/her report, Line 2 from the top. He/she writes: “In their analysis of monthly global and NH data (fig 5), cross overs can be clearly seen at $\log(\tau/\text{months}) \approx 1.7$, i.e., $\tau \approx 6$ months, i.e., the fluctuation behaviour above 6 months is much lower than that below 6 months.”

However, this calculation of the referee is not correct, in view of the following fact: in the page 14736, L3 from the top of our paper, we write: “Moreover, the fluctuations of the monthly means reveal stronger persistent long-range correlations than the annual means for the interval time ranging from 4 months to 32 yr.”. This way we clearly give the information to the reader that the interval $0.62 < \log \tau < 2.58$ (shown in Fig.5 of our paper) corresponds to $4 \text{ months} < \tau < 380.2 \text{ months}$ ($\approx 32 \text{ yrs}$), or in other words it is obvious that we use base-10 logarithms. Keeping this in mind we see that the “cross over” seen by the referee at $\log \tau = 1.7$, in reality corresponds to 50 months (and not to

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6 months as the referee claims), thus belonging to the large scales and not to the short ones as the referee says.

It is therefore obvious that, despite the afore-mentioned clear remarks in the text of our paper, the referee wrongly considers base-e logarithms (where e is the irrational mathematical constant ≈ 2.71828), for our data presented in our Fig.5, thus making thereafter erroneous interpretation of our results.

2. Page C4596 of his/her report, Line 8 from the top. He/she writes: "There is no scaling behaviour in the investigated range, and for "larger" scales the scaling is weaker than for short scales. In fact, the longest scales investigated are $\exp(3) \approx 20$ months, i.e., less than 2 years."

It is evident that the referee incorrectly again considers base-e logarithms, thus raising erroneous claims, once more. In particular, the truth is that the longest scale investigated in our analysis is $\tau = 10 \exp(2.58) = 380.2$ months, i.e. 32 years (and not 20 months as this referee incorrectly claims).

In conclusion, the criticism raised by this referee stems from his/her arbitrary and erroneous assumption that our "log-log plots" presented in our manuscript are base-e logarithms (natural logarithms, designed by the International Organization for Standardization as $\ln x$), while in reality we have employed $\log x$ (base-10 logarithms), as it is clear from the content of our manuscript.

Because of this misunderstanding this referee has drawn to erroneous conclusions and in addition raised false arguments on the analysis presented and on the relevant interpretation in our paper.

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