

Proposal for Fluxnet Synthesis

Initial Proposers: K. Fred Huemmrich^{1,2}, Elizabeth Middleton², Hank Margolis³

Co-workers needing access to data: Yen-Ben Cheng^{4,2}, Petya Campbell^{1,2}

Affiliations:

¹ Joint Center for Earth Systems Technology (JCET)
University of Maryland Baltimore County

Contact information:

Code 614.4

Biospheric Sciences Branch

NASA's Goddard Space Flight Center

Greenbelt MD 20771

Phone: (301) 614-6663

Fax: (301) 614-6695

Email: Karl.F.Huemmrich@nasa.gov

² Biospheric Sciences Branch
NASA's Goddard Space Flight Center
Greenbelt, MD, USA

³ Canadian Carbon Program and
Université Laval, Sainte-Foy, Québec, Canada

⁴ Earth Resources Technology, Inc.
Annapolis Junction, MD, USA

Title of Paper and Outline

Hyperspectral Remote Sensing of Carbon Fluxes

The goal of this study is to examine the use of hyperspectral reflectance data to determine ecosystem carbon fluxes and light use efficiency for different vegetation types under varying conditions. The Hyperion instrument on the Earth Observer-1 (EO-1) satellite has been collecting data for over nine years creating a unique dataset of globally distributed hyperspectral observations. Dr. Middleton, a co-proposer of this study, is the EO-1 Mission Scientist. Recently Hyperion data were made available at no cost, creating the possibility of using large numbers of images in global studies. This study will use Hyperion data to test approaches to detect biochemical changes in leaves associated with photosynthetic downregulation, leaf water content, leaf nutrient status, and leaf pigment content, relating these values to carbon flux and light use efficiency as measured by the flux towers. By examining a

large number of towers representing a range of vegetation types and environmental conditions we expect to develop robust approaches for remotely sensing carbon fluxes.

Sites Involved:

A cross-comparison between the Fluxnet Synthesis metadata and the Hyperion scene database found 53 stations where Hyperion scenes have been collected during the growing season of a year when the tower was reported as operating and where the image had 30% or less cloud cover. These tower sites are listed in the table below. We only specifically need flux data for about a month around the times of the Hyperion scenes.

Site ID	Site Name
AU-How	UCI-1989 burn site
AU-Tum	Hunan Yueyang
BR-Cax	FL - Kennedy Space Center (slash pine)
BR-Ji2	FL - Slashpine-Mize-clearcut-3yr,regen
BR-Ma2	FL - Slashpine-Donaldson-mid-rot- 12yrs
BR-Sa1	Carlow1
BR-Sa2	Caxiuana Forest-Almeirim
BR-Sa3	Tumbarumba
BW-Ma1	AK - Atqasuk
CA-Ca1	CA - Sky Oaks- Young Stand
CA-Ca2	Puechabon
CA-Gro	UCI-1964 burn site
CA-Man	Castelporziano
CA-Mer	UCI-1981 burn site
CA-NS1	CA - Blodgett Forest
CA-NS2	CA - Vaira Ranch- Ione
CA-NS3	CA - Tonzi Ranch
CA-NS4	WA - Wind River Crane Site
CA-NS5	IL - Bondville
CA-NS6	UCI-1964 burn site wet
CA-Obs	IL - Bondville (companion site)
CA-Ojp	NE - Mead - irrigated continuous maize site
CA-SJ1	NE - Mead - irrigated maize-soybean rotation site
CN-Hny	AZ - Santa Rita Mesquite
FR-Pue	British Columbia- Campbell River - Mature Forest Site
IE-Ca1	Manaus - ZF2 K34
IL-Yat	NE - Mead - rainfed maize-soybean rotation site
IT-Cpz	British Columbia- Campbell River - Clearcut Site
JP-Mas	Santarem-Km77-Pasture
US-Atq	Sask.- SSA Old Black Spruce
US-Aud	BOREAS NSA - Old Black Spruce
US-Bar	Mase paddy flux site, Tsukuba, Japan (MSE)
US-Bkg	UCI-1850 burn site
US-Blo	OH - Oak Openings
US-Bo1	Santarem-Km67-Primary Forest

US-Bo2	Santarem-Km83-Logged Forest
US-Brw	Sask.- SSA Old Jack Pine
US-Ho1	SD - Brookings
US-Ho2	NH - Bartlett Experimental Forest
US-Ivo	Sask.- 1994 Harv. Jack Pine
US-KS1	ME - Howland Forest (main tower)
US-KS2	Maun- Mopane Woodland
US-Ne1	Rond.- Rebio Jaru Ji Parana- Tower A
US-Ne2	Howard Springs
US-Ne3	Yatir
US-Oho	FL - Kennedy Space Center (scrub oak)
US-SO3	AZ - Audubon Research Ranch
US-SP2	ME - Howland Forest (west tower)
US-SP3	Ontario- Groundhog River-Mat. Boreal Mixed Wood
US-SRM	AK - Barrow
US-Ton	AK - Ivotuk
US-Var	UCI-1930 burn site
US-Wrc	Eastern Peatland- Mer Bleue

Co-authorship strategy:

Members of the FLUXNET community are welcome as coauthors given that they provide academic input for the analysis. For any site PI who wishes their data not be used, we will not include their data in the analysis.