

Interactive comment on “Investigating bias in the application of curve fitting programs to atmospheric time series” by P. A. Pickers and A. C. Manning

Anonymous Referee #1

Received and published: 22 August 2014

This paper is a nice comparison of various curve fitting techniques used in research of atmospheric trace gas data. It's great to have a summary of the common curve fits in one place and a comparison of them.

Comparison's are made using 'typical' setting for each technique. But these 'typical' settings may not be the best setting to use when comparing the results. It's no surprise that the ccgrcv resulted in the smallest residuals when applying the curve fits to the time series data. A short term cutoff of 50 days applied to monthly means will result in a very flexible curve, almost to the point of interpolating the data. Thoning et al. 1989 used 50 as the short term cutoff, but the current code for ccgrcv released by

C2328

NOAA/ESRL uses 80 days as the default. The 50 day cutoff is used when analyzing daily or hourly averaged data, and trying to follow the small variations of 1 to 2 weeks in length. It would be nice if the comparisons could be redone using the 80 value, but if not, at least a statement should be added stating that the current default is 80 days for the ccgrcv short term cutoff, which will result in a slightly stiffer curve.

What I'd like to see is less emphasis on the comparison with the typical settings, and more emphasis on section 3.5, the program input parameters. What parameters will give each curve similar 'stiffness'? The ccgrcv technique explicitly states the frequency response that is used. Can something similar be found for the HPspline and stl techniques? Perhaps an artificial data set can be constructed using a trend, harmonic and noise, and then find the settings for each technique that come closest to the underlying trend+harmonic.

The authors do rightly point out that users should chose the correct settings themselves rather than relying on the typical values. I think recommendation number 11 should be given more prominence though, maybe being the number one recommendation.

A couple other small points:

In Section 2.1.1, it is stated that the HPspline routines originated from Numerical Recipes in Fortran. What routines from this book were used?

In equation 5, the $(f/fc)^4$ term used by ccgrcv is the value used in Thoning et al 1989. Current ccgrcv code used $(f/fc)^6$.

This paper is a much needed discussion of the various curve fitting techniques used in the community, and I hope it prompts more comparisons and additional techniques and improvements.

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 7085, 2014.

C2329