

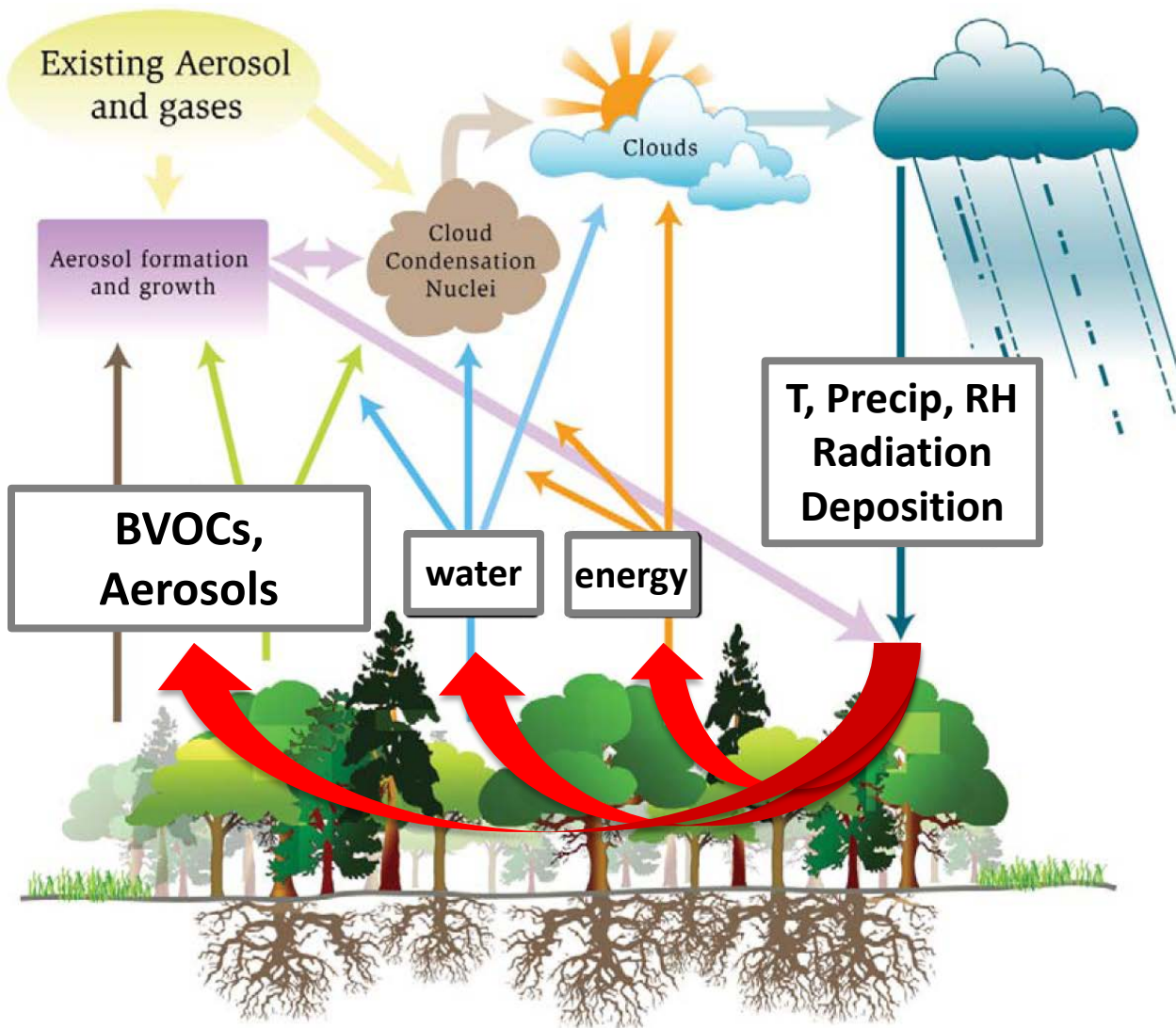
# DOE Terrestrial Ecosystem Science in GOAmazon

## Geco – Green Ocean Amazon Terrestrial ECosystem Project 2014

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March 19, 2013



# TES: Canopy Feedbacks in GOAmazon



**GOAmazon**

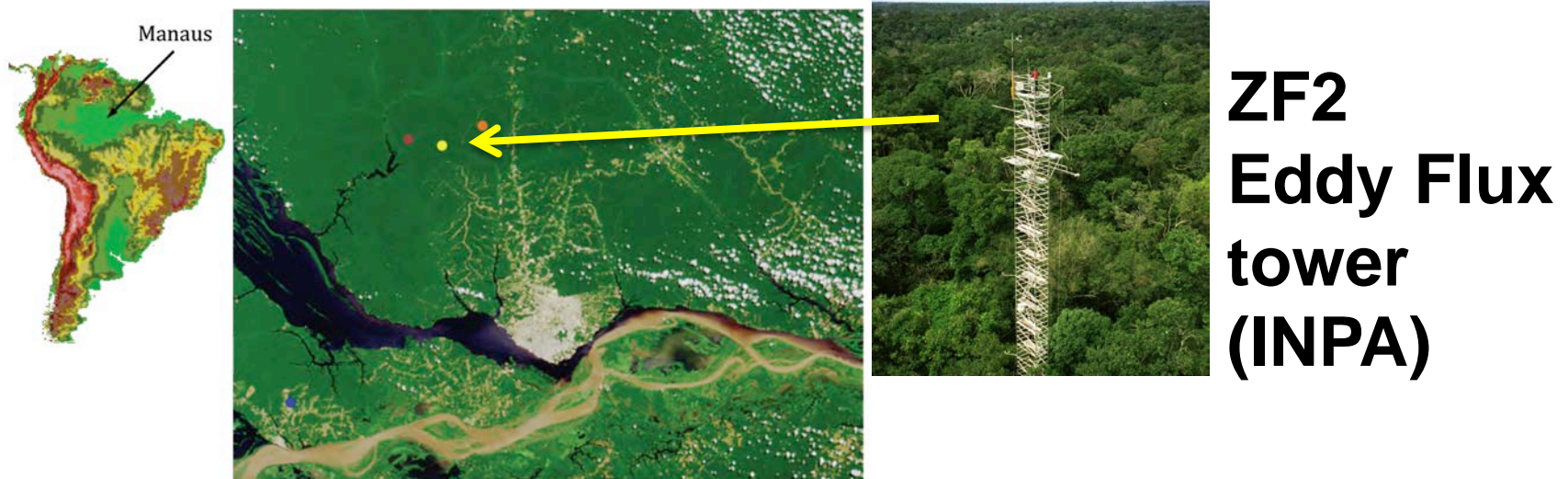
**GOAmazon-  
TES (Geco)**

Advance understanding and prediction of Tropical BVOC production and associated land-climate Feedbacks.

# Green Ocean Amazon Terrestrial Ecosystem (Geco) Project

Focus: Leaf-to-canopy BVOC emissions and improving aerosol-forest-atmosphere interactions in Earth system models (ESMs).

- How are BVOC emissions related to environmental and biotic factors?
- How do BVOC profiles and canopy emissions vary spatially
- What are the effects of light quality (direct/diffuse) on gross primary productivity (GPP), water, and energy fluxes?



Leaf level, tower-based, and airborne approaches for quantifying forest-atmosphere BVOC fluxes

# TES Approach

**MODEX: Model-inspired experiments for improving Predictive Understanding**



**Modeling  
Science**

**Experimental/P  
rocess**

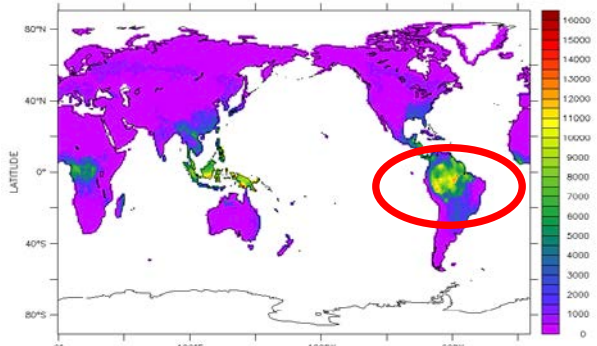
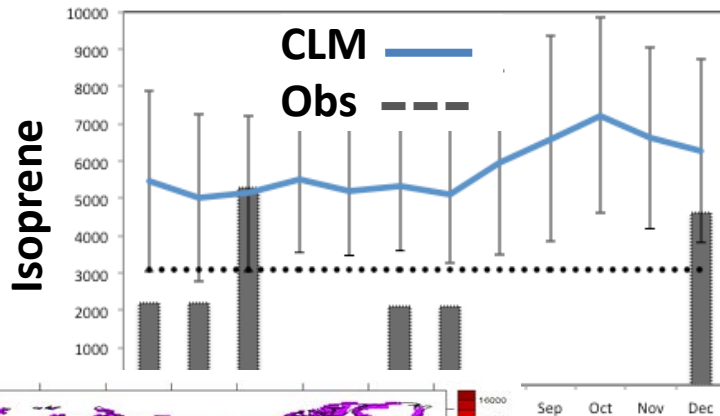


*Collaborative,  
iterative process*

# TES Approach

## MODEX: Model-inspired experiments for improving Predictive Understanding

### Model Uncertainty



(Tropics dominated)

Uncertainty, Bias

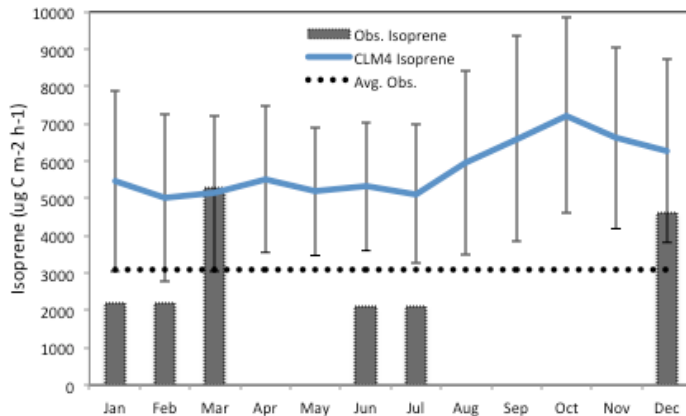
Experimental/P  
rocess

process, parameters, drivers

# TES Approach

## MODEX: Model-inspired experiments for improving Predictive Understanding

### Model Uncertainty



Uncertainty, Bias

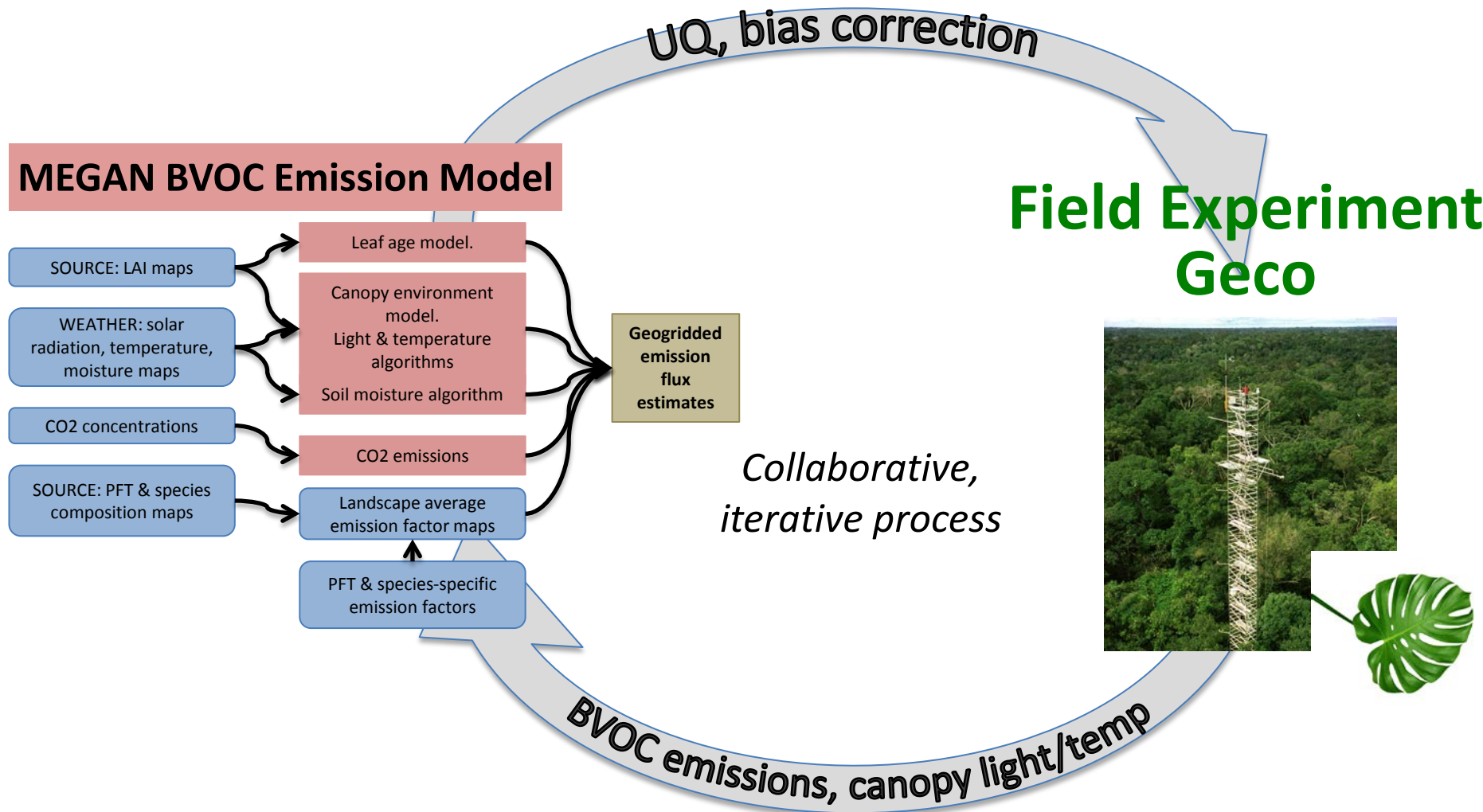
Field Experiment  
Geco



process, parameters, drivers

# TES Approach

## MODEX: Model-inspired experiments for improving Predictive Understanding



# TES Approach

## MODEX: Model-inspired experiments for improving Predictive Understanding

MEGAN BVOC Emission Model

### AMFA and AAF Measurements

**Aerosols:** atmospheric composition, properties, VOC concentrations

**Atmospheric State:** moisture, temperature, wind, ozone, precipitation

**Clouds** chemical and radiative properties

**Atmospheric Carbon**

**Radiation:** Diffuse/Direct, long/short wave radiation

UQ, bias correction

Field Experiment  
Geco

Added  
ion  
<  
ates

*Collaborative,  
iterative process*

### TES VOC Classes

Volatile Isoprenoids

Oxidation Products

Green Leaf Volatiles

Oxygenated VOCs

Sulfides

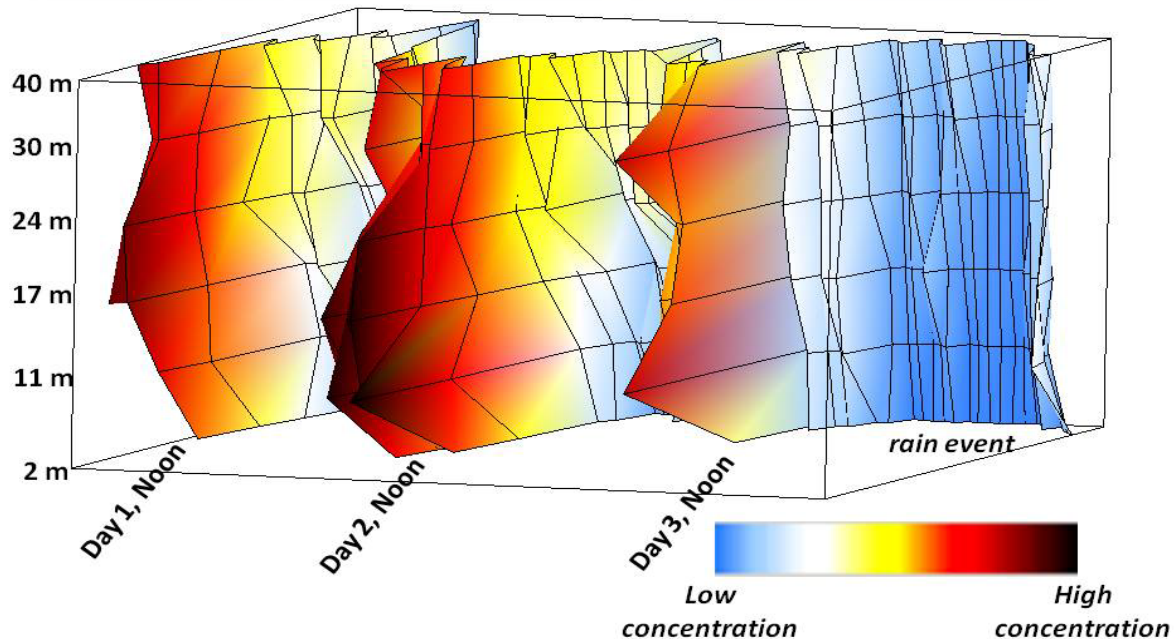
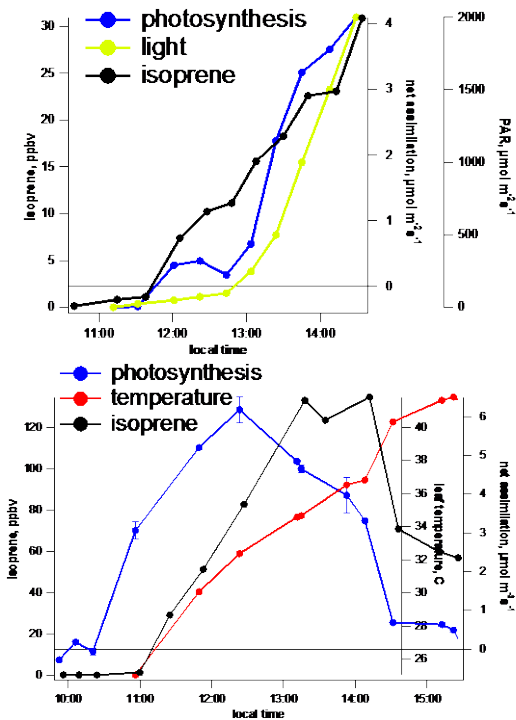
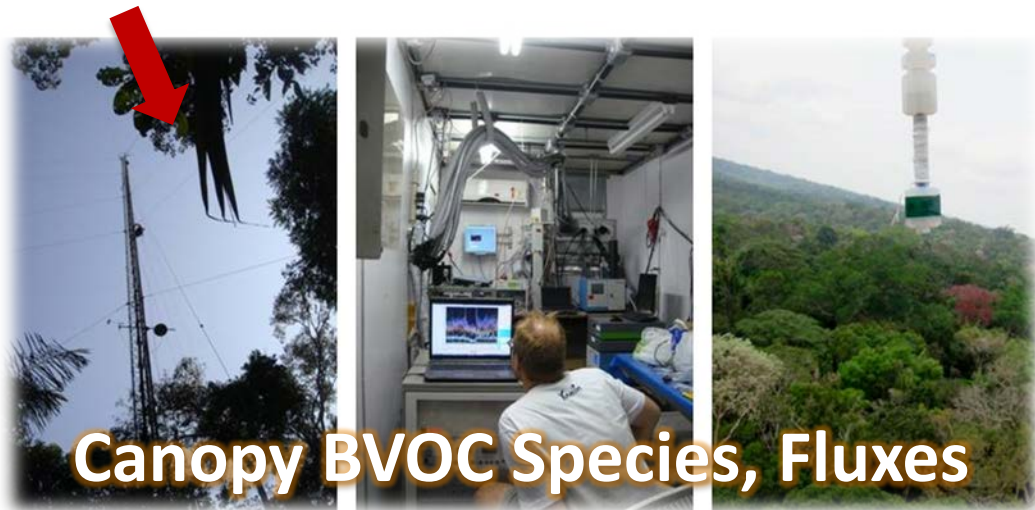
Aeromatics

Alkenes and Alkanes

missions, canopy light/t



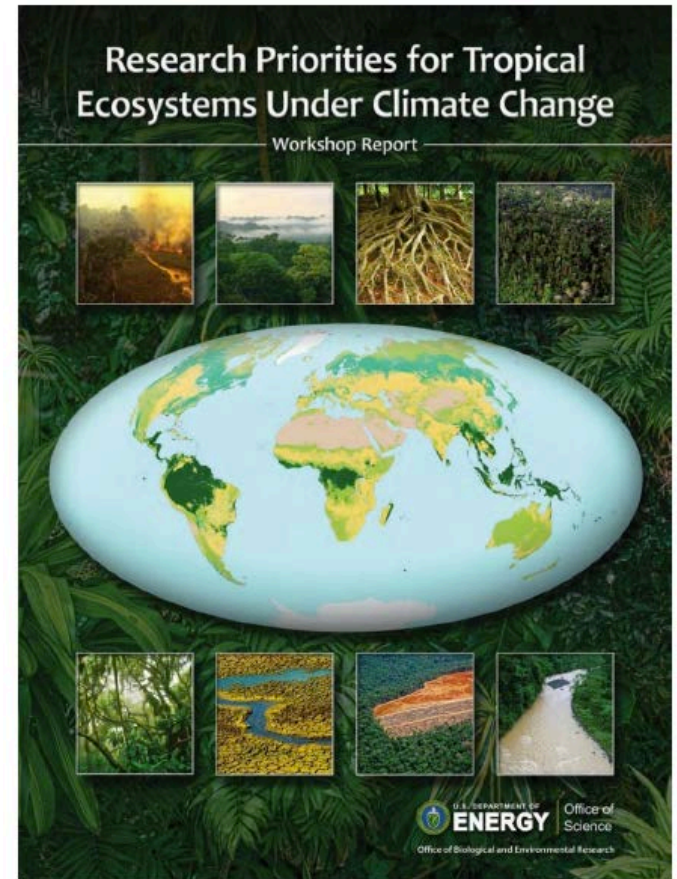
# Influence of Light and Temperature on Leaf and Ecosystem BVOC Emissions



# TES Workshop on Tropical Ecosystems

## June 2012

1. How will tropical ecosystems respond to increasing temperatures, increasing CO<sub>2</sub> concentrations, and altered rainfall?
2. Will climate change increase natural disturbance events and mortality?
3. What are the interactions of climate change with aerosol and particulate emissions from tropical forests?
4. How will forest-climate interactions respond to anthropogenic disturbance and land-use change?



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Rosie Fisher  
Jefferson Hall  
Rich Norby  
Steven C. Wofsy

Daniel Stover  
Dorothy Koch  
Mike Kuperberg