An analysis of CO$_2$ concentration variation using inverted surface fluxes

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CO$_2$ is the main cause of the global warming and there are several methods to study for the circulation of CO$_2$. The inverse method is one of these methods. It uses an atmospheric transport model to estimate CO$_2$ surface fluxes from atmospheric measurements. Recently, many atmospheric measurements of CO$_2$ are newly available and these are expected to be used for CO$_2$ inversion. Especially, measurements at upper troposphere by JAL airplane are remarkably extended and expected to impact on CO$_2$ inversion.

This study is intended to evaluate whether our transport model has an enough performance to simulate the variation of CO$_2$ concentration at upper troposphere and be able to include these CO$_2$ concentration measurements into the inversion analysis. Furthermore we analyze the seasonal variation of CO$_2$ concentration at each latitude in the upper troposphere and try to understand what process effects on these variations.

First we make CO$_2$ surface fluxes by the inverse method and then perform a CO$_2$ transport experiment using these inverted fluxes and the tracer transport model based on NICAM.