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BIOME-BGC: MODELING CARBON STORAGE AND FLUX OF PONDEROSA PINE (LAW ET AL. 2003)

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Biome-BGC: Modeling Carbon Dynamics in Ponderosa Pine Stands (Law et al. 2003)

Summary:

This archived model product contains the directions, executables, and procedures for running Biome-BGC, Version 4.1.2, to recreate the results of

Law B. E., O. J. Sun, J. Campbell, S. Van Tuyl, and P. E. Thornton. 2003. Changes in carbon storage and fluxes in a chronosequence of ponderosa pine. *Global Change Biology*, 9(4), 510-514.

Abstract:

Forest development following stand-replacing disturbance influences a variety of ecosystem processes including carbon exchange with the atmosphere. On a chronosequence of ponderosa pine (*Pinus ponderosa* var. *Laws.*) stands in central Oregon, U.S.A., we used biological measurements to estimate carbon storage in vegetation and soil pools, net primary productivity (NPP), and net ecosystem productivity (NEP) in relation to stand age. Measurements were made in 2000 on a suite of 12 ponderosa pine stands ranging in age from 9 to >300 years. Total ecosystem carbon storage and the fraction of ecosystem carbon in aboveground wood mass increased rapidly until 150-200 years and did not decline in older stands. Forest inventory data on 950 ponderosa pine plots in Oregon show that the greatest proportion of plots exist in stands ~100 years old, indicating that a majority of stands are approaching maximum carbon storage and net carbon uptake. Our data suggest that NEP averages ~70 g C m⁻² year⁻¹ for ponderosa pine forests in Oregon. About 85% of the total carbon storage in biomass on the survey plots exists in stands greater than 100 years, which has implications for managing forests for carbon sequestration. To investigate variation in carbon storage and fluxes with disturbance, simulation with process models requires a dynamic parameterization for biomass allocation that depends on stand age and should include a representation of competition between multiple plant functional types for space, water, and nutrients.

Data Citation:

Cite this model product as follows:

Law, B. E., and P. E. Thornton. 2005. Biome-BGC: Modeling Carbon Dynamics in Ponderosa Pine Stands (Law et al. 2003). ORNL DAAC, Oak Ridge, Tennessee, USA. <http://dx.doi.org/10.3334/ORNLDAAC/809>.

References:

Law B. E., O. J. Sun, J. Campbell, S. Van Tuyl, and P. E. Thornton. 2003. Changes in carbon storage and fluxes in a chronosequence of ponderosa pine. *Global Change Biology*, 9(4), 510-514.

Model Product Description:

The archived model products include the executable, input, and spin-up files, which are all contained in the `law_2003_msarch.zip` file and the detailed procedures for extracting and running Biome-BGC, Version 4.1.2, are in the companion file [law_2003_msarch_readme.pdf](#).

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- [Model Archive](#)

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