

Interactive comment on “Nested atmospheric inversion for the terrestrial carbon sources and sinks in China” by F. Jiang et al.

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jiangf@nju.edu.cn

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We would like to thank Dr. Xie for his thoughtful comments and helpful suggestions.

Referee: A nested atmospheric inverse system with a focus on China using the Bayes theory was developed for estimating carbon fluxes, monthly inverse modelling was conducted using CO₂ concentration measurements, spatial and temporal characteristics of the global and China terrestrial ecosystem carbon fluxes were investigated. The research topic is interesting, and the manuscript is within the scope of the journal Hydrology and Earth System Sciences (HESS). This manuscript is well written as a whole, but it needs minor revisions. The comments and suggestions are listed as follows:

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1. Line 26-28: “At the present, China has become the largest CO₂ emitter in the world, and will continue to increase in the near future due to with population growth and economic development.” Is it your conclusion ? Otherwise, it should be cited.

Response: Thanks for this comment. No, it is not a conclusion of this study. We have added a reference. As follows: “At the present, China has become the largest CO₂ emitter in the world, and will continue to increase in the near future due to population growth and economic development (Leggett, 2011).”

2. Section 2: The nested inversion system developed by Deng et al.(2007) was used in this research for the inversion regions using the transport modeling TM5. If the authors use a different transport model from TM5, please explain why.

Response: Thank you for your suggestion. The choice of transport model is important in atmospheric CO₂ inverse modeling because the estimated fluxes were shown to be sensitive to vertical and horizontal transport. TM5 has been evaluated extensively and consistently and performs well in ongoing intercomparisons (Stephens et al., 2007), and it has been widely used in the researches of global atmospheric chemistry (e.g., Houweling et al., 1998; Dentener et al., 2003; Peters et al., 2002) and atmospheric inversion (e.g., Meirink et al., 2008; Krol et al., 2008; Peters, et al., 2007).

Reference:

Houweling, S., Dentener, F., and Lelieveld, J.: The impact of nonmethane hydrocarbon compounds on tropospheric photochemistry, *J. Geophys. Res.*, 103, 10 637–10 696, 1998. Leggett, J.A., China’s greenhouse gas emissions and mitigation policies. CRS Report for Congress, 2011, available at: <http://www.fas.org/sgp/crs/row/R41919.pdf>, accessed 18 July 2011.

Dentener, F.,Weele, M. v., Krol, M., Houweling, S., and Velthoven, P. v.: Trends and inter-annual variability of methane emissions derived from 1979–1993 global CTM simulations, *Atmos. Chem. Phys.*, 3, 73–88, 2003.

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Peters, W., Krol, M., Dentener, F., Thompson, A. M., and Lelieveld, J.: Chemistry-transport modeling of the satellite observed distribution of tropical tropospheric ozone, *Atmos. Chem. Phys.*, 2, 103–120, 2002.

Peters, W., Jacobson, A.R., Sweeney, C., et al., An atmospheric perspective on North American carbon dioxide exchange: CarbonTracker. *Proceedings of the National Academy of Sciences (PNAS) of the United States of America.* 12/2007; 104(48): 18925-30. DOI: 10.1073/pnas.0708986104.

Krol, M. C., Meirink, J. F., Bergamaschi, P., Mak, J. E., Lowe, D., J  ockel, P., Houweling, S., and R  ockmann, T.: What can 14CO measurements tell us about OH?, *Atmos. Chem. Phys.*, 8, 5033–5044, doi:10.5194/acp-8-5033-2008, 2008. Meirink, J. F., Bergamaschi, P., Frankenberg, C., et al.: Fourdimensional variational data assimilation for inverse modelling of atmospheric methane emissions: Analysis of SCIAMACHY observations, *J. Geophys. Res.*, 113, D17301, doi:10.1029/2007JD009740, 2008.

Stephens, B. B., Gurney, K. R., Tans, P. P., Sweeney, C., Peters, W., Bruhwiler, L., Ciais, P., Ramonet, M., Bousquet, P., Nakazawa, T., Aoki, S., Machida, T., Inoue, G., Vinnichenko, N., Lloyd, J., Jordan, A., Heimann, M., Shibistova, O., Langenfelds, R. L., Steele, L. P., Francey, R. J., and Denning, A. S.: Weak Northern and Strong Tropical Land Carbon Uptake from Vertical Profiles of Atmospheric CO₂, *Science*, 316, 1732-1735, 10.1126/science.1137004, 2007.

Interactive comment on *Biogeosciences Discuss.*, 10, 1177, 2013.