

Community Research Priorities

November 13, 2012

Goal of This Session

To identify research priorities for the integrated assessment modeling community and to make recommendations for future community work.

- What are the research tasks that are bigger than individual researchers and research groups?
- How do we galvanize the international group of funding agencies to support those activities?

IAMC Research Priorities 2011

1. Technology and mitigation scenarios
2. Policy scenarios (imperfect and perfect)
3. Second-best worlds
4. Regional scenarios
5. Development, Demographics, and Urbanization
6. Integration between energy, economy, land use and water
7. Interactions between climate mitigation, climate adaptation, residual impacts
8. RCPs, Post-RCP replication and storylines
9. Uncertainty

IAMC Capacity-Building Priorities 2011

1. Diagnostic scenarios
2. Historic Reproduction and Data Development
3. Standardized Data Template and Community Data Base

Two Core Missions

Science-based analysis, insights and scenarios

- Data
- Models
- Validation
- Scientific insights
- Standardized scenarios

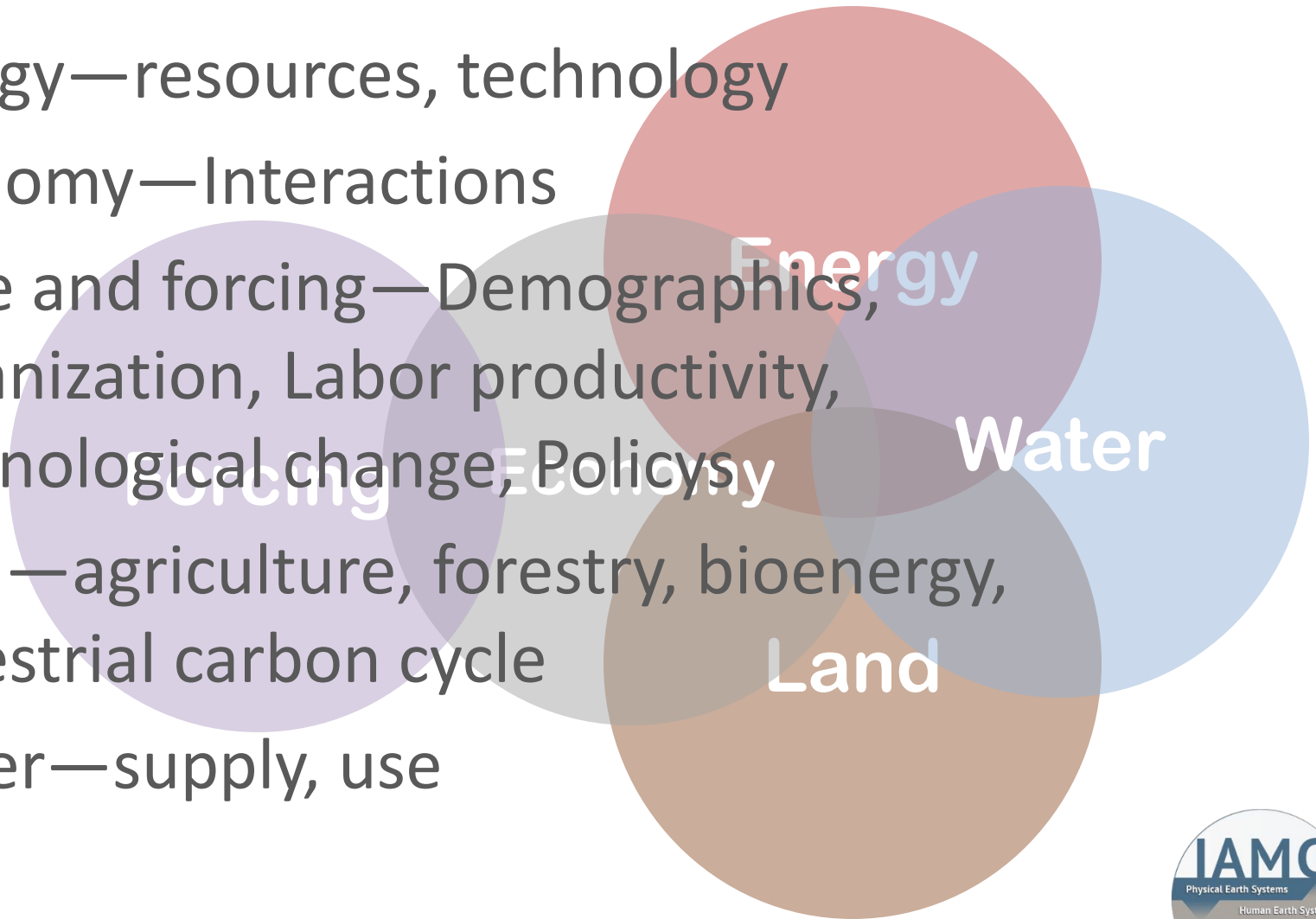
Decision support

- Tools
- Policy Relevant Analysis

IAM DEVELOPMENTS

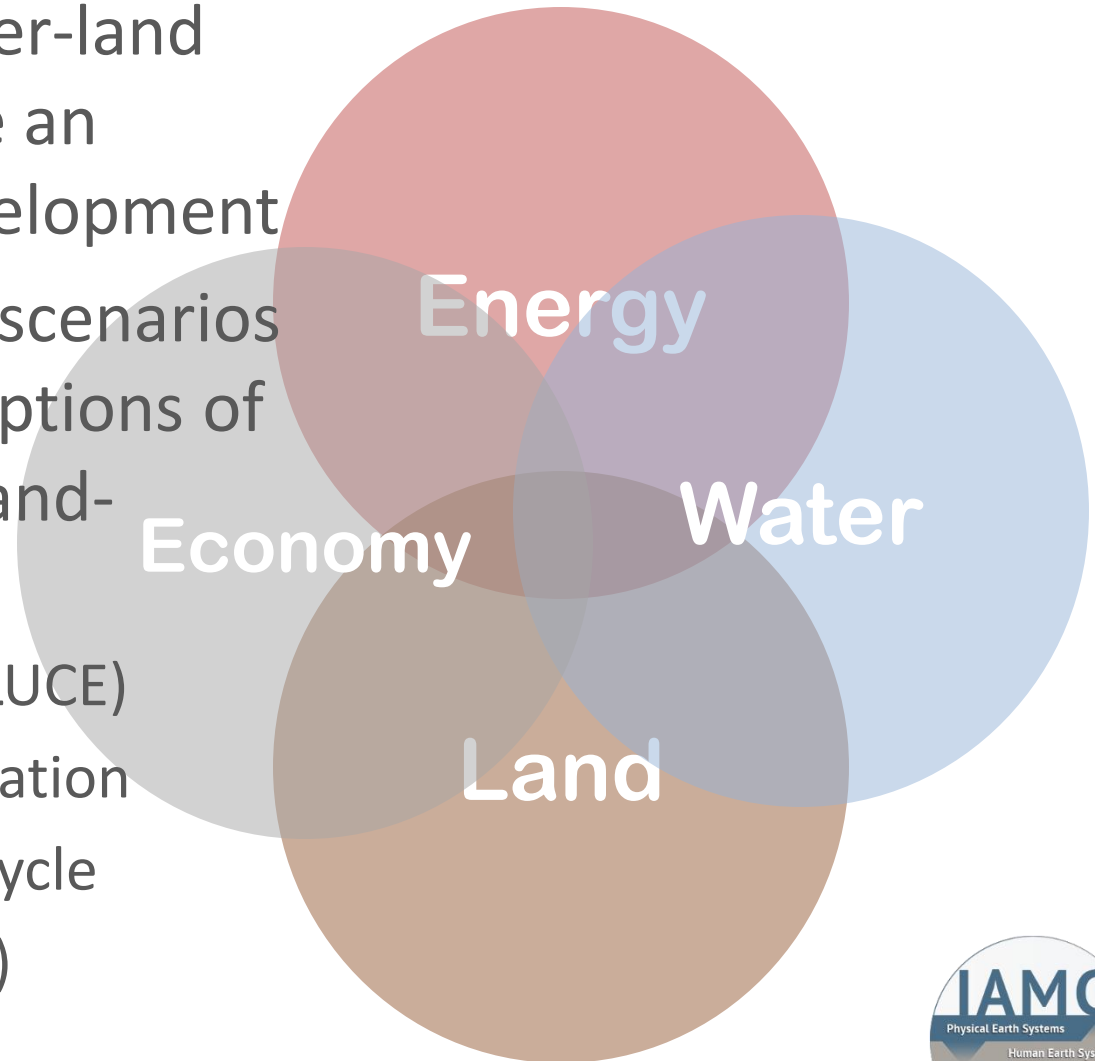
Most of Our Focus Has on the Human Earth System Emissions

- Energy—resources, technology
- Economy—Interactions
- Scale and forcing—Demographics, Urbanization, Labor productivity, Technological change, Policies
- Land—agriculture, forestry, bioenergy, terrestrial carbon cycle
- Water—supply, use



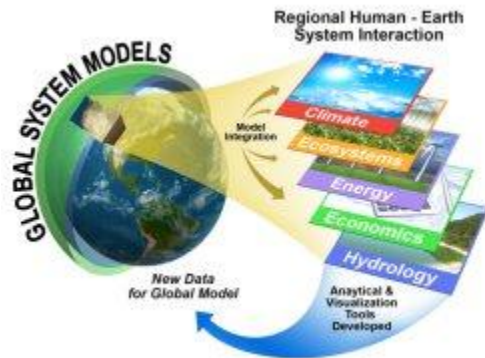
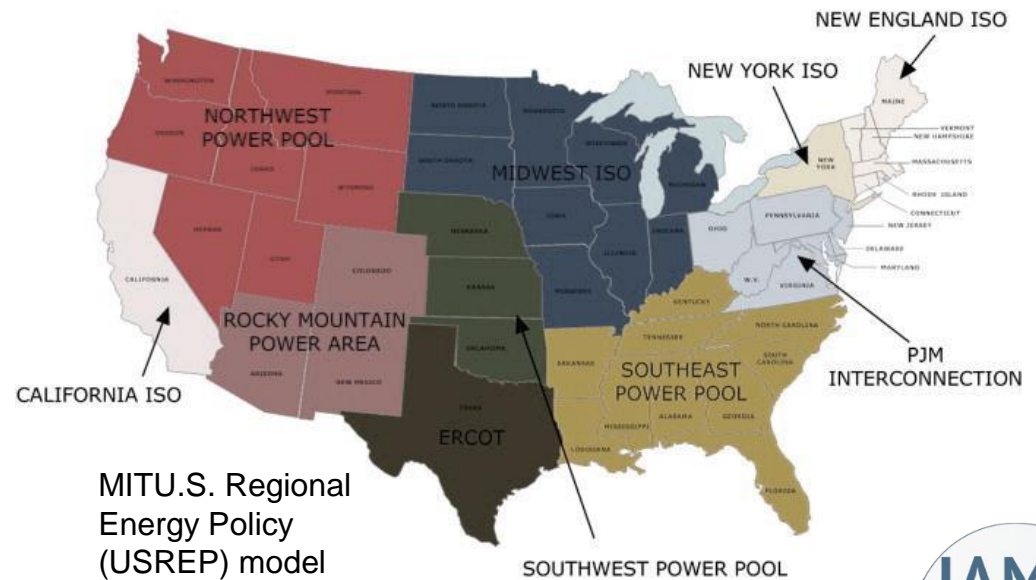
Energy-Economy-Water-Land

- Explicit energy-water-land representations are an important IAM development
- Policy intervention scenarios need explicit descriptions of energy- (esp. bio) land-water interactions.
 - Terrestrial policy (ILUCE)
 - Terrestrial sequestration
 - Terrestrial carbon cycle
 - Land cover (albedo)



Higher Resolution

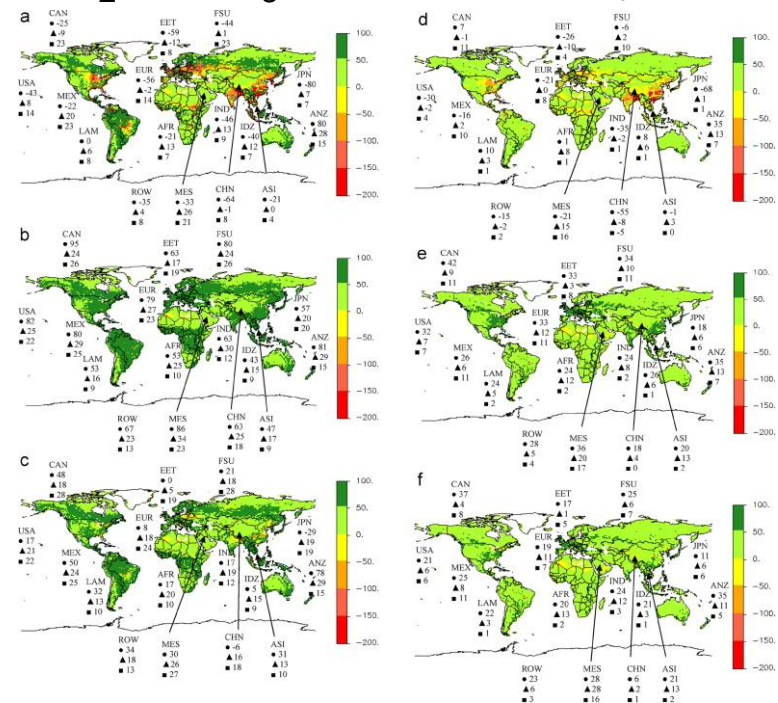
- Finer spatial resolution
- Finer temporal resolution



IAMs as IAVs

- While hardly the center of IAM research, IAM research teams are increasingly considering physical climate impacts
 - Water, HDD, CDD, sea level, ecosystem, crop yields, direct land-use effects on climate (albedo, H₂O feedback & heat)

CO₂ and O₃ effects on crop yields

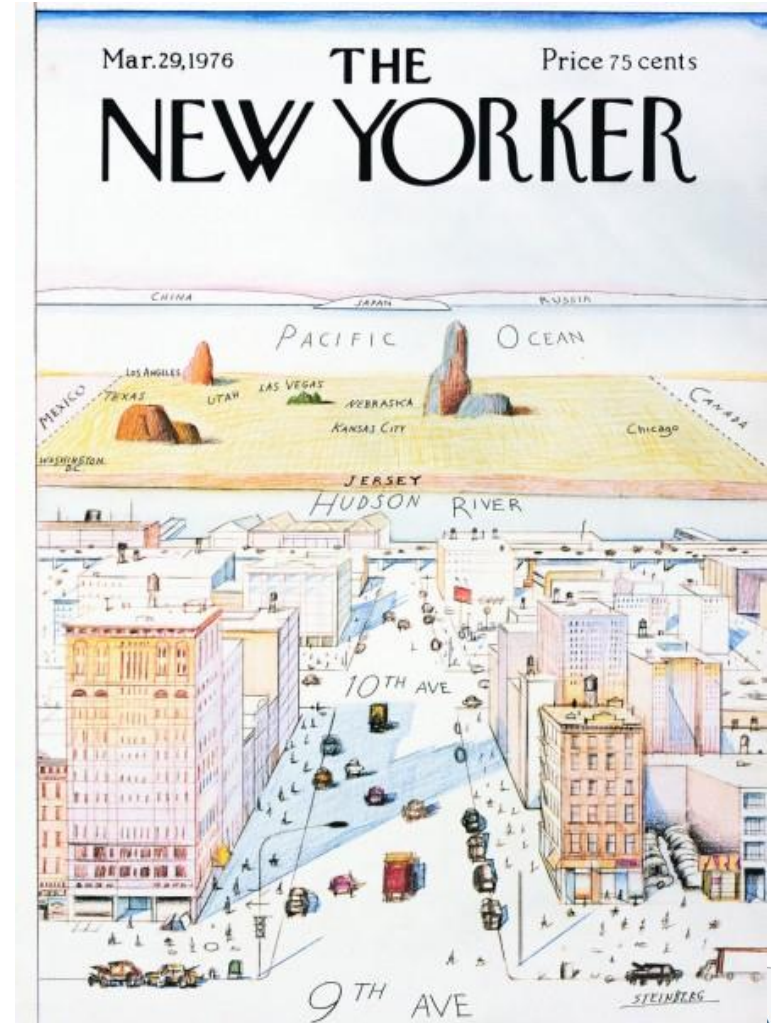


Source: J. Reilly, S. Paltsev, B. Felzer, X. Wang, D. Kicklighter, J. Melillo, R. Prinn, M. Sarofim, A. Sokolov, C. Wang. 2007. Global economic effects of changes in crops, pasture, and forests due to changing climate, carbon dioxide, and ozone, *Energy Policy*, Volume 35, Issue 11, November 2007, Pages 5370–5383

INTERACTIONS WITH BIOGEO- PHYSICAL EARTH SCIENCE

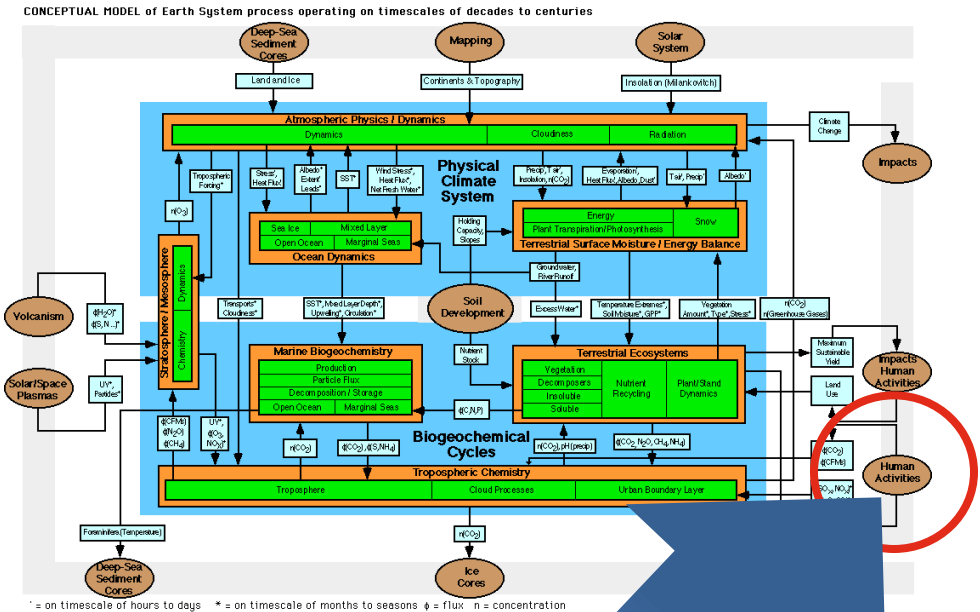
Alternative Views of the Earth System

- The New Yorker's view



Alternative Views of the Earth System

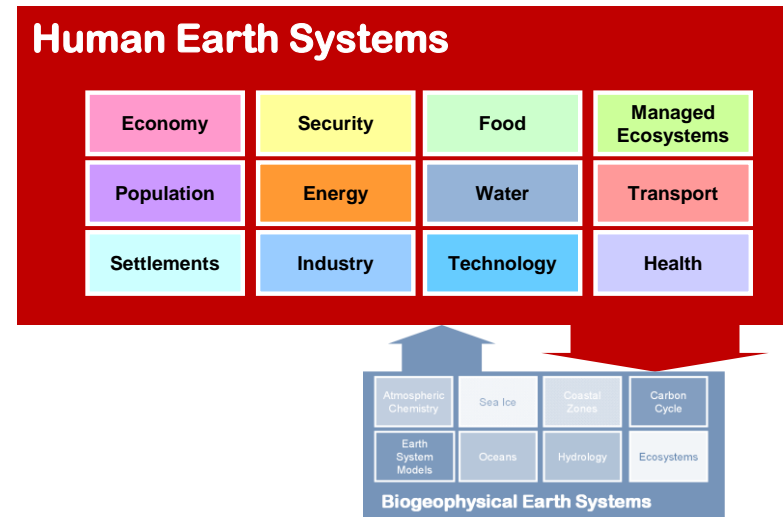
- The New Yorker's view
- The biogeochemical modeler's view



You are here

Alternative Views of the Earth System

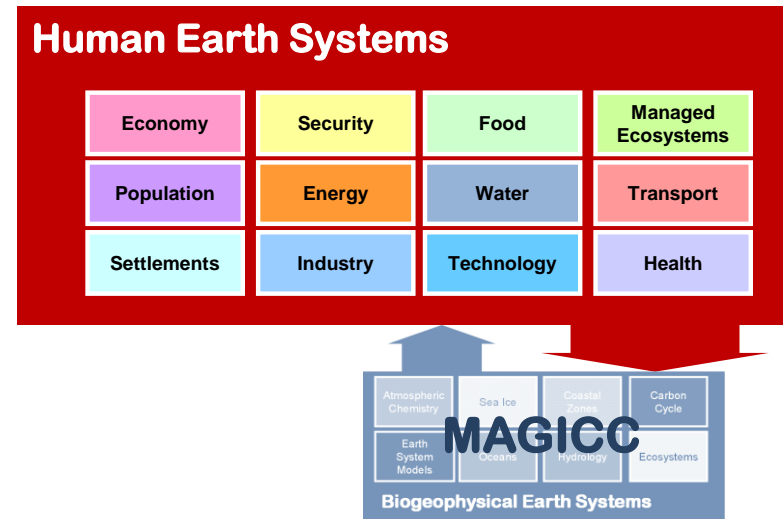
- The New Yorker's view
- The biogeochemical modeler's view
- The IAM modeler's view



Biogeochemical Earth Systems

Approaches

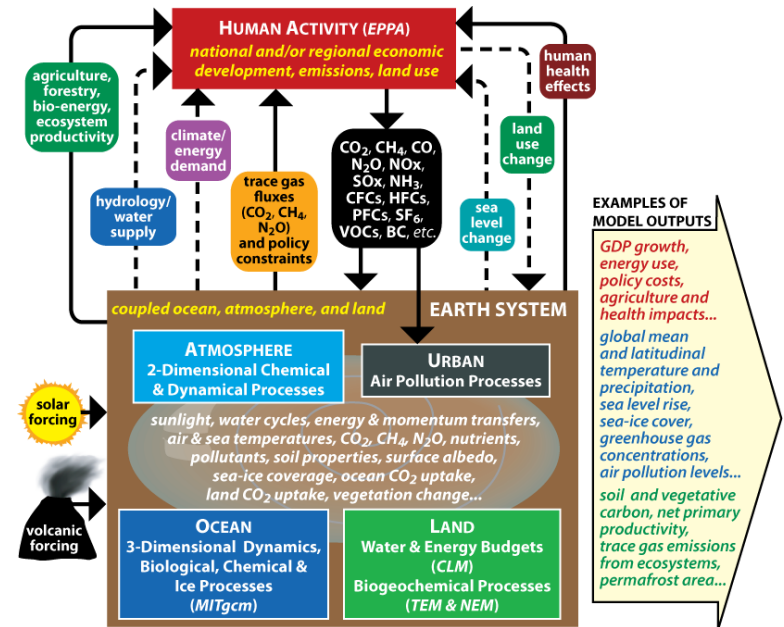
- MAGICC



Biogeochemical Earth Systems

Approaches

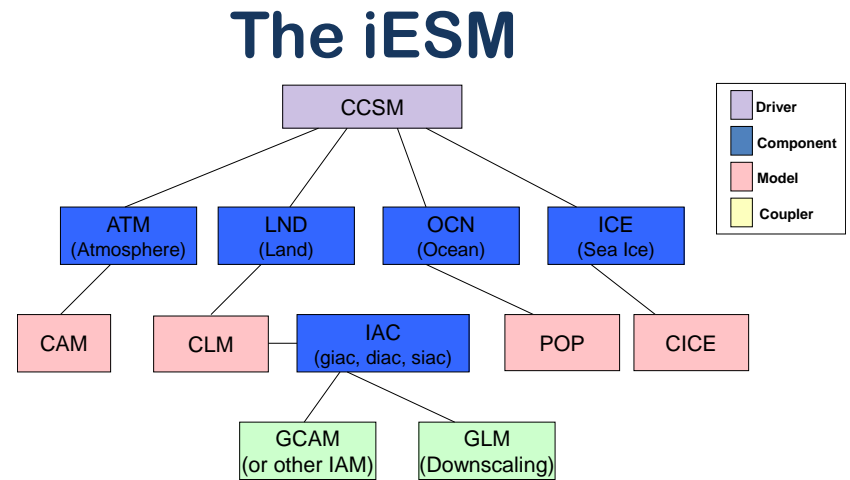
- MAGICC
- Team developed



Biogeochemical Earth Systems

Approaches

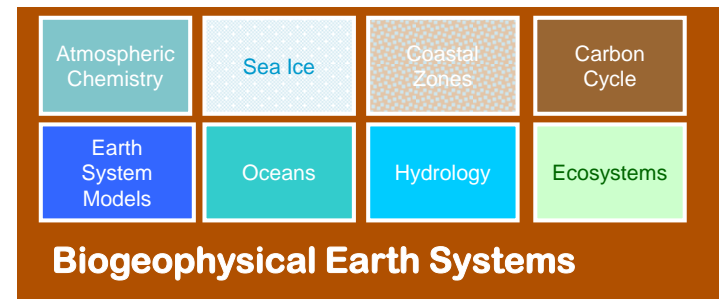
- MAGICC
- Team developed
- Collaboration with a science team—e.g. the iESM



Biogeochemical Earth Systems

Approaches

- MAGICC
- Team developed
- Collaboration with a science team—e.g. the iESM
- Development of an IAMC community biogeochemical Earth system modeling resource

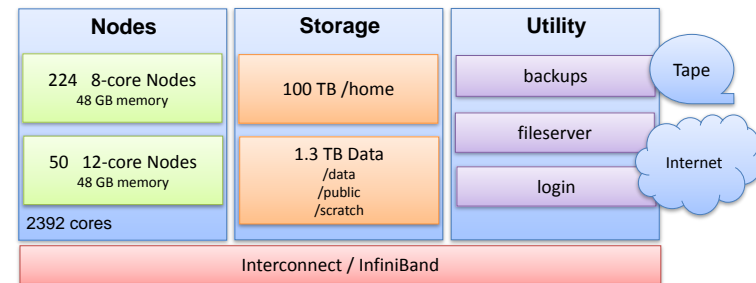


RESEARCH PRIORITIES 2012

The Community's Tool Kit

- Model intercomparison/
coordinated scenario
development
- Data base development
- Model validation

- Shared computational
resources
- Community modeling?



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Potential IAMC Research Priorities 2012

1. Technology and mitigation scenarios
2. Policy scenarios (imperfect and perfect)
3. Second-best worlds
4. Regional scenarios
5. Development, Demographics, and Urbanization
- 6. Integration between energy, economy, land use and water**
7. Interactions between climate mitigation, **climate adaptation, residual climate impacts**
8. ~~RCPs~~, Post-RCP replication and storylines
- 9. Uncertainty, Diagnostics and Validation (SWG?)**
- 10. Improved biogeochemical Earth system representations and interactions**

Cross-Walk with Model Intercomparison

Issue\Community Activity	LAMP	EMF-24, 27, 28	AMPERE	RoSE	PIMDDI	LIMITS	MUG	Ag-Mip	ISI-Mip	ICARUS/TEaM
Technology and mitigation scenarios	X	X	X	X		X				X
Policy scenarios (non-ideal, 2 nd best & ideal)		X	X	X	X	X				
Regional scenarios	X	X	X (EU)	X (China)	X	X				
Development, Demography & Urban	X			X (dev)						
Integration energy, econ., land use & water		X			X	X		X	X	
Interaction mitigation & climate adaptation					X					
Uncertainty					X		X			X
Model diagnostics & historic reproduction			X		X					

2012 First community activity addressing WATER yet.

X X

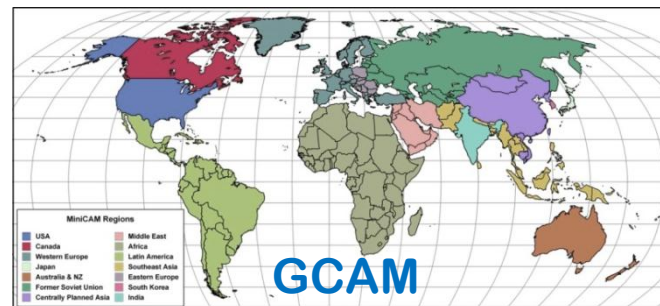
X X

IAMC Capacity-Building Priorities 2011

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2. Historic Reproduction and Data Development
3. Standardized Data Template and Community Data Base

IAMC Capacity-Building Priorities 2012

1. Diagnostic scenarios [moved to research priorities]
2. Historic Reproduction and Data Development [moved to research priorities]
3. Standardized Data Template and Community Data Base
 - Reporting standards?
 - Regional definitions?



More Potential IAMC Capacity-Building Priorities 2012

- **Standardization of geographic regions**
- **Community data developments**
 - Today we use GTAP, IEA, Hyde/Hurtt
 - Do we want to develop data conventions and pointers?
 - Meta data regarding model characteristics and documentation
- **Community computational resources**
- **Community modeling**
 - Multi-institution development of an open modeling resource,
 - e.g. the iESM, or
 - e.g. an IAM community biogeochemical model with open modular architecture.
- **IAMC journal? or adopt a journal?**



DISCUSSION