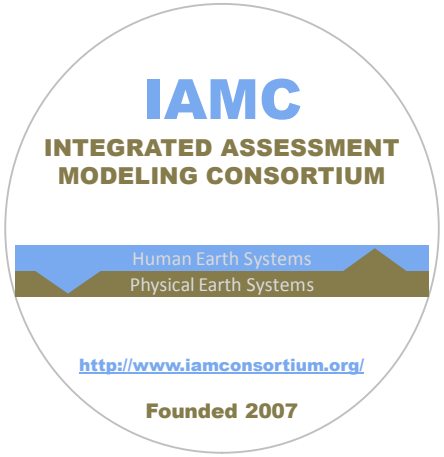
the 17th AIM International Workshop
18 February, 2012, Tsukuba, JAPAN

The Integrated Assessment Modeling Consortium



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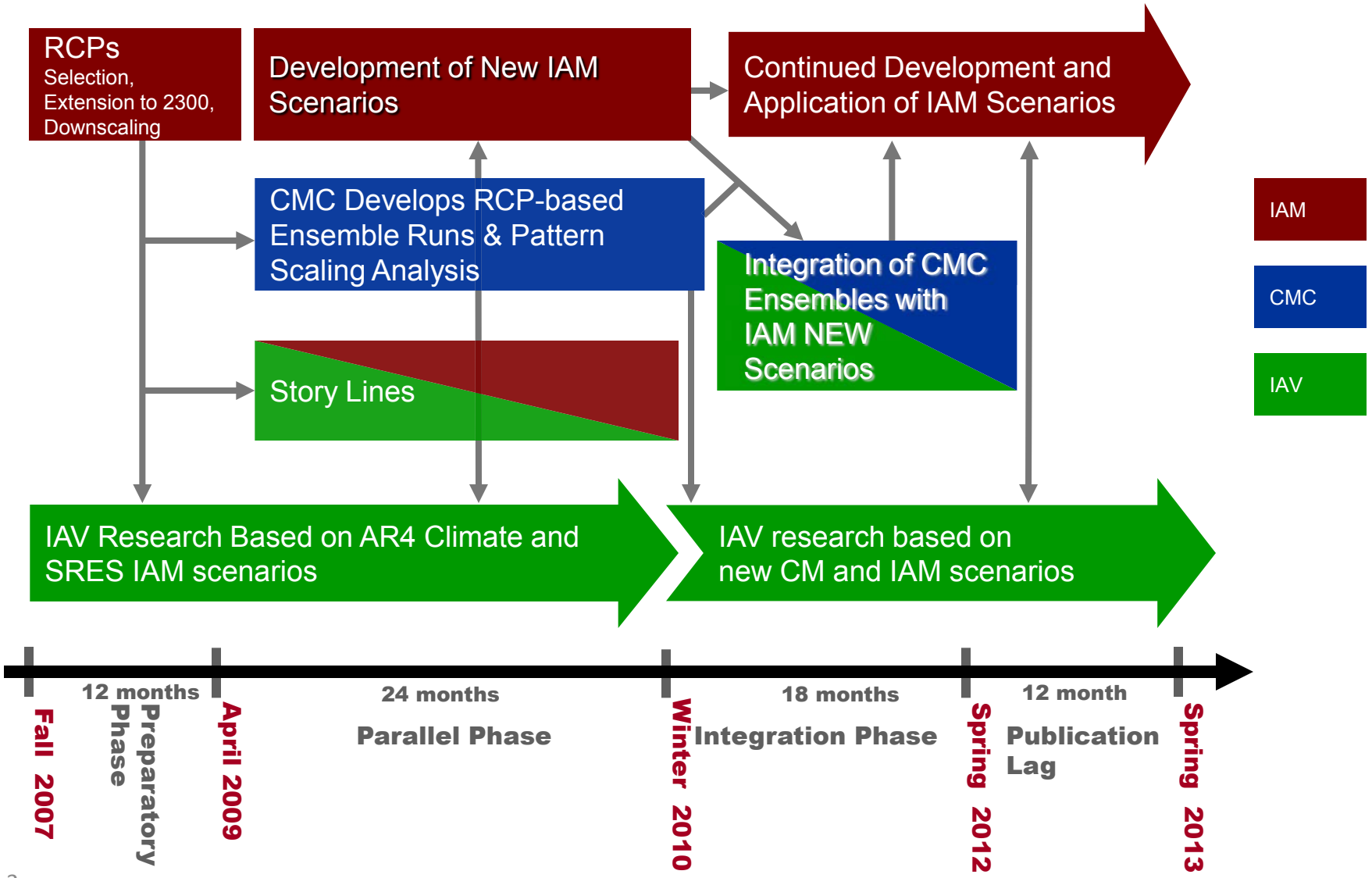
presentation is based on outputs from IAMC Scientific Steering Committee (SSC)

Contribution to IAMC from NIES is partly sponsored by the Environment Research and Technology Development Fund (S-6-1 and A-1103) of the Ministry of Environment of Japan.

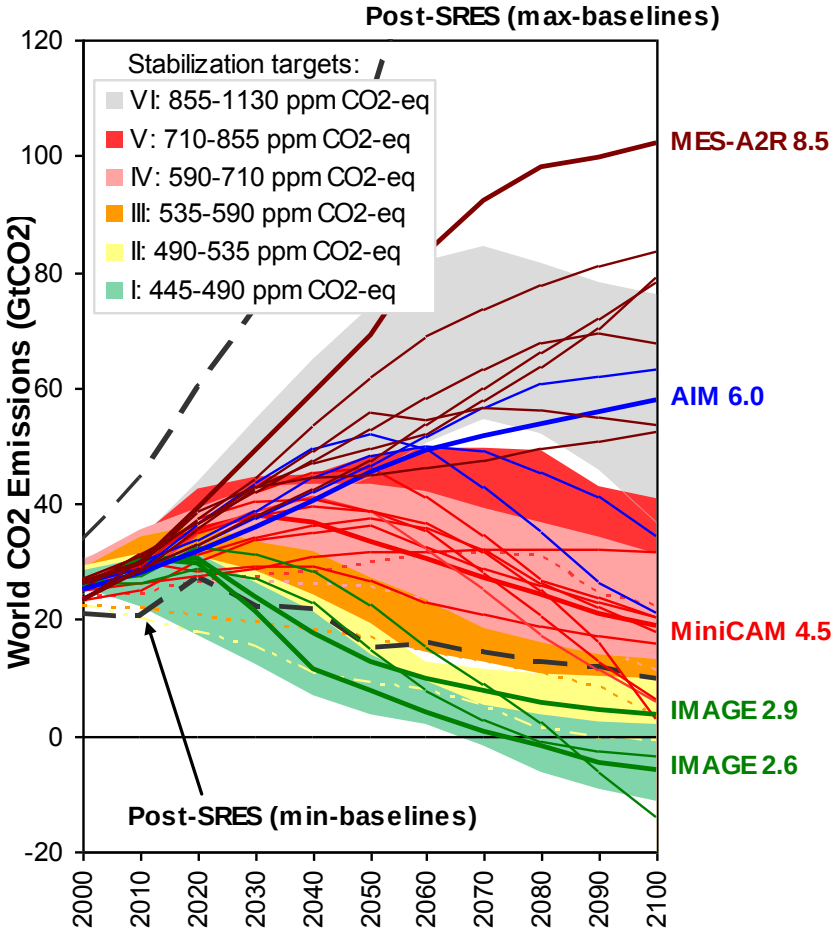
The IAMC

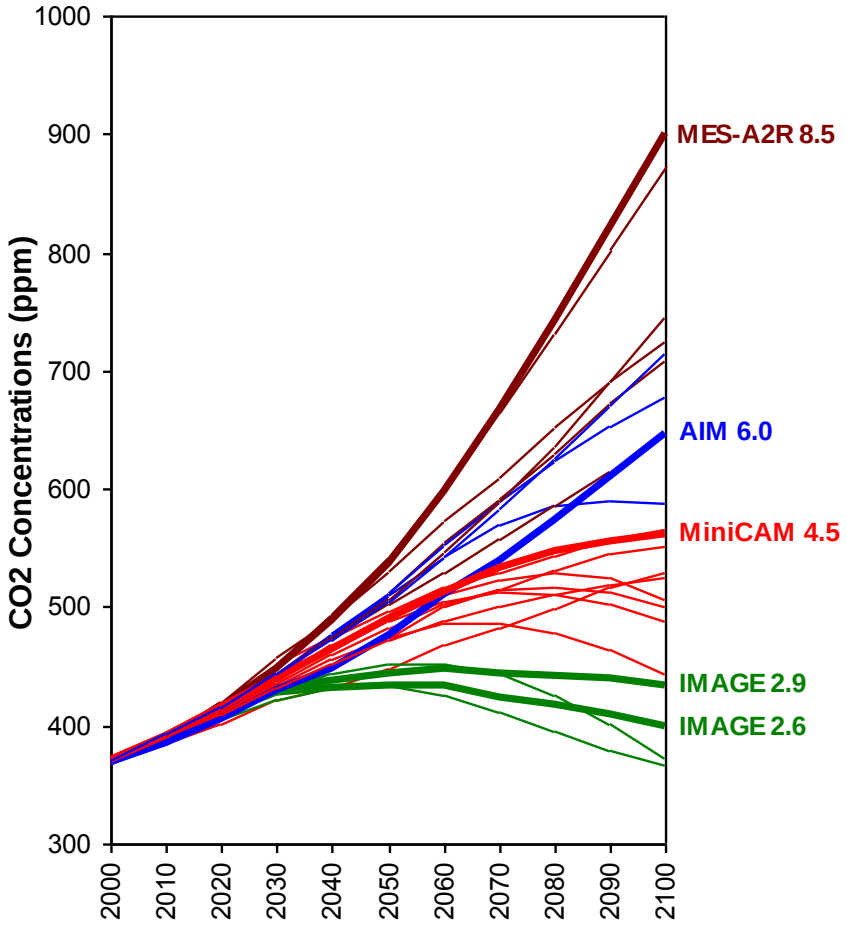
- The Integrated Assessment Consortium (IAMC) was created in 2007 in response to a call from the IPCC for an organization to lead the integrated assessment modeling community in the development of new scenarios that could be employed by climate modelers in the development of prospective ensemble numerical experiments for both the near term and long term.
- Leaders from 3 institutions, John Weyant (EMF), Nebojsa Nakicenovic (IIASA) and Mikiko Kainuma (NIES), invited other research organizations to join with them to form the IAMC for the purpose of developing scenarios.
  - These became the 4 Representative Concentration Pathway scenarios.

New Scenario Development

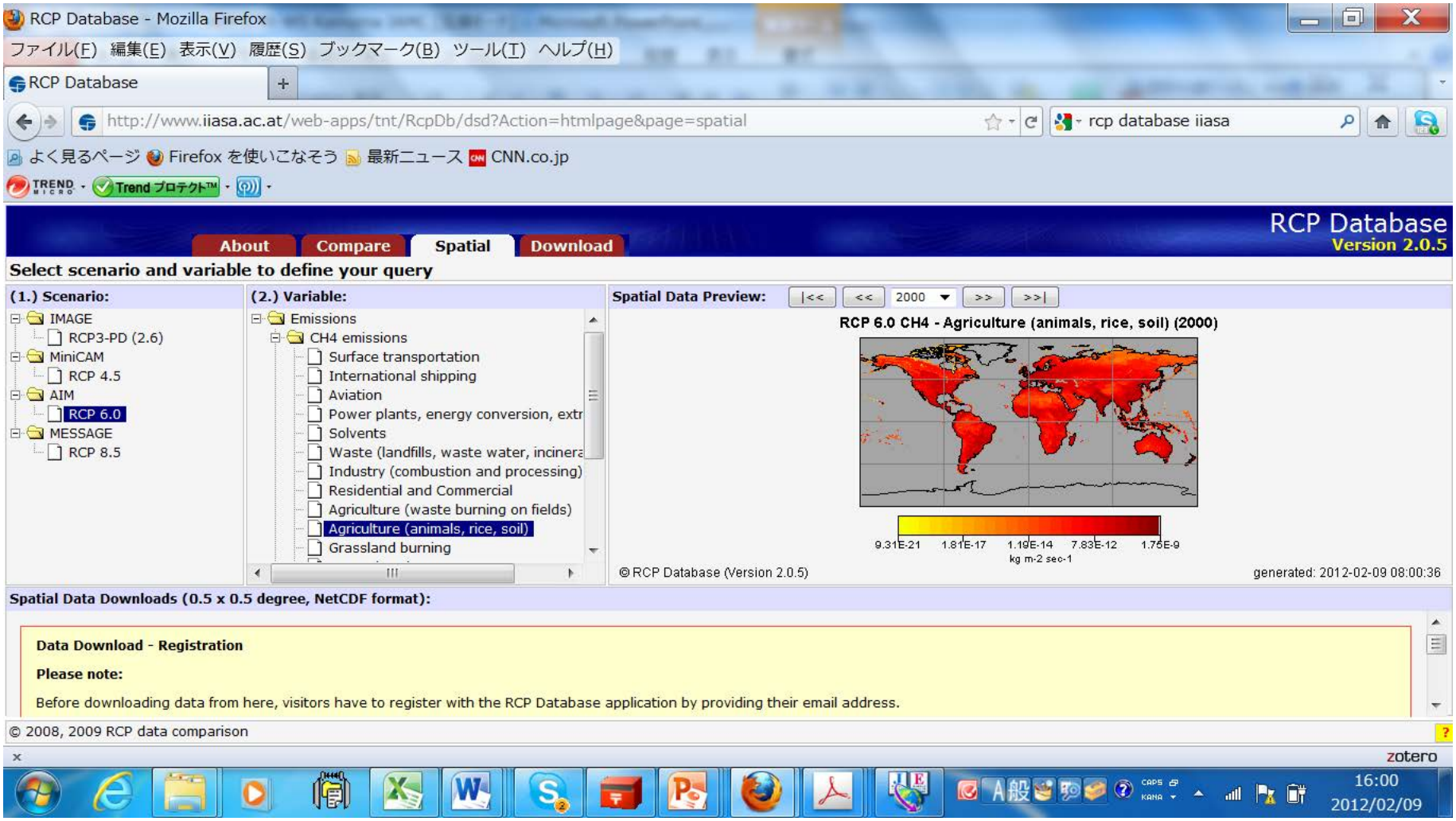


Representative Concentration Pathways (RCPs)





RCP scenario database



The RCPs scenarios explore a wide range of possible future transition pathways. The results of other activities will be added to the IAMC database

IAMC Steering Committee

Core members

- EMF (Energy Modeling Forum), USA
- EPRI (Electric Power Research Institute) , USA
- ERI (Energy Research Institute), China
- IIASA (International Institute for Applied Systems Analysis), Austria
- IIM (Indian Institute of Management, Ahmedabad), India
- NIES (National Institute for Environmental Research), Japan
- PBL (The Netherlands Environmental Assessment Agency), The Netherlands
- PIK (Potsdam Institute for Climate Impact Research), Germany
- PNNL (Pacific Northwest National Laboratory), USA

IAMC Membership
(Updated September 1, 2011)

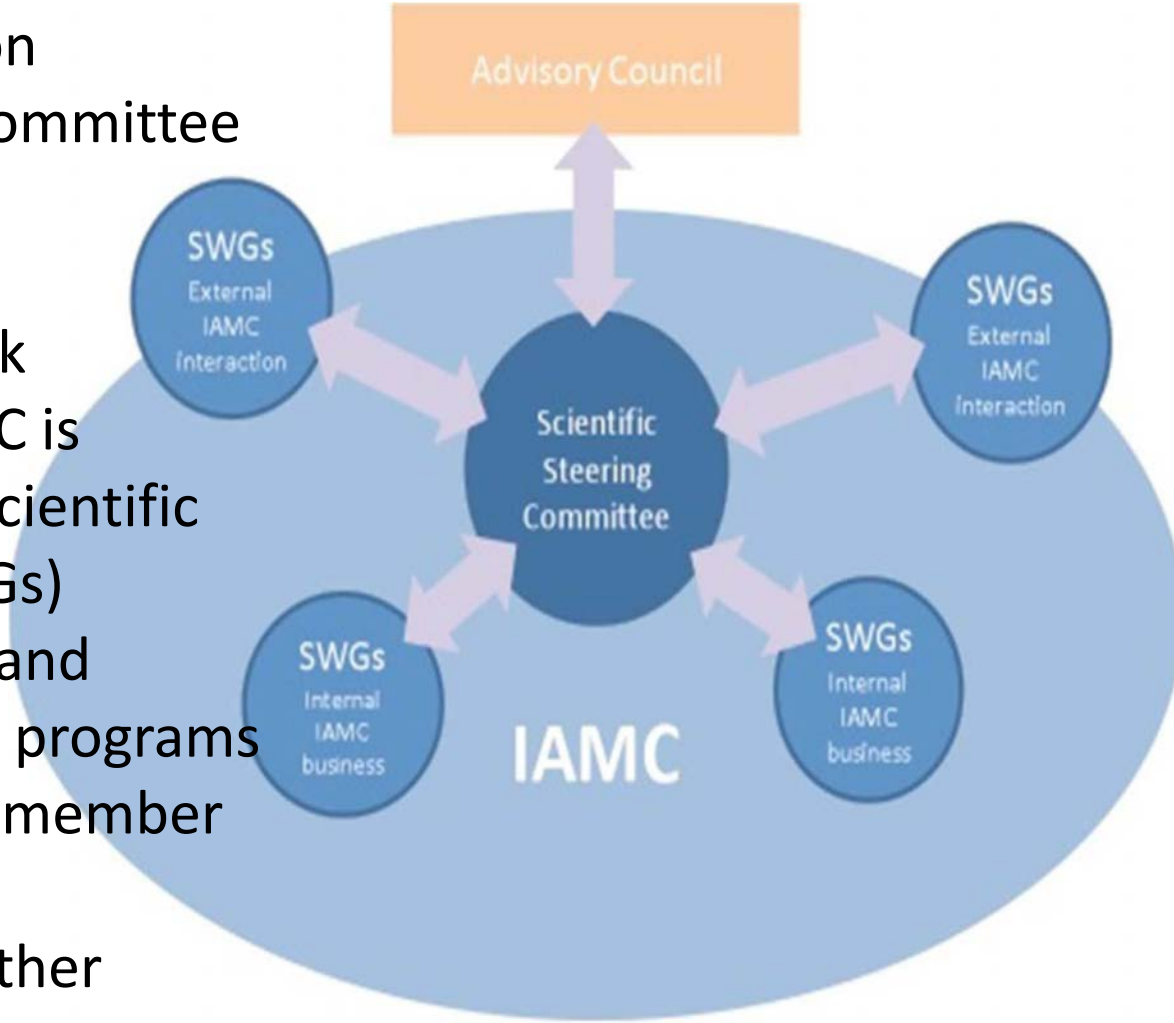
- Australian Bureau of Agricultural and Resource Economics (ABARE)
- Bundeswehr University, Munich
- Business Council for Sustainable Development – Argentina
- CEA - LERNA, University of Social Sciences
- Centre for International Climate and Energy Research (CICERO), University of Oslo
- Argonne National Laboratory
- Centre International de Recherche sur l'Environnement et le Developpement (CIRED)
- CRA International
- DIW Berlin
- Electric Power Research Institute (EPRI)
- Energy Research Institute, National Development and Reform Commission (NDRC)
- Energy Technology Systems Analysis Programme (ETSAP)
- ETH Zurich
- European Commission, Joint Research Centre, Institute for Prospective Technological Studies (IPTS)
- Fondazione Eni Enrico Mattei (FEEM)
- Hamburg University and Economic and Social Research Institute (ESRI)
- Indian Institute of Management
- Institut d'Economie et de Politique de l'Energie (IEPE - CNRS)
- Institute of Applied Energy
- International Institute for Applied Systems Analysis (IIASA)
- National Institute for Environment Studies (NIES)
- National Center for Atmospheric Research (NCAR)
- Ohio State University
- Pacific Northwest National Laboratory, Joint Global Change Research Institute at the University of Maryland
- Potsdam Institute for Climate Impact Research (PIK)
- Programa de Planejamento Energético - PPE/COPPE/UFRJ
- Purdue University
- RAND
- Research Institute of Innovative Technology for the Earth (RITE)
- San Marcos University
- Stanford University Energy Modeling Forum (EMF)
- Tellus Institute
- Texas A&M University
- The Netherlands Environmental Assessment Agency (PBL)
- Tsinghua University
- Tyndall Centre for Climate Change Research, The University of East Anglia
- Universidad de Los Andes / Universidad Nacional de Colombia
- Universidad Iberoamericana Puebla
- University of Cambridge
- University of Oldenburg
- US Environmental Protection Agency
- VTT
- World Bank

Individual community projects on IAM presented at 4th annual meeting of IAMC

- Asian Modeling Exercise (AME)
- Model comparisons on energy end-use (organized by AIM)
- Research Institute Energy Modeling Forum (EMF) 24
- Assessment of Climate Change Mitigation Pathways and Evaluation of the Robustness of Mitigation Cost Estimates (AMPERE)
- Roadways to Sustainable Energy futures (RoSE)
- Program on Integrated Assessment Model Development, Diagnostics and Inter-Model Comparisons (PIMDDI)
- Renewable resources (organized by NREL)
- Low climate IMpact scenarios and the Implications of required Tight emission control Strategies (LIMITS)
- CPO (organized by FEEM)
- Global Energy Assessment (GEA), IAMs linking into the Rio+20 process
- Integrated Earth System Model (iESM)
- Community Earth System Model (CESM)

Governance

- The IAMC Organization
  - Scientific Steering Committee (SSC)
  - Advisory Council
- Conduct of IAMC work
  - The work of the IAMC is conducted through Scientific Working Groups (SWGs) chartered by the SSC and
  - Community research programs undertaken by IAMC member organizations
- Collaborations with other organizations



Current Scientific Working Groups

- So far the Scientific Steering Committee (SSC) has chartered four Scientific Working Groups (SWGs):
  - –Working Group on Representative Concentration Pathways (Work completed)
  - –Working Group on Research Priorities
  - –Working Group on Data Protocols and Management
  - –Working Group on Scenario Matrix Architecture (SMA) and Shared Socio-ecosystem Pathways (SSP) process (Narratives and Storylines)

There are Two Sorts of IAMC Community Priorities

- *IAMC Community Research Priorities are priorities for community research activities and not recommendations of research directions for individual modeling teams.*
  - Individual teams will inevitably pursue their own research agendas focusing on answering specific scientific questions.
- Community Research Priorities
- Capacity-Building Priorities

IAMC Research Priorities

- Technology and mitigation scenarios (Clarke/Riahi)
- Policy scenarios (imperfect and perfect) (Kriegler)
- Second-best worlds (Kriegler)
- Regional scenarios (Calvin)
- Development, Demographics, and Urbanization (O'Neill)
- Integration between energy, economy, land use and water (van Vuuren/Edmonds)
- Interactions between climate mitigation, climate adaptation, residual impacts (van Vuuren/Edmonds)
- RCPs, Post-RCP replication and storylines (Kram, Van Vuuren, and Edmonds)
- Uncertainty (Kriegler/Bosetti)

Working with others

- The IAMC will also work with and through other organizations.
  - Member organizations may propose to undertake activities that benefit the community and the IAMC may choose to recommend to its members, e.g. the EMF or FEEM or AIM or AMPERE) may choose to undertake a coordinated exercise on a topic that would potentially execute an element of the "Parallel" phase.
  - The IAMC may also team with other organizations, e.g. AIMES (Analysis, Integration and Modeling the Earth System) to undertake programs of mutual interest.
  - The IAMC may also work with external organizations such as the IPCC to produce products of mutual interest.

Thanks!

Additional Slides

Cross-Walk with Community Activities

Issue Community Activity \	AME	EMF-24	AMP ERE	RoSE	PIMD DI	LIMITS	CPO	IAMC
Technology and mitigation scenarios	X	X	X	X		X		
Policy scenarios (imperfect and perfect)		X	X	X	X	X		
Regional scenarios	X (Asia)	X (US,EU)	X (EU)	X (China)	X	X	X	
Development, Demog., & Urbanization	X (all 3)			X (Dev)				X (SSPs)
Integration energy, econ., land use & water		X			X	X		
Interaction mitigation & climate adaptation					X			
RCPs, replication & SSPs								X
Uncertainty	X				X			
Model diagnostics & historic reproduction			X		X			
Standard data template								X

Technology and Mitigation Scenarios

- **Background**: *Technology and policy are the two largest determinants of feasibility and cost.*
- **Scientific Question**: *Are there any essential technologies, e.g. nuclear or CCS? Are present technologies sufficient?*
- **Why This Is A Community Research Priority?** *While any individual modeling team can explore these questions, results from a community activity help determine the generality of findings.*
- **Developing A Community Activity**: *We have begun this investigation in EMF 24 and AME and other community activities e.g. RoSE. Potential to do more.*

Policy scenarios: Ideal, Non-ideal, 2nd Best

- **Background**: *Analyzing "realistic" and "second-best" policy scenarios is increasingly called for. Long-term climate policy analysis requires specs across all regions out to 2050-2100.*
- **Scientific Question**: *How can generic, but still regionally differentiated and reflective scenarios of regional character scenarios be identified? (Which policies are in the baseline)? Which real-world imperfections matter most? How to craft better real-world policies.*
- **Why This Is A Community Research Priority?** *Individual modeling teams and projects are all confronted with the request for more policy realism. Exchanging experience and establishing a set of useful policy scenarios improve results and help determine generality of findings.*
- **Developing A Community Activity**: Major focus in *EMF 22, 24, 27, RoSE, & AMPERE. Potential to do more.*

Regional Scenarios

IAMC
INTEGRATED ASSESSMENT MODELING CONSORTIUM
Human Earth Systems
Physical Earth Systems
http://www.iamconsortium.org/
Founded 2007

- **Background**: *Emissions mitigation and climate change occur at regional scales. We use the term region in two different contexts—elements of IAMs and geographic areas at finer spatial scales than in IAMs.*
- **Scientific Question**: *What is the role of individual regions in shaping emissions and emissions mitigation? How does climate mitigation and adaptation take place at local scales consistent with larger global forces?*
- **Why This Is A Community Research Priority?** *Community activities that link regional experts with global modelers can improve both regional and global modeling results.*
- **Developing A Community Activity**: *This has begun with the Asia Modeling Exercise (AME) and CPO. Potential to expand on this model. Individual IAM teams are working to develop high-resolution disaggregations—regional integrated models.*

Development, Demographics, and Urbanization

- **Background**: *Most analysis use limited demographic information.*
- **Scientific Question**: *What difference does varying demographic assumptions make? How are demographics, urbanization and economic development related?*
- **Why This Is A Community Research Priority?** *Community activities could improve the quality of analysis in the community.*
- **Developing A Community Activity**: *Model intercomparison on alternative demographic tracks, urbanization and development (e.g. AME), development of community demographic tools.*

Integration Between Energy, Economy, Land Use and Water

- **Background**: *IAMs do not presently include water, yet water could be an important constraint on energy systems.*
- **Scientific Question**: *Do emissions mitigation results change when water is explicitly included. This could be particularly important for bioenergy, and power plants which need cooling.*
- **Why This Is A Community Research Priority?** *The community would benefit from coordinated activities to assemble models and data.*
- **Developing A Community Activity**: *Individual teams have begun to develop research efforts. No present activities have been developed yet.*

Interactions Between Climate Mitigation, Climate Adaptation, Residual Impacts

IAMC
INTEGRATED ASSESSMENT MODELING CONSORTIUM
Human Earth Systems
Physical Earth Systems
http://www.iamconsortium.org/
Founded 2007

- **Background**: *Emissions, climate change and impacts-adaptation occur concurrently.*
- **Scientific Question**: *How are climate mitigation and adaptation affected by the presence of the other?*
- **Why This Is A Community Research Priority?** *Large investments will need to be made to link state of the art human systems models with state of the art climate models, but coordination would benefit all.*
- **Developing A Community Activity**: *Several modeling teams have begun working on this problem. Coordination would be beneficial.*

RCPs, Post-RCP replication and storylines

- **Background**: *The Noordwijkerhout plan calls for RCPs and a jump start to the next assessment cycle, but needs to be followed by replications and efforts to develop scenarios that would be useful to the IAV community.*
- **Scientific Question**: *Can these RCPs be replicated by other teams? Can we better organize linkages between the IAM and VIA community? How can the information resulting from the climate modeling experiments be used to enrich the representation of the climate system and carbon cycle in IAMs?*
- **Why This Is A Community Research Priority?** *RCPs are a core mission of the IAMC.*
- **Developing A Community Activity**: *RCPs are complete. Replication and new scenarios for IAV use under development.*

Uncertainty

- **Background**: *"Prediction is difficult, particularly about the future"—attributed to various sources. Most work is deterministic.*
- **Scientific Question**: *How do results change when uncertainty is treated explicitly?*
- **Why This Is A Community Research Priority?** *Researchers have traditionally developed uncertainty as individual teams, but no coordinated project has been organized since early EMF work.*
- **Developing A Community Activity**: *Work under way in PIMDDI – the Nordhaus initiative.*

Diagnostic Scenarios

- **Background**: *IAMs are complex, but contain modules that perform common functions.*
- **Scientific Question**: *How well do individual model components perform?*
- **Why This Is A Community Research Priority?** *The IAM community could benefit from comparing component performance.*
- **Developing A Community Activity**: *Three activiteis have begun to address these issues: RoSE, AMPERE, and PIAMDDI.*

Historic Reproduction & Data Development

- **Background**: Models use a variety of data sources. Models also have, in general not gone through any formal validation process.
- **Scientific Question**: *How well would IAMs do, if they were given the challenge of predicting the present starting 50 to 100 years in the past?*
- **Why This Is A Community Research Priority?** *IA models have been criticized for not back casting or validating. The community would benefit if it could put this issue to rest.*
- **Developing A Community Activity**: *Would require development of data bases for the models, consistent with the long-term nature of the models. Procedures and protocols would need to be developed. Diagnostic work. Who would sponsor?*

Activities for the Scientific Working Group on Research Priorities

- Catalogue of current and recent IAMC activities, including
  - Completed: EMF 22, RECIPE, ADAM,
  - Ongoing: AME, AMPERE, CPO, EMF 24&27, LIMITS, PIAMDDI, & RoSE
- Identify IAMC research and capacity-building priorities
  - Take into account interests of external communities, such as the IPCC, the VIA community, governments decision makers and so forth
- Map research priorities to existing IAMC activities.
- Identify gaps in the community agenda.

IAMC Capacity-Building Priorities

- Diagnostic scenarios (Weyant/Kriegler)
- Historic Reproduction and Data Development (Edmonds)
- Standardized Data Template and Community Data Base (Krey/Calvin)

Aims of the IAMC

- The Integrated Assessment Modeling Consortium (IAMC) exists to facilitate and foster the development of integrated assessment models (IAMs), peer interaction and vetting, and the conduct of research employing IAMs, including model diagnosis, intercomparison, and coordinated studies.
- The IAMC also exists to facilitate and coordinate IAM research with research conducted in both the Climate Modeling (CM) and the Impact, Adaptation, and Vulnerability (IAV) research communities.
- The IAMC also exists to provide a point of contact with other institutions and organizations interacting with the IAM community, e.g. the IPCC.

The IAMC

- The IAMC exists to further scientific research.
- The IAMC does not take political positions, nor does it exist to further political agendas.

Membership

- Membership is open to organizations whose work helps further the goals of the IAMC.
- Terms and conditions of membership are established by the Scientific Steering Committee.