

THE CARBON BALANCE OF THE TERRESTRIAL BIOSPHERE IN THE TWENTIETH CENTURY

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Each year a consortium of Dynamic Global Vegetation Modelling groups perform a factorial set of global simulations over the historical period, 1901 –present, to investigate the temporal and spatial trends in the land sink, and the contribution of land-use to emissions. This activity contributes the annual global carbon budget updates of the Global Carbon Project. Typical around 10 models are forced with reconstructed observed climate, global atmospheric CO₂, gridded fields of historical land-use and land cover changes (LULCC), and nitrogen deposition for a subset of models which include a fully interactive nitrogen cycle. The TRENDY project will be presented, including process developments through to the latest Trendy-v4 (1901-2014). Results are used to ascertain the individual contribution of CO₂, Climate, Land-Use and N deposition on the regional and global land carbon sink. Increasingly offline land surface simulations and coupled ESM simulations use the same land-surface components and results from each can inform the other. Both TRENDY and C4MIP have increasing interest in evaluation activities. Furthermore, observational datasets including those from remote sensing are used to evaluate model performance and help constrain the global land carbon sink over the past two decades.

Keywords: land-atmosphere interactions, DGVMs, climate-carbon cycle models