



Reconstructed preindustrial landuse change emissions and atmospheric CO₂ from icecores are inconsistent

C.H. Reick (1), T. Raddatz (1), J. Pongratz (1,2), M. Claussen (1,3)

(1) Max Planck Institute for Meteorology, Hamburg, Germany (2) International Max Planck Research School on Earth System Modelling, Germany (3) Meteorological Institute, University of Hamburg, Germany (Christian.Reick@zmaw.de / Phone: +49-40-41173-117)

Based on the reconstruction of anthropogenic landcover change 800 AD to present by Pongratz et al. (2007) we derive the associated CO₂-emissions due to agricultural expansion using two different approaches: The first is a variant of the Houghton et al. (1999, 2002) book keeping method, the second makes use of the process based land vegetation model JSBACH. Together we find that between 1160 AD and 1770 AD the emissions sum up to 29 PgC to 55 PgC (depending on assumed emission factors). Surprisingly, during this same time span the atmospheric CO₂-concentrations decreased according to ice core reconstructions. Moreover, the analysis of carbon isotope ratios by Trudinger et al. (2002) indicates that during this period the land biosphere has been a carbon sink. — All these findings are only hard to reconcile. If one is not questioning the common view of landuse emissions as a consequence of deforestation, a speculative explanation could be a very strong positive feedback between carbon cycle and climate: in combination with the known cooling during the Little Ice Age this could have led to a strong reduction in overall emissions from soil respiration that overcompensated the landcover change emissions.