

The Carbon Balance of the Terrestrial Biosphere under Climate Change

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The terrestrial biosphere is the most variable and uncertain of the major components in the global carbon cycle. Inter-annual variability in the terrestrial carbon sink is large, and the processes underpinning this variability are not well understood. This is further confounded by carbon dioxide emissions from anthropogenic land use change, which are also poorly constrained and highly variable both in space and time. Although global carbon cycle models perform reasonably well at replicating observed trends in terrestrial vegetation carbon cycling, there is very poor agreement between models about whether the terrestrial biosphere will remain a sink or become a source during the 21st century. Moreover, the likelihood of large-scale outgassing of carbon from the terrestrial biosphere is unknown and this possibility is poorly constrained in model predictions of 21st century climate change.