Model Descriptions from Modeling Teams

During the submission of model outputs for PEMIP, modeling teams were required to submit readme files providing metadata surrounding their modeling approach. These readme files were concatenated to create this document. The table below provides an overview of the ten models used in the study.

Model Name	Regional Abbreviation	Site Abbreviation	Reference
Community Land Model (CLM) 4.5 with biogeochemistry (BGC)	N/A	CLM45BGC-v5-1	Oleson et al., 2013
CLM 4.5 with carbon, nitrogen, (CN), and biogeochemistry	N/A	CLM45CN-v3-1	Oleson et al., 2013
Ecosystem Demography Model (ED) version 2.1	ED2-v1	ED2-v7	Moorcroft et al., 2001; Medvigy et al., 2009
ED 2.1 Land Use (LU)	N/A	ED2-LU-v8	Moorcroft et al., 2001; Medvigy et al., 2009
JULES (Joint UK Land Environment Simulator)	N/A	JULES-STATIC	Best et al., 2011; Clark et al., 2011
JULES Top-down Representation of Interactive Foliage and Flora Including Dynamics (TRIFFID)	TRIFFID	JULES-TRIFFID-v1	Best et al., 2011; Clark et al., 2011
Linking Inherently Nonlinear K Among Gradients and EcoSystems (LINKAGES) version 1.3	LINKAGES	LINKAGES-v2-1	Post and Pastor, 2013
Lund–Potsdam–Jena – Wald, Schnee, Landschaft (LPJ-WSL)	LPJ-WSL-v1	LPJ-WSL-v6	Gerten et al., 2004; Sitch et al., 2003
Lund-Potsdam-Jena General Ecosystem Simulator (LPJ-GUESS) SVN revision 3826	LPJ-GUESS	LPJ-GUESS-v6	Gerten et al., 2004; Sitch et al., 2003; Smith et al., 2001; Smith et al., 2014
Simple Biosphere/Carnegie-Ames-Stanford Approach (SiBCASA)	N/A	SiBCASA-v1	Schaefer et al., 2008

Community Land Model (CLM) 4.5 with biogeochemistry (BGC)

README: CLM45BGC

CONTACT PERSON

- Yao Liu
  - University of Arizona
  - School of Natural Resources & the Environment
  - Address: 1064 E Lowell Street, ENR2, N233
  - Email: yaoliu@email.arizona.edu; yao.liu.uwyo@gmail.com

MODEL INFORMATION:

- Full model name and version: Community Land Model (CLM) 4.5 with BGC biogeochemistry
- Model acronym: CLM45BGC
- Reference: Oleson, K.W., D.M. Lawrence, G.B. Bonan, B. Drewniak, M. Huang, C.D. Koven, S. Levis, F. Li, W.J. Riley, Z.M. Subin, S.C. Swenson, P.E. Thornton, A. Bozbiyik, R. Fisher, E. Kluzek, J.-F. Lamarque, P.J. Lawrence, L.R. Leung, W. Lipscomb, S. Muszala, D.M. Ricciuto, W. Sacks, Y. Sun, J. Tang, Z.-L. Yang, 2013: Technical Description of version 4.5 of the Community Land Model (CLM). Ncar Technical Note NCAR/TN-503+STR, National Center for Atmospheric Research, Boulder, CO, 422 pp, DOI: 10.5065/D6RR1W7M.
- URL: http://www.cesm.ucar.edu/models/clm/
- Is the code used in this analysis publicly available? Where?: Yes. https://svn-ccsm-models.cgd.ucar.edu/cesm1/release_tags/cesm1_2_1

MODELING TEAM:

- Avelino F. Arellano
  - University of Arizona
  - Department of Atmospheric Sciences
  - Address: 1118 E 4th St, Tucson, AZ 85721
  - Email: arellano@atmo.arizona.edu
  - Contribution: Strategy and advice on preparation for DART (Ensemble Kalman Filter)
- Andrew M. Fox
  - NEON, Inc.
  - Address: 1685 38th St., Ste. 100, Boulder, CO 80301
  - Email: afox@neoninc.org
  - Contribution: Advice on CLM4.5 and preparation for DART
- Yao Liu
  - University of Arizona
  - School of Natural Resources & the Environment
  - Address: 1955 E 6th St, Tucson, AZ 85719
  - Email: yaoliu@email.arizona.edu
  - Contribution: CLM setup, pre-processing, performing simulations, and post-processing output

- Francesc Montane
    - University of Arizona
    - School of Natural Resources & the Environment
    - Address: 1955 E 6th St, Tucson, AZ 85719
    - Email: fmontane@email.arizona.edu
    - Contribution: Performed simulations at some sites for output version v.1
- David J.P. Moore
    - University of Arizona
    - School of Natural Resources & the Environment
    - Address: 1955 E 6th St, Tucson, AZ 85719
    - Email: davidjpmoore@email.arizona.edu
    - Contribution: Team strategy and co-ordination
- Daniel M. Ricciuto
    - Oak Ridge National Laboratory
    - E-mail: ricciutodm@ornl.gov
    - Contribution: CLM setup with Yao Liu. Advice on trouble-shooting.

MODIFICATIONS:

- No model changes to produce the runs.
- No additional met drivers required by the model.
- Other environmental input: Aerosol forcing, lightning.
- From all the environmental drivers files provided by PalEON, nitrogen deposition and land use change files were the only ones not included in the runs.
- Climate forcings are interpolated onto 30-minute grids to drive CLM. See the "driver" section in model survey for details on the interpolation scheme used.

TRACEABILITY INFORMATION:

- Traceability framework not implemented in the version of the model that we run (CLM4.5).

MODEL OUTPUTS:

- The outputs provided are monthly outputs.
- The 3-hourly outputs for 1600-1609, 1850-1859 and 1996-2005 are not provided, but could be done if needed.
- The variable "GWBI" is an approximation because it includes a part of root C that was included in the original CLM variable.

CLM 4.5 with carbon, nitrogen, (CN), and biogeochemistry

README: CLM45CN

CONTACT PERSON:

- Yao Liu
    - University of Arizona
    - School of Natural Resources & the Environment
    - Address: 1064 E Lowell Street, ENR2, N233
    - Email: yaoliu@email.arizona.edu; yao.liu.uwyo@gmail.com

MODEL INFORMATION:

- Full model name and version: Community Land Model (CLM) 4.5 with CN (carbon nitrogen) biogeochemistry
- Model acronym: CLM45CN
- Reference: Oleson, K.W., D.M. Lawrence, G.B. Bonan, B. Drewniak, M. Huang, C.D. Koven, S. Levis, F. Li, W.J. Riley, Z.M. Subin, S.C. Swenson, P.E. Thornton, A. Bozbiyik, R. Fisher, E. Kluzek, J.-F. Lamarque, P.J. Lawrence, L.R. Leung, W. Lipscomb, S. Muszala, D.M. Ricciuto, W. Sacks, Y. Sun, J. Tang, Z.-L. Yang, 2013: Technical Description of version 4.5 of the Community Land Model (CLM). Ncar Technical Note NCAR/TN-503+STR, National Center for Atmospheric Research, Boulder, CO, 422 pp, DOI: 10.5065/D6RR1W7M.
- URL: http://www.cesm.ucar.edu/models/clm/
- Is the code used in this analysis publicly available? Where?: Yes. https://svn-ccsm-models.cgd.ucar.edu/cesm1/release_tags/cesm1_2_1

MODELING TEAM:

- Avelino F. Arellano
    - University of Arizona
    - Department of Atmospheric Sciences
    - Address: 1118 E 4th St, Tucson, AZ 85721
    - Email: arellano@atmo.arizona.edu
    - Contribution: Strategy and advice on preparation for DART (Ensemble Kalman Filter)
- Andrew M. Fox
    - NEON, Inc.
    - Address: 1685 38th St., Ste. 100, Boulder, CO 80301
    - Email: afox@neoninc.org
    - Contribution: Advice on CLM4.5 and preparation for DART
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    - University of Arizona
    - School of Natural Resources & the Environment
    - Address: 1955 E 6th St, Tucson, AZ 85719
    - Email: yaoliu@email.arizona.edu
    - Contribution: CLM setup, pre-processing, performing simulations, and post-processing output
- Francesc Montane
    - University of Arizona
    - School of Natural Resources & the Environment
    - Address: 1955 E 6th St, Tucson, AZ 85719
    - Email: fmontane@email.arizona.edu
    - Contribution: Performed simulations at some sites for output version v.1
- David J.P. Moore
    - University of Arizona
    - School of Natural Resources & the Environment
    - Address: 1955 E 6th St, Tucson, AZ 85719

    - Email: davidjpmoore@email.arizona.edu
    - Contribution: Team strategy and co-ordination
- Daniel M. Ricciuto
    - Oak Ridge National Laboratory
    - E-mail: ricciutodm@ornl.gov
    - Contribution: CLM setup with Yao Liu. Advice on trouble-shooting.

MODIFICATIONS:

- No model changes to produce the runs.
- No additional met drivers required by the model.
- Other environmental input: Aerosol forcing, lightning.
- From all the environmental drivers files provided by PalEON, nitrogen deposition and land use change files were the only ones not included in the runs.
- Climate forcings are interpolated onto 30-minute grids to drive CLM. See the "driver" section in model survey for details on the interpolation scheme used.

TRACEABILITY INFORMATION:

- Traceability framework not implemented in the version of the model that we run (CLM4.5).

MODEL OUTPUTS:

- The outputs provided are monthly outputs.
- The 3-hourly outputs for 1600-1609, 1850-1859 and 1996-2005 are not provided, but could be done if needed.
- The variable "GWBI" is an approximation because it includes a part of root C that was included in the original CLM variable.

Ecosystem Demography Model (ED) version 2.1

README

MODEL INFORMATION:

- Full model name and version: Ecosystem Demography Model (ED) version 2.1
- Model acronym: ED2
- Reference:
    - Moorcroft, P.R., G.C. Hurtt, and S.W. Pacala. 2001. A method for scalign vegation dynamics: the ecosystem demography model (ED). Ecological Monographs 71(4): 556-586.
    - Medvigy, D., S. C. Wofsy, J. W. Munger, D. Y. Hollinger, and P. R. Moorcroft (2009), Mechanistic scaling of ecosystem function and dynamics in space and time: Ecosystem Demography model version 2, J. Geophys. Res., 114, G01002, doi:10.1029/2008JG00081
- URL: https://github.com/EDmodel/ED2/wiki
- Is the code used in this analysis publicly available? Where?: Yes. https://github.com/EDmodel/ED2

MODELING TEAM:

- Christine Rollinson
    - Boston University

    - Department of Earth & Environment
    - Address: 685 Commonwealth Ave, Room 130, Boston, MA 02215
    - Email: crollinson@gmail.com, crolli@bu.edu
    - Contribution: Current site runs using github version of ED 2.1
- Michael Dietze
    - Boston University
    - Department of Earth & Environment
    - Address: 685 Commonwealth Ave, Room 130, Boston, MA 02215
    - Email: dietze@bu.edu
    - Contribution: Team strategy and co-ordination, oversight of model runs
- Jaclyn Hatala Matthes
    - (Former BU postdoc)
    - Dartmouth College
    - Department of Geography
    - Address: 6017 Fairchild Hall, Hanover, NH 03755
    - Email: jaclyn.hatala.matthes@gmail.com
    - Contribution: initial site parameterization & modeling efforts on all sites

MODIFICATIONS:

- ED 2.1 Branch History: https://github.com/crollinson/ED2

TRACEABILITY INFORMATION:

MODEL OUTPUTS:

- The outputs provided are monthly outputs.
- Added output: BAI. In addition to GWBI, we included the model estimate of Basal Area Increment to facilitate direct comparison with tree rings.
- Note on SnowDepth: The output includes the depth of snow or ponded water (temporary surface water), so there may be values even when the snow is melted
- Note on SWE: Like snow depth, this includes the mass of all temporary surface water

Version Changes:

- v3 -- first run with new met
- v4 -- new mortality schemes; adjusted PFT parameters
- v5 -- increased number of cohorts for better stability (14 Jun 2015)
- v6 -- fixed post-processing bugs (NEE = -NEP; swdown components)

ED 2.1 Land Use (LU)

README

MODEL INFORMATION:

- Full model name and version: Ecosystem Demography Model (ED) version 2.1
- Model acronym: ED2-LU
- Reference:

    - Moorcroft, P.R., G.C. Hurtt, and S.W. Pacala. 2001. A method for scalign vegation dynamics: the ecosystem demography model (ED). Ecological Monographs 71(4): 556-586.
    - Medvigy, D., S. C. Wofsy, J. W. Munger, D. Y. Hollinger, and P. R. Moorcroft (2009), Mechanistic scaling of ecosystem function and dynamics in space and time: Ecosystem Demography model version 2, J. Geophys. Res., 114, G01002, doi:10.1029/2008JG00081
- URL: https://github.com/EDmodel/ED2/wiki
- Is the code used in this analysis publicly available? Where?: Yes. https://github.com/EDmodel/ED2

MODELING TEAM:

- Christine Rollinson
    - Boston University
    - Department of Earth & Environment
    - Address: 685 Commonwealth Ave, Room 130, Boston, MA 02215
    - Email: crollinson@gmail.com, crolli@bu.edu
    - Contribution: Current site runs using github version of ED 2.1
- Michael Dietze
    - Boston University
    - Department of Earth & Environment
    - Address: 685 Commonwealth Ave, Room 130, Boston, MA 02215
    - Email: dietze@bu.edu
    - Contribution: Team strategy and co-ordination, oversight of model runs
- Jaclyn Hatala Matthes
    - (Former BU postdoc)
    - Dartmouth College
    - Department of Geography
    - Address: 6017 Fairchild Hall, Hanover, NH 03755
    - Email: jaclyn.hatala.matthes@gmail.com
    - Contribution: initial site parameterization & modeling efforts on all sites

MODIFICATIONS:

- ED 2.1 Branch History: https://github.com/crollinson/ED2

TRACEABILITY INFORMATION:

MODEL OUTPUTS:

- The outputs provided are monthly outputs.
- Added output: BAI. In addition to GWBI, we included the model estimate of Basal Area Increment to facilitate direct comparison with tree rings.
- Note on SnowDepth: The output includes the depth of snow or ponded water (temporary surface water), so there may be values even when the snow is melted
- Note on SWE: Like snow depth, this includes the mass of all temporary surface water

Version Changes:

- v1 -- first run, new met, land use on
- v2 -- second run with adjusted PFT parameters; FORGOT TO TURN LANDUSE ON
- v3 -- full run identical to ED2.v6 except for smaller timestep & Land-Use turnned ON

JULES (Joint UK Land Environment Simulator)

Model information:

- JULES (Joint UK Land Environment Simulator)
- Version 4.1 (release date 3rd Nov 2014)
- www: https://jules.jchmr.org/
- (Publically avaliable from sam site)

Standard citations:

- Best, M. J., M. Pryor, D. B. Clark, G. G. Rooney, R. Essery, C. B. Ménard, J. M. Edwards et al. "The Joint UK Land Environment Simulator (JULES), model description–Part 1: energy and water fluxes." Geoscientific Model Development 4, no. 3 (2011): 677-699.
- Clark, D. B., L. M. Mercado, S. Sitch, C. D. Jones, N. Gedney, M. J. Best, M. Pryor et al. "The Joint UK Land Environment Simulator (JULES), model description–Part 2: carbon fluxes and vegetation dynamics." Geoscientific Model Development 4, no. 3 (2011): 701-722.

Modelling team

- Tristan Quaife
    - Department of Metereology,
    - University of Reading,
    - Reading, UK.
    - t.l.quaife@reading.ac.uk

Modifications:

- No specific modifications but note that this is a specific configuration of JULES.
- The primary features relevant to Paleon are that it is running with with daily phenology and static PFTs (prescribed vegetation from R&F). Also note that the soil carbon is constant (and calculated from the env drivers [n.b. in the current runs PHA has been set at a nominal value of 20 kg/m2]).
- In addition there are a whole host of choices of submodels that are turned on/off, but that are probably of less signifigance (e.g. I am using a specific sunfleck penentration model etc etc).
- Deviation from the Paleon protocol in terms of spin up for soil water and soil temperature. I used the internal spinup routines which may deviate slightly from what is requested in the protocol.
- Biggest derivaton is Fcomp. This is measured in % AREA (as JULES doesn't explicitly calculate biomass). The order of PFTs and tile types in Fcomp is:
    - Broadleaf Trees,
    - Needleleaf Trees
    - C3 Grass
    - C4 Grass

    - Shrubs
    - Urban
    - Lake
    - Bare Soil
    - Ice
- The final four "tile" types are not considered to be PFTs in JULES. In the Paleon site level runs Urban, Lake and Ice should be zero. ("Ice" in this context refers permanent land ice like glaciers - not seasonally frozen ground). The sum of the PFTs + Bare Soil should equal 1.

Traceability:

- In this configuration of JULES there IS NO C ALLOCATION BETWEEN POOLS. (n.b. no configuration of JULES has dynamic allocation between plant compartments except for the new crop model. Some configurations of JULES have dynamic allocation to soil.)

JULES Top-down Representation of Interactive Foliage and Flora Including Dynamics (TRIFFID)

Model information:

- JULES (Joint UK Land Environment Simulator)
- Version 4.1 (release date 3rd Nov 2014)
- www: https://jules.jchmr.org/
- (Publically avaliable from sam site)

Standard citations:

- Best, M. J., M. Pryor, D. B. Clark, G. G. Rooney, R. Essery, C. B. M nard, J. M. Edwards et al. "The Joint UK Land Environment Simulator (JULES), model description Part 1: energy and water fluxes." Geoscientific Model Development 4, no. 3 (2011): 677-699.
- Clark, D. B., L. M. Mercado, S. Sitch, C. D. Jones, N. Gedney, M. J. Best, M. Pryor et al. "The Joint UK Land Environment Simulator (JULES), model description Part 2: carbon fluxes and vegetation dynamics." Geoscientific Model Development 4, no. 3 (2011): 701-722.

Modelling team:

- Tristan Quaife
    - Department of Metereology,
    - University of Reading,
    - Reading, UK.
    - t.l.quaife@reading.ac.uk

Modifications:

- No specific modifications but note that this is a specific configuration of JULES. The primary features relevant to Paleon are that it is running with with daily phenology and PFTS that have are allowed to compete using the TRIFFID module. Soil carbon

and PFT fractions are spun up by cycling over the first 20 years of the climate data for 4000 years. In practice the generally converge in less than 1000.

- In addition there are a whole host of choices of submodels that are turned on/off, but that are probably of less signifigance (e.g. I am using a specific sunfleck penentration model etc etc).
- Deviation from the Paleon protocol in terms of spin up for soil water and soil temperature. I used the internal spinup routines which may deviate slightly from what is requested in the protocol.
- Biggest derivaton is Fcomp. This is measured in % AREA (as JULES doesn't explicitly calculate biomass). The order of PFTs and tile types in Fcomp is:
    - Broadleaf Trees,
    - Needleleaf Trees
    - C3 Grass
    - C4 Grass
    - Shrubs
    - Urban
    - Lake
    - Bare Soil
    - Ice
- The final four "tile" types are not considered to be PFTs in JULES. In the Paleon site level runs Urban, Lake and Ice should be zero. ("Ice" in this context refers permanent land ice like glaciers - not seasonally frozen ground). The sum of the PFTs + Bare Soil should equal 1.

Traceability:

- In this configuration of JULES there IS NO C ALLOCATION BETWEEN POOLS. (n.b. no configuration of JULES has dynamic allocation between plant compartments except for the new crop model. Some configurations of JULES have dynamic allocation to soil.)

Linking Inherently Nonlinear K Among Gradients and EcoSystems (LINKAGES) version 1.3

README

MODEL INFORMATION:

- Full model name and version: Linking Inherently Nonlinear K Among Gradients and EcoSystems (LINKAGES) version 1.3
- Model acronym: LINKAGES
- Reference:
    - Post, W. M., & Pastor, J. (2013). *LINKAGES: An Individual-based Forest Ecosystem Biogeochemistry Model* (Version 1). ORNL Distributed Active Archive Center. https://doi.org/10.3334/ORNLDAAC/1166 Date Accessed: 2026-06-17

    - https://daac.ornl.gov/MODELS/guides/LINKAGES.html
- Is the code used in this analysis publicly available?
    - https://github.com/araiho/Linkages

MODELING TEAM:

- Jason McLachlan
    - University of Notre Dame
    - Biology Department
    - Address: 100 Galvin Life Sciences, Notre Dame, IN 46615
    - Email: jmclachl@nd.edu
    - Contribution: Team strategy
- Ann Raiho
    - University of Notre Dame
    - Biology Department
    - Address: 100 Galvin Life Sciences, Notre Dame, IN 46615
    - Email: araiho@nd.edu
    - Contribution: Current site runs using github version of LINKAGES 1.3

MODIFICATIONS:

- Technical changes to Pastor and Post 1986 version 1 of LINKAGES found on ORNL website:
- Changed random number generator to be based on the clock instead of specific seeds.
- Changed input files to be more flexible to more climate data and different plant functional type specification.
- changed the output to be a .csv file instead of a printed .txt file.

TRACEABILITY INFORMATION:

MODEL OUTPUTS:

- The outputs provided are every other year outputs.

Lund–Potsdam–Jena – Wald, Schnee, Landschaft (LPJ-WSL)

Model Information:

- Model name: LPJ-wsl
- citation:
    - LPJ (Sitch et al. 2003) combines the ecophysiological processes of the Lund-Potsdam-Jena (LPJ) DGVM (Sitch et al. 2003) with hydrological updates from Gerten et al., 2004) and represents vegetation dynamics via the 'mean individual' for each PFT.
    - Gerten, D. et al., 2004. Terrestrial vegetation and water balance-hydrological
    - evaluation of a dynamic global vegetation model. Journal of Hydrology, 286(1-4), pp.249-270.

    - Sitch, S. et al., 2003. Evaluation of ecosystem dynamics, plant geography and terrestrial carbon cycling in the LPJ dynamic global vegetation model. Global Change Biology, 9(2), pp.161-185.

Modelling team:

- Ben Poulter; Montana State University, USA; benjamin.poulter@montana.edu; coordinator, performed simulation and prepared output

Modifications:

- Variables NOT used as driver: nitrogen deposition
- Shortest modelling time step is daily.
- no leap year, removed February 29th from driver, where applicable
- Global PFT, excluding experimental TNE (Temperate needleleaved evergreen)
- recalculation of the driver:
- tair -> daily averages - 273.15
- precipf -> daily sums of precipitation in [mm]
- swdown -> daily averages
- lwdown -> daily averages
- Calculation of potential natural vegetation only. No methods were implemented in the model to reflect fractional pasture or crop. Neither wood harvest is in the model.
- Variables NOT in the output:
    - albedo (is a global constant of 0.17)
    - all Energy fluxes
    - Qsb
    - SnowDepth
    - Fire emissions are calculated annually only
- Variables different than in protocol:
    - We model only fine roots. Coarse roots are in the sap and heart wood.
    - Therefore AGB and AGB:total is higher than one expects it.

Version Update (added by C. Rollinson 21 March 2016):

- v6: Previous versions had constant CO2. version 6 (originally called “version3” in Ben’s email)
    - has CO2 temporally-varying CO2

Lund-Potsdam-Jena General Ecosystem Simulator (LPJ-GUESS) SVN revision 3826

Model Information

- Model name: LPJ-GUESS SVN revision 3826 with applied aet_ifalive_fix_v2.diff patch
- citation: LPJ-GUESS (Smith et al. 2001, 2014) combines the ecophysiological processes of the Lund-Potsdam-Jena (LPJ) DGVM (Sitch et al. 2003) with hydrological updates from Gerten et al., 2004), Nitrogen cycling (Smith et al. 2014)

and more detailed representations of vegetation dynamics and forest mortality, adopting a forest gap model approach.
    - Gerten, D. et al., 2004. Terrestrial vegetation and water balance-hydrological evaluation of a dynamic global vegetation model. Journal of Hydrology, 286(1-4), pp.249-270.
    - Sitch, S. et al., 2003. Evaluation of ecosystem dynamics, plant geography and terrestrial carbon cycling in the LPJ dynamic global vegetation model. Global Change Biology, 9(2), pp.161-185.
    - Smith, B., Prentice, I.C. & Sykes, M.T., 2001. Representation of vegetation dynamics in the modelling of terrestrial ecosystems: comparing two contrasting approaches within European climate space. Global Ecology and Biogeography, 10(6), pp.621-637.
    - Smith B., Wårlind D., Arneth A., Hickler T., Leadley P., Siltberg J., Zaehle S., 2014. Implications of incorporating N cycling and N limitations on primary production in an individual-based dynamic vegetation model. Biogeosciences, 11, pp.2027-2054.
- Code available on request: http://www.nateko.lu.se/lpj-guess/lpj_guess_main.html

Modelling team:

- Jörg Steinkamp; Georg-Voigt-Str. 14-16, 60325 Frankfurt am Main, Germany; joerg.steinkamp@senckenberg.de; performed simulation and prepared output
- Thomas Hickler; Georg-Voigt-Str. 14-16, 60325 Frankfurt am Main, Germany; thomas.hickler@senckenberg.de; coordinator
- Matthew Forrest; Georg-Voigt-Str. 14-16, 60325 Frankfurt am Main, Germany; matthew.forrst@senckenberg.de; code improvement, PFT improvement
- Christian Werner; Georg-Voigt-Str. 14-16, 60325 Frankfurt am Main, Germany; christian.werner@senckenberg.de; rewriting input/output routine

Modifications:

- Variables NOT used as driver: lwdown, psurf, qair, wind, land-use, nitrogen deposition
- Shortest modelling time step is daily.
- no leap year, removed February 29th from driver, where applicable
- stochastic patch destroying interval (distinterval) 100 years
- Number of patches: 50
- Global PFT, excluding experimental TNE (Temperate needleleaved evergreen)
- recalculation of the driver:
- tair -> daily averages - 273.15
- precipf -> daily sums of precipitation in [mm]
- swdown -> daily averages
- Calculation of potential natural vegetation only. No methods were implemented in the model to reflect fractional pasture or crop. Neither wood harvest is in the model.
- Variables NOT in the output:

    - albedo (is a global constant of 0.17)
    - all Energy fluxes
    - Qsb
    - SnowDepth
    - Fire emissions are calculated annually only
- Variables different than in protocol:
    - We model only fine roots. Coarse roots are in the sap and heart wood. Therefore AGB and AGB:total is higher than one expects it.
- UPDATE (Thu May 14 11:54:19 CEST 2015): Corrected soil water content. Now in mm
- UPDATE (Tue Jun 30 15:33:55 CEST 2015): Basal Area was wrong.

- UPDATE (Wed Jul 22 10:15:45 CEST 2015): checked the radiation output. Is always lower by the
    - model internal fixed albedo of 0.17

Simple Biosphere/Carnegie-Ames-Stanford Approach (SiBCASA)

Model Information:

- Model name: Simple Biosphere/Carnegie-Ames-Stanford Approach (SiBCASA)
- Citation: Schaefer, K., G. J. Collatz, P. Tans, A. S. Denning, I. Baker, J. Berry, L. Prihodko, N. Suits, and A. Philpott (2008), Combined Simple Biosphere/Carnegie-Ames-Stanford Approach terrestrial carbon cycle model, J. Geophys. Res., 113, 03034, doi:10.1029/2007JG000603.

Modeling team:

- Kevin Schaefer, National Snow and ice Data Center, University of Colorado
- Elchin Jafarov, Institute of Arctic and Alpine Research, University of Colorado

Modifications:

- Added soil organic matter, new snow model (Schaefer, K., T. Zhang, A. G. Slater, L. Lu, A. Etringer, and I. Baker (2009), Improving simulated soil temperatures and soil freeze/thaw at high-latitude regions in the Simple Biosphere/Carnegie-Ames-Stanford Approach model, J. Geophys. Res., 114, art. num F02021, doi:10.1029/2008JF001125.)
- Added frozen permafrost carbon (Schaefer, K., T. Zhang, L. Bruhwiler, and A. P. Barrett (2011), Amount and timing of permafrost carbon release in response to climate warming, Tellus Series B: Chemical and Physical Meteorology, DOI: 10.1111/j.1600-0889.2011.00527.x.)
- Added frozen soil biogeochemistry and dynamic soil organic layer