



AGRO Meteorological Products in Support of BigFoot Modeling

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Introduction

The BigFoot Project requires meteorological data to run the ecosystem process models used for scaling GPP and NPP. For the purposes of monitoring interannual variability and for model testing, meteorological data sets have been compiled from recent years (fig. 1). Data from the year 2000 and beyond is likewise being compiled and will be used to generate the BigFoot GPP and NPP products.

The data is formatted as comma-delimited text file of 367 rows and 8 columns. The first two rows are for parameter names and units. The column variables are:

1. BigFoot Site Name
2. Day of Year
3. Precipitation (cm)
4. Maximum Daily Temperature (deg C)
5. Minimum Daily Temperature (deg C)
6. Daily Average Vapor Pressure Deficit (Pa)
7. Daily Average Instantaneous Shortwave Flux Density (W/m²)
8. Daily Average Instantaneous Photosynthetically Active Radiation (PAR) (W/m²)
9. Daylength (s)

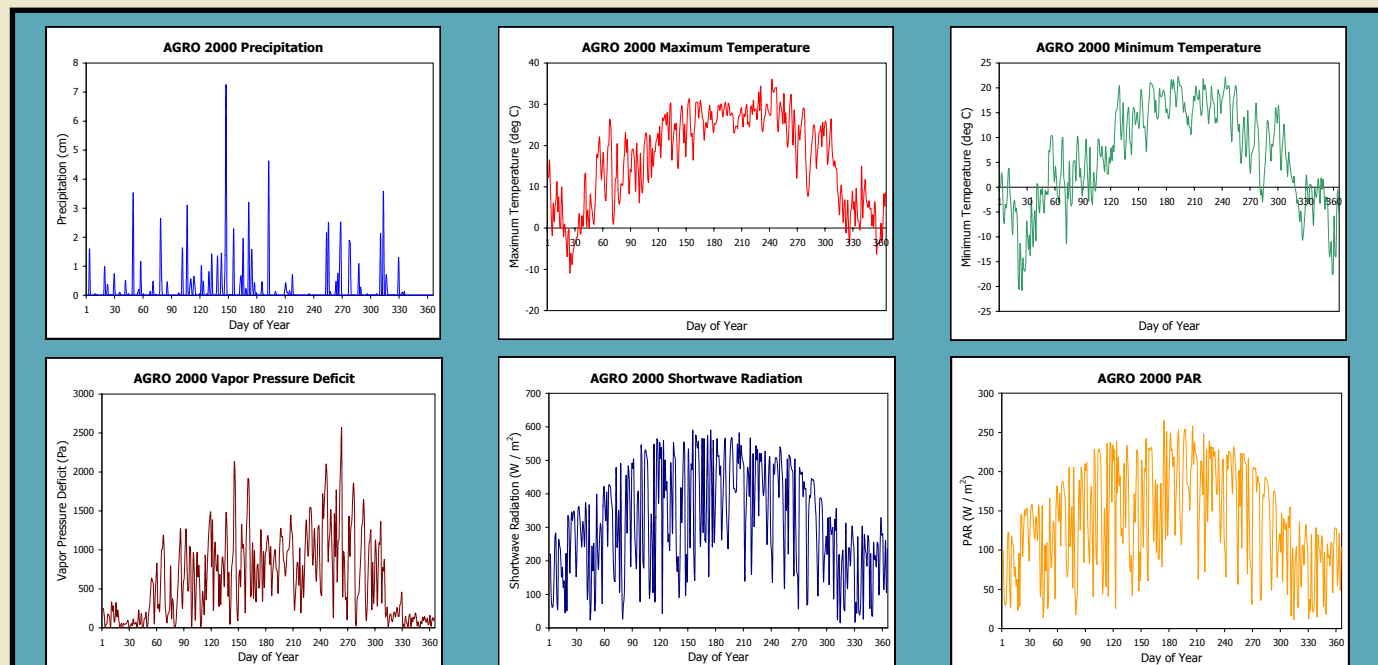


Figure 1. AGRO meteorological products (2000)



Site Specific Parameters

AGRO : Bondville, IL crop site

Site coords : 40.01° N, 88.29° W

For the AGRO site, the meteorological data begins with 1995. Except for precipitation, it is derived from half-hourly measurements made at the SURFRAD site less than 5 km from the study area. SURFRAD is network of sites funded by the National Oceanic and Atmospheric Administration (NOAA) and is designed to monitor solar radiation. The original data and a description of the SURFRAD network is available online (<http://www.srrb.noaa.gov/surfrad/surfradpage.htm>) and use of these data should be consistent with the fair use policies of SURFRAD and BigFoot. The original measurements are aggregated to the daily time step for use in the BIOME-BGC model. Precipitation and missing temperature values were from the Champaign-Urbana Airport meteorological station, 10 km to the north of the study area provided by the NOAA National Virtual Data System (<http://nndc.noaa.gov/>). For missing vapor pressure deficit, the minimum temperature was assumed to be the dew point, and for solar radiation the fill-ins were generated following Thornton and Running (1999). If PAR was missing, it was given the value of $(0.5 * \text{shortwave flux density})$.

Table 1. Primary and secondary sources for AGRO meteorological data

FIELD	PRIMARY SOURCE	SECONDARY SOURCE
PRCP	Champaign-Urbana met station	N/A
TMAX	SURFRAD temperature	Champaign-Urbana met station
TMIN	SURFRAD temperature	Champaign-Urbana met station
VPD	SURFRAD relative humidity	modeled with MTCLIM43
SWAVGFD	SURFRAD global solar	modeled with MTCLIM43
PAR	SURFRAD PAR	$(0.5 * \text{SWAVGFD})$

YEARS : 1995 - 2000

Notes : The TMAX and TMIN fields are corrected through the following regression equations which were developed using days where data exist for both places.

Tower TMAX = $(0.9988 * \text{Champaign TMAX}) - 0.3455$

Tower TMIN = $(1.0181 * \text{Champaign TMIN}) + 0.1639$



References

Thorton, P.E. and Running, S.W. 1999. An improved algorithm for estimating incident daily solar radiation from measurements of temperature, humidity, and precipitation. *Agricultural and Forest Meteorology* 93:211-228.

Data Sample (AGRO 2000)

```
SITE,DAY,PRCP,TMAX,TMIN,VPD,SWAVGFD,PAR,DAYL
location,day,cm,deg C,deg C,Pa,W m^-2,W m^-2,s
AGRO,1,0.0,12.3,-0.1,245.5,219.7,99.1,33187
AGRO,2,0.0,16.5,2.9,158.9,90.9,43.5,33230
AGRO,3,1.6,9.4,1.4,3.3,61.0,29.5,33277
AGRO,4,0.0,1.5,-6.5,41.7,66.4,31.8,33328
AGRO,5,0.0,-1.7,-7.3,56.4,147.6,65.4,33382
AGRO,6,0.0,6.0,-3.5,176.0,267.4,119.9,33440
AGRO,7,0.0,1.6,-4.2,164.3,281.6,122.7,33501
AGRO,8,0.0,5.1,-2.4,134.3,105.0,49.4,33567
AGRO,9,0.1,7.2,2.6,3.4,57.4,28.2,33635
AGRO,10,0.0,11.2,3.8,328.6,263.1,117.1,33707
```

Data Download Link

http://www.fsl.orst.edu/larse/bigfoot/data_indx.html

Metadata

Data_Originator:

Investigator:

Name: Turner, David P.

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Investigator:

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Metadata_Author:

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Data_Set_Information:

Data_Set_Title: AGRO Compiled Meteorological Data

Project: BigFoot

Site_Information:

Site: Bondville, IL, USA

Westernmost_Longitude: -88.29

Easternmost_Longitude: -88.29

Northernmost_Latitude: 40.01

Southernmost_Latitude: 40.01



Time_Period:

Temporal_Coverage:

Start_Date: 19950101

End_Date: 20001231

Temporal_Resolution: Daily

Parameter_Description:

Parameter: PRECIPITATION AMOUNT

Parameter_Description:

Parameter: MAXIMUM/MINIMUM TEMPERATURE

Parameter_Description:

Parameter: VAPOR PRESSURE DEFICIT

Parameter_Description:

Parameter: INCOMING SHORTWAVE RADIATION

Parameter_Description:

Parameter: PHOTOSYNTHETICALLY ACTIVE RADIATION

Parameter_Description:

Parameter: DAYLENGTH

Keywords:

BigFoot

AGRO

Bondville

Savoy

Meteorological Data

Data_Access_Information:

Data_Set_Status: Preliminary

Data_Set_Restrictions: Restricted to science team

Data_Set_Location: Laboratory for Applications of Remote Sensing in Ecology, Forestry Sciences Lab, Corvallis OR

Data_Contact_Person:

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Data_Center_URL: <http://www.fsl.orst.edu/larse/bigfoot/>

Data_Set_Citation: Turner, D.P. and M.J. Gregory (2000). Compiled AGRO Meteorological Data

Data_Set_Link:

URL: http://www.fsl.orst.edu/larse/bigfoot/data_indx.html

Label: AGRO Compiled Meteorological Data

Search_Text_Link:

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