



On recent trend of land use change emissions: reality or fallacy?

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Land use change (LUC) emissions is the integral component of terrestrial carbon balance, with the magnitude accounting for 12.5% of anthropogenic CO₂ emissions. Until today, estimation of LUC emissions has been developed via various methods such as statistical approaches (e.g., inventory and book-keeping), remote-sensing, and process modeling. However, large interannual and decadal variations still exist between estimates of LUC emissions, which limits our confidence in future projection of terrestrial carbon balance.

Among the existing methods, in particular, LUC emissions by process models have drastically changed between before and after the update of land use and land cover changes (LULCC) forcing for models (i.e. History Database of the Global Environment: HYDE). Before the update, (1) LUC emissions increased from the 1980s to the 1990s, then decreased in the 2000s. After the update, (2) LUC emissions were kept at a low level for the 1980s-1990s, then started increasing in the 2000s and continued to increase towards the recent years. These changes question whether effort of land use management strategies in the past decades has been effective, thus deliver different messages to policy makers.

Based on results of multiple estimates of LUC emissions including process models (the TRENDY series, ver. 2 to ver. 7), statistical approaches (inventories and country statistics), and remote-sensing, this study aims to bring an opportunity to discuss on the recent trend of LUC emissions (e.g., why the estimates differ in decadal variability, what has been changed in recent estimates, and what is necessary to have consistent decadal variability?).