MEGAN Community Data Portal (CDP) User Guide

October 15, 2007 Alex Guenther The latest version of this guide and any updates on MEGAN code and input data are described at http://acd.ucar.edu/~guenther/MEGAN/MEGAN.htm

The Model of Emissions of Gases and Aerosols from Nature (MEGAN) requires landcover and weather variables to drive biogenic emission variations. The weather variables currently must be provided by the user. Global distributions of landcover variables are available at a base resolution of 30 seconds latitude X 30 seconds longitude (~ 1km2) in ARCGIS format. The Input Data Preprocessors User Guide (see <u>http://acd.ucar.edu/~guenther/MEGAN/MEGAN.htm</u>) describes how to regrid these files to a specific model domain using GIS. Lower resolution files are available in NETCDF format.

The MEGAN code and input data can be downloaded from the MEGAN CDP which is located on the NCAR community data portal (URL: <u>http://cdp.ucar.edu</u>). Enter "MEGAN" into the search box. First time users will need to register before you can view or download the data.

As of October 1, 2007, the MEGAN CDP has the following folders and data:

Contents of the MEGAN CDP

```
MEGAN Version 2.0
 - CODE
      - MEGANv2.03.tar.gz
    INPUT
      - ESRI_GRID_30sec
        - EF
             - EF.zip
             - ef21.zip
             - efmt21.zip
          - EF PFT
              - EFPFT.zip
          - LAI
               LAI03fall.zip

    LAI03spring.zip

             - LAI03summer.zip
```

- PFT - PFT.zip - PFT21.zip - WP | - WP.zip - NETCDF_150sec - EF -_____ | | | - EF.zip ef21.zip | | | - efmt21.zip - EF_PFT | | | - EFPFT.zip - LAI | - LAI20.zip - PFT | | | - PFT.zip | | | - PFT21.zip - WP | - WP.zip - NETCDF_30min | - EF | | | - EF.zip - ef21.zip efmt21.zip - EF_PFT - EFPFT.zip - LAI | - LAI20.zip - PFT | - PFT.zip | - PFT21.zip

```
| | - WP
| | |
| | - WP.zip
|
- OUTPUT
```

I. CODE FOLDER

This folder contains FORTRAN code and tables with input data. This code generates biogenic emission estimates for the CMAQ regional air quality model. A user guide is available at http://acd.ucar.edu/~guenther/MEGAN/MEGAN.htm.

II. INPUT FOLDER

This folder contains gridded georeferenced emission factor and landcover variables used to drive emission variations in MEGAN. The data are currently available in ESRI ARCGIS GRID format and NETCDF format with spatial resolutions ranging from ~1 to 60 km.

Data format and spatial resolution: There are currently three combinations of format and resolution. These include

ESRI_GRID_30sec: ESRI GRID format (can be used with ARCGIS) with global coverage (83 N to 57 S) at a spatial resolution of 30 seconds latitude X 30 seconds longitude (about 1 km).

NETCDF_ 150sec: NETCDF format with global coverage (83 N to 57 S) at a spatial resolution of 150 seconds latitude X 150 seconds longitude (about 5 km). **NETCDF_ 30min:** ESRI GRID format (can be used with ARCGIS) with global coverage (83 N to 57 S) at a spatial resolution of 30 minutes latitude X 30 minutes longitude (about 60 km).

Input data types: There are currently 4 types of input data:

EF: Area average emission factors. This is the emission factor required for the EFMAP_LAI.csv input file for the standard MEGAN code. It is an average for all PFTs. The units are μ g compound m⁻² h⁻¹.

There are currently 3 EF datasets:

EF.zip contains isoall2000. This is version 2.0 of the MEGAN emission factors. This is the isoprene emission factor distributions described by Guenther et al. 2006.

EF21.zip contains

isoall200021: isoprene (ISOP variable in EFMAP_LAI.csv) mboall200021: methylbutenol (MBO variable in EFMAP_LAI.csv) meohall200021: methanol (MEOH variable in EFMAP_LAI.csv) noall200021: Nitric oxide (NO variable in EFMAP_LAI.csv)

This is version 2.1 of the MEGAN emission factors. They are representative of present day emissions (year 2000). These data were released in August 2007.

EFmt21.zip contains

careall200021: 3-carene (3CAR variable in EFMAP_LAI.csv) limall200021: limonene (LIMO variable in EFMAP_LAI.csv) myrall200021: myrcene (MYRC variable in EFMAP_LAI.csv) ociall200021: ocimene (OCIM variable in EFMAP_LAI.csv) pinaall200021: alpha-pinene (APIN variable in EFMAP_LAI.csv) pinball200021: beta-pinene (BPIN variable in EFMAP_LAI.csv) saball200021: sabinene (SABI variable in EFMAP_LAI.csv)

This is version 2.1 of the MEGAN monoterpene emission factors. They are representative of present day emissions (year 2000). These data were released in August 2007.

EF_PFT: Emission factors for individual PFTs. This is made available for models that provide their own PFTs. The units are μ g compound m⁻² h⁻¹. There is currently 1 EF_PFT dataset:

EFPFT.zip contains isoall2000. This is version 2.0 of the MEGAN PFT emission factors. This is the PFT isoprene emission factors described in Guenther et al. 2006.

LAI: Leaf Area Index (LAIv) averaged over vegetation covered surfaces. The units are m² per 1000 m². Divide by 1000 to get units of m² m⁻² which is required for the EFMAP_LAI.csv input file for MEGAN code

LAI03spring.zip contains

LAIv200301: LAIv for January 2003 LAIv200302: LAIv for February 2003 LAIv200303: LAIv for March 2003 LAIv200304: LAIv for April 2003 LAIv200305: LAIv for April 2003 LAIv200305: LAIv for May 2003 LAIv200306: LAIv for June 2003 LAIv200307: LAIv for July 2003 LAIv200308: LAIv for August 2003 LAIv200308: LAIv for August 2003 LAIv200309: LAIv for September 2003 LAIv200310: LAIv for October 2003 LAIv200311: LAIv for November 2003 LAIv200312: LAIv for December 2003

LAI20.zip contains LAIv200301: LAIv for January 2003 LAIv200302: LAIv for February 2003 LAIv200303: LAIv for March 2003 LAIv200304: LAIv for April 2003 LAIv200305: LAIv for May 2003 LAIv200306: LAIv for June 2003 LAIv200307: LAIv for July 2003 LAIv200308: LAIv for August 2003 LAIv200309: LAIv for September 2003 LAIv200310: LAIv for October 2003 LAIv200311: LAIv for November 2003 LAIv200312: LAIv for December 2003

This is version 2.0 of the MEGAN LAIv. This is the LAIv data described in Guenther et al. 2006.

PFT: fraction of a grid covered by a plant functional type for the year 2001. The units are non-dimensional. Note that the PFTS do not necessarily add up to one since part of the grid may not have vegetation (e.g. barren, rock, ice, water). Version 2.0 has 6 PFTs:

BTR: broadleaf trees

FTD: fineleaf deciduous trees

FTE: fineleaf evergreen trees

CRP: crops

GRS: grass

SHR: shrub

Version 2.1 combines FTD ands FTE into a single category (NTR=needleleaf trees)

It is an input for determining PFT weighted emission factors

PFT21.zip contains

btr200121: fraction of grid covered by broadleaf trees ntr200121: fraction of grid covered by needleleaf trees grs200121: fraction of grid covered by grass crp200121: fraction of grid covered by crops shr200121: fraction of grid covered by shrubs

Version 2.0 is the PFT data described in Guenther et al. 2006.

WP: Wilting point. The soil moisture level below which plants cannot extract water from soil. The units are m³ m⁻³. It is an input for the MEGAN algorithm characterizing the response of isoprene emission to soil moisture (equation 20 in Guenther et al. 2006)

WP.zip contains WPtop: WP for top soil layer WPbot: WP for lower soil layer

This is version 2.0 of the MEGAN WP. This is the WP data described in Guenther et al. 2006.

III. OUTPUT FOLDER

This folder will contain emission rates generated using MEGAN with the provided driving variables. We will provide this after posting a version of the MEGAN FORTRAN code which will have more choices of input formats for weather (temperature, solar radiation) driving variables. Users currently must generate their own MM5 weather model outputs. We will also post weather data in the INPUT folder so that users can compare their model output for selected test cases.