

Interactive comment on “What can tracer observations in the continental boundary layer tell us about surface-atmosphere fluxes?” by C. Gerbig et al.

Anonymous Referee #3

Received and published: 22 November 2005

Inversion techniques used to derive CO₂ surface fluxes from atmospheric measurements together with atmospheric transport models and prior information, have been used for several years now. Some of the novelties and complications, come from the fact that inversion are now performed at smaller spatial and temporal scales. In going toward smaller scale, the inverse problem is harder to constrain given the small number of actual observation. The use of a good prior information becomes all the more fundamental. This paper discusses the importance of the error covariance matrix (especially the off diagonal elements) that needs to be associated with this prior information. Stressing the importance of the error covariance matrix is not new but it

Full Screen / Esc

Print Version

Interactive Discussion

Discussion Paper

is done here in a systematic way using a pseudo-data experiment. A receptor oriented Lagrangian transport model is used together with a very simple biospheric model to generate the “truth”. The use of an adaptative grid where resolution decreases with distance from the receptor is original. In this study, the spatial correlation is assumed to decay exponentially with distance. Several cases are then analysed with the prior correlation scale being smaller or greater than the “true” correlation scale. Implications on the posterior errors are derived. Results are also discussed as a function of the size of the averaging domain chosen to aggregate the results. The paper is well written and the figures are clearly described giving useful interpretations. I thus recommend publication of this article. I only have few minor comments that I give below :

Detailed comments :

L17-20 p 9251 : This is true of the North American continent but also in Europe. It is to be noted that CO₂ measured at eddy flux towers is useful if calibration enables meaningful intercomparison of the towers.

L14 p 9259 : The parenthesis “(also with 100 particles)” is not understood ?

p 9266 : Could there be a discussion of how much the “cross-talk” that is seen is dependent on the set up used and if possible how it can be reduced ?

L20 p 9266 : The verb “is” is missing.

L1 p9268 : There is probably a typo after the “if”

First paragraph p 9268 : I think the comparison between an accuracy of 0.14-2.8Mt C/year and the 1 GtC/year of Gurney et al. is not quite fare. In the first case the numbers are from a pseudo experiment . These numbers are probably too low in the context of real world application and might be slightly misleading.

Legend Fig 3 : The construction of the third sentence is awkward.

Legend Fig 9 : No vertical arrows are seen on the plot ?

[Full Screen / Esc](#)[Print Version](#)[Interactive Discussion](#)[Discussion Paper](#)

Interactive
Comment

Full Screen / Esc

Print Version

Interactive Discussion

Discussion Paper