Atmos. Chem. Phys. Discuss., 11, C1298–C1300, 2011
www.atmos-chem-phys-discuss.net/11/C1298/2011/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Air-chemistry "turbulence": power-law scaling and statistical regularity" *by* H.-m. Hsu et al.

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Received and published: 29 March 2011

General comment

The question addressed in the paper, as reflected in its title, is within the scope of ACP. The work involves excellent hourly observations throughout a year (2004) in Taiwan and novel (to many readers of ACP) methods such as DFA and CWT. Several spectral peaks, dual-exponent structures, and power-law scaling in heavy tails of air-chemistry variations were revealed, with discussions of possible relationships to underlying atmospheric dynamical processes. It will be beneficial if the authors provide more details of the methods in order to make feasible reproduction of results by fellow scientists. The abstract is proper and the overall presentation is clear with sufficiently good language (hopefully to be improved by a language editor) and references. My overall evaluation

of the manuscript is 'good', with potential of minor improvements.

Specific comments

Abstract: '...are intriguingly interesting...'. Vague wordings like this and perhaps somewhere else in the manuscript. Try better expressions to make understood more explicitly why the present results are 'interesting'.

Introduction: page 9639 lines 1-16. This paragraph likes a summary of the present work before main text. Possible to simplify and combine into the last para. of the Introduction?

Data and methodology: I prefer to see 'methods' here. It deserves highlighted that some novel methods are applied in this work, which are not familiar to many if not most readers of ACP. In particular, it is beneficial that a succinct set of formulas of the DFA procedure are present with explanations in context. Critical details for calculating CWT (e.g., how to set the scale parameters in the procedure applied to the hourly series) are also needed, regarding reproduction of the results by fellow scientists. I'd also see the specific formulas for calculating the skewness and kurtosis of the hourly observations.

Section 3: page 9642-9644, paragraphs introducing various chemical gases. These are helpful for some readers (including me), but a bit distracting from the main contents of the paper. Possible to simplify?

Section 3.2: the last sentence. Besides revising syntax problem, explain a bit more physical meaning of difference between '-3' and '-1'.

Section 3.3: last paragraph. DFA exponent 3/4 for low frequency band, inconsistent with the result of CWT? Add explanation

Section 3.4: last para. unclear about the explanation why the DFA/CWT results for low frequency tend to diverse.

Section 3.5: there could be a reason for separating the analysis of aerosol measure-

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ments here.

Summary: Page 9654 lines 11-13. 'On the other hand, for the low-frequency band (LFB) in the CWT spectra and the corresponding long time-lag band (LTLB) in the DFA spectra, the exponents in average are -1 and 1, respectively.' The results in previous sections are not quite so clear. Perhaps need to add some discussion in previous sections wherever relevant to this 'conclusion'.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 9635, 2011.