Atmos. Chem. Phys. Discuss., 6, S5093–S5094, 2006
www.atmos-chem-phys-discuss.net/6/S5093/2006/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Technical Note: Long-term memory effect in the atmospheric CO_2 concentration at Mauna Loa" *by* C. Varotsos et al.

Anonymous Referee #3

Received and published: 6 December 2006

The paper analyzes the monthly mean averages of the atmospheric carbon dioxide concentrations measured at Mauna Loa, Hawaii during 1958-2004 by employing a modern technique of Statistical Physics, namely the Detrended Fluctuation Analysis (DFA). The main finding of the paper is that the fluctuations of carbon dioxide concentrations exhibit long range temporal correlations obeying 1/f behaviour. This interesting finding is consistent with the fact that very recently such behaviour has been also found in a variety of complex systems. Thus, the conclusion of this paper is of profound importance and hence I believe that this paper certainly merits publication in ACP journal. However, I think that the paper will be better understood by a wider audience, if the following point is emphasized. The data analyzed refer to time series of around 5 102 data points. Most of the people might not be aware why DFA (and not, for example,

wavelet based estimators of self-similarity) was preferred by the authors. They must clarify that there are recent detailed studies, e.g. Audit, B., Bacry, E., Muzy, J. F., and Arneodo, A.: Wavelets based estimators of scaling behaviour IEEE, Trans. Information Theory 48, 11, 2938-2954, 2002, which demonstrate that the wavelet transform modulus maxima (WTMM) estimator leads to larger mean squared errors when analyzing short time series of length 102 data points. In other words, Audit et al., 2002 showed that for time series of the afore-mentioned length, the DFA exponent is the best estimator (thus fully justifying, why the present authors preferred to use the DFA tool).

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 11957, 2006.