SMOS-IC L-VOD reveals that tropical forests did not recover from the strong 2015–2016 El Niño event

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Severe drought and extreme heat associated with the 2015–2016 El Niño event have led to large carbon emissions from the tropical vegetation to the atmosphere. With the return to normal climatic conditions in 2017, tropical forest aboveground carbon (AGC) stocks are expected to partly recover due to increased productivity, but the intensity and spatial distribution of this recovery are unknown. Simulations from land-surface models used in the global carbon budget (GCB) suggest a strong reinvigoration of the tropical land sink after the 2015–2016 El Niño. However, models and atmospheric inversions display large divergences in tropical CO₂ fluxes during the 2017 recovery event. For instance, models predict a total net land sink recovery (2017 sink minus the 2015–2016 average sink) ranging from 0.3 to 2.6 Pg C, and the land sink recovery estimated from five atmospheric inversions ranges from −0.08 to +1.92 Pg C. The results of different inversions show a large spread in the tropics due to the scarcity of stations and uncertainties in atmospheric transport simulations.

We used low-frequency microwave satellite data (L-VOD) to feature precise monitoring of AGC changes and show that the AGC recovery of tropical ecosystems was slow and that by the end of 2017, AGC had not reached predrought levels of 2014¹. From 2014 to 2017, tropical AGC stocks decreased by 1.3 Pg C due to persistent AGC losses in Africa (-0.9 Pg C) and America (-0.5 Pg C). Pantropically, drylands recovered their carbon stocks to pre-El Niño levels, but African and American humid forests did not, suggesting carryover effects from enhanced forest mortality.

Reference