NPP Multi-Biome: TEM Calibration Data, 1992, R1

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Revision date: September 13, 2013

Summary:

This data set contains one data file (.csv format) that is known as the Terrestrial Ecosystem Model (TEM) data set. The data provide pool sizes and fluxes of carbon (C) and nitrogen (N) for 16 globally distributed field sites that represent a wide range of terrestrial biomes, tundra to tropical forest, but exclude wetlands. The net primary productivity (NPP) data were extracted from the literature. They were not previously widely available to the ecosystem modeling community in electronic form until this data set and additional NPP data sets were published by the ORNL DAAC. The data were used to calibrate the ecosystem process-based TEM.

The TEM was developed by staff at the Ecosystem Center, Marine Biological Laboratory, Woods Hole, Massachusetts, USA, to estimate the spatial and temporal distribution of major carbon (C) and nitrogen (N) fluxes and pool sizes at continental to global scales (resolution: 0.5 degrees latitude x 0.5 degrees longitude).

Eight of the TEM calibration sites are also included in the ORNL DAAC NPP data collection as individual site NPP data sets.

Revision Notes: Only the documentation for this data set has been modified. The data files have been checked for accuracy and are identical to those originally published in 1999.

Additional Documentation:

NPP data collection contains field measurements of biomass, estimated NPP, and climate data for terrestrial grassland, tropical forest, temperate forest, boreal forest, and tundra sites worldwide. Data were compiled from the published literature for intensively studied and well-documented individual field sites and from a number of previously compiled multi-site, multi-biome data sets of georeferenced NPP estimates. The principal compilation effort (Olson et al., 2001) was sponsored by the NASA Terrestrial Ecology Program. For more information, please visit the NPP web site at http://daac.ornl.gov/NPP/npp_home.html.

Data Citation:

Cite this data set as follows:

Kicklighter, D. W. 2013. NPP Multi-Biome: TEM Calibration Data, 1992, R1. Data set. Available on-line [http://daac.ornl.gov] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, USA. doi:10.3334/ORNLDAAC/471

This data set was originally published as:

Kicklighter, D. W. 1999. NPP Multi-Biome: TEM Calibration Data, 1992. Data set. Available on-line [http://daac.ornl.gov] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A.

Table of Contents:

1. Data Set Overview:

Project: Net Primary Productivity (NPP)

The TEM is a process-level ecosystem simulation model that uses spatially referenced information on soils, vegetation, and climate to estimate important C and N pool sizes and fluxes at continental to global scales, with a time step of 1 month. The model is grid cell based, each grid cell being 0.5 degrees latitude x 0.5 degrees longitude (3,090 km at the equator). TEM was developed by staff at the Ecosystem Center, Marine Biological Laboratory, Woods Hole, Massachusetts, USA.

Eight of the TEM calibration sites are also part of the NPP data collection at the ORNL DAAC. Some of the NPP values provided herein do not agree with values published in the 8 individual NPP data sets, source publications, and Glower et al. (2013) and Olson (2013a, b) because of rounding and different calculation methods.

Table 1. TEM calibration sites

Site Number	Site Name	Country	Vegetation Type	NPP Data Set ID
A1	Toolik Lake, Alaska	USA	Polar Desert/Alpine Tundra	581
A2	Toolik Lake, Alaska	USA	Wet/Moist Tundra	581
A3	Schefferville, Quebec	Canada	Boreal Woodland	573
A4	Bonanza Creek Experimental Forest, Alaska	USA	Boreal Forest	611
A5	Andrews Experimental Forest Watershed 10, Oregon	USA	Temperate Coniferous Forest	NA
A6	Curlew Valley, Utah	USA	Arid Shrubland	NA
A7	Central Plains Experimental Range, Colorado	USA	Short Grassland	145
A8	Osage Prairie, Oklahoma	USA	Tall Grassland	211
A9	Cedar Creek Natural History Area, Minnesota	USA	Temperate Savanna	NA
A10	Harvard Forest Hardwood Site, Massachusetts	USA	Temperate Deciduous Forest	NA
A11	Harvard Forest Mixed Forest Site, Massachusetts	USA	Temperate Mixed Forest	NA
A12	Taita Experimental Station, North Island	New Zealand	Temperate Broadleaved Evergreen Forest	NA
A13	Nylsvley Nature Reserve	South Africa	Tropical Savanna	194
A14	Guanica State Forest	Puerto Rico	Xeromorphic Forest	NA
A15	Chakia	India	Tropical Deciduous Forest	NA
A16	Ducke Forest, Manaus	Brazil	Tropical Evergreen Forest	579

2. Data Description:

This data set contains one data file, in comma-separated-value (csv) format. The data provide pool sizes and fluxes of carbon (C) and nitrogen (N) for 16 globally distributed field sites that represent a wide range of terrestrial biomes.

Spatial Coverage

Site: Global

Site boundaries: (All latitude and longitude given in decimal degrees)

Site (Region)	Westernmost Longitude	Easternmost Longitude	Northernmost Latitude	Southernmost Latitude
Global	-148.25	174.97	65.43	-41.18

Site Information

Data from 16 non-wetland intensively studied field sites (Table 1) were collated from the literature for calibration of the TEM. The study sites represent a wide range of terrestrial biomes ranging from tundra to tropical forest. McGuire et al. (1992) and Raich et al. (1991) provide brief site descriptions of the sites used to calibrate the model. For more site details, please consult the published literature and the individual NPP data sets for each study site, where applicable.

Spatial Resolution

The TEM has a spatial resolution of 0.5 degrees latitude x 0.5 degrees longitude. Please consult original data sources and individual NPP data sets, where applicable, for information on spatial resolution of individual field study sites.

Temporal Coverage

1960/01/01-1992/12/31

Temporal Resolution

Mean annual values of carbon in vegetation (CV), nitrogen in vegetation (NV), carbon in soils (CS), nitrogen in soils (NS), and inorganic nitrogen in soils (NAV) are in g/m^2 of either carbon or nitrogen. Values of gross primary productivity (GPP) and NPP are in $gC/m^2/yr$. Nitrogen uptake by vegetation (NUPTAKE), saturation response of NPP to nitrogen fertilization (NPPSAT), and the annual amount of nitrogen mobilized for production via recycling (NMOBIL) are in $gN/m^2/yr$.

Data File Information

Table 2. Data files in this data set archive

FILE NAME	TEMPORAL COVERAGE	FILE CONTENTS
NPP_TEM.csv	1960/01/01-1992/12/31	TEM calibration data. Pool sizes and fluxes of carbon (C) and nitrogen (N) extracted from the literature for 16 globally diverse field sites.

NPP Data. Pool sizes and fluxes of C and N for 16 globally distributed field sites are provided in one file in .csv format (Table 2). The first 18 lines are metadata; data records begin on line 19. There are no missing values. GPP and NPP are expressed as $gC/m^2/yr$. Nitrogen uptake by vegetation, saturation response of NPP to nitrogen fertilization, and nitrogen mobilization are expressed as $gN/m^2/yr$ (dry matter weight).

Table 3. Column headings in NPP file

COLUMN HEADING	DEFINITION	UNITS
TEM Sites	Intensively studied field sites from which data was gathered and used to calibrate some of the vegetation-specific parameters in TEM	Text
Vegetation Type	Non-wetland biome classification for each field site	
Site Name	Site name and location	
Country	Country where field site is located	
Latitude	Latitude of field site	Decimal degrees
Longitude	Longitude of field site	
CV	Mean annual carbon in vegetation (using a conversion factor of 0.475 or 0.5 to determine carbon content of living above + below-ground biomass)	gC/m^2
NV	Mean annual nitrogen in vegetation (based on laboratory analyses)	gN/m^2
CS	Mean annual carbon in soil (derived from estimates of detritus production). Soil organic matter is assumed to be 58% C.	gC/m^2
NS	Mean annual nitrogen in soils (based on laboratory analyses)	gN/m^2
NAV	Mean annual inorganic nitrogen in soils (based on laboratory analyses)	
GPP	Gross primary productivity	$gC/m^2/year$
NPP	Net primary productivity. NPP = carbon in litter production = carbon in heterotrophic respiration.	
NPPSAT	Saturation response of NPP to nitrogen fertilization	
NUPTAKE	Annual N uptake by vegetation. NUPTAKE = nitrogen in litter production = net nitrogen mineralization.	$gN/m^2/year$
NMOBILE	Annual amount of nitrogen mobilized for production via recycling	
Comments	Comments and assumptions about the data	Text

Sample NPP Data Record

TEM Sites, Vegetation Type, Site Name, Country, Latitude, Longitude, CV, NV, CS, NS, NAV, GPP, NPP, NPPSAT, NUPTAKE, NMOBILE, Comments

,,,, South is negative, West is negative, carbon in vegetation, nitrogen in vegetation, carbon in soil, nitrogen in soil, inorganic nitrogen in soil, gross primary productivity, net primary productivity, NPP saturation response, N uptake by vegetation, N mobilisation,

,,,, decimal degrees, decimal degrees, g C/ m2, g N/ m2, g C/ m2, g N/ m2, g N/ m2, g C/ m2/ year, g C/ m2/ year, g C/ m2/ year, g N/ m2/ year, g N/ m2/ year,

A1, Polar Desert/Alpine Tundra, Toolik Lake, Alaska, USA, 65.43, -145.50, 450, 6.5, 6000, 260, 0.4, 255, 65, 130, 0.5, 1.3, Data are based on vegetation in the heath site.

A2, Wet/Moist Tundra, Toolik Lake, Alaska, USA, 65.43, -145.50, 750, 15, 18000, 1100, 0.4, 440, 120, 225, 0.8, 3.2, Assumes that vegetation typical of the tussock site, wet site, heath site, and shrub site covers 40%, 40%, 15%, and 5% of the landscape, respectively.

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3. Data Application and Derivation:

This data set was used to calibrate the TEM for each vegetation type in Table 1.

4. Quality Assessment:

Please consult original data sources and individual NPP data sets, where applicable, for information on the quality of field measurements.

Sources of Error

Information not available.

5. Data Acquisition Materials and Methods:

TEM calibration data were extracted from published literature. McGuire et al. (1992) and Raich et al. (1991) provide brief site descriptions of the methods used to derive data values and source publications. For more site details, please consult the published literature and the individual NPP data sets for each study site, where applicable.

6. Data Access:

This data is available through the Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).

Data Archive Center:

Contact for Data Center Access Information:
E-mail: uso@daac.ornl.gov
Telephone: +1 (865) 241-3952

7. References:

Gower, S.T., O. Krankina, R.J. Olson, M. Apps, S. Linder, and C. Wang. 2013. NPP Boreal Forest: Consistent Worldwide Site Estimates, 1965-1995, R1. Data set. Available on-line [http://daac.ornl.gov] from the Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A. doi:10.3334/ORNLDAAC/611

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