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El Niño induced draught and recently increased terrestrial CO2 release

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Currently about half of the anthropogenic CO2 emissions remain in the atmosphere, the remainder is taken up by the oceans and the terrestrial biosphere. Future climate modelling experiments, however, show that todays terrestrial sink capacity is likely to become a CO2 source by the second half of the century. But in order to accurately predict the long-term response of the biosphere to climate change it is important to successfully simulate CO2 fluctuations on interannual time scales, which show a highly significant correlation with El Niño/Southern Oscillation. Uncertainties surrounding the underlying mechanisms have been highlighted when the most recent accelerated rise in atmospheric CO2 concentrations received widespread media coverage. Here, we present simulations of the balance between photosynthesis and ecosystem respiration with the terrestrial biosphere model BETHY driven by observed climate. Simulations capture most of the timing and magnitude of the observed CO2 growth rate anomalies, and agree remarkably well with remote sensing observations of the fraction of absorbed photosynthetically active radiation, showing a drought-related decline after mid 1999 linked to the most recent El Niño event. Both provide compelling evidence for an El Niño-linked carbon cycle feedback.