



## **Increasing tree mortality in Amazonia and potential consequences for future forest carbon storage**

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Studies based on dynamic global vegetation models (DGVMs) suggest that tropical forests will be largely resilient to future global environmental change, with the vast majority of DGVM projections for the 21st century resulting in large biomass gains due to enhanced productivity arising from significant CO<sub>2</sub> fertilisation. However, recent analyses have found that the Amazonian intact forest carbon sink has diminished substantially in recent decades as a consequence of increases in biomass losses due to tree mortality exceeding increases in forest productivity.

Here we investigate the extent to which commonly used vegetation models are able to represent the observed declines in the Amazonian forest carbon sink and find that the models are generally unable to replicate the magnitude of the decline. This is mainly due to the inability of the models to capture the large increases in biomass mortality rates observed in recent decades. This inability has potentially profound implications for the simulated fate of tropical forests under global environmental change as it may lead to predictions of unrealistically resilient forests with optimistically high future biomass gains. This reflects the historical bias in model development towards processes linked to productivity with comparatively little attention paid to accurate representation of mortality/turnover processes.

The underlying mechanisms driving increases in Amazonian tree mortality are complex and hard to disentangle, presenting an important challenge for the vegetation modelling community. While there has been substantial effort invested in improving representation of some mechanisms, particularly drought-induced mortality, other potentially important mechanisms, such as liana-induced mortality are currently much less developed.