

Introduction to the GCAM Community Modeling Meeting

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Joint Global Change Research Institute
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GCAM community modeling activities are supported by DOE's office of science.

Community modeling is an exciting step forward for GCAM.

- ▶ Several years ago, a case was made that developers of integrated assessment models may be hesitant to move to an open paradigm;
 - Rent-seeking behavior;
 - Fear of misuse;
 - Fear of embarrassment.
- ▶ All of these are real issues, to varying degrees.
- ▶ But they missed another one: it's a lot of work!
- ▶ In contrast, there are enormous benefits of a community approach:
 - A broader community means more feedback on the model.
 - A broader community means more high-quality researchers that can be part of the GCAM development in the long-run.
 - A broader community means a **better model and better research.**

Vision for a GCAM Modeling Community

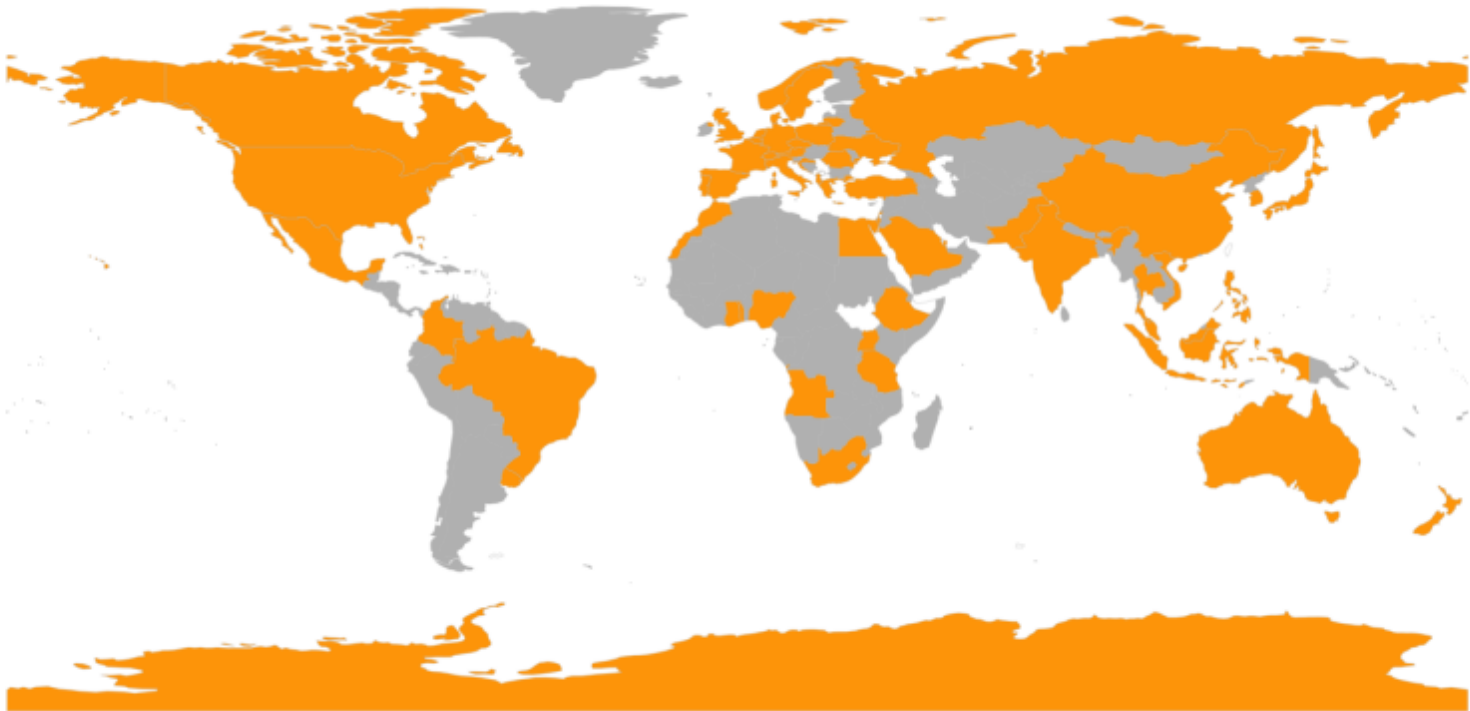
- ▶ A community of researchers that
 - Uses GCAM;
 - Tailors GCAM to their own research needs;
 - Communicates regularly;
 - Identifies key areas for GCAM development;
 - Contributes to GCAM's development.
- ▶ We've made a lot of progress since moving to a community paradigm
 - This is the 5th Annual Meeting of the GCAM Community
 - We have implemented a community listserve
 -



**Evolution of GCAM
as a Community
Model**

We have an expanding GCAM user community

- ▶ As of May 2014, 419 people had received copies of GCAM.
 - 254 institutions, 58 countries, 7 continents
- ▶ We average ~20 downloads per month



It's easier than ever to get GCAM

► Now all you need to do is go to the website

► <http://www.globalchange.umd.edu/models/gcam/download/>



GCAM Model Release

September 26, 2013 – GCAM 3.2 has been released.

Detailed documentation of the GCAM is available at the [GCAM Wiki](#), including a [Getting Started with GCAM](#) page. See also the [GCAM Community](#) web page.

GCAM and the GCAM Model Interface are made available under the terms of the [ECL open source license version 2.0](#). Portions of this software incorporate other open source projects that are subject to their own open source licenses.

GCAM users are requested to follow the following guidelines.

A) Please cite the following two references when publishing results obtained with GCAM:

Kim, S.H., J. Edmonds, J. Lurz, S. J. Smith, and M. Wise (2006) [The ObJECTS Framework for Integrated Assessment: Hybrid Modeling of Transportation](#) *Energy Journal* (Special Issue #2) pp 51-80.


<http://wiki.umd.edu/gcam/>

B) Researchers are welcome to make any changes they like for their own research interests. However, **any revised version, with altered input data or model code, must be identified not as GCAM but as GCAM-xxxx**. For example, the GCAM version that has been customized with input data specific for India is referred to as GCAM-IIM (for India Institute of Management).

If you have made model changes (code or data) that you feel may be useful to the broader GCAM community please see the making contributions to core GCAM webpage.

As the GCAM moves to a community-oriented model platform, we welcome would appreciate a notice of publications using GCAM

We've implemented a Wiki documentation system



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The GCAM developers are grateful to the U.S. Department of Energy's Integrated Assessment Research Program for long-term research support.



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Main Page

The Global Change Assessment Model (GCAM) is a global integrated assessment model with particular emphasis on the representation of human earth systems including interactions between the global economic, energy, agricultural, land use and technology systems. Previously known as MiniCAM^[1], this model traces its origins to the Edmonds and Reilly model.^{[2][3][4][5]} Over time the model has developed and evolved through a series of advances documented in a variety of papers^{[1][6][7][8][9][10]}. The GCAM physical atmosphere and climate are represented by the Model for the Assessment of Greenhouse-Gas Induced Climate Change (MAGICC)^{[11][12][13]}.

PNNL is committed to making the Global Change Assessment Model (GCAM) a community tool – expanding its user community and gradually opening the development of the model to this community. The purpose of this wiki is to provide a resource for users across the globe learning to run GCAM. If you are interested in running GCAM, please see the [getting started page](#). The current version of the model is [GCAM 3.1](#).

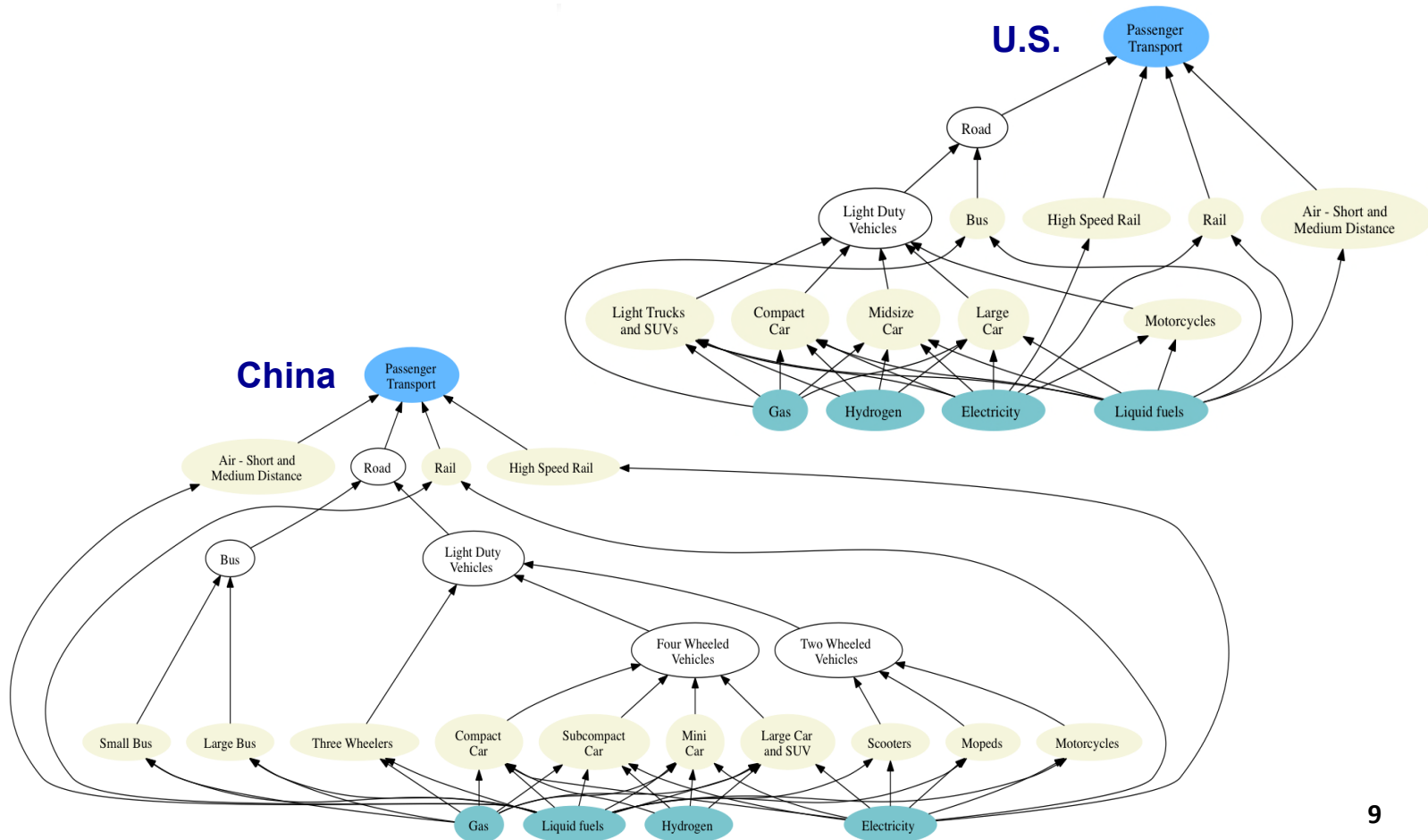
Contents [\[hide\]](#)

- 1 General Structure
 - 1.1 Figure 1: Overall structure of the general structure of the energy system of the GCAM
 - 1.2 Figure 2: Overall structure of the agriculture-land-use module of the GCAM
 - 1.3 Figure 3: Overview of energy production and transformation in GCAM.
 - 1.4 Table 1: Overview of the key characteristics of the GCAM.
- 2 Detailed Model Description
- 3 Selected GCAM Papers and Reports

And we are building collaborations to improve the model

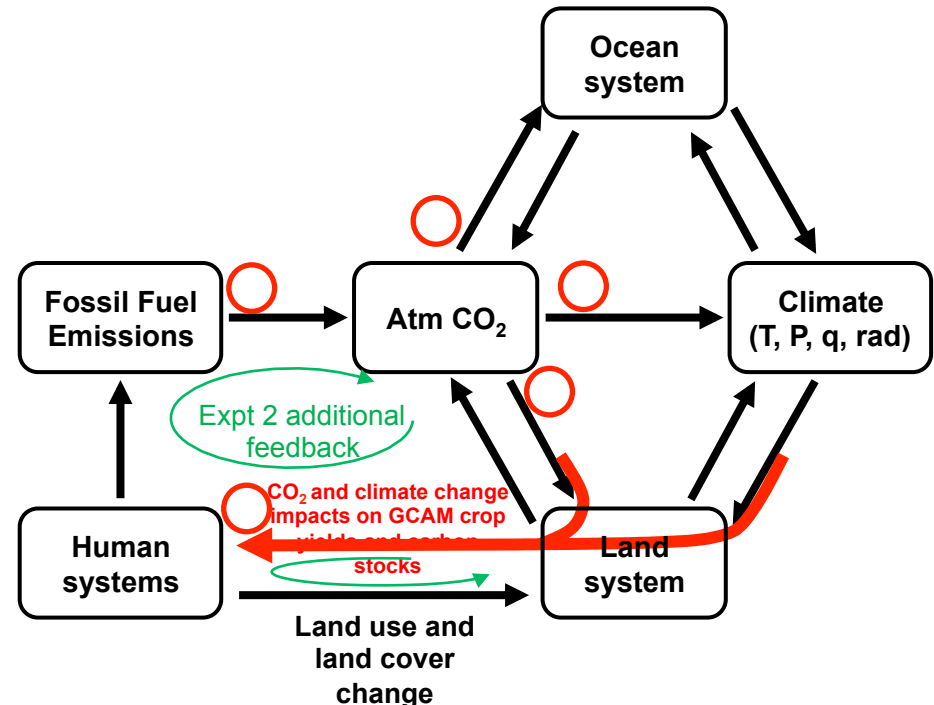
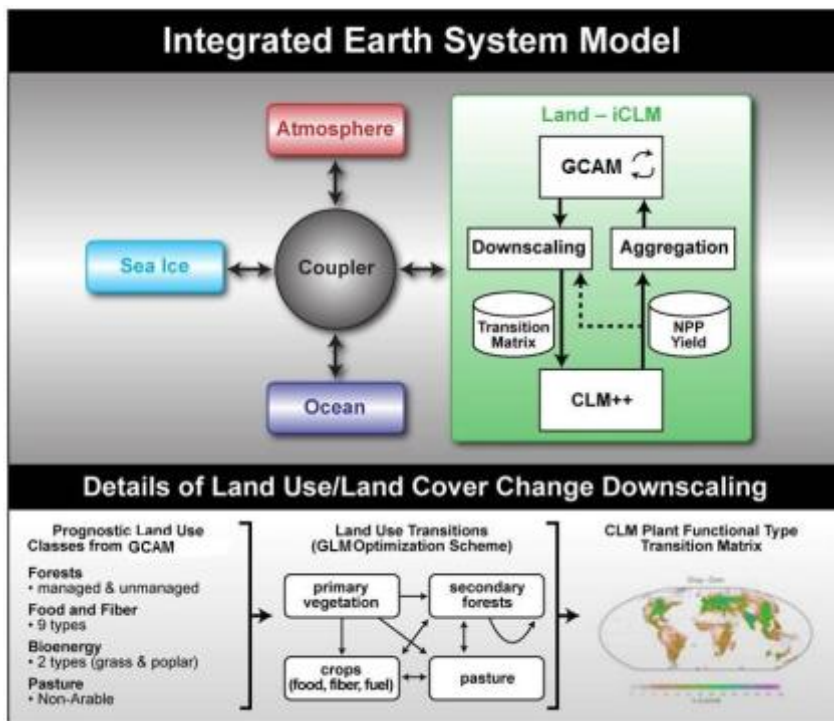
GCAM – UCDTransport Module

Detailed representation of transportation sector using variable nesting structure depending on the region



And GCAM is entering the climate modeling community through the iESM project

- ▶ iESM is a coupled human-Earth system model that integrates GCAM into the Community Earth System Model (CESM)
 - Applied to scientific questions about human and Earth system interactions—feedbacks matter to human, energy and biogeochemical systems.
 - Developed improved methods for the IAM, ESM and IAV communities to use in future coupling experiments (e.g. CMIP).



Some Priorities for Moving Forward on the GCAM Community

- ▶ Priority: Enhancing the community of GCAM development
- ▶ Priority: Enhancing the usability of GCAM
 - Visualization
 - Input and output structures
 - Interoperability with other tools and analyses
 - Documentation
 - Computational efficiency and stability