AIM Impact modeling

AIM/Impact Japan Team

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Members and their range of work

Link Policymaking and comprehensive impact projections

COMPREHENSIVE

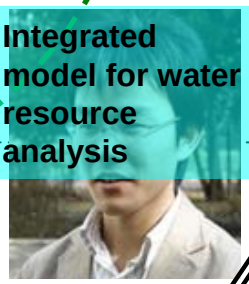
Tool for comprehensive analysis of climate impacts

Provision of Impact function

GCM study

Link specific impact researches and comprehensive analysis tool

Hard link



Integrated model for water resource analysis

SOCIAL SCIENCE

NATURAL SCIENCE

Committee on Adaptation

Provision of Impact function

Climate scenario

Probabilistic analysis of impacts using multi-model results

Crops productivity model

Impact researchers in Japan

GERF S-4

SPECIFIC

GERF S-5

Noteworthy events in FY2007（April - September）

- April
  - Release of IPCC-AR4 WG2 report [Harasawa, Takahashi]
  - Distribution of Global Drainage Basin Database (GDBD) on CGER website. [Masutomi]
- May
  - Workshop for the intercomparison of global water resources models at Kassel [Hanasaki]
- July
  - Presentation of AIM/Impact[Policy] at EMF-Snowmass CCCIA meeting [Hanasaki]
- August
  - Prize-winning of “Speech Paper Award for Global Environmental Studies” (Development of Global Drainage Basin Database : GDBD) [Masutomi]
  - Interim evaluation of S-4 project [Harasawa et al.].
- September
  - Participation in IPCC new scenario meeting at the Netherlands [Kainuma, Takahashi]

Noteworthy events in FY2007（October – February）

- October
  - Launch of MoE committee on climate change impact and adaptation and working groups for supporting the committee [Harasawa, Hijioka, Takahashi]
- November
  - 1st Dialogue among experts and media persons to draw a ‘Whole Picture’ of climate change consequences [All]
- January 2008
  - WS for the global estimation on agricultural water at Stockholm [Hanasaki]
- February 2008
  - Presentations in 2nd international workshop on climate risk at JAMSTEC [Hanasaki, Masutomi, Takahashi]

Main projects/activities

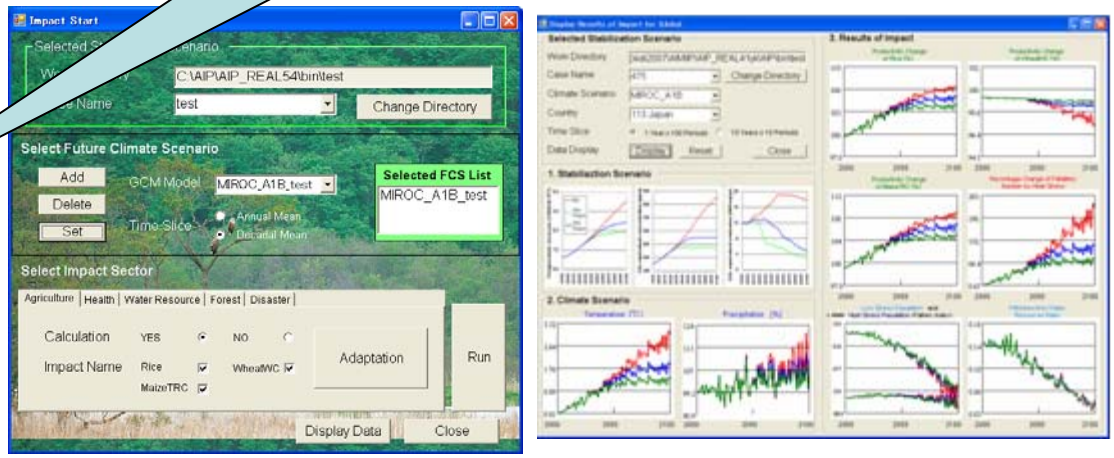
- GERF S-4 [FY2005-2009]
  - Comprehensive assessment of climate change impacts to determine the dangerous level of global warming and to determine the appropriate stabilization target for atmospheric GHG concentration
- GERF S-5 [FY2007-2011] & OPC3 (Core project 3 in priority program on climate change) [FY2006-2010]
  - Integrated research on climate change scenarios to increase public awareness and contribute to the policy process (S-5)
  - Climate change risk assessment based on integrated climate, impact, and land use models (OPC3)
- Cooperation to the MOE committee on climate change impact and adaptation.

Improvement and application of AIM/Impact[Policy] (S-4)

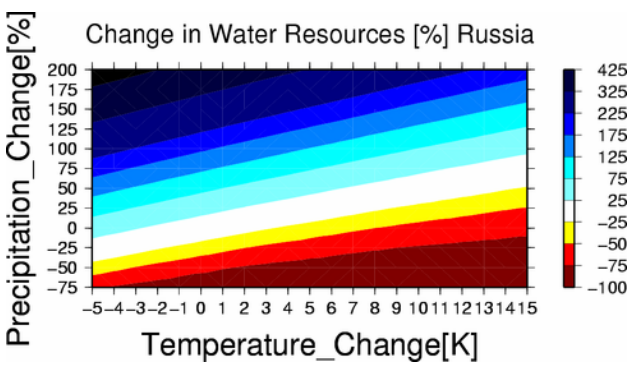
Dr. Hijioka's presentation

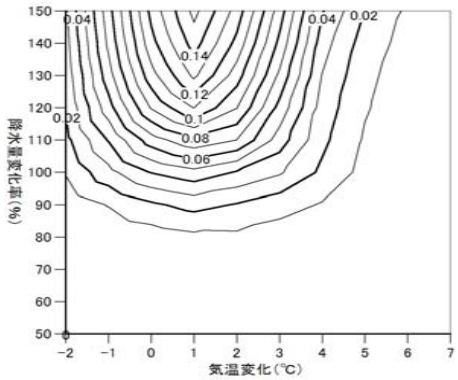
Dr. Hanasaki's presentation

- Refinement of tool user interface
- Development of impact response functions
  - Water scarcity risks
  - Crops productivity (revised)
  - Heat stress mortality
  - Beech tree in Japan



Example of user interface of AIM/Impact[Policy]



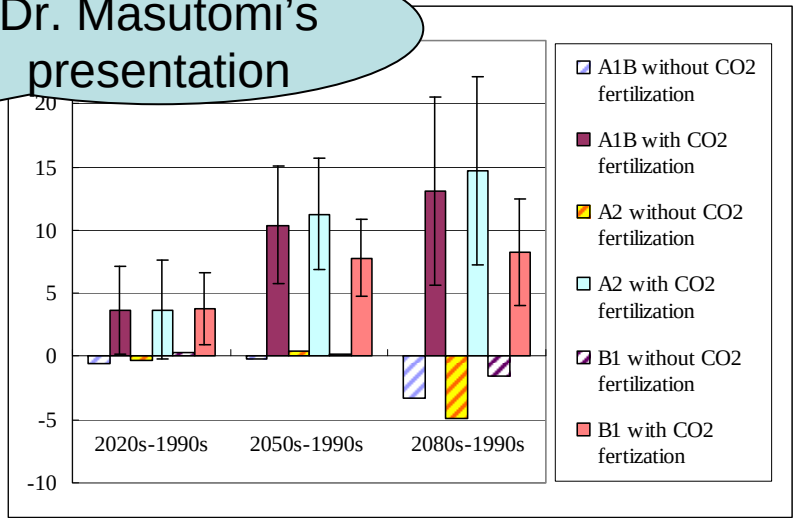


Graphical expressions of impact functions
(Left: Water resource in Russia ;
Right: Ratio of area suitable for Beech in Akita prefecture in Japan)

Climate risk assessments (S-5 and opc3)

- Probabilistic analysis of climate change impact on crop productivity in Asia
  - Utilization of multi-GCM for considering uncertainties.
- Hard-link MIROC (GCM) and the global integrated water resources model
  - Effect of different irrigation on global climate
- Risk communication
  - Dialogue among experts and media persons to draw a “whole picture” of climate change consequences.

Dr. Masutomi’s presentation



Rice productivity change in Asia

Dialogue among Experts and Media Persons to Draw a ‘Whole Picture’ of Climate Change Consequences (Nov 2008)

Collaboration with other research groups

- Inter-comparison of global crop models.
  - Hanasaki (SWIM), Masutomi(GAEZ), and Dr. Wu in University of Tokyo (GEPIC).
  - Launched in Oct 2007 and in progress.
- Information exchange for crop model improvement
  - Masutomi and Dr. Hasegawa in National Institute for Agro-Environmental Sciences
- Inter-comparison of global water resource models.
  - Hanasaki (H07), Prof. Alcamo, Prof. Arnell, et al.
  - Two international meetings at Kassel (Germany) and Stockholm (Sweden).
- Enhancement of global water resource assessment
  - Hanasaki and Prof. Oki laboratory in University of Tokyo
  - Press release on virtual water study is planned on 29 February.
- Development of prefecture-wise impact functions
  - Health: Takahashi and Prof.Honda in Tsukuba University
  - Beech tree: Forestry and Forest Products Research Institute

Research papers

- Published from March 2007 – February 2008 (Refereed papers)
  - Water resource
    - Y. Shen and others (Naota Hanasaki). Projection of future world water resources under SRES scenarios: 1. Water withdrawal .Hydrological Sciences Journal, 53, 11-33, doi: 10.1623/hysj.53.1.11, 2008
    - Masutomi, Y., Hanasaki, N., Takahashi, K., Hijioka, Y. and Matsuoka, Y. : (2007) Development of river runoff model which can reproduce seasonal fluctuations and global assessment of water scarcity, using the model, Annual J. of Hydraulic Eng., 51, 235-240.
    - Komatsu, E., T. Fukushima, and H. Harasawa, 2007: A modeling approach to forecast the effect of long-term climate change on lake water quality, Ecological Modelling, 209, 351–366.
  - Health
    - Takahashi, K., Honda, Y. and Emori, S.: Assessing Mortality Risk from Heat Stress due to Global Warming, Journal of Risk Research, 10, 339-354.
  - Integrated assessment
    - Hijioka, Y. and Takahashi, K.: (2007) Integrated assessment of greenhouse gas stabilization concentrations, emission pathways, and impact threshold values for control of global warming, Global Environmental Research, 10(2), 261-270.
    - Hijioka, Y., Takahashi, K. and Kubota, I. (2007): Development of the climate change impact database for supporting decision-making on the climate stabilization target: Climate change impact database, Papers on Environmental Information Science, 21, pp. 423-428. (In Japanese)
    - N. Hanasaki and others. Development of a global water resources scheme for climate change policy support models. Environmental System Research, Vol. 35, pp367-374, 2007 (In Japanese)
    - Takahashi, K.: (2007) Impacts of global warming on agricultural production and adaptations in response, Global Environmental Research, 10(2), 243-252.
    - Harasawa, H., 2007: Effects of Global Warming on Civil Life in Japan, Global Environmental Research, 10(2), 219-226.
    - Harasawa, H., 2007: A Consideration on Dangerous Level of Global Warming, Global Environmental Research, 10(2), 253-259.
    - Kainuma, M., Matsuoka, Y., Masui, T., Takahashi, K. and Hijioka, Y.: (2007) Climate policy assessment using the Asia-Pacific Integrated Model, In Schlesinger, M., Kheshgi, H., Smith, J., De La Chesnaye, F. and Reilly, J.M. (Eds.), Human-Induce Climate Change, Ed.1, Cambridge University Press.
- Accepted
  - Masutomi, Y., Inui, Y., Takahashi, K. and Matsuoka, Y.: Development of highly accurate global polygonal drainage basin data, Submitted to Hydrological Processes.(Accepted)
  - Yasuaki Hijioka, Yuzuru Matsuoka, Hiromi Nishimoto, Toshihiko Masui, Mikiko Kainuma : Global GHG emission scenarios under GHG concentration stabilization targets, Journal of Global Environment Engineering
  - T. Inuzuka and others (N. Hanasaki) Detailed analysis of virtual water import to Japan Focusing on the origin of water supply, Annual J. of Hydraulic Eng., accepted, (In Japanese)
- Submitted
  - N. Hanasaki, and others. An integrated model for the assessment of global water resources. Part 1: Input meteorological forcing and natural hydrological cycle modules. Hydrology and Earth System Sciences Discussions, 4, 3535-3582, 2007
  - N. Hanasaki, and others. An integrated model for the assessment of global water resources. Part 2: Anthropogenic activities modules and assessments. Hydrology and Earth System Sciences Discussions, 4, 3583-3626, 2007
  - Masutomi, Y., Takahashi, K., Harasawa, H. and Matsuoka, Y. : Impact Assessment of Climate Change for Paddy Rice Productivity in Asia Considering Uncertainties in Climate Modeling and Emission Scenarios, submitted to Agriculture, Ecosystems & Environment.
- Other scientific publications in FY2007
  - IPCC-WG2, Chapter 10: Asia, [Lal and Harasawa as CLAs, Takahashi as CA]
  - IPCC-WG2, Chpater 16: Small island states [Takahashi as CA]
  - IPCC-WG2, Chapter 17: Adaptation [Takahashi as LA]
  - GEO-4, CHapter 9: The Future Today [Kainuma, Hijioka as LA]

If you are interested in the published articles or the drafts, ask the member in impact team.

Challenges/Plans for the future

- Comprehensive analysis of climate risks in Japan using AIM/Impact[Policy] (in S-4 project)
  - Publish of S-4 project interim report [by May 2008]
  - Further improvement/development of impact functions [1year]
- Further consideration of uncertainty (in S-5 project)
  - Probabilistic analyses of impacts [1-2 years]
  - Promotion of inter-comparison of global-scale impact assessment models. [1-5 years]
- Model linkage (in opc3 project)
  - Link GCM and integrated water resource model [1-3 years]
  - Link landuse model and crop model [1-3 years]
- More link with economic model for considering feedback effect of climate impacts [1-3years]
  - Cost analyses
  - Aiming at take a role in IPCC new scenario process
  - New research project which will succeed B-52 (AIM)
- Adaptation analysis [1-5 years] (in S-4 project?)
  - Rapidly increasing policymakers' interest.
  - Extension to studies on development?
  - Cost benefit analysis at regional/local scale?
- Strengthening team [urgent]
  - Looking for a post-doc fellow who can work on uncovered sectors (biodiversity, human health, fishery, SLR, etc.)