

## GC33F-01 Assessing the Spatiotemporal Dynamics of Carbon Balance of the Terrestrial Biosphere in Response to Climate Change in 1911-2000

[Back to:](#) [Session: Environmental, Socioeconomic, ...](#)

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To assess how terrestrial ecosystems react to climate change at different scales in a long term, in this paper, the spatiotemporal variability of terrestrial carbon flux at global and continental scales were assessed and compared in the period 1911-2000. The 30-year running mean values results indicated that the terrestrial biosphere has been approximately neutral in 1911-1940 periods, and climate variability and change promoted absorbance of terrestrial carbon in 1941-1970 periods with  $0.482 \text{ Pg C yr}^{-1}$ , while in 1971-2000, the sink effect weakened with  $0.239 \text{ Pg C yr}^{-1}$ . Ecosystems in Europe and North America were estimated to have been absorbing carbon in the last 90 years. Savanna and temperate forest contributed the most to carbon uptake than other ecosystems, while most carbon release was induced by tropical forest. Ecosystems at northern mid-latitude north of the tropics have been sinks for atmospheric carbon, and the effect strengthened gradually in the past 90 years. By contrast, the South Temperate Zone appeared neutral for carbon in 1911-1970, while carbon accumulated significantly and amounted to  $0.208 \text{ Pg C yr}^{-1}$  in 1971-2000. The tropic zone appears to be a small net source of carbon in 1911-1940, and then carbon was accumulating in 1941-1970. However, in 1971-2000, a robust carbon source was formed. Due to the consistently rising global temperature and redistributed precipitation patterns, the distribution of terrestrial ecosystems changed with shrinking mid- and high latitude ecosystems, while expanding of ecosystems in temperate zones. Accordingly, the global terrestrial NPP increased during the past century, but it didn't cause a substantial terrestrial carbon sink, for warming may enhance NPP, but also stimulates soil respiration. In general, the react of carbon flux of different terrestrial ecosystem varied a lot in response to climate change, and the generation or reversal of the terrestrial carbon sink caused by climate change itself may play a negative feedback to the climate system.

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