INTEGRATED BIOSPHERE SIMULATOR MODEL (IBIS), VERSION 2.5

Get Data

Integrated Biosphere Simulator Model (IBIS), Version 2.5

Summary:

The Integrated Biosphere Simulator (IBIS) is designed to be a comprehensive model of the terrestrial biosphere; the model represents a wide range of processes, including land surface physics, canopy physiology, plant phenology, vegetation dynamics and competition, and carbon and nutrient cycling. The model generates global simulations of the surface water balance (e.g., runoff), the terrestrial carbon balance (e.g., net primary production, net ecosystem exchange, soil carbon, aboveground and belowground litter, and soil CO2 fluxes), and vegetation structure (e.g., biomass, leaf area index, and vegetation composition).

IBIS was developed by the Center for Sustainability and the Global Environment (SAGE) researchers as a first step toward gaining an improved understanding of global biospheric processes and studying their potential response to human activity [Foley et al. 1996]. IBIS was constructed to link explicitly land surface and hydrological processes, terrestrial biogeochemical cycles, and vegetation dynamics within a single, physically consistent framework. Furthermore, IBIS was one of a new generation of global biosphere models, termed Dynamic Global Vegetation Models (DGVMs), that consider transient changes in vegetation composition and structure in response to environmental change. Previous global ecosystem models have typically focused on the equilibrium state of vegetation and could not allow vegetation patterns to change over time.

Version 2.5 of IBIS includes several major improvements and additions [Kucharik et al. 2000]. SAGE continues to test the performance of the model, assembling a wide range of continental- and global-scale data, including measurements of river discharge, net primary production, vegetation structure, root biomass, soil carbon, litter carbon, and soil CO2 flux. With these field data and model results used for the contemporary biosphere (1965-1994), their evaluation shows that simulated patterns of runoff, net primary production, biomass, leaf area index, soil carbon, and total soil CO2 flux agreed reasonably well with measurements that have been compiled from numerous ecosystems. These results also compare favorably to other global model results [Kucharik et al. 2000].

More information about IBIS is available on the SAGE web site [http://www.sage.wisc.edu/mapsdatamodels.html].

Data Citation:

Cite this data model as follows:

Foley, J. A., C. J. Kucharik, and D. Polzin. 2005. Integrated Biosphere Simulator Model (IBIS), Version 2.5. ORNL DAAC, Oak Ridge, Tennessee, USA. http://dx.doi.org/10.3334/ORNLDAAC/808.

References:

Kucharik, C. J. 2003. Evaluation of a process-based agro-ecosystem model (Agro-IBIS) across the U.S. cornbelt: simulations of the inter-annual variability in maize yield. Earth Interactions 7, 1-33.

Kucharik, C. J., and K. R. Brye. 2003. Integrated BIosphere Simulator (IBIS) yield and nitrate loss predictions for Wisconsin maize receiving varied amounts of Nitrogen fertilizer. Journal of Environmental Quality 32, 247-268.

Kucharik, C. J., J. A. Foley, C. Delire, V. A. Fisher, M. T. Coe, J. Lenters, C. Young-Molling, N. Ramankutty, J. M. Norman, and S. T. Gower. 2000. Testing the performance of a dynamic global ecosystem model: Water balance, carbon balance and vegetation structure. Global Biogeochemical Cycles 14(3), 795-825.

Foley, J. A., I. C. Prentice, N. Ramankutty, S. Levis, D. Pollard, S. Sitch, and A. Haxeltine. 1996. An integrated biosphere model of land surface processes, terrestrial carbon balance, and vegetation dynamics. Global Biogeochemical Cycles 10(4), 603-628.

Model Product Description:

Model Documentation and User's Guide

The IBIS Version 2.5 model download materials include three README files:

- Usage Agreement (http://daac.ornl.gov/daacdata/model_archive/IBIS/ibis_2.5/comp/IBIS_README-1st.pdf)
- Users Guide for the NetCDF model implementation (http://daac.ornl.gov/daacdata/model_archive/IBIS/ibis_2.5/comp/IBIS_README_Users_Guide.pdf)
- User notes for adjusting soil parameters (http://daac.ornl.gov/daacdata/model_archive/IBIS/ibis_2.5/comp/IBIS_README_soil-notes.pdf)

Source Code

A full NetCDF model implementation [ibis_2.5.tar.gz] including:

- MAKE files that will automatically generate the executable code.
- A version history file with a listing of bug fix changes.

HDF and Mac-HDF versions are available via the SAGE web site [http://www.sage.wisc.edu/mapsdatamodels.html].

Input Data Sets

Randomly generated NetCDF test data at 10-degree resolution [input10-nc.tar.gz] -- the results generated from this data are meaningless and are only intended to be used to test your code.

Due to the proprietary nature of some of the climate data, SAGE cannot freely distribute all of the input files.

Document Information:

2005/4/15

Document Review Date:

2005/4/15