



A probabilistic assessment of historic carbon dioxide emissions due to land use changes

L. I. Miltich (1,*), D. Ricciuto (2), and K. Keller (1)

(1) Department of Geosciences, The Pennsylvania State University, University Park, PA 16802, U.S.A., (*) lmiltich@geosc.psu.edu, (2) Environmental Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN 37831, U.S.A.

Carbon dioxide emissions through land use changes are an important climate forcing. Current estimates of these CO₂ emissions are deeply uncertain. Estimates of land use change CO₂ emissions for the 1980s, for example, range from 0.6 to 2.5 Gt C yr⁻¹. This uncertainty hinders our mechanistic understanding of past, as well as our predictive capability of future CO₂ sinks. Here, we assimilate oceanic and atmospheric observations into a globally aggregate coupled climate carbon cycle model in order to analyze the power of past and future observations to: (i) distinguish between alternative previously published land use CO₂ emissions reconstructions, (ii) improve hindcast and projection skill, and (iii) reduce uncertainty in key carbon cycle parameters.