



## **Impact of volcanism on the terrestrial biosphere: Insights from Northern Hemisphere FLUXNET data**

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Volcanic eruptions can have a significant effect on the Earth's terrestrial biosphere through the release of sulphur dioxide into the stratosphere, with reduced surface temperatures lowering rates of heterotrophic respiration, and an increased diffuse radiation fraction enhancing rates of photosynthesis. Our current understanding of these mechanisms is reliant upon Earth System global climate models that contain key uncertainties, thus reducing their robustness in simulating a biospheric impact. Fundamentally, a highly resolved temporal proxy dataset that can constrain these model estimates is lacking. Here, the FLUXNET micrometeorological tower network is assessed as a climate science tool to overcome these limitations, by exploring its ability to identify a carbon cycle response from two recent volcanic eruptions. Results demonstrate a transient factor-of-two enhancement of the terrestrial carbon cycle to a volcanic forcing, highlighting the importance of relatively minor, yet frequent eruptions that have so far been ignored. These results have implications for both climate model parameterisation and uncertainty analysis, whilst enhance our understanding of climate-cycle interactions. Results further suggest recent volcanism may have had a greater contribution to the current global warming hiatus than previously thought, and advocates further expansion of the FLUXNET network with additional research that explores climate-carbon cycle interactions proving invaluable.