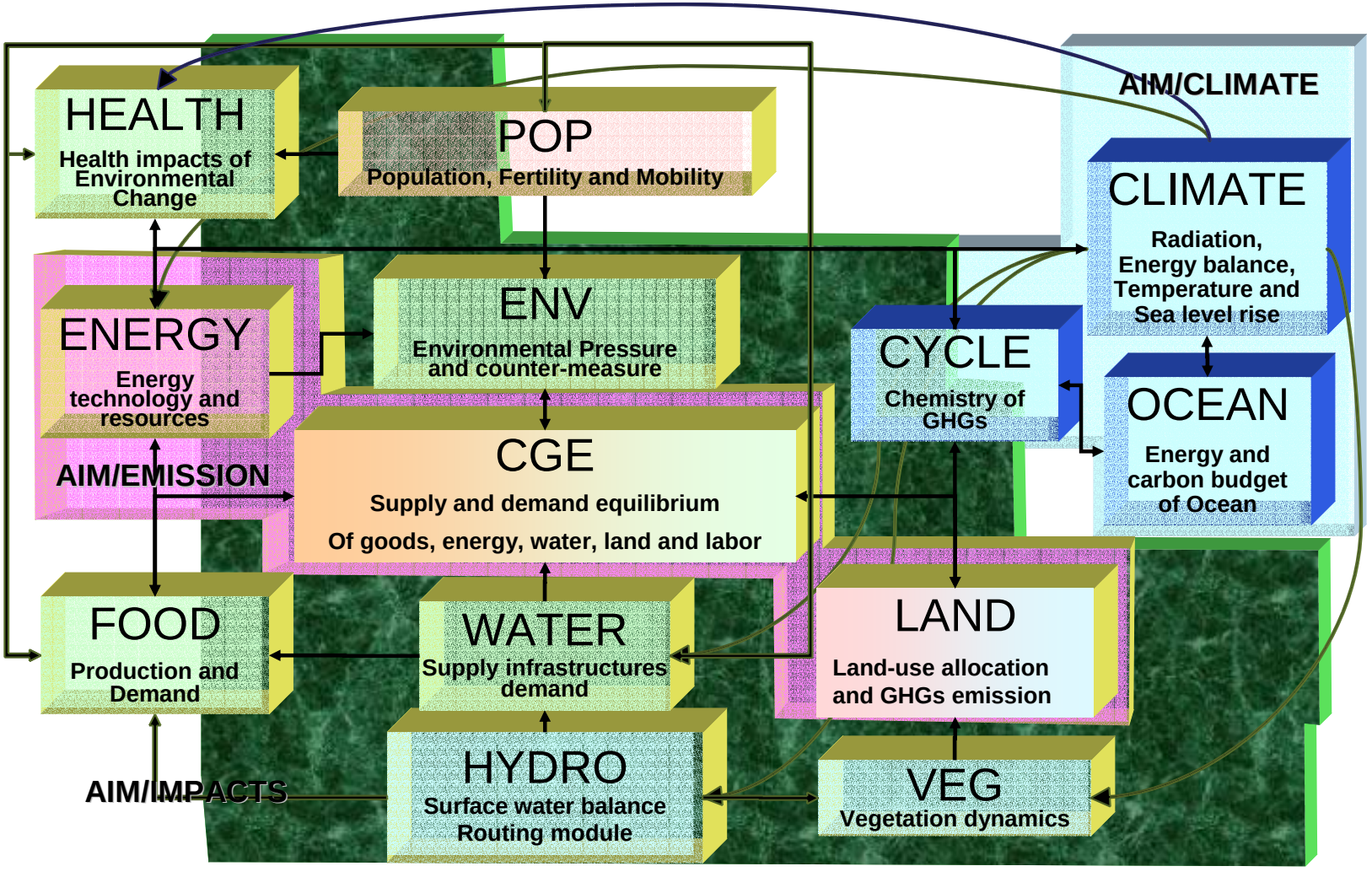
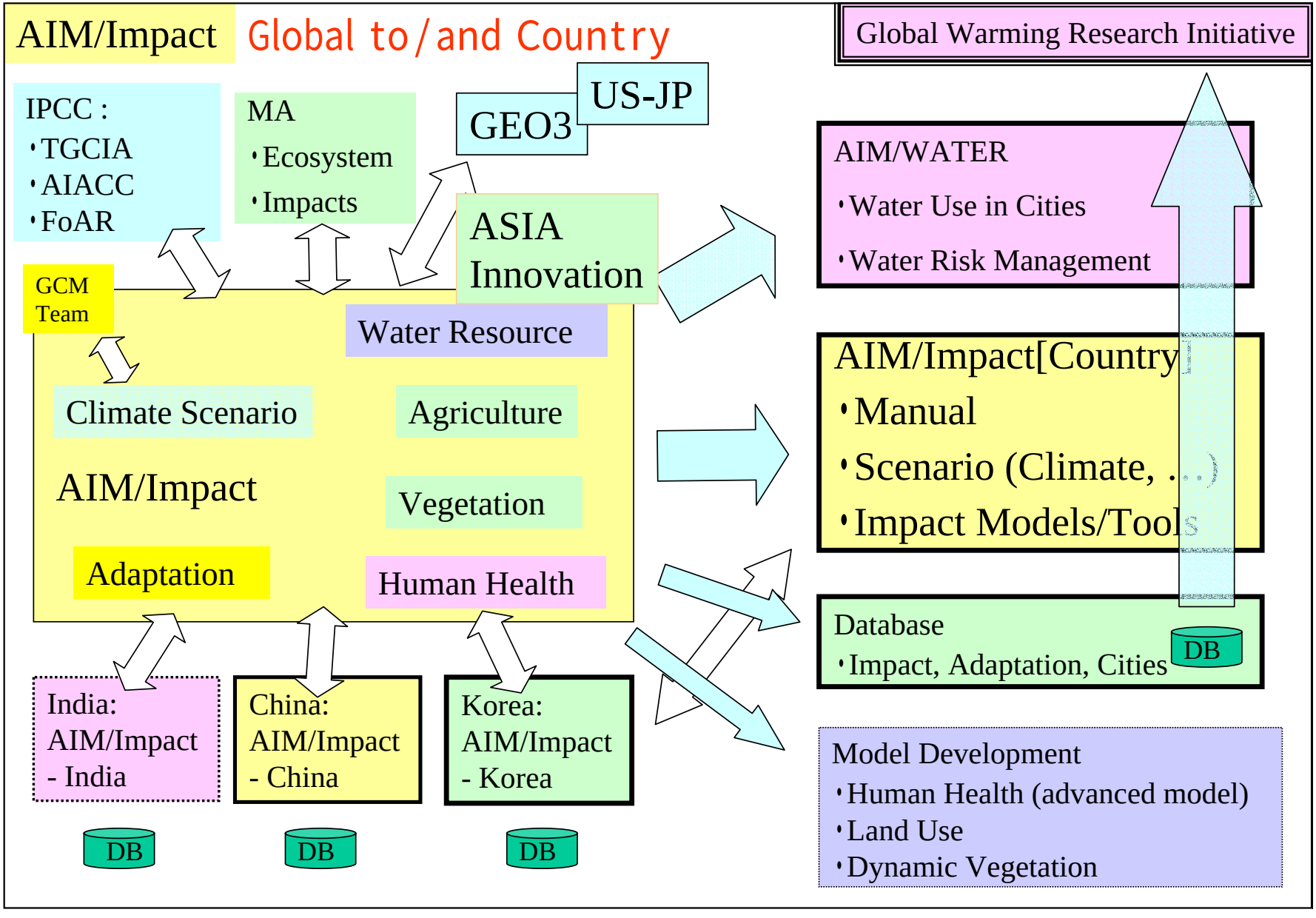
Recent Development of the AIM/Impact Model

Hideo Harasawa (NIES)

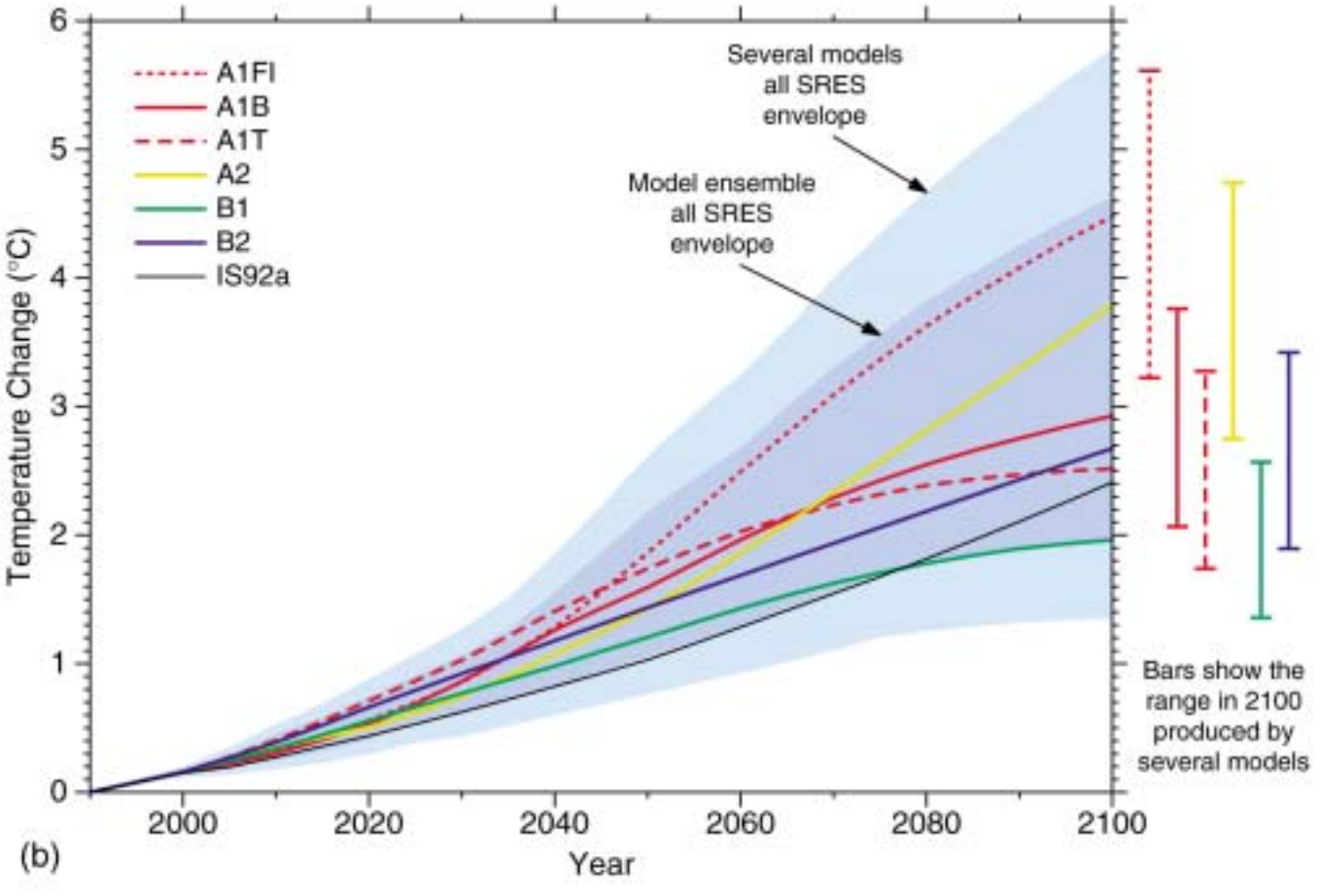
1. Impact Study in AIM, IPCC, and Japan
2. Progress of AIM/Impact Models
   - AIM/Impact[Country]: Takahashi
   - AIM/Water : Hijioka
   - AIM/Impact[Korea]: Jeon & Jung
   - Database for AIM/Impact: AIM/Impact-China, Profs. Sun, Li & You
3. Future Direction

AI/Impact Mode Structure




AIM/Impact
Global to/and Country
Global Warming Research Initiative
IPCC :
・TGCIA
・AIACC
・FoAR
MA
・Ecosystem
・Impacts
GEO3
US-JP
ASIA
Innovation
GCM
Team
Water Resource
Climate Scenario
Agriculture
AIM/Impact
Vegetation
Adaptation
Human Health
India:
AIM/Impact
- India
China:
AIM/Impact
- China
Korea:
AIM/Impact
- Korea
DB
DB
DB
AIM/WATER
・Water Use in Cities
・Water Risk Management
AIM/Impact[Country
・Manual
・Scenario (Climate, .
・Impact Models/Tool
Database
・Impact, Adaptation, Cities
DB
Model Development
・Human Health (advanced model)
・Land Use
・Dynamic Vegetation

By 2100,1.4～5.8℃ Temp. Increase, 9～88cm Sea Level Rise



Future Temperature Increase (SRES Scenario)

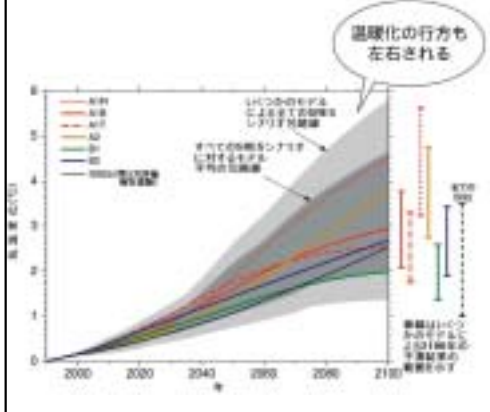
温暖化の予測結果（ＳＲＥＳシナリオによる）

Emission Scenario

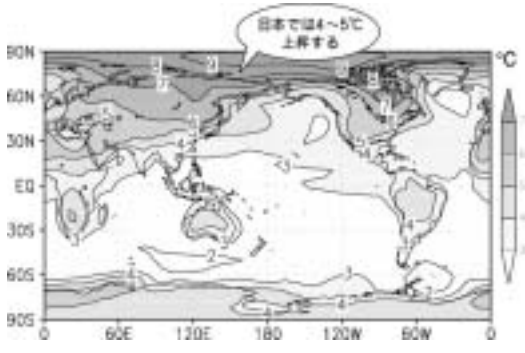
Climate Model & Prediction

Climate Scenario
→ Impact Assessment

IS92a ～f
・BaU Scenario

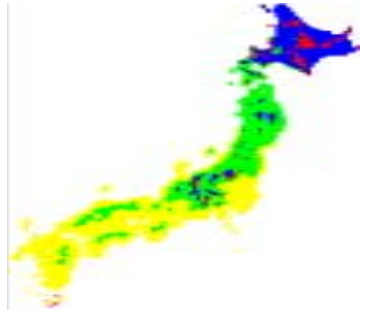


Climate Model (GCM)
A-GCM
→AO-GCM
Regional Climate Model



Equilibrium Experiment
×2 CO2
Transient Experiment
1% Increase
SRES Scenario
Stabilization Scenario

Regional Climate Scenario
・Down Scaling
・(Regional Climate Model)



Arbitrary Scenario +/-1,2,..℃
Equilibrium Experiment
×2 CO2
Transient Experiment
1% Increase
(SRES Scenario)

Climate Scenarios distributed by IPCC Data Distribution Center

	ECHAM4	HadCM2	CSIRO	CCCma	GFDL	NCAR	CCSR
Research Institute (Country)	German Climate Research Center (Germ)	Hadley Center (UK)	CSIRO (Australia)	Canada Climate Model Analysis Center(Canada)	Geophyscial Fluid Dynamics Laboratory(US)	National Canter of Atmospheric Research (US)	Tokyo Univ - Climate System Research Center (Japan)
AGCM Spatial Resolution	2.8 ° x2.8 ° L19	2.5 ° x 3.75 ° L19	3.2 ° x5.6 ° L9	3.7 ° x3.7 ° L10	4.5 ° x7.5 ° L9	4.5 ° x7.5 ° L9	5.6 ° x5.6 ° L20
OGCM Spatial Resolution	2.8 ° x2.8 ° L11	2.5 ° x 3.75 ° L20	3.2 ° x5.6 ° L21	1.8 ° x1.8 ° L29	4.5 ° x 3.75 ° L12	1 ° x1 ° L20	2.8 ° x2.8 ° L17
Control CO_{2c} Concentration	354 ppmv	323 ppmv	330 ppmv	295 ppmv	300 ppmv	330 ppmv	N.A.
CO_2 Conc. Rate of Increase	1% yr^{-1}	1% yr^{-1}	0.9% yr^{-1}	1% yr^{-1}	1% yr^{-1}	1% yr^{-1}	1% yr^{-1}
Calc. Period (Year)	Cont : 240 GHG : 240 GHG+A : 240	Cont : 240 GHG : 240 GHG+A : 240	Cont : 219 GHG : 219 GHG+A : 219	Cont : 200 GHG : 200 GHG+A : 200	Cont : 1000 GHG : 100 GHG+A : 300	Cont : 136 GHG : 136 GHG+A : 136	Cont : 210 GHG : 210 GHG+A : 210
2xCO_2 Global Average Temperature Increase(ºC)	1.3	1.7	2.0	2.7	2.3	2.3 (est.)	N. A.
2 x CO_2 Equilibrium Temperature (ºC)	2.6	2.5	4.3	3.5	3.7	4.6	N. A.

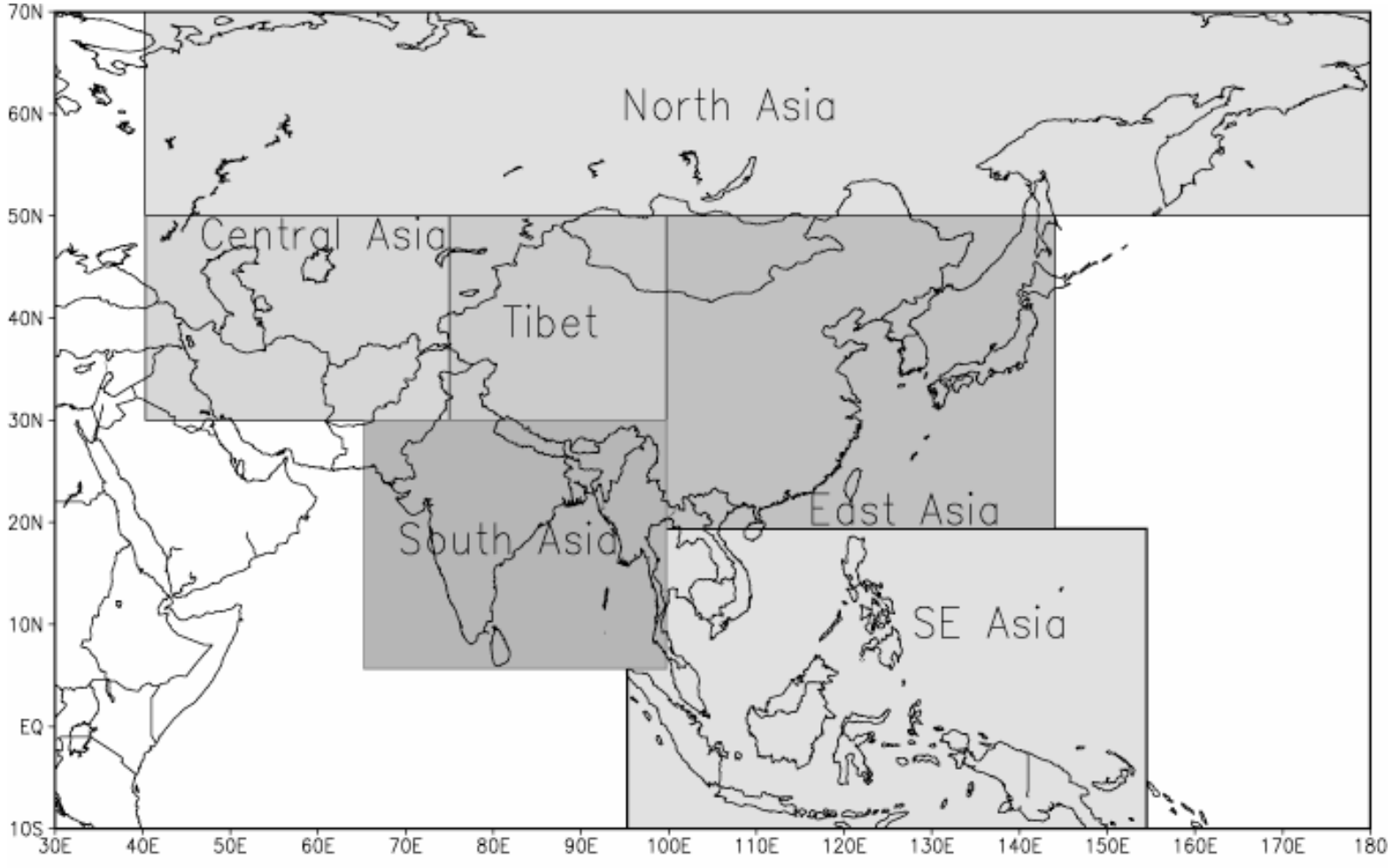
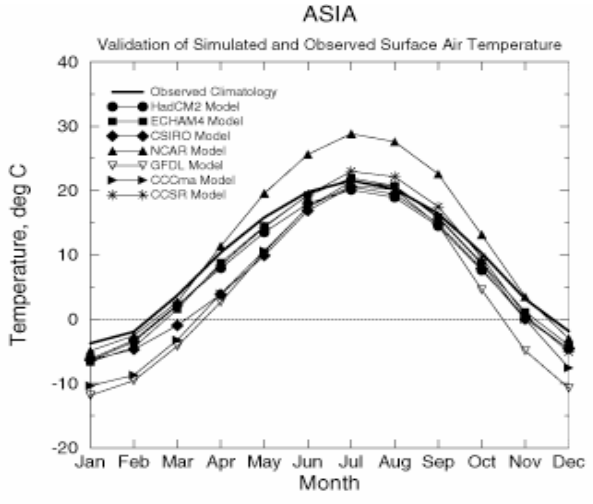


Fig. 1: The geographical domain of Asia and its sub-regions as considered in the study



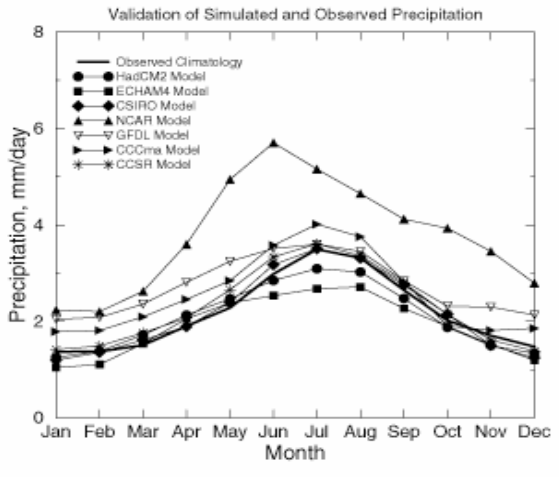
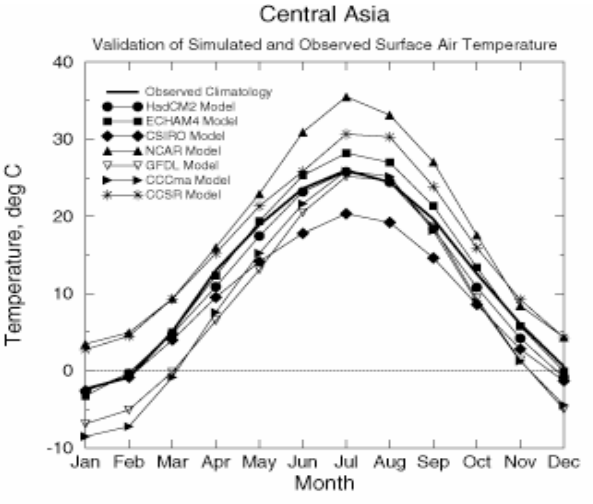


Fig. 2: The area-averaged monthly mean observed and simulated surface air temperature (deg C) and precipitation (mm day^{-1}) climatology over the Asian continent (land regions only).



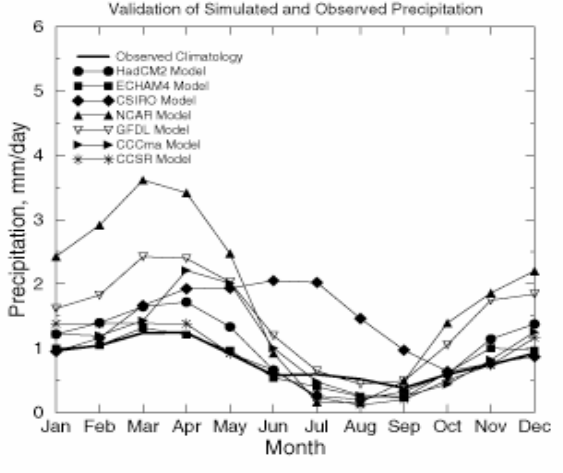
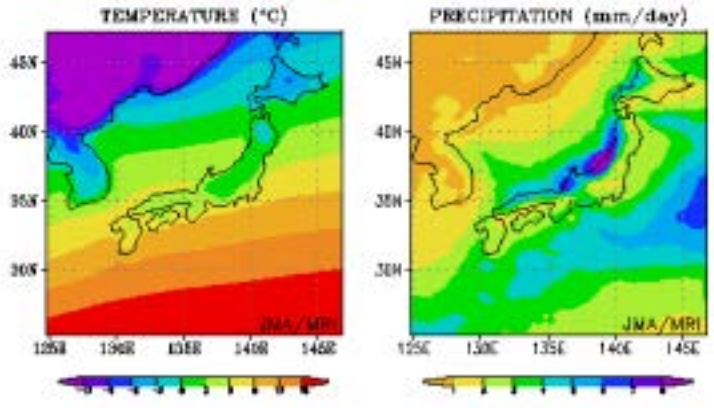
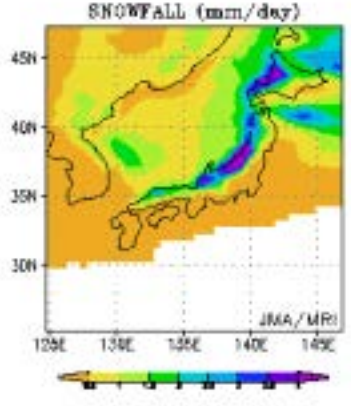


Fig. 3: The area-a veraged monthly mean obser ved and simulated surface air temperature (deg C) and precipitation (mm day^{-1}) climatology over Central Asia (land regions only)

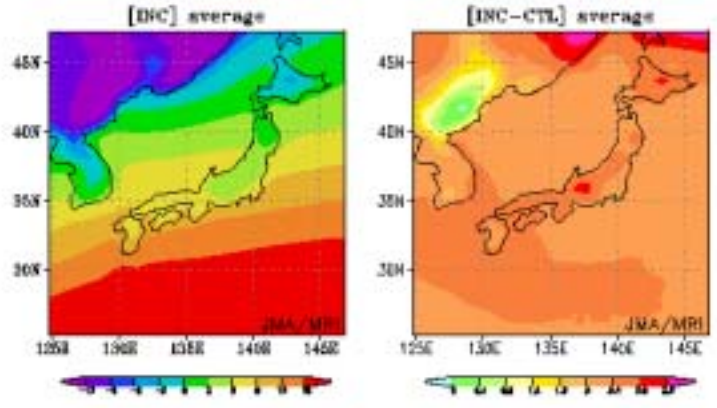
Regional Climate Scenario (JMA/MRI)

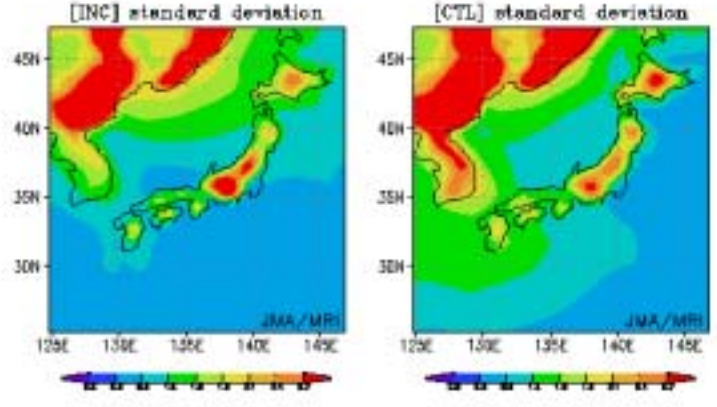
[CTL] January, AVERAGE FOR 61 - 80 YEARS PERIOD



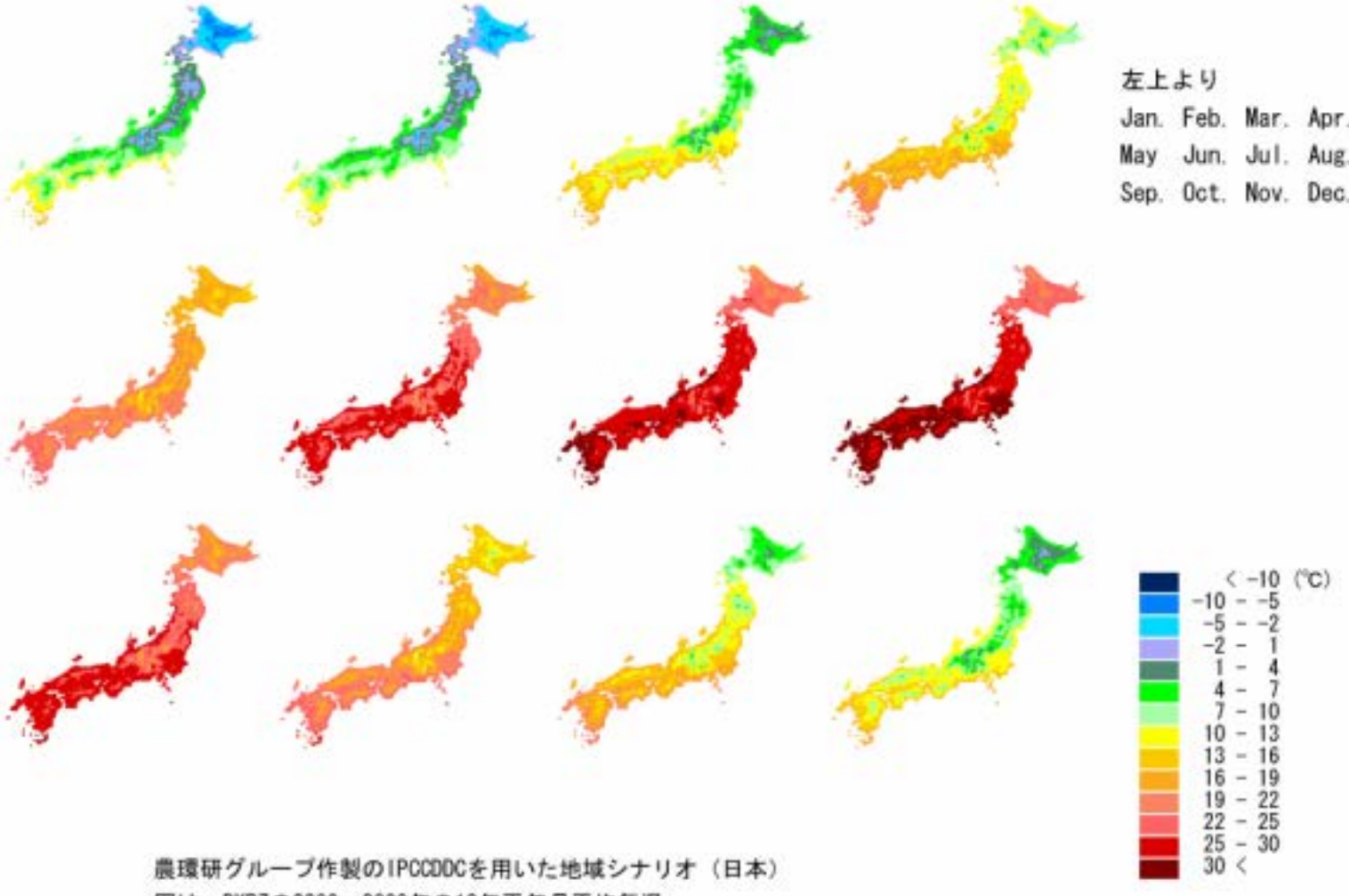


TEMPERATURE (°C)
January, 61 - 80 YEARS



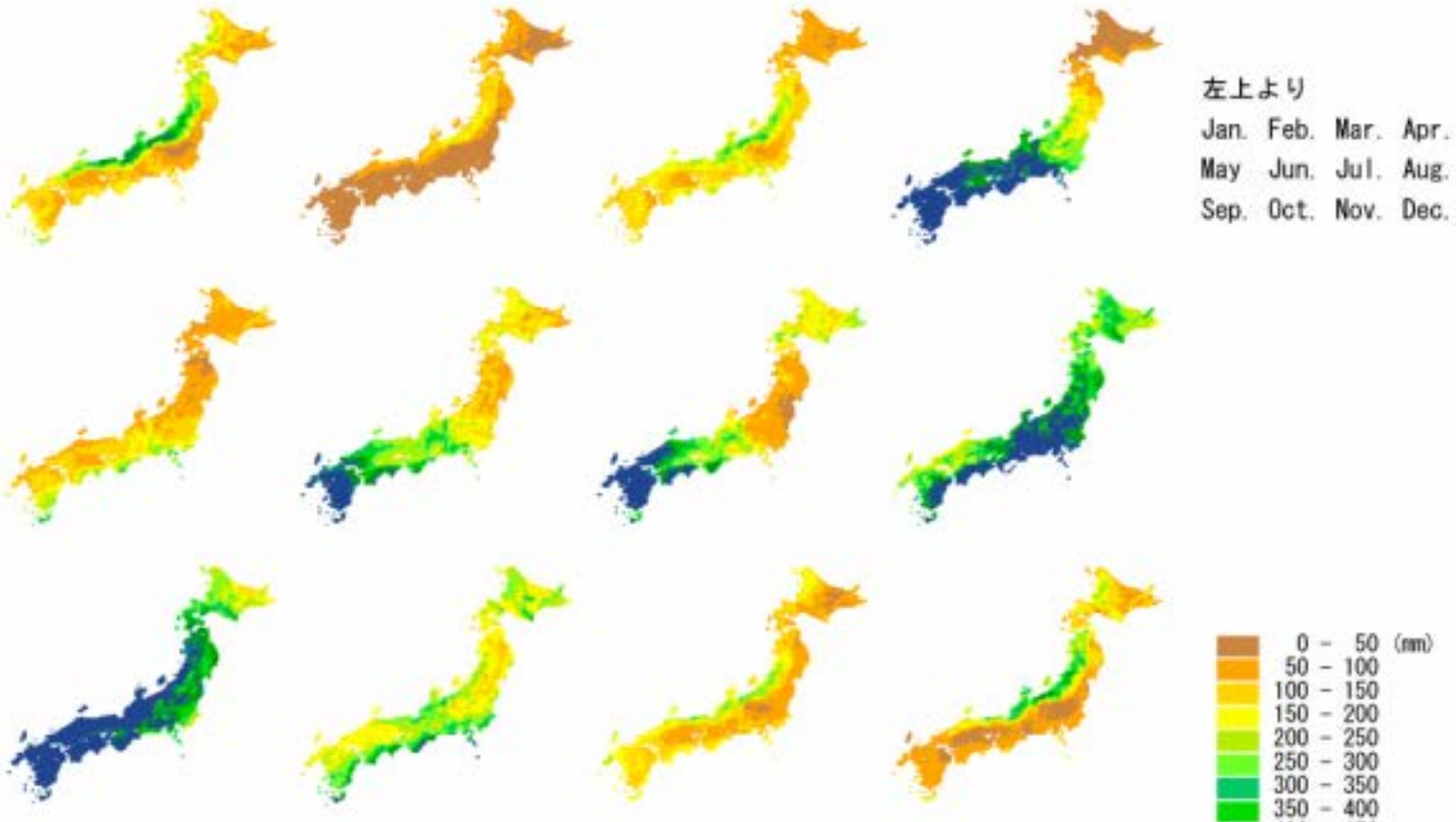


Future Climate (temperature) : Statistical Down Scaling



農環研グループ作製のIPCCDDCを用いた地域シナリオ（日本）
図は、DKRZの2090～2099年の10年平年月平均気温

Future Climate(Rainfall): Statistical Down Scaling



農環研グループ作製のIPCCDDCを用いた地域シナリオ（日本）
図は、DKRZの2090～2099年の10年平年月平均降水量

IPCC

2002. 4 IPCC 18th Plenary

- New Bureau for Fourth Assessment Report (FoAR)

Technical Paper

- Tech. Paper on Climate Change and Biodiversity
- Tech. Paper on Climate Change and Sustainable Development
- Tech. Paper on Levels of GHG in the Atmosphere and Dangerous Anthropogenic Interference with climate System

AIACC

- Capacity Building (Impact Study by DC, for DC)
- GEF Fund
- UNEP, START, IPCC, TWAS

AIACC:

Assessments of Impacts and Adaptations to Climate Change

Objectives:

(i) To advance scientific understanding and fill gaps in knowledge regarding climate change impacts, adaptation and vulnerability in developing countries

(ii) To build and enhance capacity in developing countries to carry out and sustain research in these areas

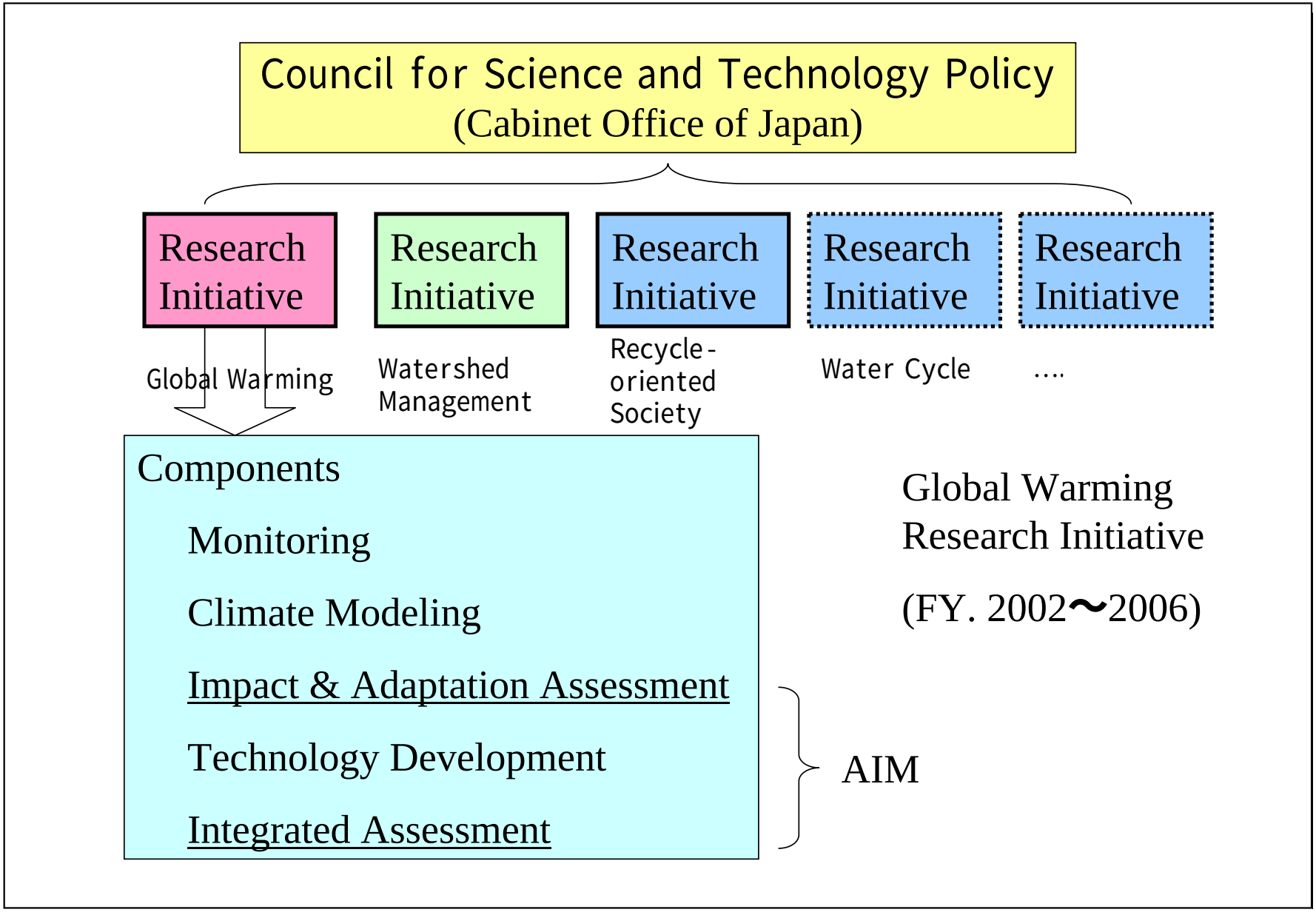
Period/Budget:

2- 3 years / $100,000—$250,000 per project

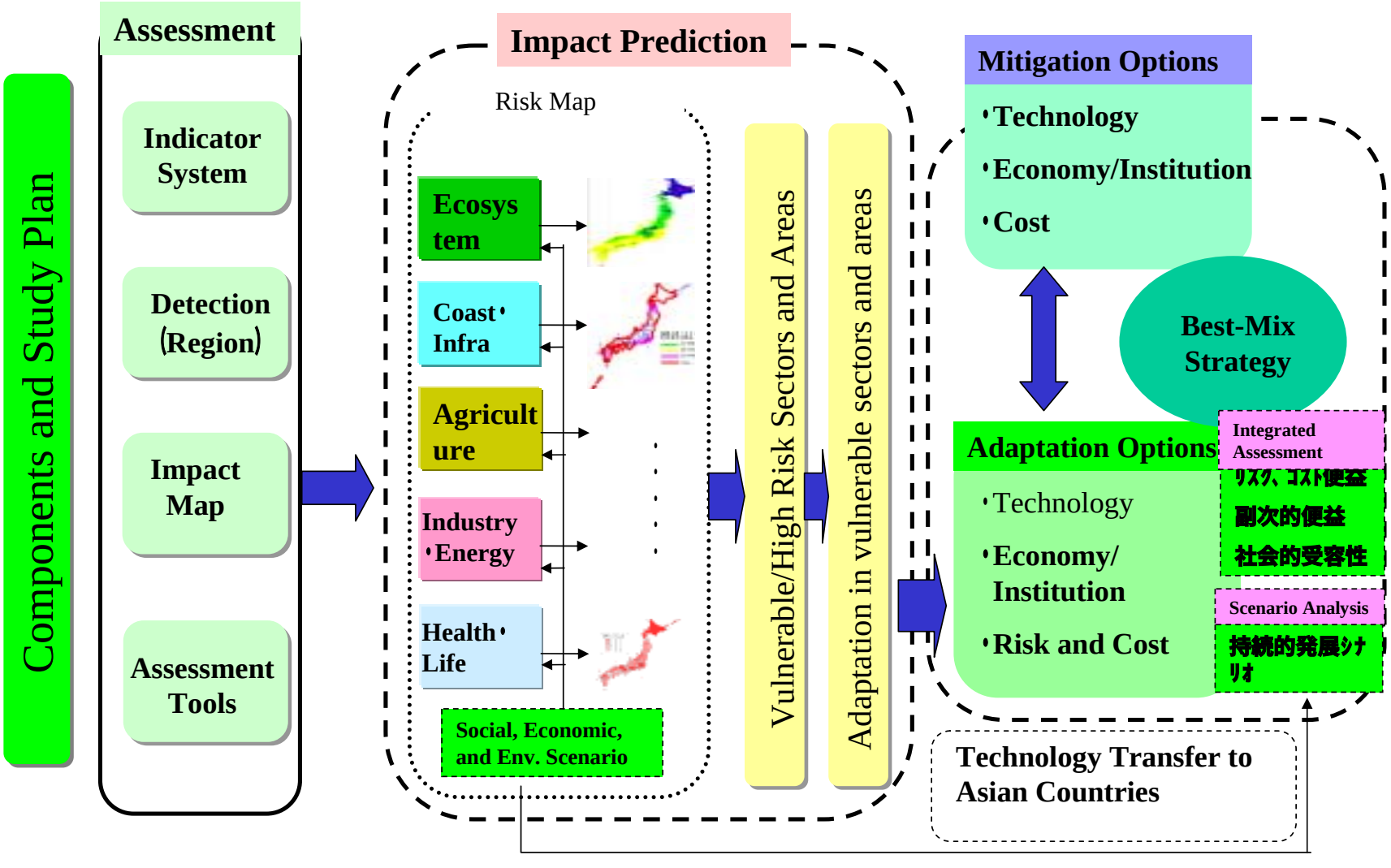
No. of Projects accepted: 20

Support: UNEP, START, IPCC, Third World Academy of Science

Science Director: Neil Leary (former IPCC WG2 TSU Officer)


Council for Science and Technology Policy
(Cabinet Office of Japan)
Research Initiative
Research Initiative
Research Initiative
Research Initiative
Research Initiative
Global Warming
Watershed Management
Recycle-oriented Society
Water Cycle
....
Components
Monitoring
Climate Modeling
Impact & Adaptation Assessment
Technology Development
Integrated Assessment
AIM
Global Warming Research Initiative
(FY. 2002〜2006)

Comprehensive Study on Global Warming Impacts and Adaptation Strategy



Tentative U.S.-Japan Joint Project List
developed by
Second Meeting of the U.S.-Japan High-Level Consultations on Climate Change
Science and Technology Working Group

Priority Area 2:
Impact and adaptation/mitigation policy assessment employing emission-climate-impact integrated models

Proposed Topics 2

2.1 Scenario Development: Analysis and development of future scenarios for socioeconomic and environmental conditions, and consequent future emission scenarios towards the development of new IPCC scenarios for the prediction of future climate change

2.2 Integrated Model: Development of a climate-socioeconomic integrated model based on an emission model, climate model and impact model

2.3 Impact and Adaptation: Research on current and projected climate change impacts and adaptation options including developing countries in the Asia-Pacific and South American regions

2.4 Best mix Policy: Scientific evaluation of mitigation and adaptation options making use of the integrated model

JPCC2

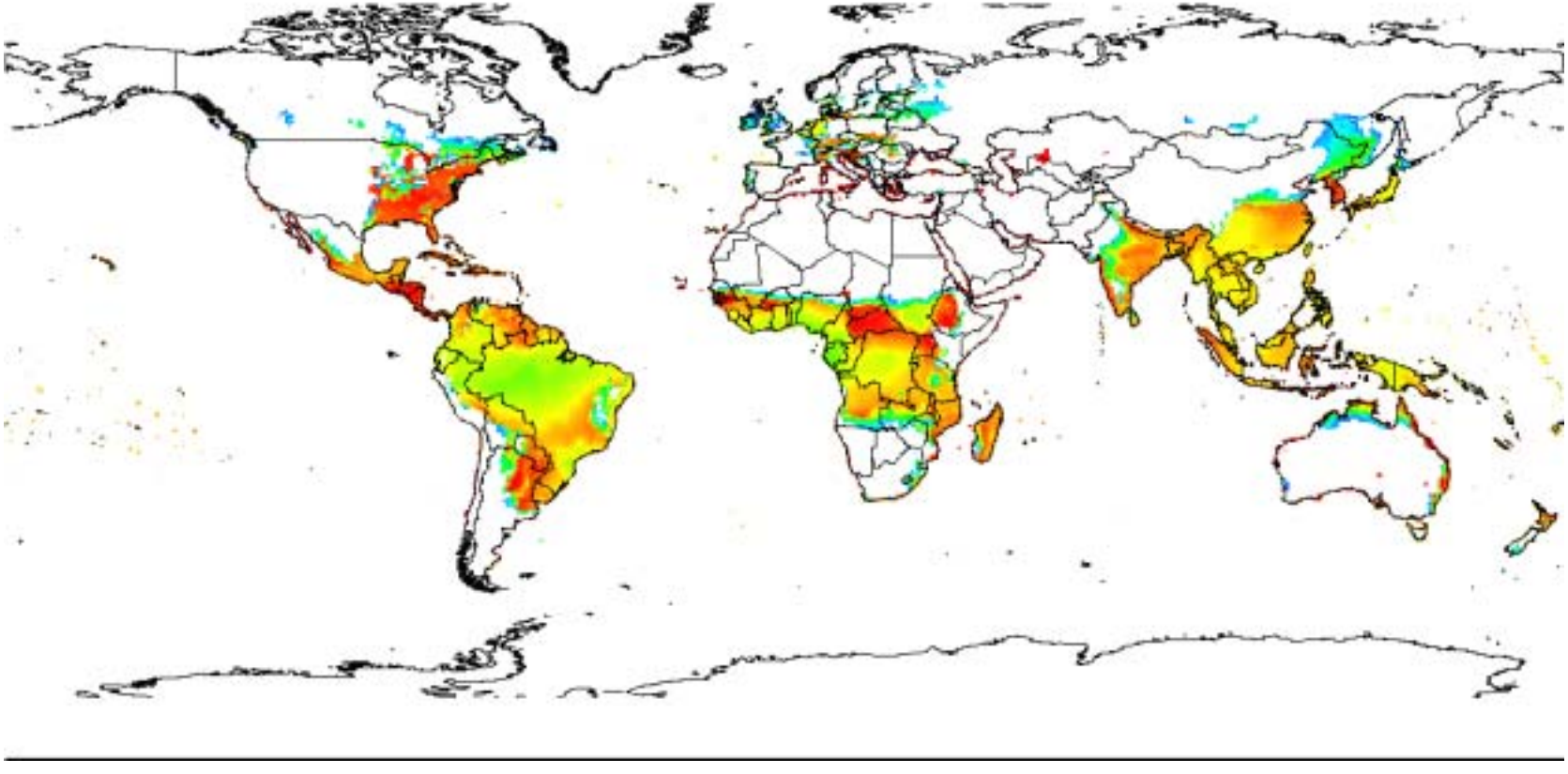
2000.1 Sub-Committee Member Meeting
2000.7 Writing Team Meeting (about 70 researchers)
2001.1 Experts Review
2001.3 Completion of the JPCC2 Report
2001.3 Dissemination, Workshop, etc.

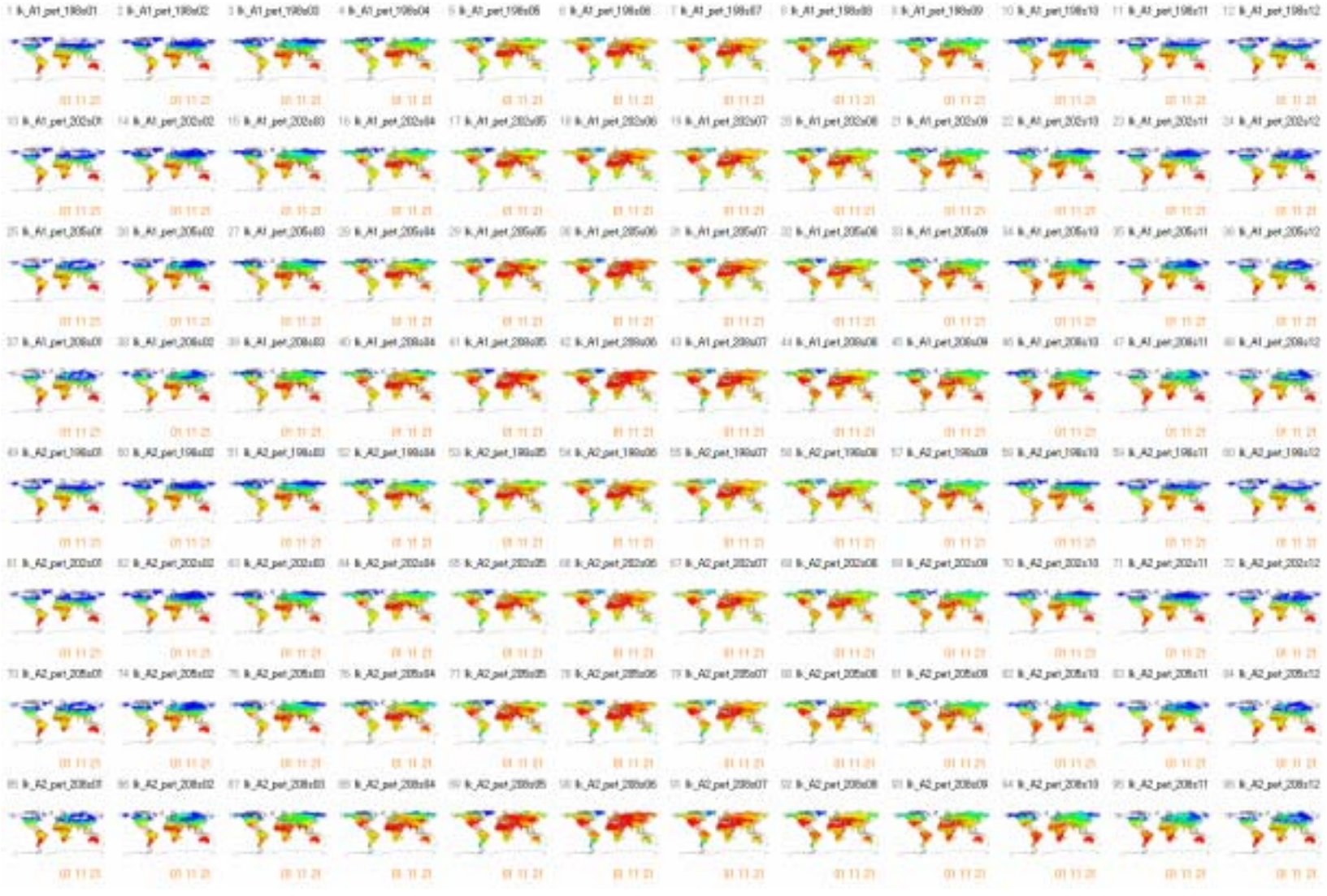
Outputs

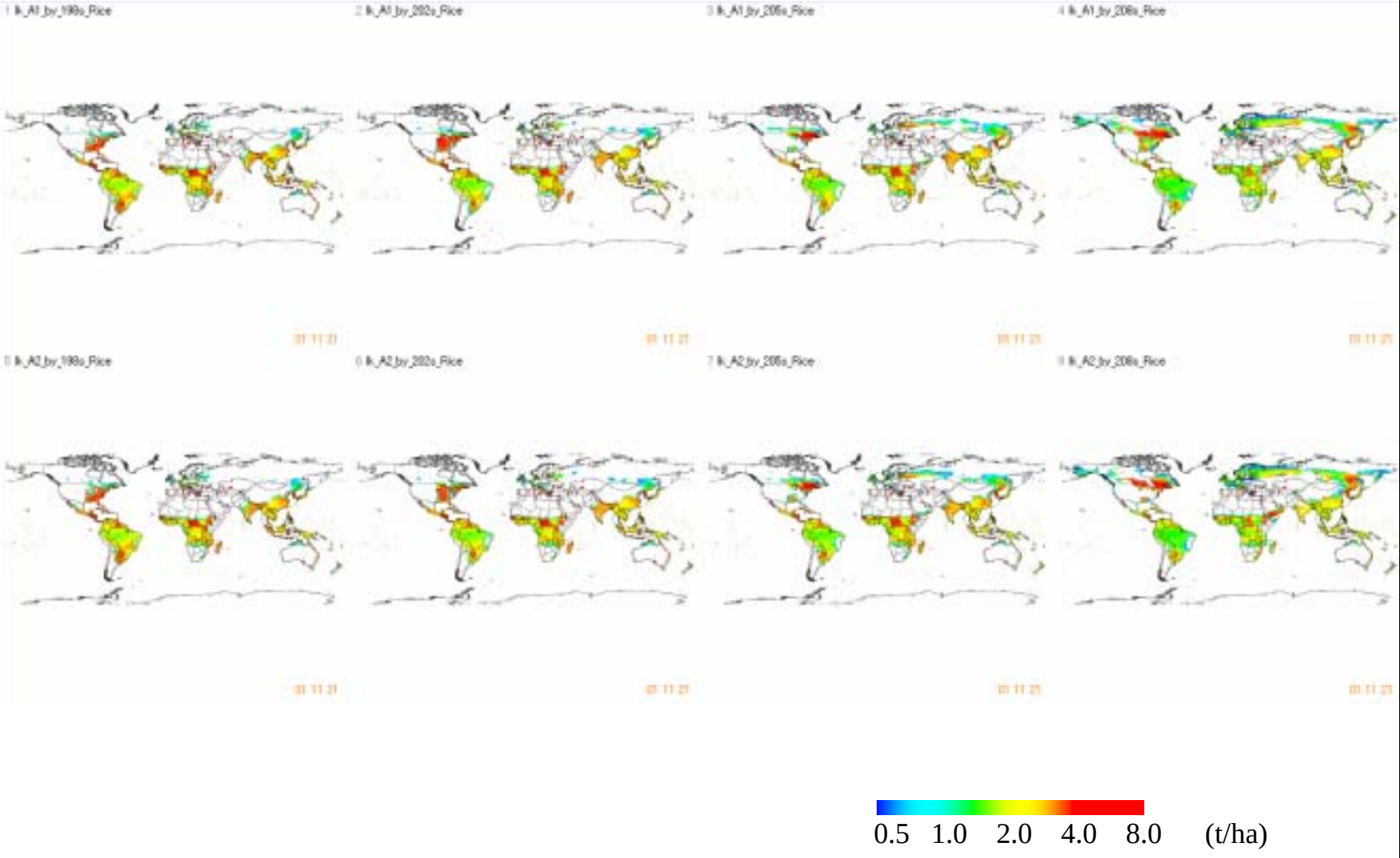
- Report “Global Warming Impacts In Japan 2001”
- Pamphlet
- Book (Now editing)
- English Book (Now editing)

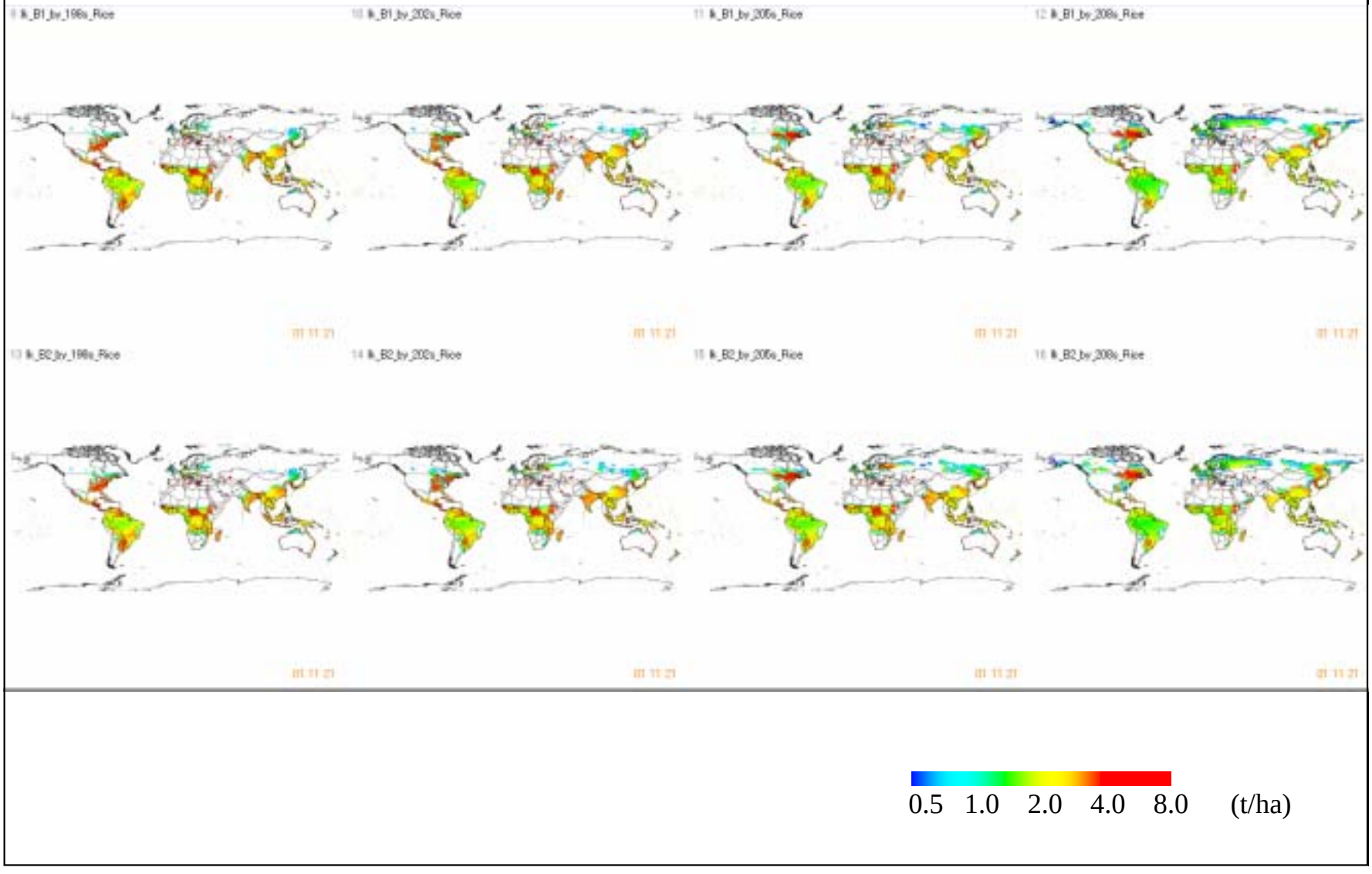
Progress of AIM/Impact

Future Rice Yields predicted based on SRES Scenario (A1)

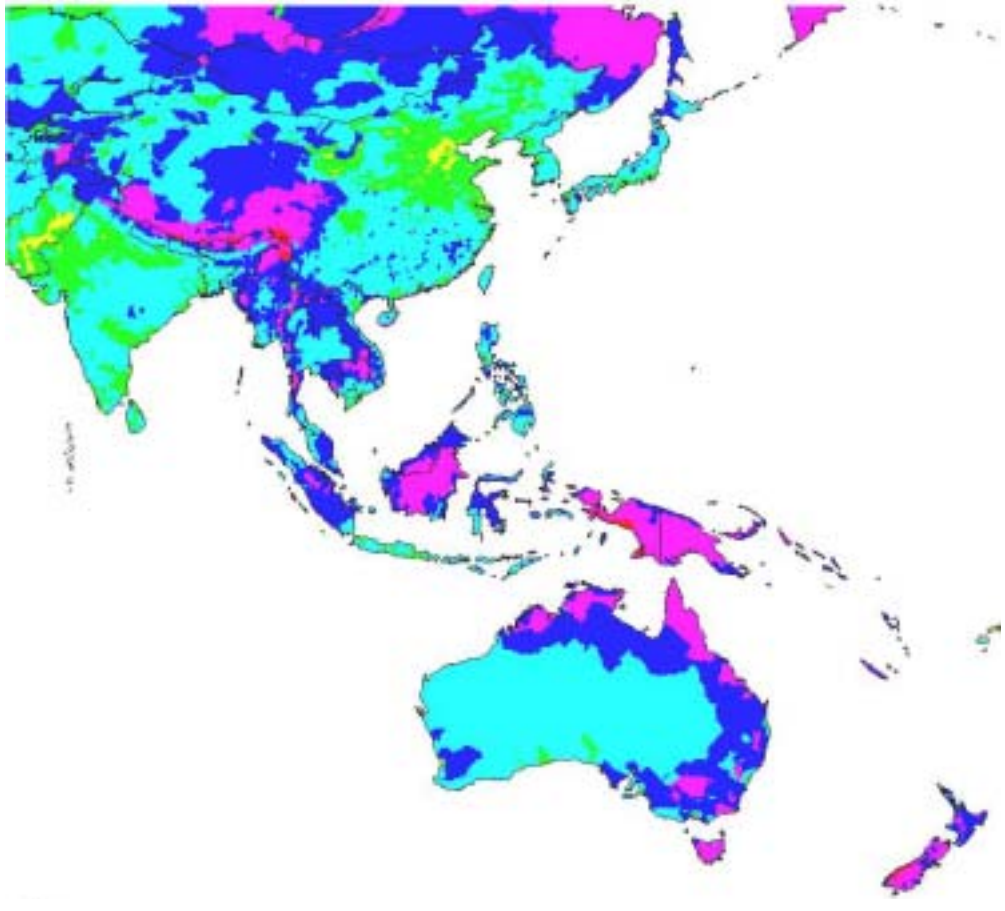





0.5 1.0 2.0 4.0 8.0 (t/ha)

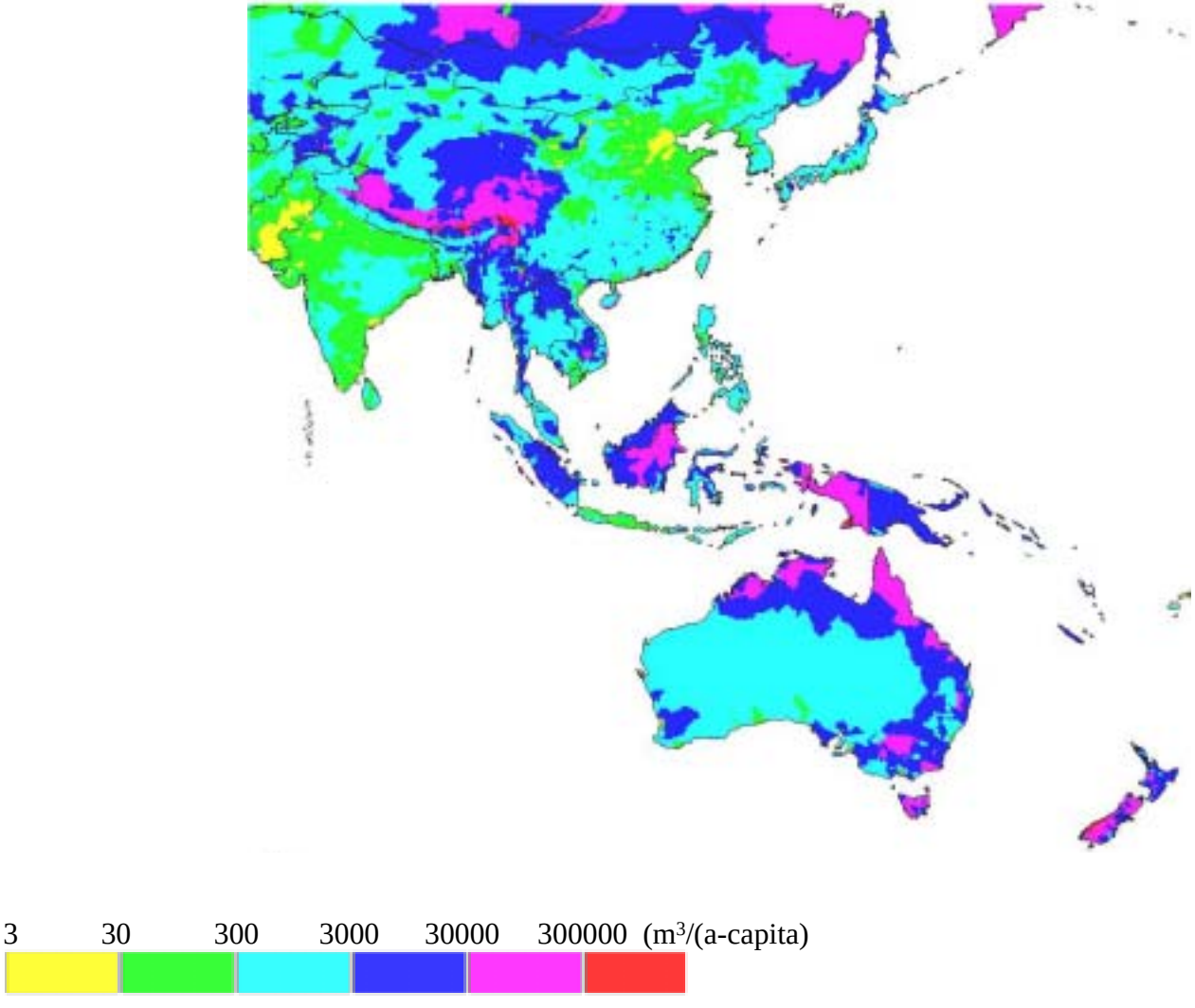

0.5 1.0 2.0 4.0 8.0 (t/ha)

Water Resources



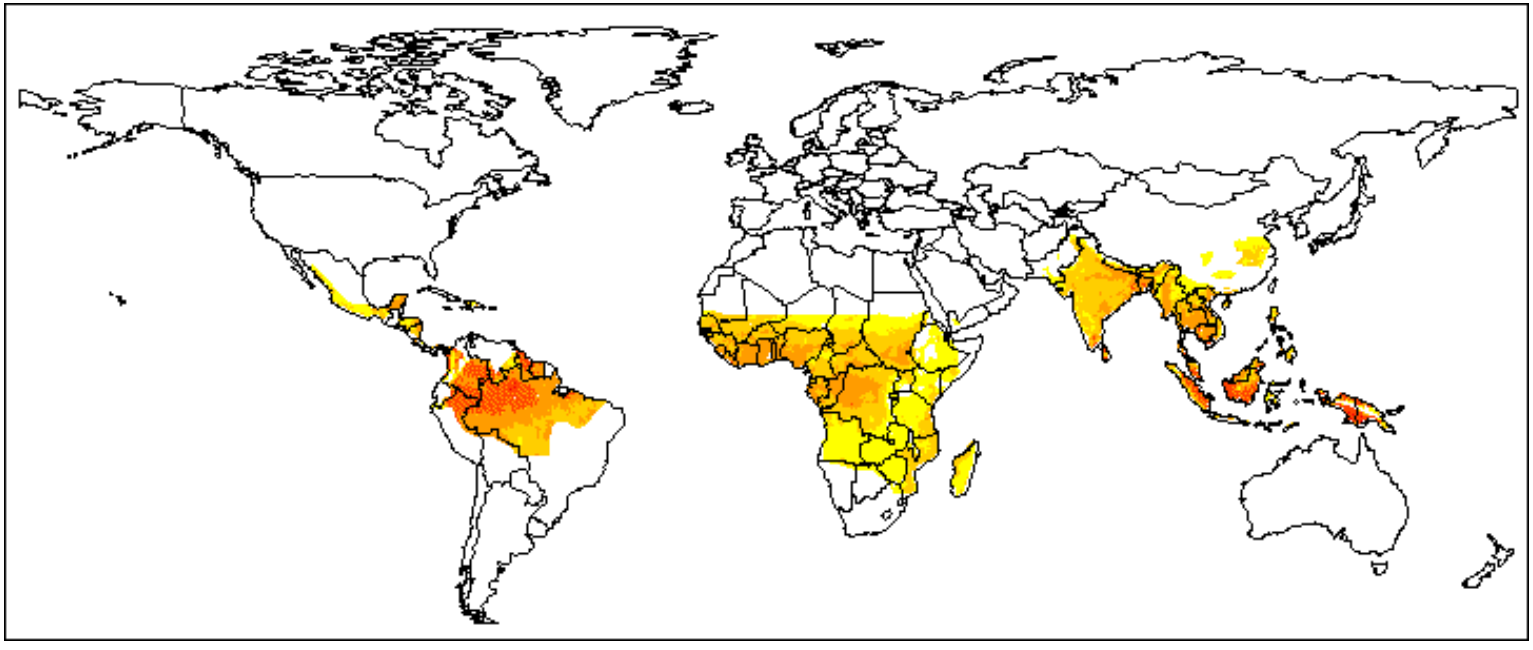
3 30 300 3000 30000 300000 (m^3/(a-capita)

Water availability per capita, 1990



Water availability per capita, 2050

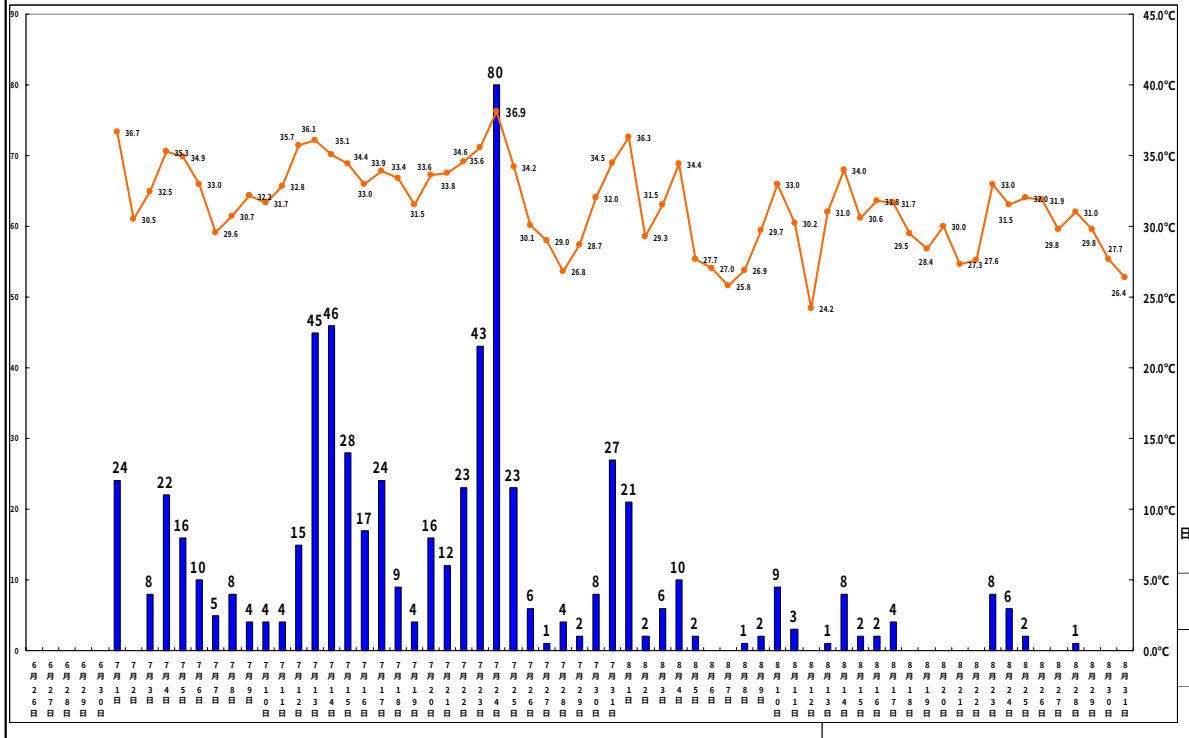
AIM/Impact (Health)



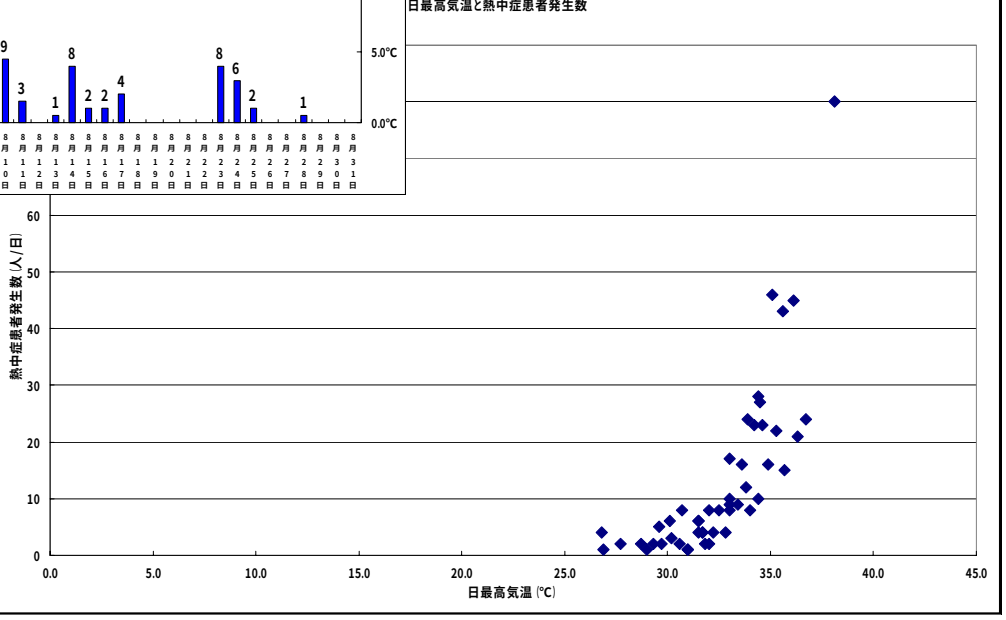
猛暑による影響が伺える傷病者の発生状況(東京都における最高気温と搬送者数)

平成13年7月1日～8月31日 (7月:538人、8月:90人)

東京消防庁救助課調べ



Heat Wave Impacts (last June-August)



Future Development

- AIM/Impact - Global Model

  Prediction of Impacts based on SRES-based climate Scenarios

  Water Supply vs. Water Demand + Food Security

  Advanced Model: Health, Land, Dynamic Vegetation

- AIM/Impact[Country]

  Basic tools/Data/Information

  AIM/Impact-Korea, China, India

- AIM/Water - City

- Adaptation Countermeasures and Cost Estimation