Woods Hole Research Center

RESEARCH SUMMARY

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Tropical forests are a net carbon source based on aboveground measurements of gain and loss

New report in the journal *Science* provides most comprehensive picture of the toll taken on tropical forests from deforestation and forest degradation.

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KEY MESSAGES

- Tropical forests are a net source of carbon emissions to the atmosphere making their management a critically important climate change mitigation tool.
- Accurate measurements of change in forest carbon through time are needed to support countries in determining their national contributions to the Paris Agreement.
- Current methods of monitoring forest carbon do not sufficiently address losses from forest degradation and disturbance or gains from growth.
- The newly published approach promises to provide a range of stakeholders, including national and subnational governments, with consistent and accurate estimates of losses and gains in forest carbon from biomass change across large areas.

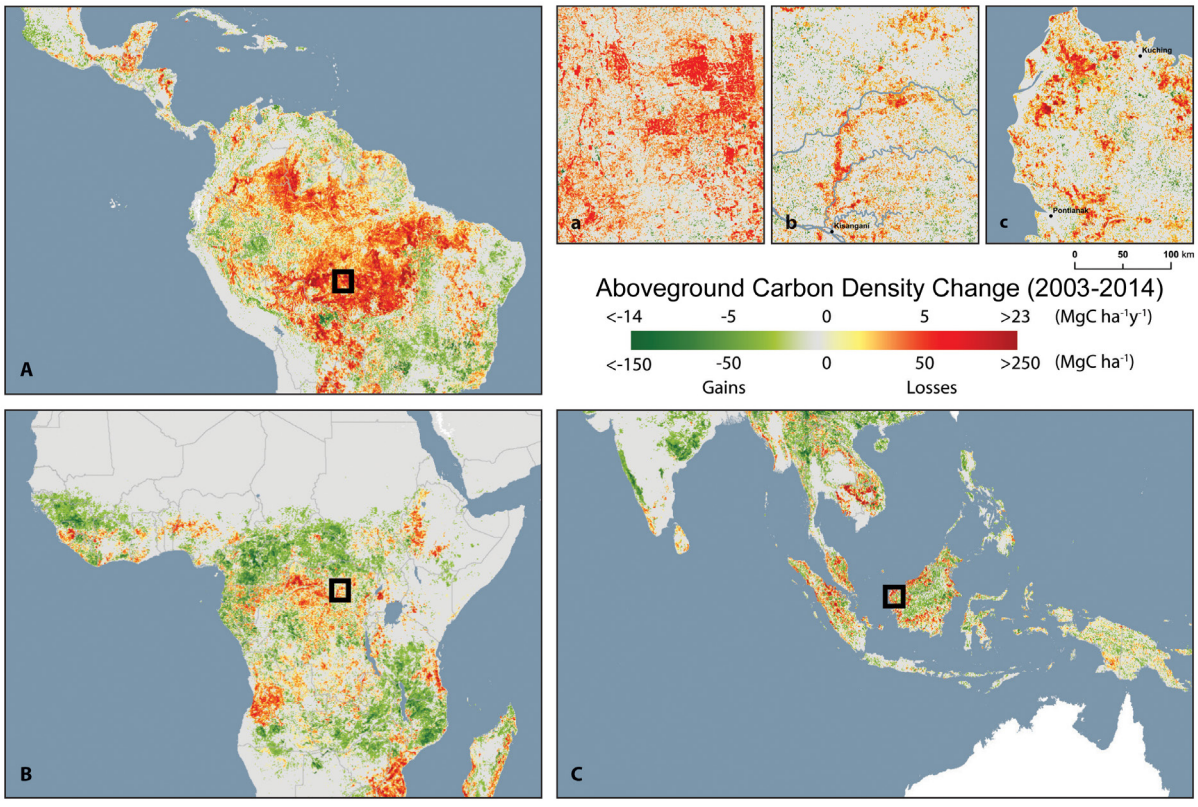
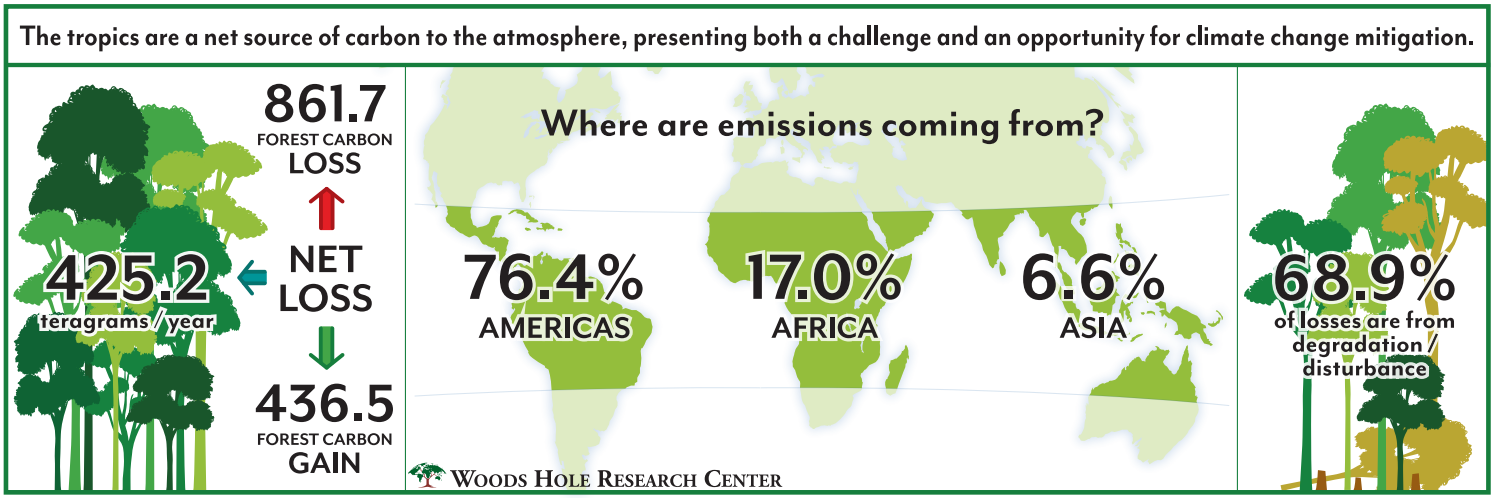


Figure 1. Geography of carbon density change. The figure depicts the spatial distribution of areas exhibiting gains, losses, and no change (stable) for the period 2003-2014 within each grid cell (ca. 500 x 500 m). *credit: Science*



BACKGROUND

For more than 30 years scientists have estimated the emissions of carbon from land-use change by assigning carbon densities of biomass and soil to lands undergoing changes in management, for example the conversion of forest to agriculture. Now, with the ability to measure aboveground carbon density using information from satellites, we can measure changes in land-based carbon without first identifying changes in land use.

Advancing prior work of WHRC scientists, this new research combines field and satellite measurements to assess changes (i.e., gains and losses) in aboveground carbon density using a model that provides for annual measurements with quantified uncertainty. This approach has several advantages over previous methods, including the ability to account for losses of forest carbon associated with forest degradation and disturbance as well as from deforestation without the need to explicitly define and/or identify changes in land use. The approach can also account for gains in carbon associated with forest growth.

IMPLICATIONS FOR CLIMATE

The Paris Agreement was a major step forward in addressing global climate change, with more than 190 countries signing the accord. Many of their national commitments to reducing carbon dioxide emissions to the atmosphere – especially from countries in the developing world – depend on maintaining forests intact. Approximately 18 percent of global greenhouse gas emissions come from deforestation and land use change. The largest remaining tracts of tropical forest in the world – in the Amazon, Central Africa, and Southeast Asia – contain enormous amounts of carbon and are key to our ability to mitigate the worst effects of climate change. The ability to accurately measure gains and losses in above ground carbon storage will provide more rigor to our understanding of the climate system while moving the world closer to climate solutions through mechanisms like the Paris Agreement.

FULL PAPER AVAILABLE AT: **http://science.sciencemag.org/lookup/doi/10.1126/science.aam5962**

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