Effect of meteorological data in carbon cycle inverse model

Takashi Maki[1]; Masaki Adachi[1]

[1] Atmospheric Environment Division, JMA

http://www.jma.go.jp/jma/index.html

The CO2 is one of the most important greenhouse gases. However, we do not fully understand its sources and sinks distributions. The inverse model is one of the most useful tools to estimate them. Up to now, we usually use specific year's meteorological data in inverse model (Baker et al., 2006). In this study, we have adopted Japanese Re-Analysis 25 year's meteorological data in inverse model (forward calculation). We have tested 3 types of experiment as below.

1. Calculate transport matrix from the specific year's meteorological data in inverse model.
2. Calculate transport matrix from the re-analysis meteorological data in inverse model.
3. Use averaged transport matrix (experiment 2) in inverse model.

There is little difference in estimated global CO2 flux between the three experiments. This means that the traditional (specific year's meteorological data in transport matrix) inverse model has some rationality in estimate global CO2 flux. The other hand, there are some difference in the observational data selection rate (Maki et al., 2005) and analysis error between them. In both issues, the experiment 2 and 3 shows good performance than the experiment 1. This shows that we can enlarge the number of observational data and obtain more robust CO2 analysis when we adopt real meteorological field in inverse model.

The datasets used for this study are provided from the cooperative research project of the JRA-25 long-term reanalysis by the Japan Meteorological Agency (JMA) and the Central Research Institute of Electric Power Industry (CRIEPI).

Baker, D. F., et al., 'TransCom 3 inversion intercomparison: Impact of transport model errors on the interannual variability of regional CO2 fluxes, 1988-2003', Global Biogeochemical Cycles, 2006.

Maki, T. et al., 'Observational Data Screening Technique Using Transport Model and Inverse Model in Estimating CO2 Flux History', Extended abstracts 7th International CO2 Conference, Broomfield, Colorado, 2005.