PalEON Model-Data Inter-comparison Project:
Phase 1

Overall PalEON Objectives

1.Develop a coherent inferential framework with rigorous estimates of uncertainty for the purpose of reconstructing ecological variations in forested ecosystems for the last 2000 years from the Great Lakes to New England
2.**Apply these reconstructions to test the ecosystem models currently being used to forecast ecosystem dynamics, with an emphasis on testing "potential vegetation" equilibrium assumptions and assessing decadal- to centennial-scales processes. These processes are essential to 21st-century ecological forecasting, yet remain poorly constrained by ecological observational datasets.**
3.Conduct systematic and coordinated field campaigns to collect new paleorecords that are based on gaps identified by the PalEON working groups
4.Gain a richer understanding of how climate variations across a range of timescales have shaped the composition and function of forested ecosystems.

Modeling research questions

The overall modeling objective of PalEON is to allow data to inform and improve the long-term dynamics in the class of models that are currently being employed to predict centennial-scale responses to global change. Paleo data are uniquely suited to calibrate and validate these models. Within the existing proposal we divided this overall goal into three broad objectives.

1.**Validation** (Phase 1) - How do the models we use to predict future responses to climate change perform when confronted with past climate change? Are we able to capture dynamics correctly and, if not, can we understand why?
2.**Inference** (Phase 2) - Paleo proxies only provide partial information about ecosystem dynamics, but models allow us to estimate the possible ranges for unobserved quantities that are consistent with the observed data.
3.**Initialization** (Phase 2) - Projections of the future are made conditioned on the present, but key ecosystem and biogeochemical variables, such as soil carbon, strongly reflect site history across centennial to millennial time scales. Due to an absence of data, equilibrium assumptions for model initialization are common, but are clearly untenable. Paleo-data provide the history necessary to understand the present and predict the future.

To address these objectives we proposed two major modeling activities. The first, which is described in this modeling protocol (**Phase 1**), is focused on validation. In this phase we will to conduct an ensemble of model runs over the PalEON spatial/temporal domain that will be used to assess how consistent the modeled "potential vegetation" is with the observational data and to what extent the models capture long-term dynamics. For parts of this we will need new model runs under a common set of drivers and experimental design, while for other parts we will also draw upon existing "potential vegetation" equilibrium states from the modeling community.

In the second modeling activity (**Phase 2**) we will actively assimilate the PalEON data product into the ecosystem models in order to address the second two objectives of making inference about the past and assessing sensitivity of current and future dynamics to vegetation history. The protocol for the Phase 2 activity will be provided in a second protocol to be developed at the January 2012 PalEON meeting.

Phase 1 timeline:

May 2011:	Established protocols
Summer/Fall 2011:	Build driver datasets
Fall '11/Winter '12:	Phase 1 runs
Spring/Summer 2012:	Analysis of Phase 1
Winter 2012/2013:	Validate models against PalEON data product

Phase 1 Model Simulations

1A: Model teams submit a **steady-state "potential vegetation" snapshot** of model output for the region based on running their model to equilibrium by cycling modern meteorology. These runs should represent **pre-settlement** conditions, and could come from existing model output, but should have a resolution no coarser than 1 degree. An example would be the MsTMIP steady-state initial conditions (1840) for the globe (0.5 deg, RG1) or North America (0.25 deg, RR1). Please submit 10 years of simulation so as to capture inter-annual variability. <u>If such runs do not already exist, proceed to 1B.</u> These runs should be submitted with the label **PNS** (see Table 1). **TARGET DEADLINE: JANUARY 3, 2012**

1B: **New runs over the PalEON time period** under a common set of drivers. "Validation" data will not be available until after runs are submitted, so calibration is not possible. If any "tuning" is done please also submit the original baseline run and document what changes were made. Because there is significant uncertainty in the ability of models and paleo-proxies to capture the events, patterns, and variability that most strongly effect ecosystems we will employ an ensemble of different drivers from multiple models run with different environmental forcings that should bound the range of variability. At least one ensemble member will be a "constant climate" driver analogous to 1A but with the same drivers used by all models.

In order to facilitate these runs we have attempted to emulate the conventions and drivers used in recent inter-comparisons (MsTMIP, NACP site and regional, LBA). Below we also attempt to highlight the differences that exist and changes to existing runs that would need to be done.

Modeling teams are asked to run simulations regionally over the PalEON domain at **0.5°x0.5° spatial** resolution. This corresponds to an 80 x 30 grid representing longitudes **-100° to -60° (west)**, and latitude **35° to 50° (north)**. Five simulations should be run, one for each meteorological driver dataset (see Table 1).

Table 1: List of simulations to run by meteorological driver dataset. See "Summary of Driver Datasets" for detailed description of these driver datasets.

Run Name	Paleoclimate Driver	Notes	Target Deadlines
PNS	as available	Phase 1A presettlement 'snapshot'	Jan 3, 2012
PN1	steady-state	Driver to be provided	Feb 17, 2012
PN2	MPI-ESM (ECHAM)	Time range: 800 – 2005 A.D.	Feb 17, 2012
PN3	CCSM3 (CAM3)	Time range: 1150 – 1700 A.D.	TBA
PN4	CCSM4 (CAM4)	Time range: 850 – 2005 A.D.	TBA
PN5	Paleo-proxy	Time range: 0 – 2000 A.D.	TBA

Output File Naming Convention: [simulation acronym].[model acronym].[year].nc
e.g., PN3.ED2.1501.nc

Although model output files may differ in their native output frequency (e.g., subdaily, monthly, or annual files) we ask that the files be submitted as annual files of monthly mean data, which will be convenient for consistent archiving and analysis. See Table 4 for a list of output specifications.

Model Spin-up & Initial Conditions

All simulations should be spun up to a steady-state initial conditions prior to the start of the meteorological driver data. The exact start date will vary from driver to driver (A.D. 0, 800, 850, 1150). In all cases models should cycle the oldest 20 years of the meteorological data for the spin-up period (e.g., 800-819). At the start of spin up, any prognostic soil temperatures should be initialized to the mean of the 20 years worth of data that are being repeated. Canopy temperatures and canopy air space temperatures, pressures, and humidity should be initialized to the first observation in the met files. Biogeochemical pools and all other prognostic variables can be initialized as best suited for your model, however for models that possess a dynamics vegetation component, we strongly discourage the use of the Ramankutty and Foley biome map as a number of our hypotheses will involve comparison to that data set and we want the dynamic models to be independent. Otherwise, models with static vegetation will use the Ramankutty and Foley map to specify biome.

Summary of Driver Datasets

All simulations should be run using the standardized driver data, which can be downloaded from the PalEON server: sftp://ebi-forecast.igb.uiuc.edu/. This site is not public and if you have not already been sent a login you will need to request an account from Bjorn Brooks <bjorn@climatemodeling.org> (include your preferred username). Use the following example as a guide for downloading driver data on Unix systems:

```
$ sftp ebi-forecast.igb.uiuc.edu
Connecting to ebi-forecast.igb.uiuc.edu...
bjorn@ebi-forecast.igb.uiuc.edu's password:
sftp> ls

env_drivers  met_drivers

sftp> cd env_drivers

sftp> ls -l

-rw-r--r--    1 bjorn    paleon_admins   450560 Nov  6 08:59 env_drivers.tar

drwxr-sr-x   2 bjorn    paleon_admins     4096 Nov  6 08:59 netcdf

drwxr-sr-x   2 bjorn    paleon_admins     4096 Nov  6 08:59 scripts
sftp> get env_drivers.tar

Fetching /home/share/paleon/downloads/env_drivers/env_drivers.tar to env_drivers.tar

/home/share/paleon/downloads/env_drivers/env_  100%  440KB 220.0KB/s   00:02
sftp> exit
```

Each year of meteorological forcing data is bundled as a tar file under the 'downloads/met_drivers' directory. Inside each tar file are the netCDF formatted driver data. After downloading and inflating all of the years of forcing data and the checksum file within each variable directory (sha256sum.txt) the netcdf files should be verified (bit-for-bit) to ensure the driver data are accurate. Use the following example as a guide to untaring and checking the forcing data files:

```
$ pwd

/home/bjorn/mpi_esm/lwdown
$ tar xvf *.tar
-system-specific-3.2$ tar xvf *.tar

mil0012_lwdown_6h_0800_01.nc

mil0012_lwdown_6h_0800_02.nc

...
$ ls

mil0012_lwdown_6h_0800_01.nc

mil0012_lwdown_6h_0800_02.nc
...
mil0012_lwdown_6h_2005_12.nc

sha256sum.txt


$ sha256sum -c sha256sum.txt

mil0012_lwdown_6h_0800_01.nc: OK

mil0012_lwdown_6h_0800_02.nc: OK
...
```

Meteorological values for all the variables listed in Table 2 are supplied together in each monthly file. Each file conforms to a regular 0.5°x0.5° spatial grid over the PalEON domain, derived either from downscaled GCM output (i.e., simulations PN2, PN3, PN4 in Table 1) or from downscaled paleo-proxy data (i.e., simulation PN5). Each modeling group should download the forcing data with the appropriate time step (6-hourly, daily or monthly) from one of the server's subdirectories.

Table 2: Meteorological driver dataset. All variable names follow the ALMA metadata conventions where possible (http://www.lmd.jussieu.fr/~polcher/ALMA/convention_input_3.html). We also reference the ALMA names to their CF equivalents (http://cf-pcmdi.llnl.gov/documents/cf-standard-names/standard-name-table/16/cf-standard-name-table.html)

ALMA Name (CF equiv.)	ALMA Definition	Units	Precision
lat (lat)	latitude	degree_north	float
lon (lon)	longitude	degree_east	float
time (time)	time	Calendar date (Gregorian proleptic)	double
LWdown [time,lat,lon] (fldlw)	Incident longwave radiation averaged over the time step of the forcing data	W m-2	float
SWdown [time,lat,lon] (fldsw)	Incident radiation in the shortwave part of the spectrum averaged over the time step of the forcing data	W m-2	float
Precipf [time,lat,lon] (rainfall_flux + snowfall_flux)	The per unit area and time precipitation representing the sum of convective rainfall, stratiform rainfall, and snowfall	kg m-2 s-1	float
PSurf [time,lat,lon] (ps)	Pressure at the surface	Pa	float
Qair [time,lat,lon] (q)	Specific humidity measured at the lowest level of the atmosphere	kg kg-1	float
Tair [time,lat,lon] (air_temperature)	Temperature measured at the lowest level of the atmosphere, not the surface temperature	K	float
Wind [time,lat,lon]	Wind speed measured with a vertical coordinate in height of 10 m	m s-1	float

The CCSM3 meteorological dataset was derived from a fully coupled simulation with T31 resolution, volcanic aerosol forcing (quasi-decadal volcanic forcing at 1258, 1269, 1278, 1286 AD), prescribed orbital forcing (950 AD orbital forcing), prescribed solar radiation (solar constant: 1365 W/m^2), prescribed greenhouse gas (1000 AD GHG level: CO_2 at 280.6ppm, CH_4 at 684.3 ppb, N_2O at 264.5 ppb) . More details appear here: http://www.cesm.ucar.edu/events/ws.2010/Presentations/Paleo/zhong.pdf

The CCSM4 meteorological driver data were derived from a fully coupled simulation for the Last Millennium PMIP3 intercomparison (part of the IPCC CMIP4 experiment series). This T85 resolution run was initialized with an 1850 control run. Total solar irradiance was derived from a calibrated reconstruction based on multiple datasets. GHG forcing (CO_2, CH_4, N_2O) was developed from Gavin Schmidt's (NASA Goddard) 1850-2000 dataset with pre-Industrial spline fit to ice cores from Law Dome Ice data. Volcanic aerosol forcing represented multiple eruptions from 1050 through 1996 and was derived from the Gao-Robock-Ammann dataset. More details appear here: http://www.cesm.ucar.edu/events/ws.2010/Presentations/Paleo/landrum.pdf

The Max Planck Institute Earth System Model (MPI-ESM) driver data were obtained from fully coupled model setup consisting of an atmosphere model (ECHAM5), ocean model (MPIOM), ocean biogeochemistry (HAMOCC), and a terrestrial vegetation model (JSBACH). The MPI-ESM framework was used to run a small ensemble of last millennium experiments. Each experiment was run at T31 resolution from AD 800 – 2005. The driver data used here represents one of the ensemble members (E2/mil0012). The ensemble simulation members of E2 were driven by environmental forcings (volcanic aerosols, total solar irradiance), as well as anthropogenic forcings including CH4 and N20 concentrations (Meure et al., 2006), land-cover changes (Pontgratz et al., 2008) and anthropogenic aerosol reconstructions (Jungclaus et al., 2010). The CO2 concentration was calculated interactively within the model via the carbon cycle model comprised of the ocean biogeochemistry module HAMOCC5 and the land surface scheme JSBACH. Note also that TSI was scaled to change only 0.1% from the Maunder Mimimum to present to test arguments that solar variations over recent centuries are smaller than previously thought. More details appear here: http://www.mpimet.mpg.de/en/science/internal-projects/millennium.html

These data were downscaled spatially using several netcdf tools including NCO, MPI's Climate Data Operators (CDO), and Octave on a 64-bit cluster at the University of Illinois. The exact downscaling procedures are available from the "scripts" directory below each model directory on the ftp server (e.g., downloads/mpi_esm/scripts/).

In addition to meteorological drivers we are providing a number of other standardized environmental driver data sets, such as CO2, nitrogen deposition, land use, soil texture, and biome. All driver datasets are available for download from our sftp site sftp://ebi-forecast.igb.uiuc.edu/ as described above.

Table 3: Environmental driver dataset

Data Type	Source	Details
CO2	PMIP3 + NOAA	
N Deposition	MsTMIP (Deneter 2006)	Time and spatially varying NHx and Nox, same as MsTMIP for 1860-2009
Land-Use	Hurtt Land-Use History A, version 1	These data are not to be confused with the Hurtt (2006) data. These were developed by Hurtt and others using the same general methodology as Hurtt (2006) but instead using the latest HYDE 3 historical data set for crop, pasture, and urban area (1500-2005).
Soil	HWSD	Harmonized World Soil Database
Biome	Rammankutty and Foley	5 arc minute, need to scale up to fractional cover of each 0.5 degree.

The CO2 time series (paleon_co2_mix.nc) has an annual timestep. The data set was created by splicing together annual means from the PMIP-3 time series (A.D. 0-2000) with NOAA's Mauna Loa time series (2000-2005). The PMIP-3 record was created by Fortunat Joos (University of Bern) from the Law Dome ice core record (cf., Etheridge et al., JGR, 2006), which covered the pre-Industrial period (0-1859), and simulated global means provided by Gavin Schmidt using the NASA GISS model (http://data.giss.nasa.gov/modelforce/ghgases/GHGs.1850-2000.txt) that covered 1860-2000. The Mauna

Loa annual CO2 means (ftp://ftp.cmdl.noaa.gov/ccg/co2/trends/co2_annmean_mlo.txt) were used to extend the PMIP-3 record through 2005, and provided a better fit to the PMIP-3 time series than did the NOAA global mean or the Scripps Mauna Loa record.
Variables:

      time: calendar years AD (1-2010)
      CO2air: Annual global CO2 mixing ratio, not 3-dimensional, ppmv

The soil texture map (paleon_whsdb.nc) is based on the World Harmonized Soil Database and was aggregated up from 5 arc-minute to a 0.5-degree. For simplicity this is the same data set as used by the MsTMIP inter-comparison.
Dimensions: 80x30
Variables:

lon:	longitude (degrees east)
lat:	latitude (degrees north
il:	Impermeable Layer (ESDB)
issoil:	1:soil, 0:non-soil
ref_depth:	Reference Soil Depth (code)
roots:	Obstacles to Roots (ESDB)
s_cec_clay:	Subsoil CEC (clay) (cmol/kg)
s_clay:	Subsoil Clay Fraction (%weight)
s_gravel:	Subsoil Gravel Content (%volume)
s_oc:	Subsoil Organic Carbon (%weight)
s_ph_h2o	Subsoil pH (H2O) (-log(H+))
s_ref_bulk	Subsoil Reference Bulk Density (kg/dm3)
s_sand	Subsoil Sand Fraction (%weight)
s_silt	Subsoil Silt Fraction (%weight)
s_usda_tex	Subsoil USDA Texture Classification
soil_code	Soil Mapping Unit Code
t_cec_clay	Topsoil CEC (clay) (cmol/kg)
t_clay	Topsoil Clay Fraction (%weight)
t_gravel	Topsoil Gravel Content (%volume)
t_oc	Topsoil Organic Carbon (%weight)
t_ph_h2o	Topsoil pH (H2O) (-log(H+))
t_ref_bulk	Topsoil Reference Bulk Density (kg/dm3)
t_sand	Topsoil Sand Fraction (%weight)
t_silt	Topsoil Silt Fraction (%weight)
t_usda_tex	Topsoil USDA Texture Classification

Land use transition data was obtained from the Land-Use History A product (LUHa.v1) available from the University of New Hampshire (ftp://tarot.sr.unh.edu/LU_harmonization/LUHa.v1/). The relevant data for the PalEON domain were extracted from the original files. These data represent land-use and transitions between cropland, pasture, primary and secondary land, including the effects of wood harvest and shifting cultivation. They cover the historical period 1500-2005 at 0.5-degree resolution. The data are in the original ASCII text format with each half-degree grid cell having its own file. Within each file data are organized in spreadsheet format with each year having a distinct row and each land-use transition type having its own column. Transitions are reported as fractions of the grid cell. Harvested biomass is reported in kg of carbon. Reported transitions are:

cp (transition from crop to pasture)
pc (transition from pasture to crop)

```
pv (transition from pasture to primary land)
vp (transition from primary land to pasture)
vc (transition from primary land to crop)
cv (transition from crop to primary land)
sc (transition from secondary land to crop)
cs (transition from crop to secondary land)
sp (transition from secondary land to pasture)
ps (transition from pasture land to secondary land)
vs (transition from primary land to secondary land)
cu (transition from crop to urban land - for LUHa_u2.v1 and LUHa_t1u2.v1 only)
pu (transition from pasture to urban land - for LUHa_u2.v1 and LUHa_t1u2.v1 only)
vu (transition from primary land to urban land - for LUHa_u2.v1 and LUHa_t1u2.v1
only)
su (transition from secondary land to urban land - for LUHa_u2.v1 and LUHa_t1u2.v1
only)
uc (transition from urban land to crop - for LUHa_u2.v1 and LUHa_t1u2.v1 only)
up (transition from urban land to pasture - for LUHa_u2.v1 and LUHa_t1u2.v1 only)
us (transition from urban land to secondary land - for LUHa_u2.v1 and LUHa_t1u2.v1
only)
sbh (biomass harvested from mature secondary forested land)
f_sbh (landuse transition associated with biomass harvested from mature secondary
forested land)
vbh (biomass harvested from primary forested land)
f_vbh (landuse transition associated with biomass harvested from primary forested
land)
sbh2 (biomass harvested from young secondary forested land)
f_sbh2 (landuse transition associated with biomass harvested from young secondary
forested land)
vbh2 (biomass harvested from primary non-forested land)
f_vbh2 (landuse transition associated with biomass harvested from primary non-
forested land)
sbh3 (biomass harvested from secondary non-forested land)
f_sbh3 (landuse transition associated with biomass harvested from secondary non-
forested land)
```

The biome map (paleon_vegtype.nc) was developed by aggregating up Ramankutty and Foley's (1999) 5-arc minute map to 0.5-degree over the PalEON domain. Both primary and fractional potential vegetation coverage are available. For this data set in particular, **models that are capable of dynamic vegetation should NOT use the biome map** but rather should initialize the model as described above in *Model spin-up and initial conditions*.

Dimensions:
lon	longitude
lat	latitude

pvfc_trd	Potential Vegetation Fractional Coverage Tropical Deciduous
pvfc_ten	Potential Vegetation Fractional Coverage Temp. Needleleaf
pvfc_ted	Potential Vegetation Fractional Coverage Temp. Deciduous
pvfc_boe	Potential Vegetation Fractional Coverage Boreal Evergreen
pvfc_bod	Potential Vegetation Fractional Coverage Boreal Deciduous
pvfc_evd	Potential Vegetation Fractional Coverage Evergreen Deciduous
pvfc_sav	Potential Vegetation Fractional Coverage Savanna
pvfc_grs	Potential Vegetation Fractional Coverage Grassland

pvfc_tun   Potential Vegetation Fractional Coverage Tundra

pri_vegtype   Primary Vegetation Type (integer code)

Code	classification
2	Tropical Deciduous Forest/Woodland
4	Temperate Needleleaf Evergreen Forest/Woodland
5	Temperate Deciduous Forest/Woodland
6	Boreal Evergreen Forest/Woodland
7	Boreal Deciduous Forest/Woodland
8	Evergreen/Deciduous Mixed Forest/Woodland
9	Savanna
10	Grassland/Steppe
13	Tundra

The following data sets are NOT standardized due to the differences among models: phenology, topography, and disturbance frequency. If your model requires prescribed phenology one option would be the MsTMIP driver data based on GIMMSg with an average seasonal cycle prior to the contemporary period. Please document any additional datasets that you need to use for your runs as well as any of the standard data sets that you model does NOT use and submit this as part of a README file with your model runs

Model Outputs

All variables should be output as **MONTHLY AVERAGES** unless otherwise indicated. Unless otherwise indicated, all variables should be packaged together into **annual netCDF files** with dimensions of [time, lat, lon], which means that these variables will have dimensions of [12, 30, 80]. Due to the size and number of output files, if a variable cannot be output by your model feel free to drop it from the file, but please describe that in the README described below. In addition to providing most model output at a monthly time step, we'd like to ask for two decade-long 'snapshots' where we look at sub-daily fluxes (3-hourly). If you model does not have sub-daily resolution, please provide output at the highest native resolution. The snap-shot period also applies to the 10-year PSN run.

* 3-hourly output only required for two time periods: 1700-1709, 1996-2005.

Table 4. List of required output variables.

Category	Variable name	Long name	Units	Sub-daily	Description
Diversity	PFT	PFT name	-	no	Name of each plant functional type or species included in the model. Dimensions: [PFT]
	Fcomp	Fractional Composition	kgC/kgC		**AGB** fractional composition of each PFT within each grid cell. Dimensions: [time, lat, lon, PFT]
	BA	Basal Area	m2/ha		Basal area by PFT. Dimensions: [time, lat, lon, PFT]
	Dens	Stem density	1/ha		Stem Density by PFT. [time, lat, lon, PFT]
Carbon Pools	AGB	Aboveground biomass	kgC/m^2	no	Total aboveground biomass
	TotLivBiom	Total living biomass			Total carbon content of living biomass (e.g. leaf +root+wood)
	TotSoilCarb	Total soil carbon			Total soil and litter cabon content over the entire soil profile
	CarbPools	Size of each carbon pool			However vegetation and soils are broken down in your model. Dimensions: [time,lat,lon,pool]
	poolname	Names of carbon pools	-		Names of each veg and soil carbon pool. Dim: [pool]
Carbon Fluxes	GPP	Gross primary productivity	kgC/m^2/s	Yes*	
	AutoResp	Autotrophic Respiration			
	HeteroResp	Heterotrophic Respiration			
	NPP	Net Primary Productivity			
	NEE	Net Ecosystem Exchange			
	Fire	Fire Emissions			
Energy fluxes	LW_albedo	Longwave Albedo	-	No	
	SW_albedo	Shortwave Albedo	-		
	LWnet	Net Longwave Radiation	W/ m^2		
	SWnet	Net Shortwave Radiation			
	Qh	Sensible Heat		Yes*	
	Qle	Latent Heat			
Other	LAI	Leaf Area Index	m^2/m^{-2}	No	
	Qs	Surface runoff	kg/m^2/s		
	Qsb	Subsurface runoff			Drainage and subsurface lateral flow
	Evap	Total Evaporation			Sum of evaporative sources minus transpiration
	Tranp	Total Transpiration			Total plant transpiration
	SnowDepth	Total snow depth	m		
	SWE	Snow water equivalent	kg/m^2		Total water mass (ice plus liquid)
	SoilMoist	Soil moisture	kg/m^2		Soil water content in each model-defined soil layer. Dimensions: [time,lat,lon,nsoil]
	SoilTemp	Soil temperature	K		Soil temperature in each model-defined soil layer. Dimensions: [time,lat,lon,nsoil]
	SoilDepth	Soil layer depths	m		Depth to the bottom of each model-defined soil layer: Dimensions: [nsoil]

README file [required]

In addition to model outputs groups need to submit a README file that contains, at a minimum, the following information:

- Model information
  - Model name
  - Model acronym
  - Preferred / standard citations
  - URL
  - Is the code used in this analysis publicly available? If so how would one obtain a copy?
- Modeling team
  - Names of those who contributed significantly to producing the PALEON runs
  - Address
  - Email
  - Phone
  - If multiple people contributed to these runs, please *briefly* describe each person's contribution
- Modifications
  - Document any model changes/tuning you made in order to produce your runs
  - Document any additional input data sets you model required
  - List any of the standard input data sets or variables that you model did NOT require.
  - Document any deviations from the PalEON protocol.

We are asking for all of this up front so that we do not have to spend time tracking this all down later when it comes time to interpret model output and to write up results. This will also reduce 'surprises' related to authorship and allow us to know exactly who needs to be kept in the loop about analyses/presentations/manuscripts.

Management Team

The PalEON-MIP project leads are Bjorn Brooks and Michael Dietze at the University of Illinois, Urbana-Champaign. The table below lists the core team that helped design this project and will help coordinate its activities.

Name	Email	Role / Model
Michael Dietze	mdietze@illinois.edu	PalEON Co-PI / ED2 model
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