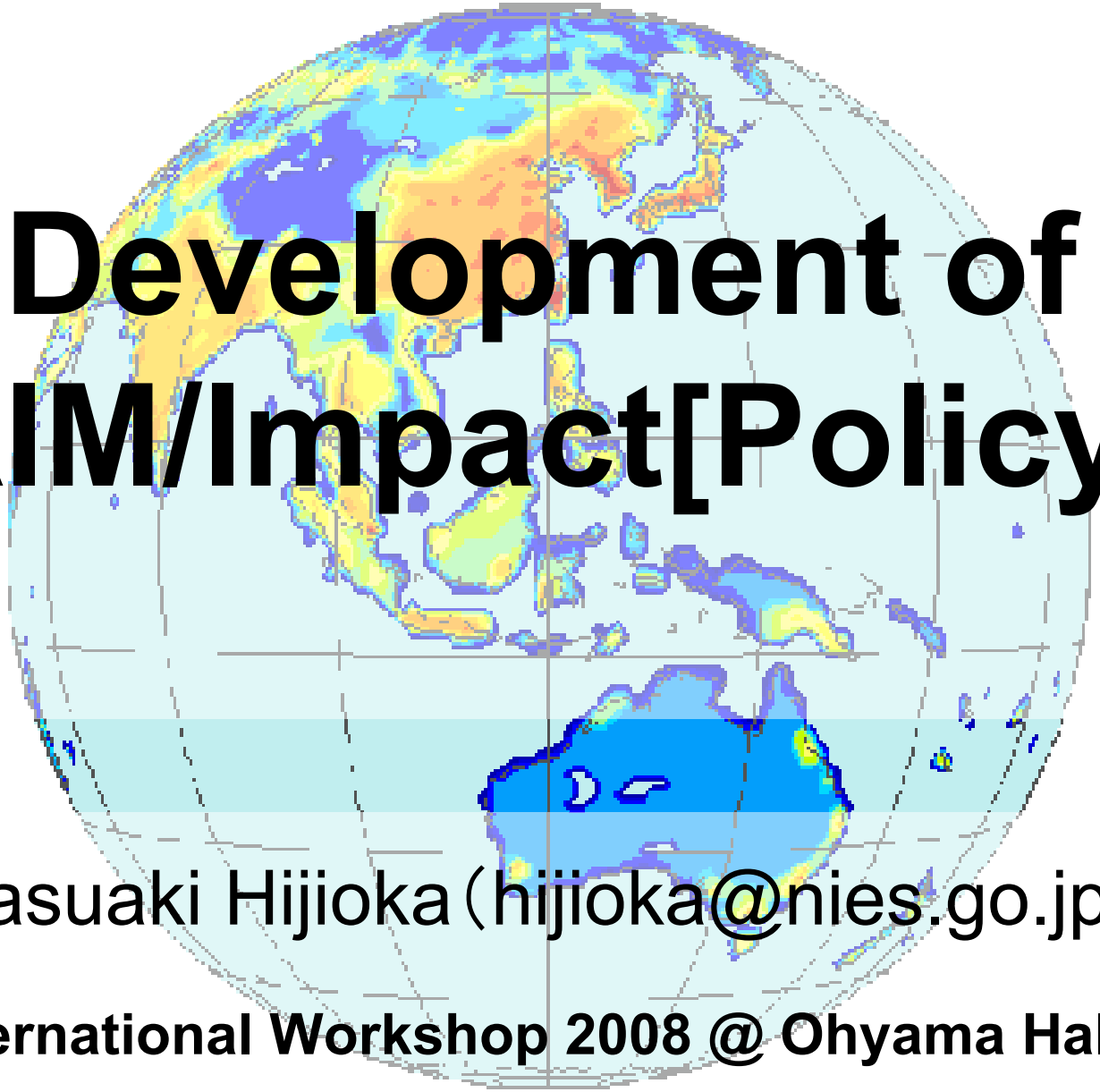
Development of AIM/Impact[Policy]



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AIM International Workshop 2008 @ Ohyama Hall, NIES

Presentation Outline

1. Background and Objectives
2. Outline of AIM/Impact[Policy]
3. Interfaces of AIM/Impact[Policy]

Background

- Global warming impacts are already appearing in various parts of the world, and as warming increases serious impacts are predicted in many fields

- Necessary for urgent GHG reductions
  - ✓ Post-Kyoto regime
  - ✓ Stabilization of GHG concentration

- ➢ What stabilization targets should we be aiming for?

Objectives

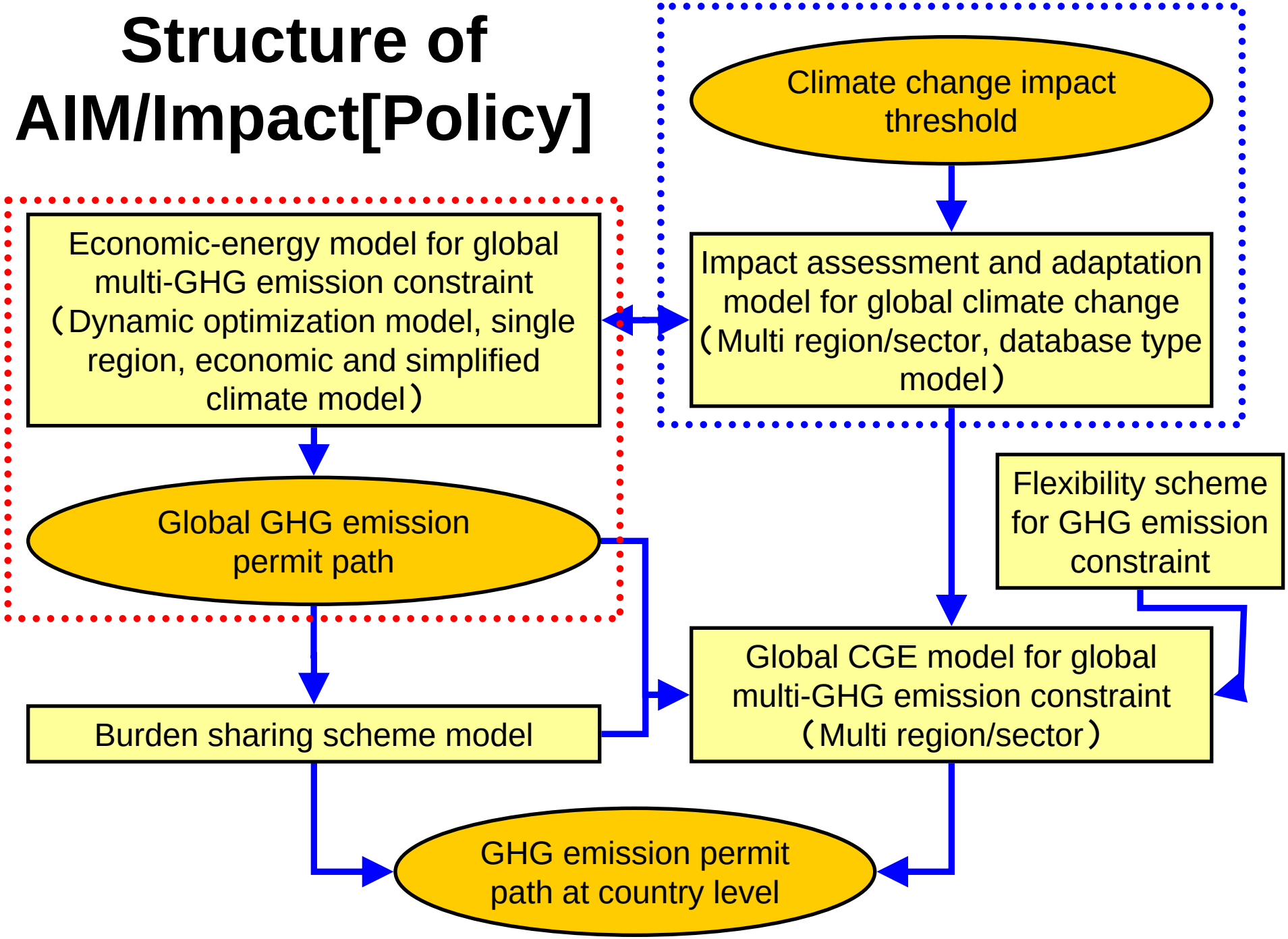
- Development of ***integrated assessment model***, AIM/Impact[Policy], for comprehensive analysis and assessment of GHG stabilization concentration targets and emission pathways for realizing them, as well as impacts and risks under such targets

- Assist policymakers' decision in action programs to arrest global warming

Integrated Assessment Model -AIM/Impact[Policy]-

- AIM/Impact[Policy] has two major parts
  - *Emissions projection part*
    - ✓ investigate GHG emission reduction strategies for achievement of climate stabilization goals
  - *Impact projection part*
    - ✓ simulate the impact of the global warming anticipated under the global warming control targets
    - ✓ integrate impacts studies of climate change on several sectors
  - Analysis of climate change impacts on dangerous level, economical damage and adaptation strategy comprehensively

Structure of AIM/Impact[Policy]

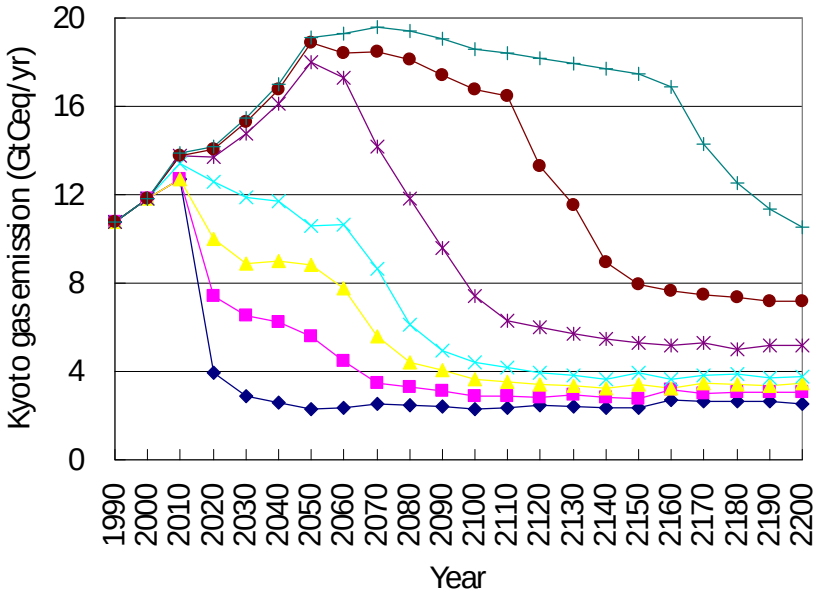


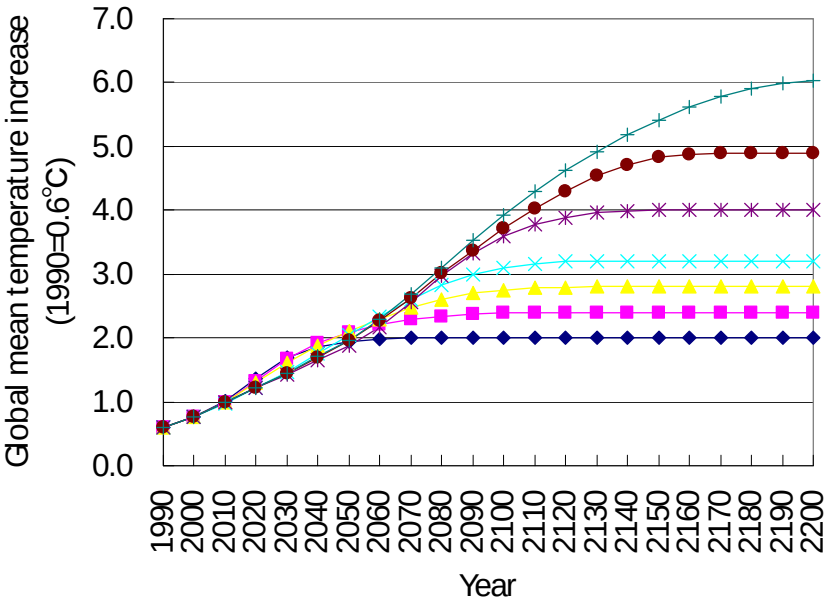
Features of Energy-Economic Model

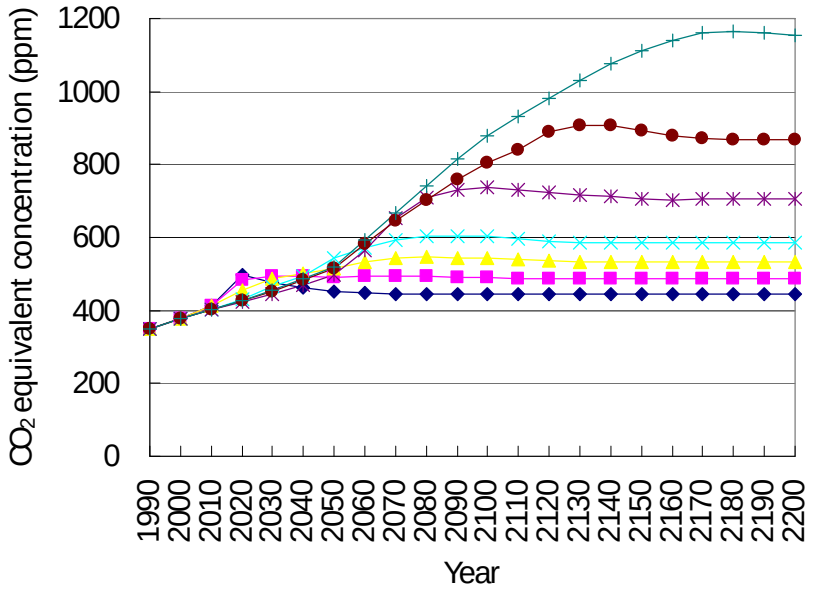
- Analyze global GHG emission paths under different socio-economic scenarios and various constrains
  - GHG emission or concentration constraints
  - Temperature constraints
  - Temperature change speed constraints
  - Sea level constraints.

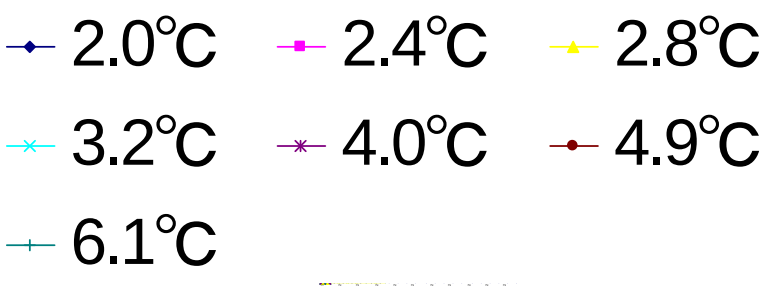
- Model Details
  - Dynamic Optimization model
  - Four modules: economic/energy module, GHG emissions module, climate module, and sea level rise module
  - Single region
  - Greenhouse gases: CO_2, CH_4, N_2O, SO_2, CFC, PFC, SF_6, BC, OC, O_3
  - Time periods: decades from 1990 through 2300

Example of global GHG emissions under several constrains





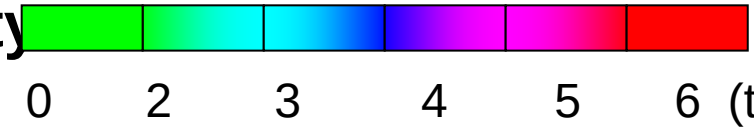


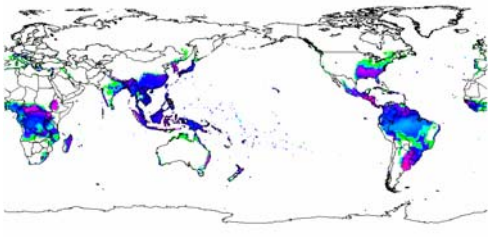
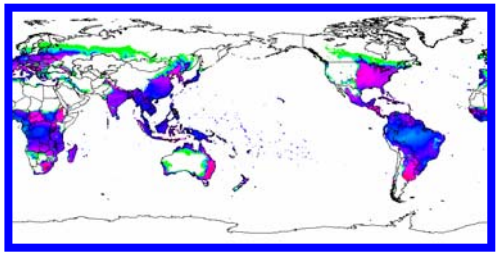
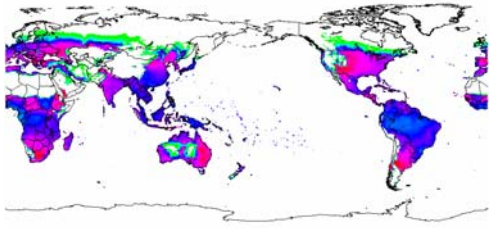
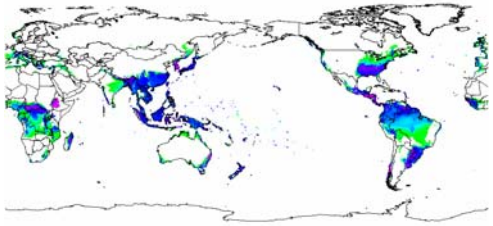
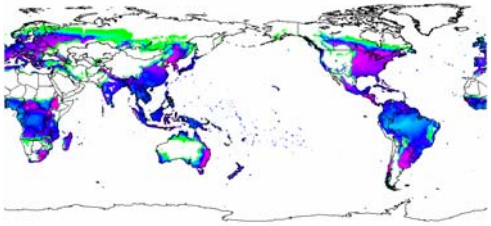
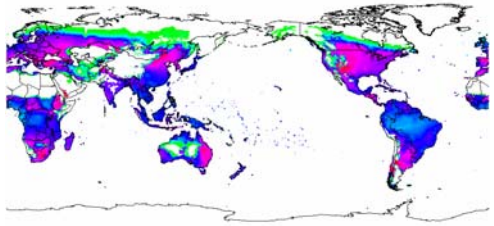
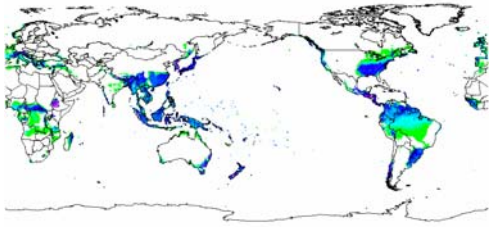
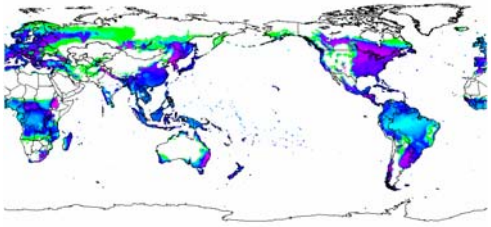
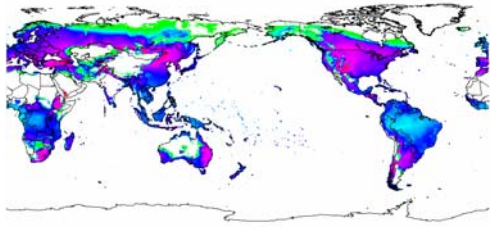
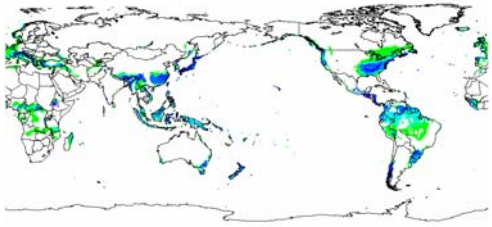
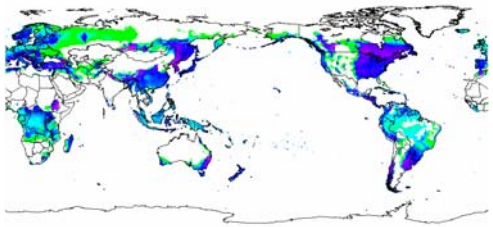
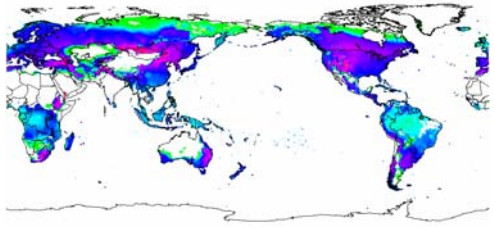


Impact assessment and adaptation model

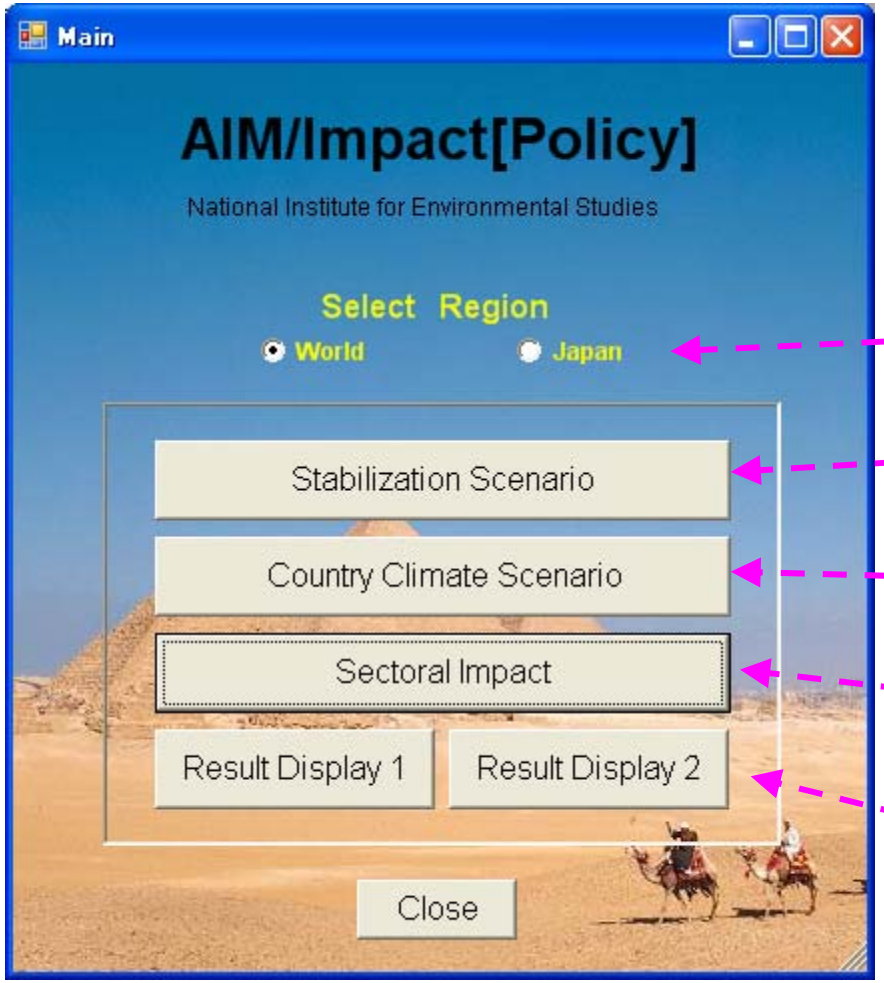
- Database type model (pre-simulated results of process type models)
  - Using existing detailed sector-level impact assessment models, the impact on each lattice point is estimated by sensitivity analysis using the two climate factors of temperature and precipitation
  - Spatially averaged country-level and sector-level impact functions are to be prepared.
  - This database can also contain knowledge obtained by other impact studies.

Change of potential crop productivity (rice)



	Precipitation -50%	Precipitation 0%	Precipitation 100%
Temperature +0ºC			
Temperature +3ºC			
Temperature +6ºC			
Temperature +9ºC			

1. Front Page



① Selection of region

↓

② Selection of stabilization scenario

↓

③ Development of climate scenario

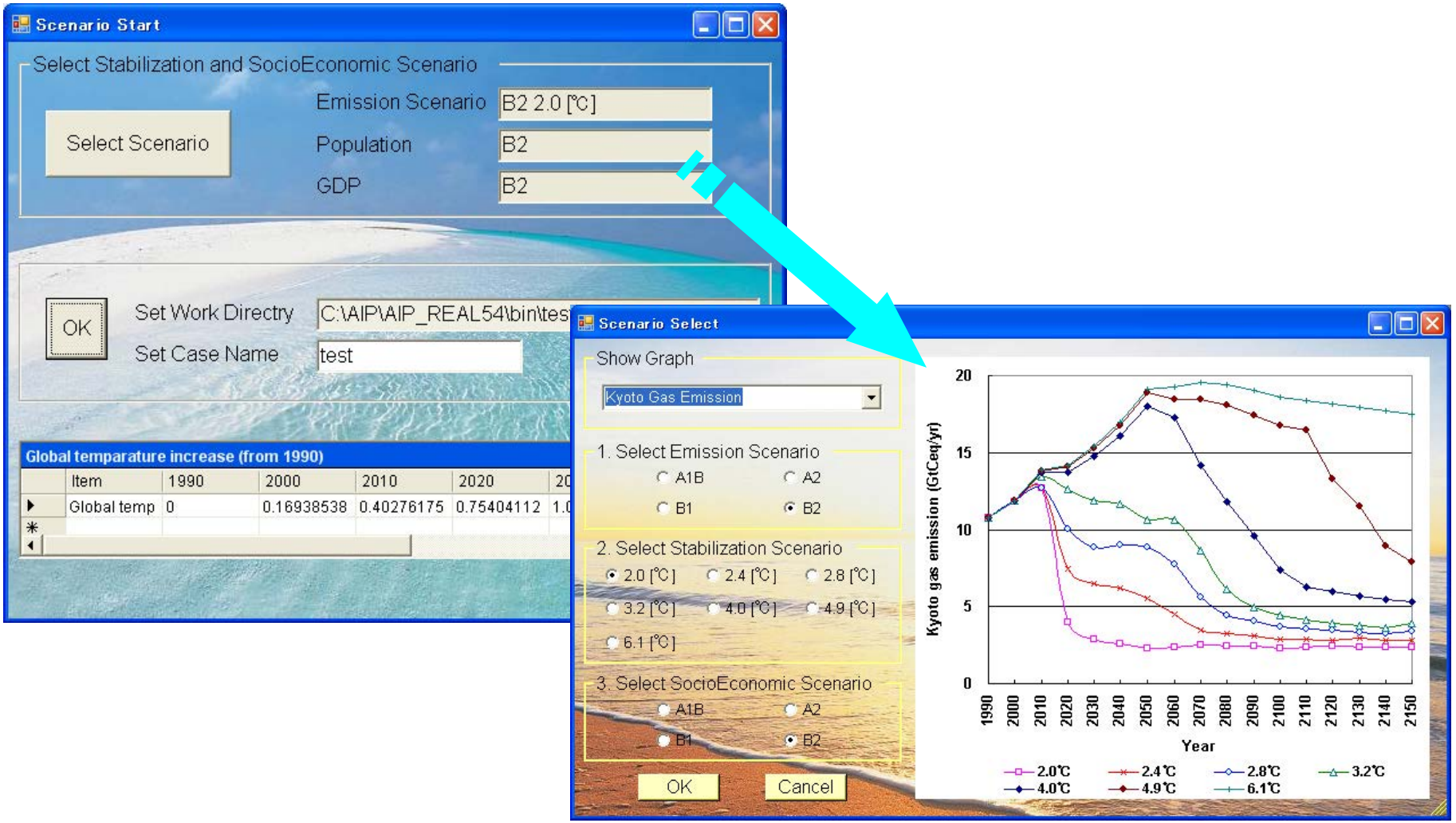
↓

④ Assessment of sectoral impacts

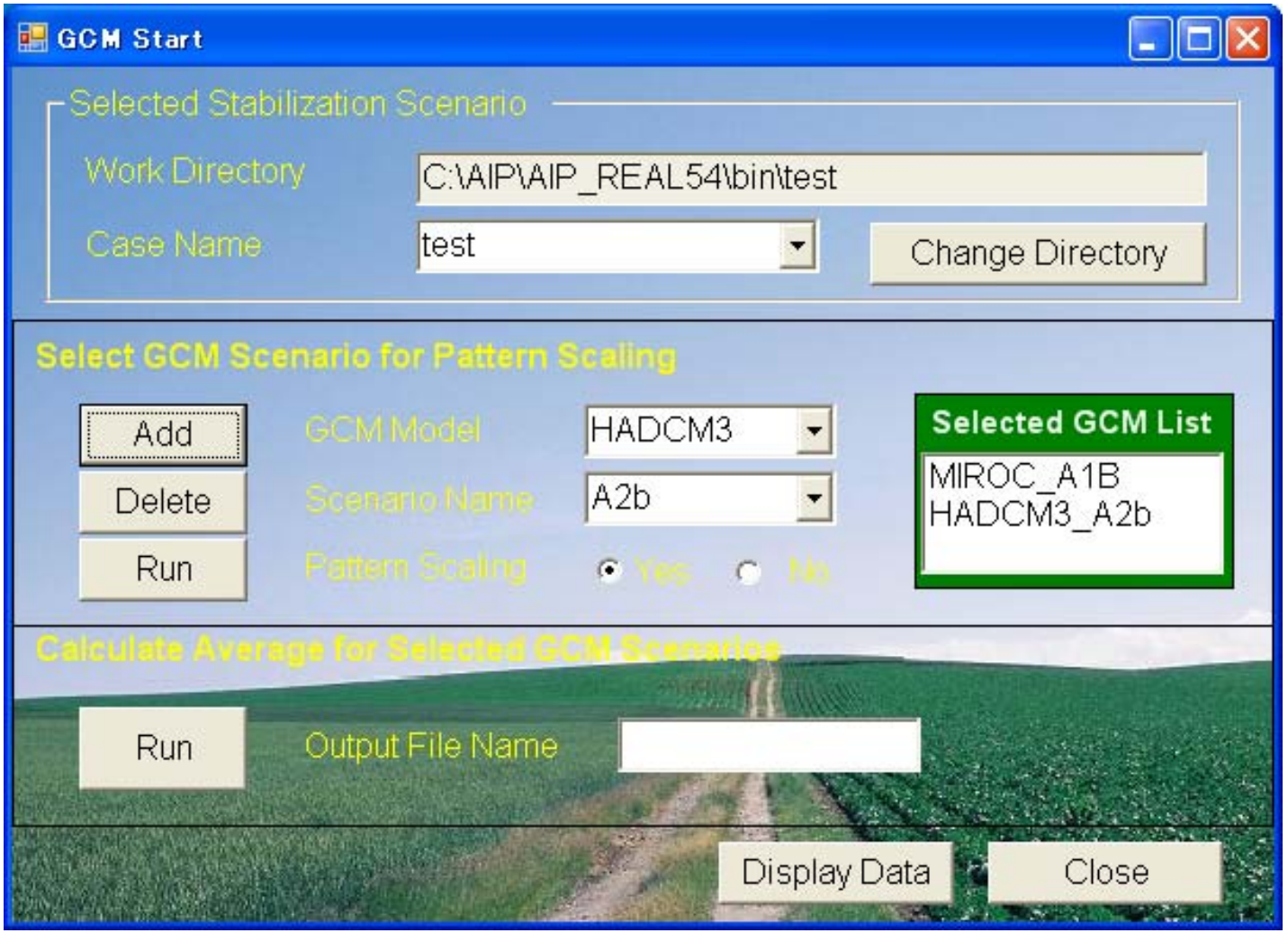
↓

⑤ Result display

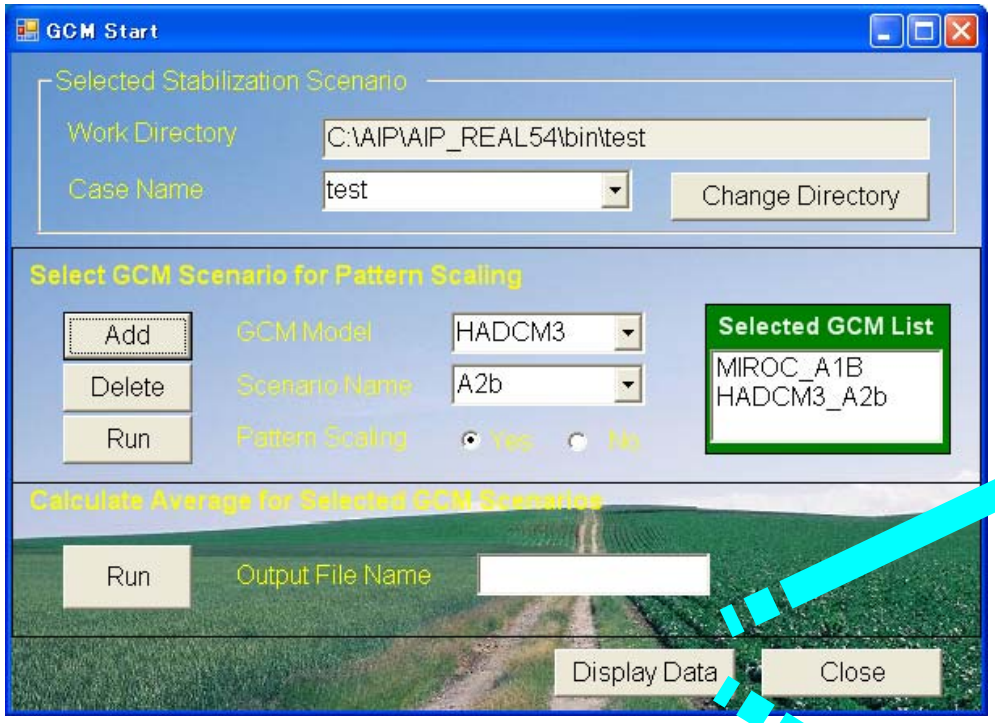
2. Selection of stabilization scenario

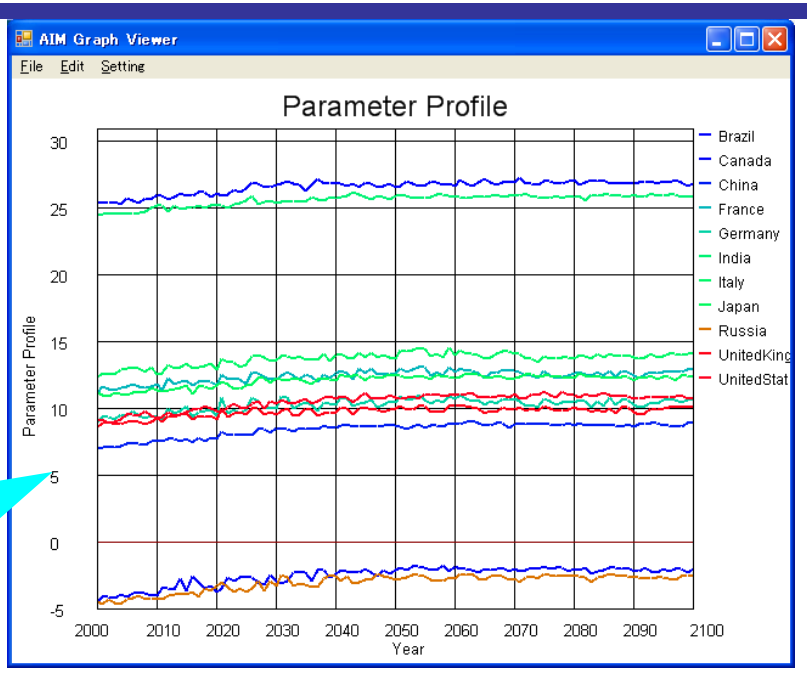


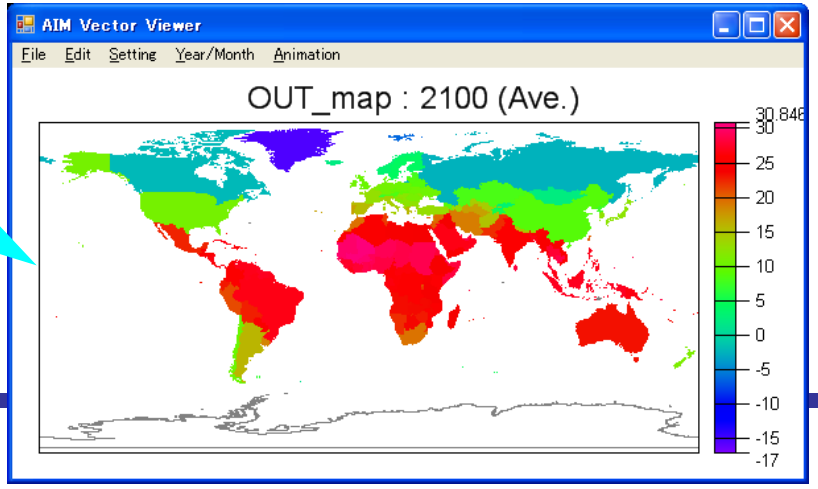
3. Development of climate scenario ①



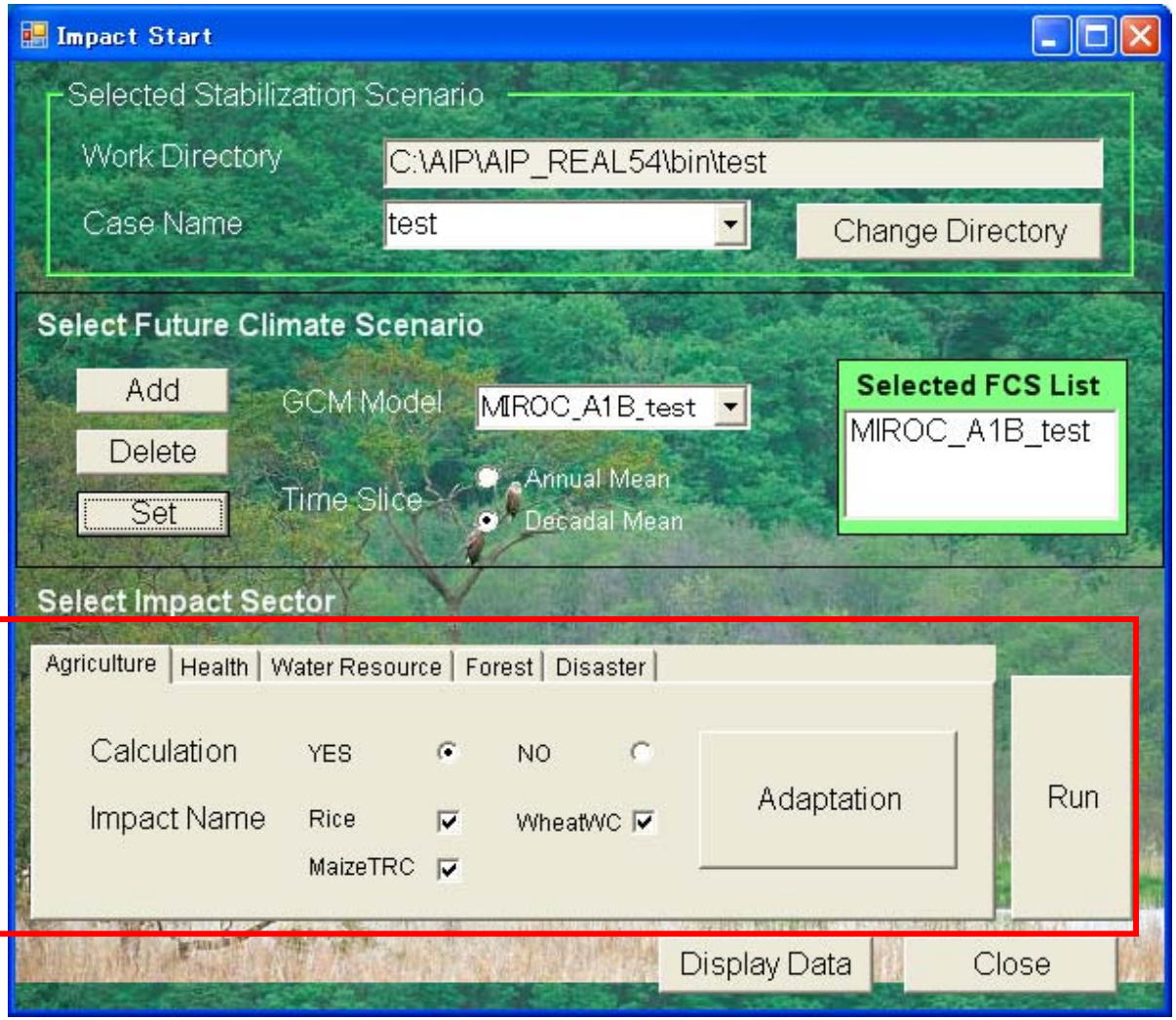
3. Development of climate scenario ②



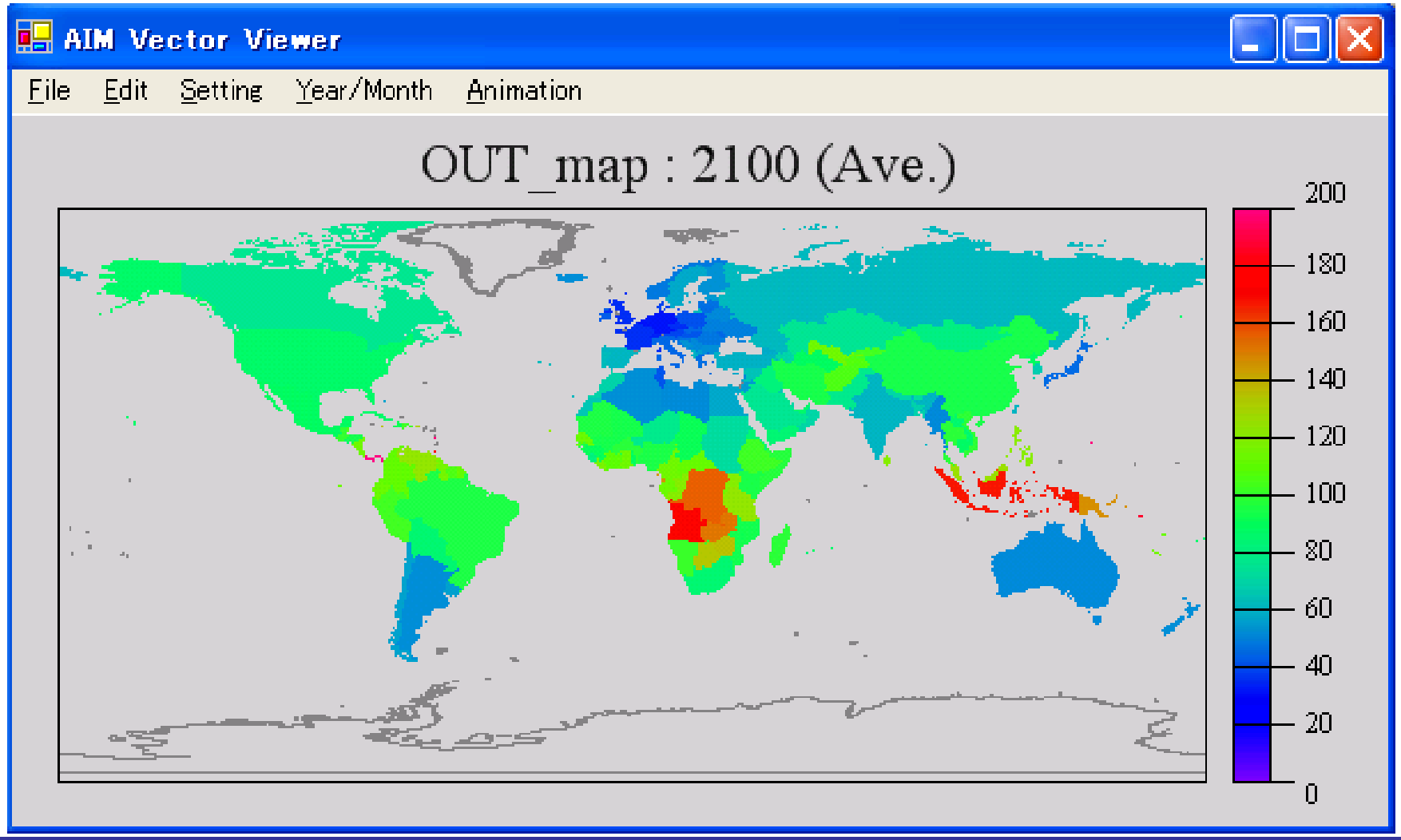




4. Assessment of sectoral impacts



4. Example of impact assessment (Heat Stress)



Display Results of Impact for Global

Selected Stabilization Scenario

Work Directory: pka\2007\AIM\IP\AIP_REAL41yk\AIP\bin\test

Case Name: 475 — Change Directory

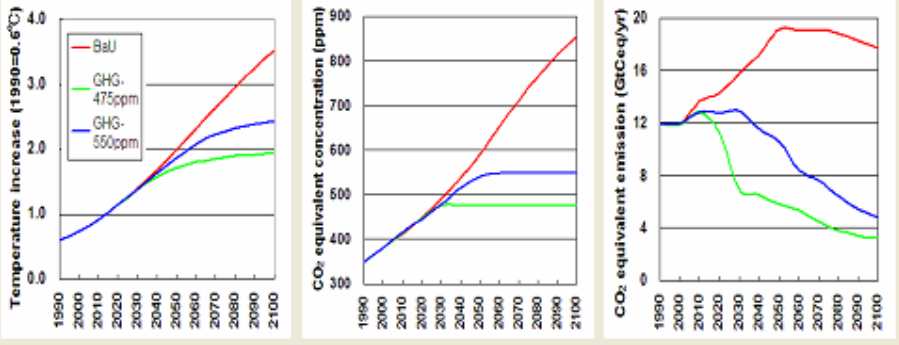
Climate Scenario: MIROC_A1B

Country: 113.Japan

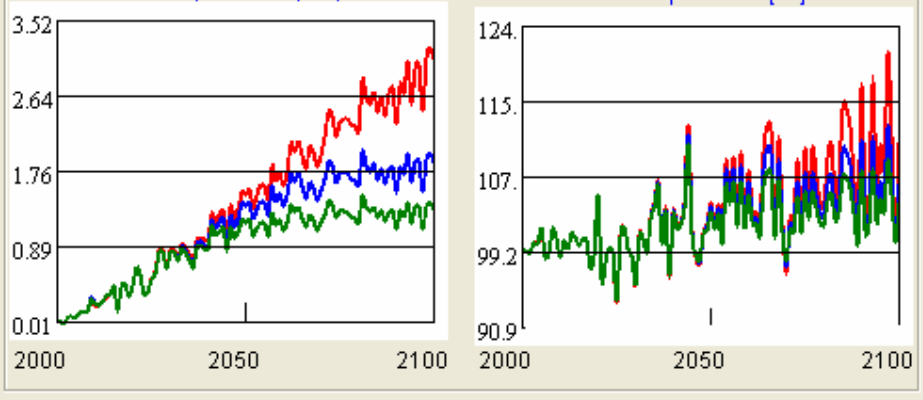
Time Slice: (•) 1 Year x 100 Periods ( ) 10 Years x 10 Periods

Data Display: Display — Reset — Close

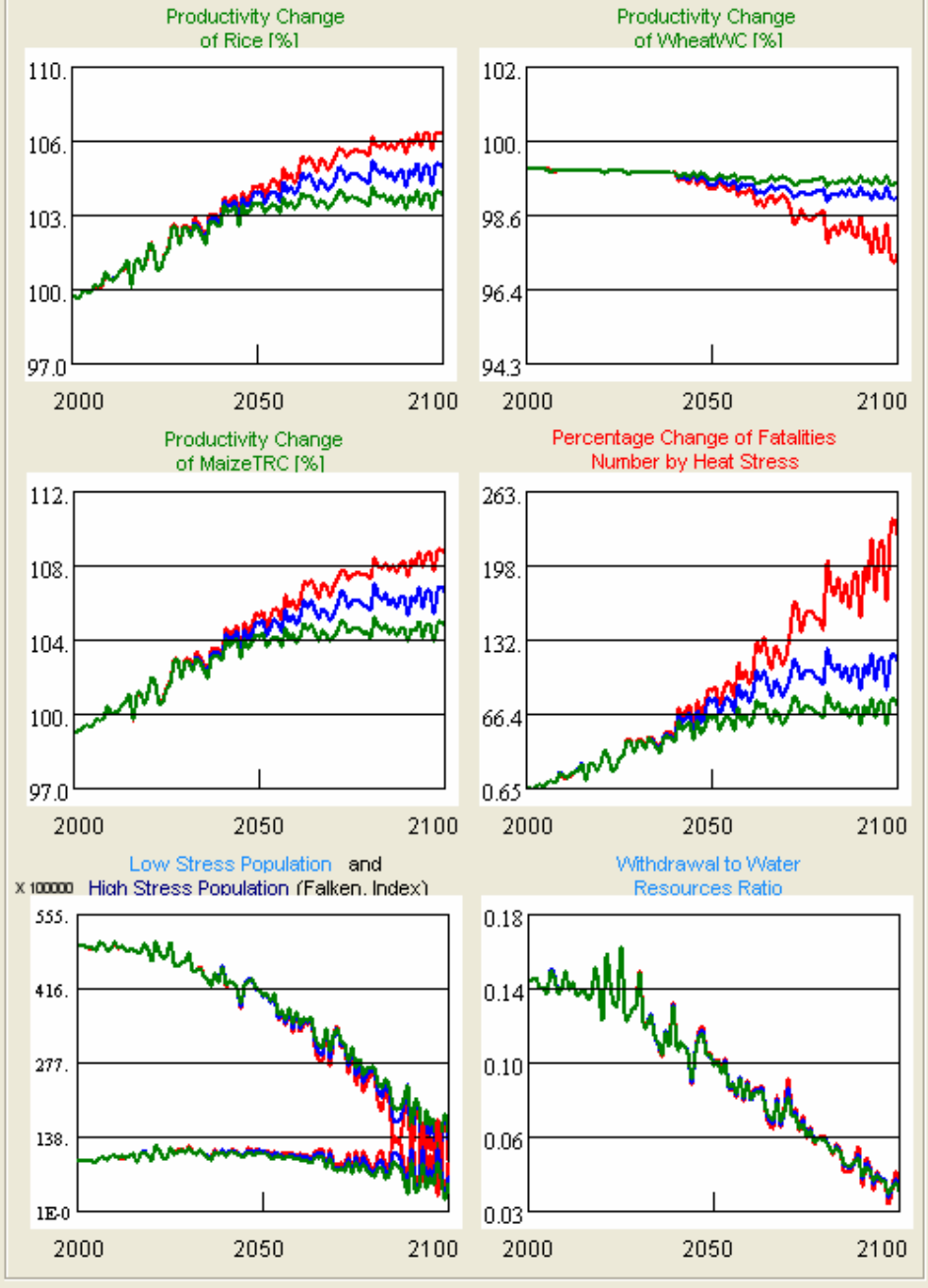
1. Stabiliaztion Scenario



2. Climate Scenario



3. Results of Impact



Conclusion

- AIM/Impact[Policy] has been developed and improved
  - Energy-economic model has been applied to develop long term stabilization scenario
  - Global impact response functions
    - ✓ Potential crop productivity (Rice, Wheat, Maize)
    - ✓ Water stress index (Falkenmark, Withdrawal and availability ratio)
    - ✓ Excess mortality due to Heat Stress
  - Japanese impact response functions
    - ✓ Flood damage, Land slide disaster, Excess mortality due to Heat Stress, Probability distribution of Buna (Fagus, crenata Blume), Rice yield, Rice head day,