

# Activities of NIES AIM/Impact team in FY2015

Kiyoshi Takahashi, Yasuaki Hijioka, Naota Hanasaki,  
Yoshimitsu Masaki, Xuanming Su, Akemi Tanaka,  
Qian Zhou, Keiko Takahashi and Hideo Harasawa

# Member list 2015



**Dr. Hideo Harasawa**, Vice president, Integrated assessment



**Dr. Yasuaki Hijioka**, Natl/global integrated impact assessment



**Ms. Keiko Takahashi**, Support of S-14 (Environmental education)



**Dr. Naota Hanasaki**, Global-scale impact assessment (Water)



**Dr. Yoshimitsu Masaki**, Global-scale impact assessment (Water)



**Dr. Qian Zhou**, Global-scale impact assessment (Economics)



**Dr. Kiyoshi Takahashi**, Global integrated impact assessment



**Dr. Xuanming Su**, IAM for adaptation analyses (Economics)



**Dr. Akemi Tanaka**, Global-scale impact assessment (Agriculture)

Collaborators:

- - Ex-members: Dr. Yuji Masutomi, Dr. Huicheul Jung, Dr. Yonghee Shin, Dr. Takahiro Yamamoto, and Dr. Yuko Onishi
  - In NIES: Dr. Tomoko Hasegawa, Dr. Shinichiro Fujimori and other emission team members

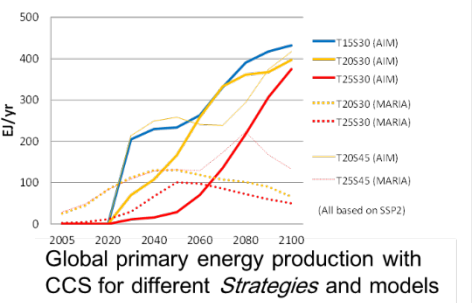
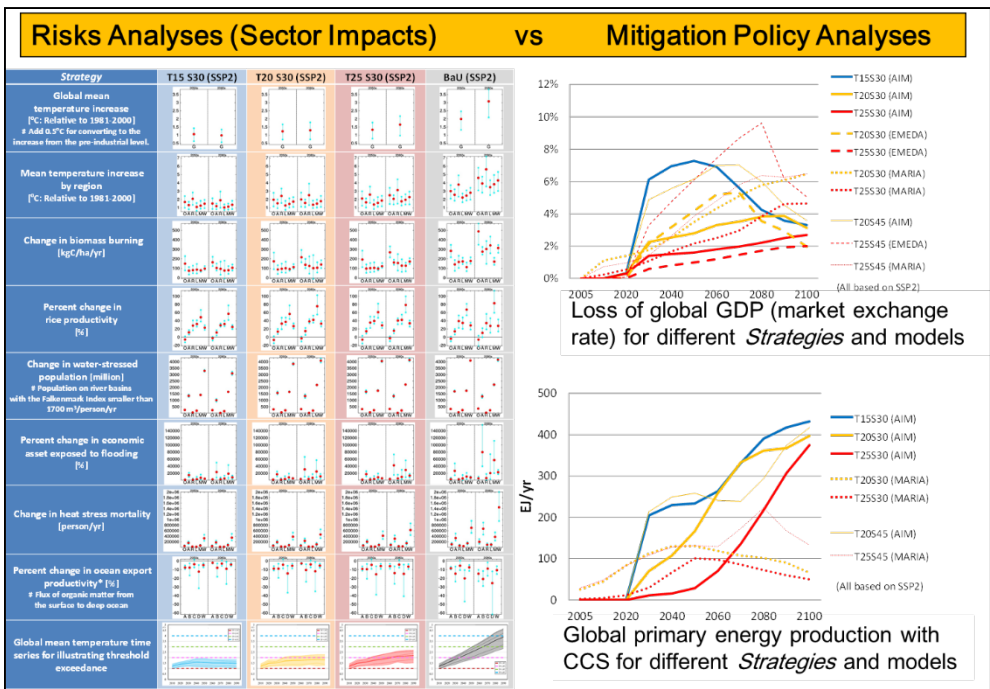
# Research projects

- NIES Climate Change Research Program
  - Climate change and **global risk assessment**  
[Takahashi, Hijioka, Hanasaki, Masaki, Su, Tanaka; 2011.6-2016.3]
- S10 (a.k.a. ICA-RUS) (funded by the MoE, Japan)
  - Development of **global climate risk management** Strategies  
[Takahashi, Hanasaki, Hijioka, Masaki, Su, Tanaka; 2012.4-2017.3]
- S14 (a.k.a. MiLAI) (funded by the MoE, Japan)
  - Global mitigation and local **adaptation** to climate change  
[Hijioka, Hanasaki, Fujimori, Takahashi, Zhou; 2015.6-2020.3]
    - Balancing reduction of climate change risks, economic development, and conservation of ecosystem services for promoting global wellbeing
- SICAT (funded by MEXT, Japan)
  - Social implementation of climate change adaptation technology **in Japan**  
[Hijioka, Takahashi; 2015.11-2020.3]

# ICA-RUS (FY2012-16)

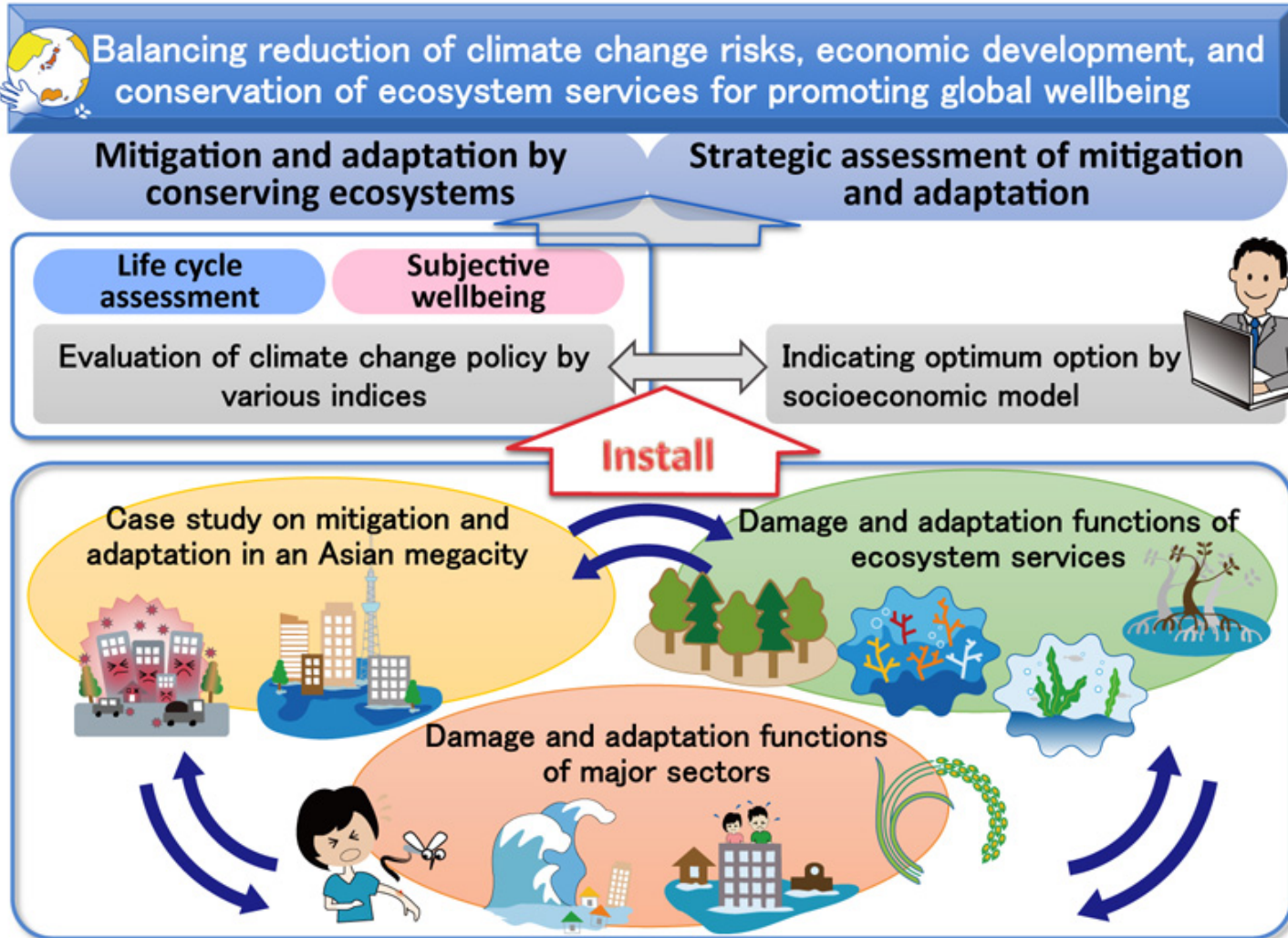
## Integrated Climate Assessment – Risks, Uncertainties and Society

- Objective
  - To propose strategies of global climate risk management
- ICA-RUS report 2015'
  - Alternatives Left to Humanity Faced with Global Climate Risks (Ver.1)
  - <http://www.nies.go.jp/ica-rus/en/>



3rd annual report based on the first version of risk management strategies (English version) has been published in this month.

# Strategic Research on Global Mitigation and Local Adaptation to Climate Change [MiLAI]



# International collaborations



- international research projects
  - Inter-Sectoral Impact Model Intercomparison Project (**ISI-MIP**) [Hanasaki, Masaki]
  - Impacts and Risks from High-End Scenarios: Strategies for Innovative Solutions (**IMPRESSIONS**) [Takahashi, Hanasaki, Masui]
- international academic coordination
  - **UNEP-PROVIA** (SSC member) [Hijioka]
  - **IGBP-AIMES** (SSC member) [Takahashi]
- IPCC
  - Participation to the ‘**IPCC Workshop on Regional Climate Projections and their Use in Impacts and Risk Analysis Studies**’ (Sep. 2015) [Hijioka, Takahashi]
- bi-national collaborations
  - Participation to the Japan – Korea International Workshop on adaptation study(SNU, Seoul, Mar. 2015) [Hijioka, Takahashi]
  - MoE project for supporting the development of state-level adaptation plans in Indonesia [Takahashi]

# Publications (Refereed; Published in 2015)

- Frieler, K., A. Levermann, J. Elliott, J. Heinke, A. Arneth, M. F. P. Bierkens, P. Ciais, D. B. Clark, D. Deryng, P. Döll, P. Falloon, B. Fekete, C. Folberth, A. D. Friend, C. Gellhorn, S. N. Gosling, I. Haddeland, N. Khabarov, M. Lomas, Y. Masaki, K. Nishina, K. Neumann, T. Oki, R. Pavlick, A. C. Ruane, E. Schmid, C. Schmitz, T. Stacke, E. Stehfest, Q. Tang, D. Wisser, V. Huber, F. Piontek, L. Warszawski, J. Schewe, H. Lotze-Campen and H. J. Schellnhuber (2015) **A framework for the cross-sectoral integration of multi-model impact projections: land use decisions under climate impacts uncertainties.** *Earth System Dynamics*, **6**, 447-460, doi:10.5194/esd-6-447-2015
- Masaki, Y., N. Hanasaki, K. Takahashi and Y. Hijioaka (2015) **Propagation of biases in humidity in the estimation of global irrigation water.** *Earth System Dynamics*, **6**, 461-484, doi:10.5194/esd-6-461-2015
- Tanaka A., Takahashi K., Masutomi Y., Hanasaki N., Hijioaka Y., Shiogama H., Yamanaka Y. (2015) **Adaptation pathways of global wheat production: Importance of strategic adaptation to climate change.** *Scientific Reports*, **5**(14312)
- Hasegawa T., Fujimori S., Shin Y., Tanaka A., Takahashi K., Masui T. (2015) **Consequence of Climate Mitigation on the Risk of Hunger.** *Environmental Science & Technology*, **49**(12), 7245-7253.
- Hasegawa T., Fujimori S., Takahashi K., Masui T. (2015) **Scenarios for the risk of hunger in the twenty-first century using Shared Socioeconomic Pathways.** *Environmental Research Letters*, **10**(1), 014010-014017
- (Other about 10 refereed publications in Japanese)

Results  
Highlight 2

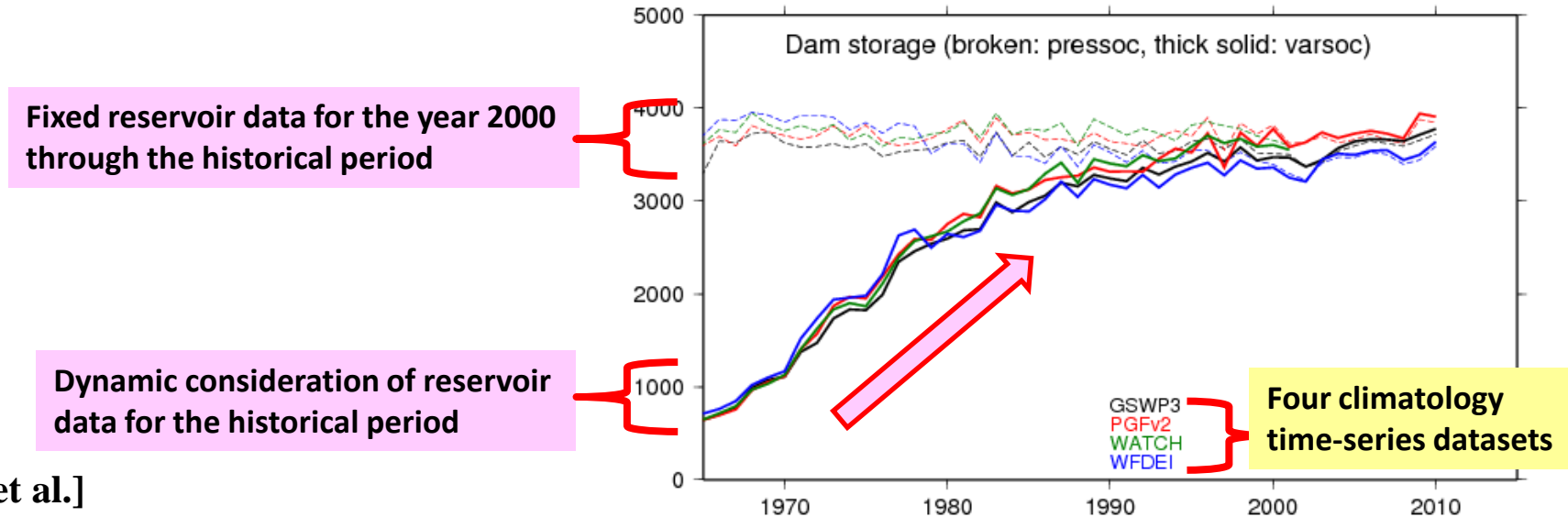
Results  
Highlight 3

# Contribution to ISI-MIP2

- Historical reproduction experiments (ISI-MIP2.1A)

## Hydrology Sector

- ① Natural  $\Rightarrow$  ② Fix: Land and reservoir  $\Rightarrow$  ③ Dynamic: Land and reservoir
  - Four climatology dataset (Historical period: 1970~2012)
  - Workshop participation (2-5 March 2015, IIASA)
- Example of results: Water reserved in dam storage
  - ... Reflection of intense construction of dams in the mid-20c



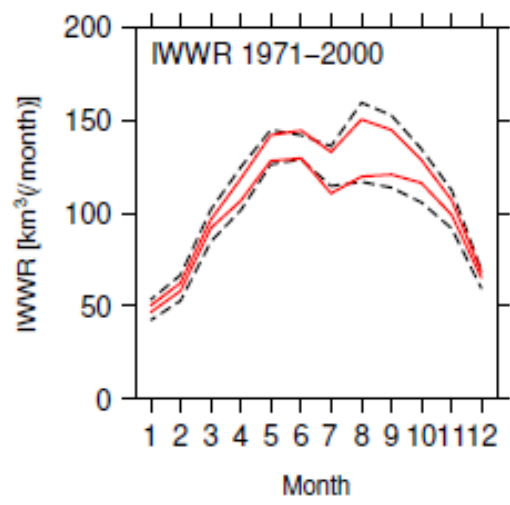


# Biases in Humidity: Reduction in range of estimation of global irrigational water

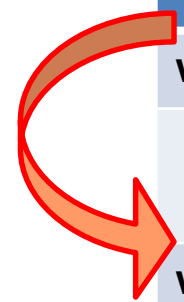
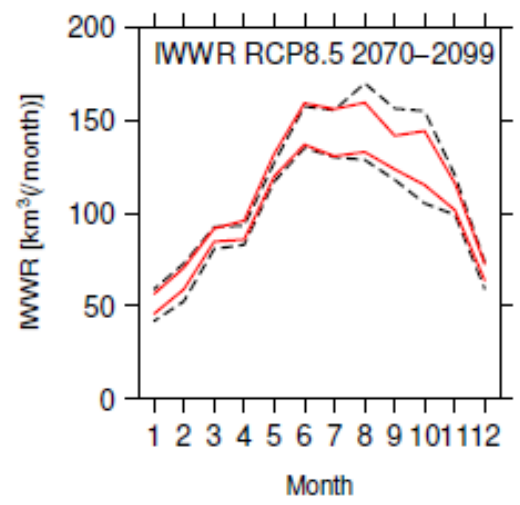
- Through the correction of humidity bias in GCM outputs, we could reduce the range of estimation of global irrigational water.

Masaki Y., N. Hanasaki, K. Takahashi and Y. Hijioka (2015) *Earth System Dynamics Discussions*, 6(1), 81-132, doi:10.5194/esdd-6-81-2015

Monthly water withdrawal from the rivers



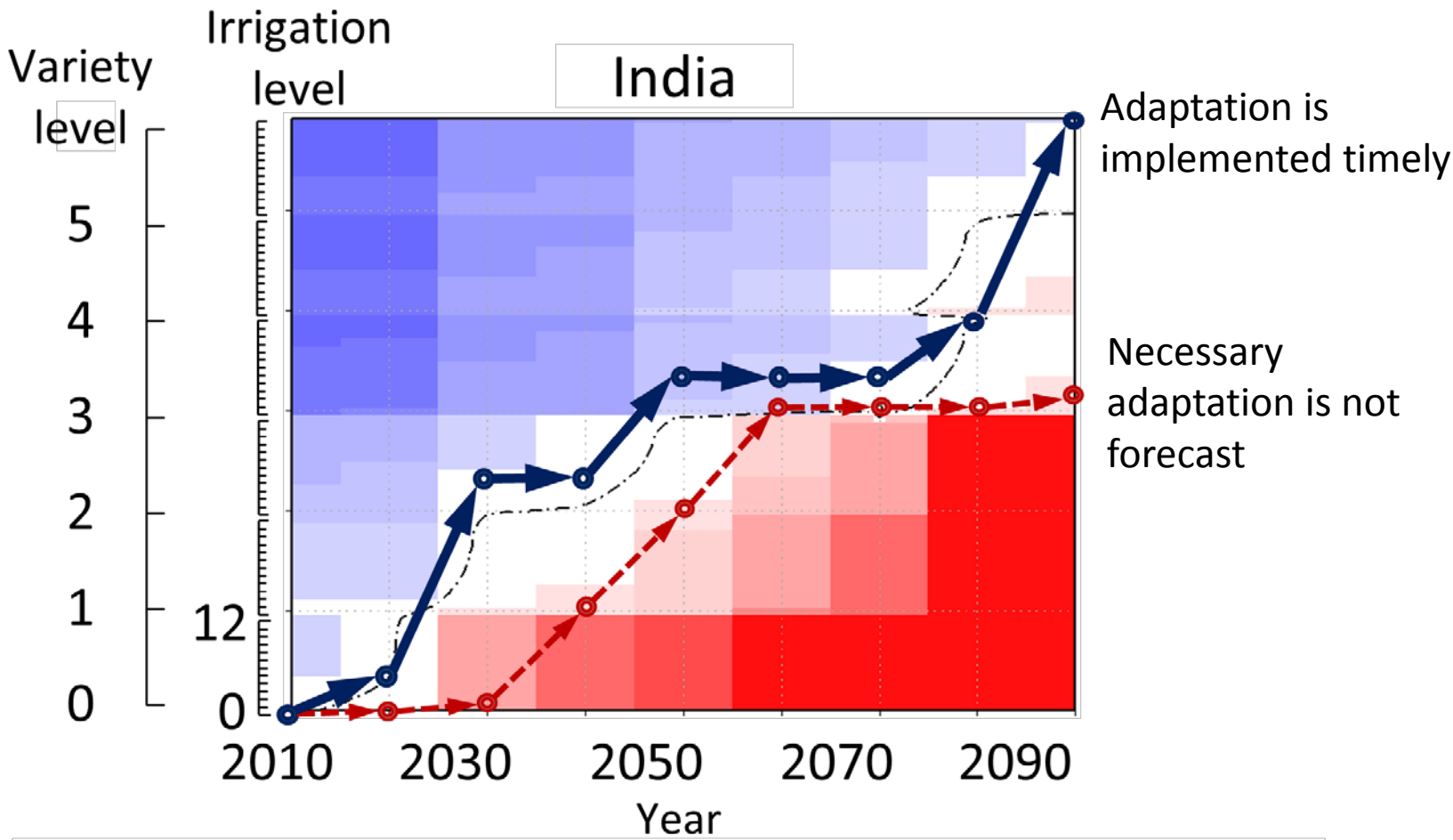
Estimation range among 5GCMs  
 - - - - - no bias correction of humidity  
 ——— with bias correction of humidity



Humidity bias	Global [km <sup>3</sup> /yr]	Irrigation demand Now	Irrigation demand RCP8.5	Irrigation withdrawal Now	Irrigation withdrawal RCP8.5
<b>wo BC</b>	<b>Range among 5GCMs</b>	<b>745.9</b>	<b>971.8</b>	<b>123.6</b>	<b>119.9</b>
	Max	3554.9	4222.0	1341.3	1354.7
	Min	2809.0	3250.2	1217.7	1234.8
<b>with BC</b>	<b>Range among 5GCMs</b>	<b>426.1</b>	<b>544.0</b>	<b>98.6</b>	<b>77.6</b>
	Max	3225.9	3737.3	1320.0	1338.4
	Min	2799.8	3193.3	1221.4	1260.8

# Adaptation pathways for wheat production in India

Adaptation pathways (shift in adaptation levels) and crop yield



Adaptation is implemented timely

Necessary adaptation is not forecast

ご清聴ありがとうございました  
Thank you for your attention



Asia-Pacific Integrated Model

<http://www-iam.nies.go.jp/aim/index.html>

