Global Forest Monitoring: CTFS-ForestGEO network

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Center for Tropical Forest Science (CTFS)- Forest Global Earth Observatory (ForestGEO)

the only ground-based forest monitoring network applying the same protocol to forests globally

64 sites | 25 countries | 100 partner institutions
> 10,000 species | > 6 million trees | > 15 million DBH measurements
CTFS-ForestGEO: a worldwide network monitoring forests in an era of global change

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Outline

1. Core census
2. The network
3. Supplementary measurements
4. Network growth & operations
1- Core Census
Attributes of a CTFS-ForestGEO Census

• Very large plot size
• Includes every freestanding woody stem ≥1cm DBH
• All individuals identified to species
• Diameter measured on all stems
• Mapping of all stems and fine-scale topography
• Census typically repeated every 5 years

Wind River, WA, USA
Example applications of core census:
mapping species distribution and C stocks on
Barro Colorado Island (Panama)

Mascaro et al., 2010
2- The Network
The CTFS-ForestGEO network represents the range of bioclimatic, edaphic, and topographic conditions experienced by forests globally.
Current Climate & Future Climate projections
(HadGEM2-ES for 2050)

Anderson-Teixeira et al. 2015
CTFS-ForestGEO plots in the landscape setting

Forest loss 2000(yellow)-2012 (red)

Hansen et al. 2013 database
3- Supplementary Measurements
Standardized measurements quantify multiple aspects of forest structure and function.

**Measurement**

phere gas exchange (15)
4- Network Growth & Operations
Growth of CTFS-ForestGEO

Number of Sites!

Year!


Boreal!
Temperate!
Subtropical!
Tropical!
Investigators

Network leadership: Smithsonian

Plots Principal Investigators

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National and International Training and Capacity Building

Strengthens scientific capacity across the global network of sites

Provide open-access analytical and data management tools
Data & Analysis

- Data archived in standardized format
- Stored in CTFS database or managed locally
- Owned by site PIs

- CTFS R package facilitates analysis
Leveraging CTFS-ForestGEO to understand forest dynamics in an era of global change
Smithsonian Institution Global Forest Observatory
Center for Tropical Forest Science

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&

Smithsonian Institution

www.ctfs.si.edu
Thank you!
Results: Diversity & Dynamics of Tropical Forests

1. Tree species have aggregated spatial distributions driven by specific habitat requirements and limited dispersal.

2. The functional characteristics and demography of species depend on the resources available in their preferred sites.

3. Habitat specialization is not sufficient to explain local tree diversity (evidence for resource-based niches needed).

1. Negative density-dependent effects are pervasive. Pests/pathogens are implicated.

2. Biomass & C storage depend on habitat, biogeography & phylogeny.

3. Forest communities are not in steady-state compositional equilibrium

1. Some (?)most) tropical forests are increasing biomass stocks.

2. Trees are growing more slowly in some tropical forests.

3. Extirpation of animals is changing forest diversity.
Global change pressures across CTFS-ForestGEO

Anderson-Teixeira et al. 2015
NEXT GENERATION ECOSYSTEM EXPERIMENT - TROPICS
More detailed mechanistic models of processes determining carbon/energy balance in the tropics
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