

Development of AIM/Impact[Policy]

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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



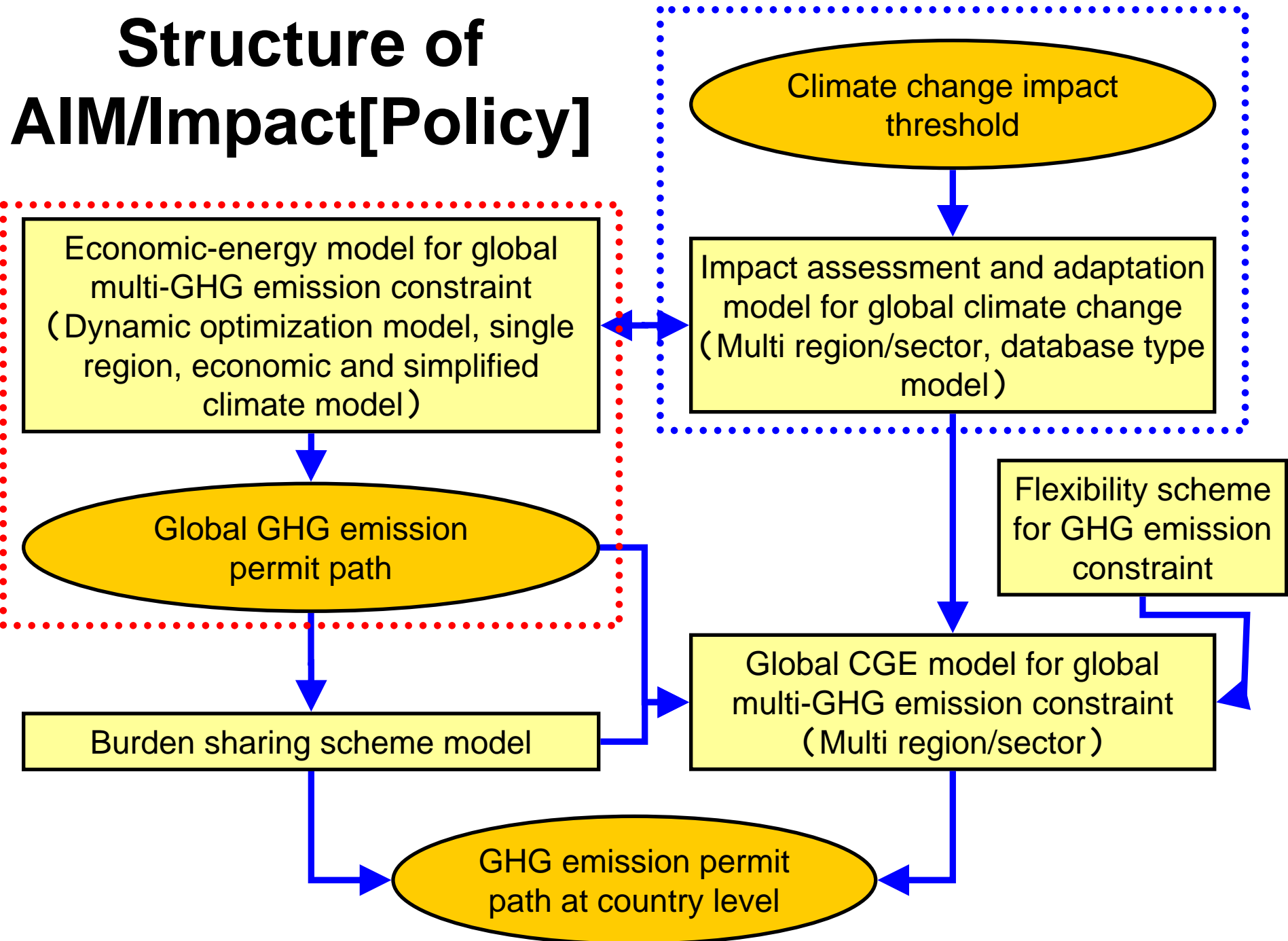
Integrated Assessment Model

-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]

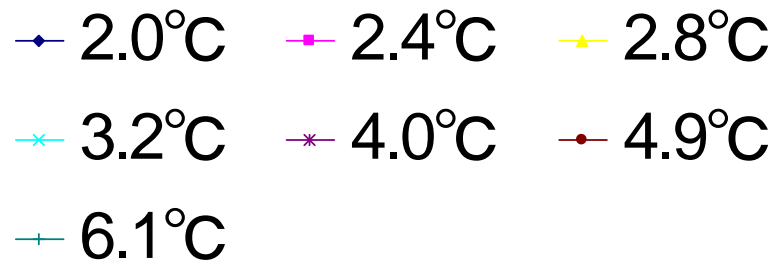
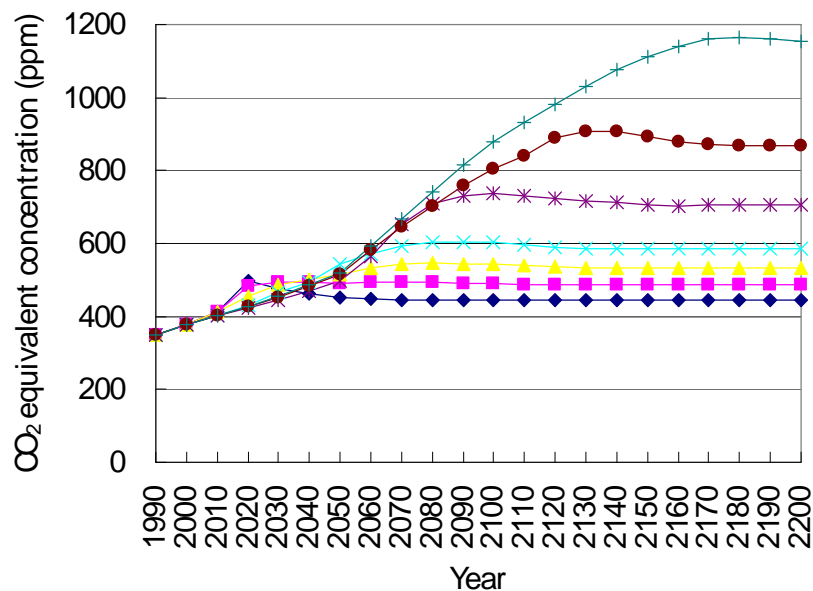
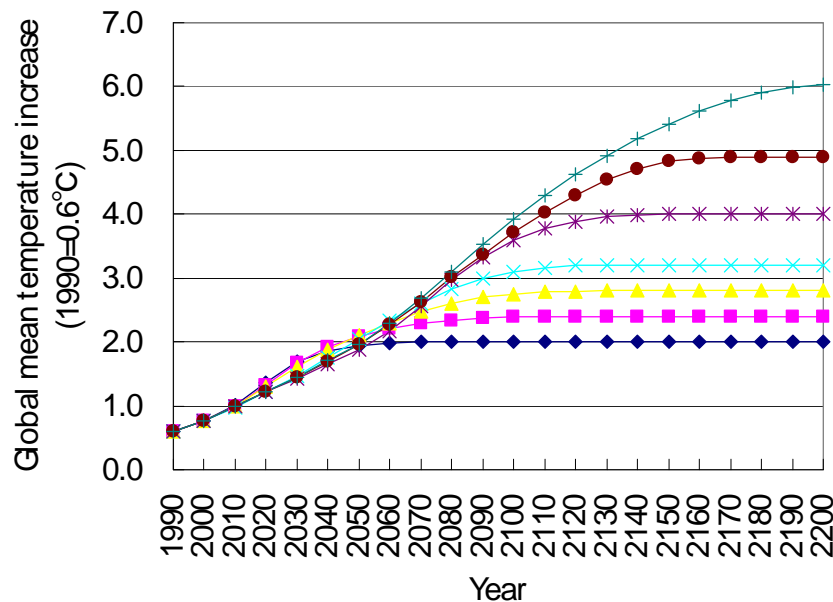
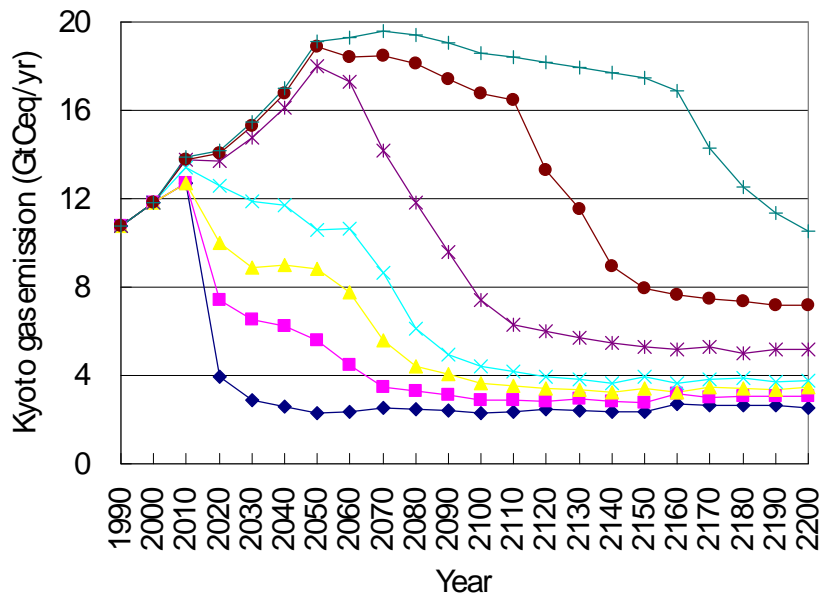


Features of Energy-Economic Model

- Analyze global GHG emission paths under different socio-economic scenarios and various constraints
 - 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: CO₂, CH₄, N₂O, SO₂, CFC, PFC, SF₆, BC, OC, O₃
 - 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)

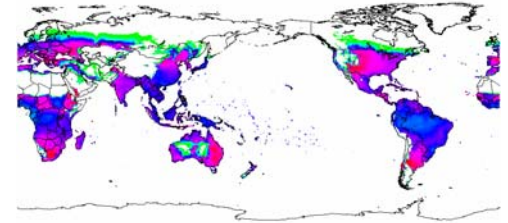
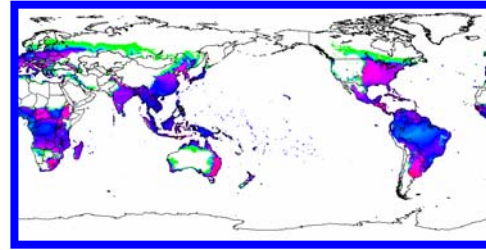
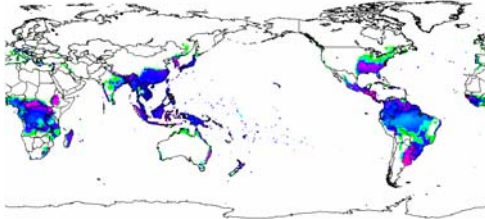


Precipitation -50%

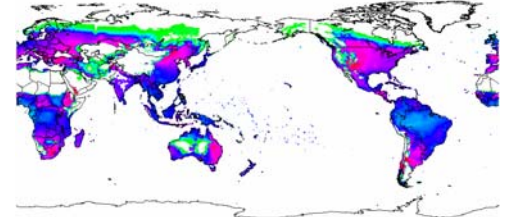
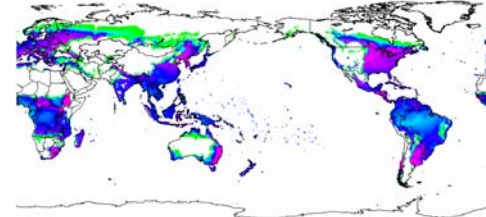
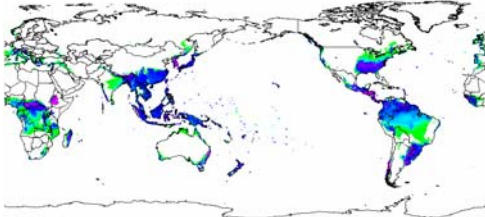
Precipitation 0%

Precipitation 100%

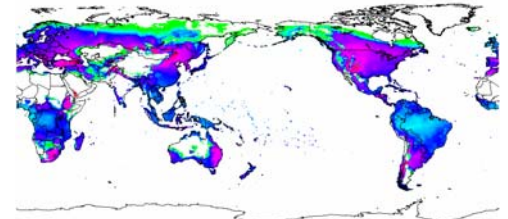
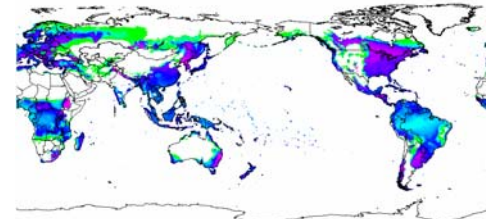
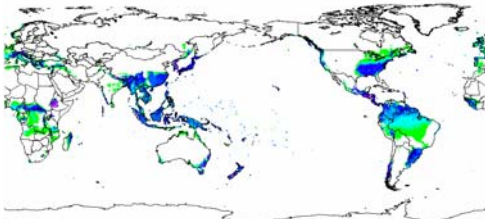
Temperature +0°C



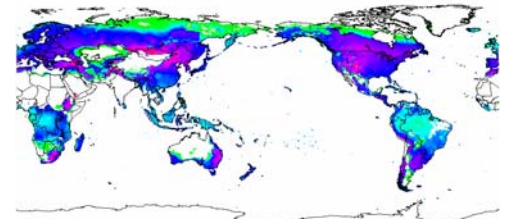
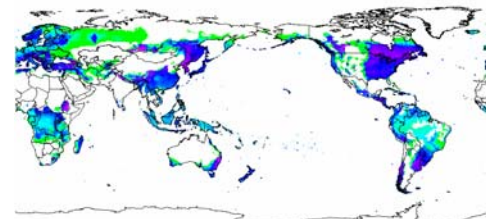
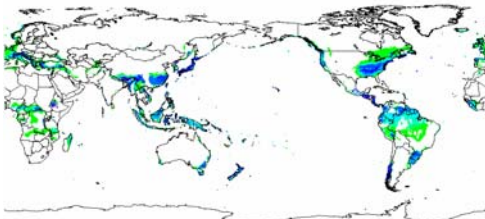
Temperature +3°C



Temperature +6°C



Temperature +9°C



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

Scenario Start

Select Stabilization and SocioEconomic Scenario

Select Scenario

Emission Scenario: B2 2.0 [°C]
 Population: B2
 GDP: B2

Set Work Directry: C:\AIP\AIP_REAL54\bin\tes
 Set Case Name: test

Global temperature increase (from 1990)

Item	1990	2000	2010	2020	2030
Global temp	0	0.16938538	0.40276175	0.75404112	1.0

Scenario Select

Show Graph: Kyoto Gas Emission

1. Select Emission Scenario
 A1B A2
 B1 B2

2. Select Stabilization Scenario
 2.0 [°C] 2.4 [°C] 2.8 [°C]
 3.2 [°C] 4.0 [°C] 4.9 [°C]
 6.1 [°C]

3. Select SocioEconomic Scenario
 A1B A2
 B1 B2

OK Cancel

3. Development of climate scenario ①

GCM Start

Selected Stabilization Scenario

Work Directory: C:\AIP\AIP_REAL54\bin\test

Case Name: test

Change Directory

Select GCM Scenario for Pattern Scaling

Add Delete Run

GCM Model: HADCM3

Scenario Name: A2b

Pattern Scaling: Yes No

Selected GCM List

MIROC_A1B
HADCM3_A2b

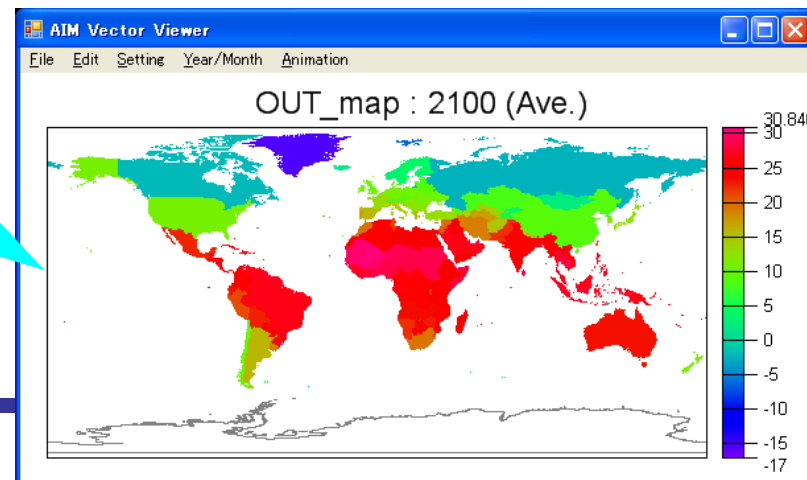
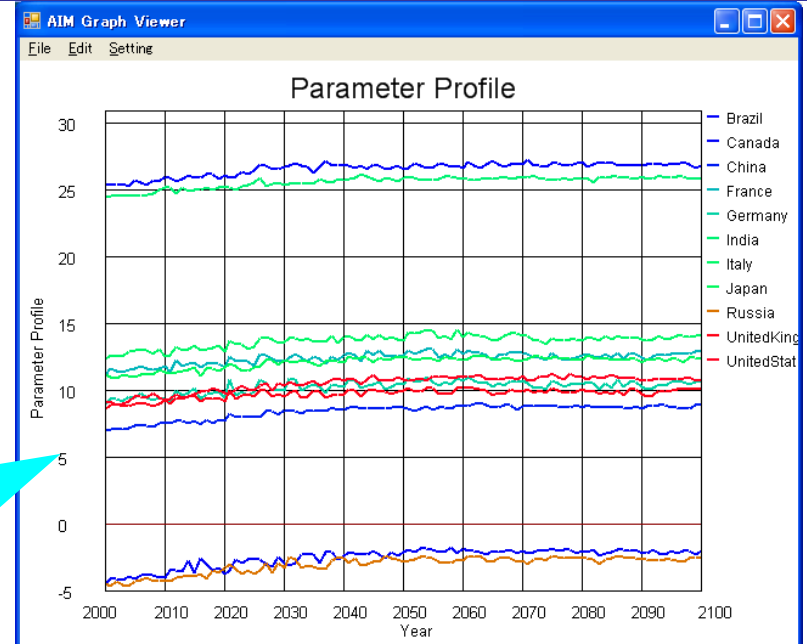
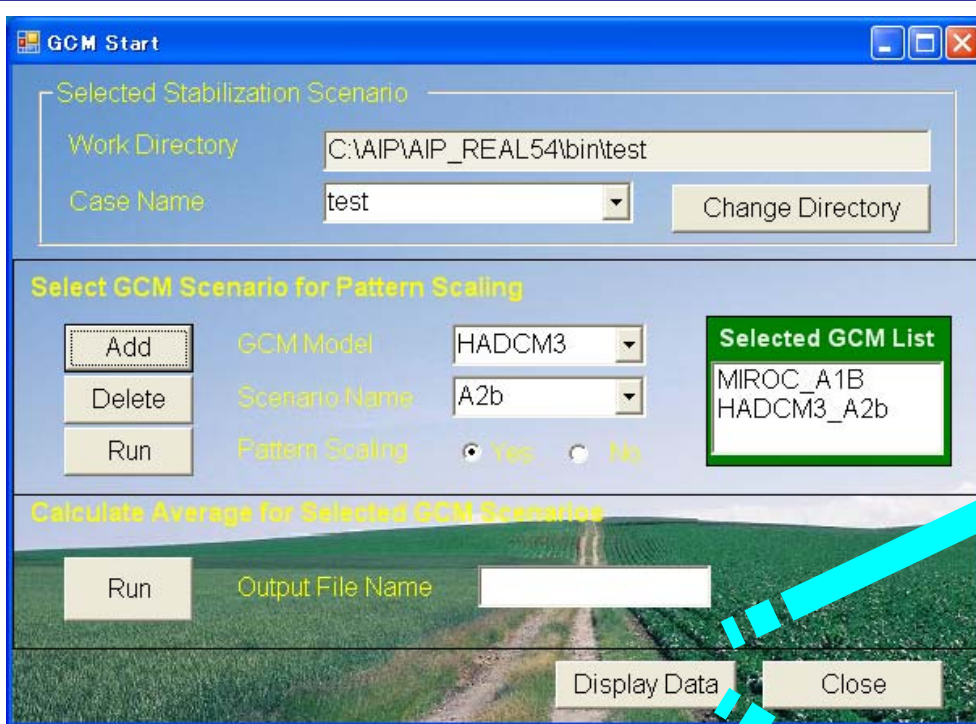
Calculate Average for Selected GCM Scenarios

Run

Output File Name

Display Data Close

3. Development of climate scenario ②



4. Assessment of sectoral impacts

The screenshot shows the 'Impact Start' application window. It is divided into three main sections: 'Selected Stabilization Scenario', 'Select Future Climate Scenario', and 'Select Impact Sector'. The 'Selected Stabilization Scenario' section includes a 'Work Directory' field with the path 'C:\AIP\AIP_REAL54\bin\test' and a 'Case Name' dropdown menu set to 'test'. The 'Select Future Climate Scenario' section features 'Add', 'Delete', and 'Set' buttons, a 'GCM Model' dropdown set to 'MIROC_A1B_test', and a 'Time Slice' section with radio buttons for 'Annual Mean' and 'Decadal Mean'. A 'Selected FCS List' box contains 'MIROC_A1B_test'. The 'Select Impact Sector' section is highlighted with a red box and includes tabs for 'Agriculture', 'Health', 'Water Resource', 'Forest', and 'Disaster'. Under the 'Agriculture' tab, there are radio buttons for 'Calculation' (YES is selected) and 'NO', and checkboxes for 'Impact Name' (Rice, MaizeTRC, WheatWC are checked). There are 'Adaptation' and 'Run' buttons. At the bottom of the window are 'Display Data' and 'Close' buttons.

Impact Start

Selected Stabilization Scenario

Work Directory: C:\AIP\AIP_REAL54\bin\test

Case Name: test

Change Directory

Select Future Climate Scenario

Add Delete Set

GCM Model: MIROC_A1B_test

Time Slice: Annual Mean Decadal Mean

Selected FCS List: MIROC_A1B_test

Select Impact Sector

Agriculture | Health | Water Resource | Forest | Disaster

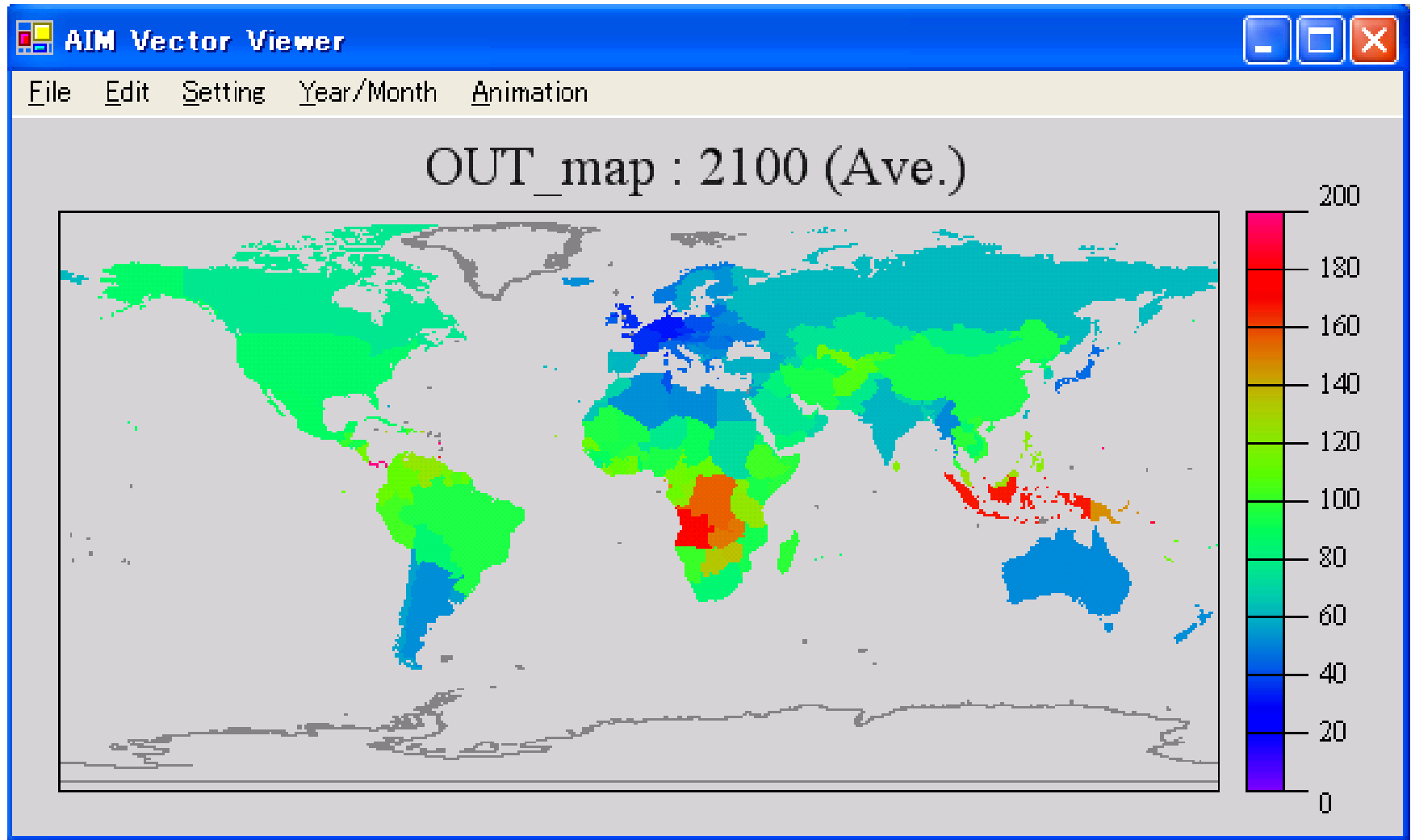
Calculation: YES (selected) NO

Impact Name: Rice (checked) MaizeTRC (checked) WheatWC (checked)

Adaptation Run

Display Data Close

4. Example of impact assessment (Heat Stress)



Selected Stabilization Scenario

Work Directory:

Case Name:

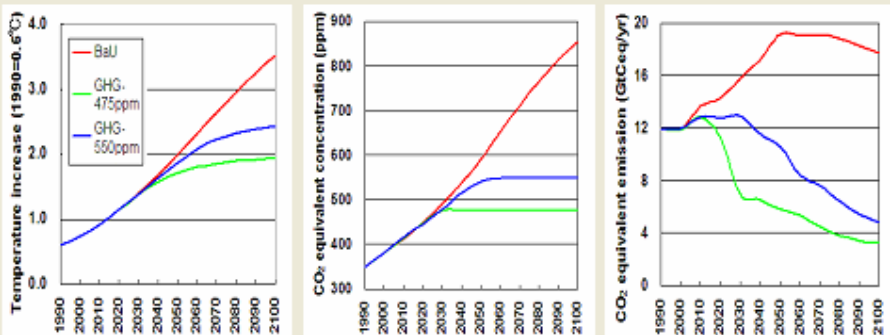
Climate Scenario:

Country:

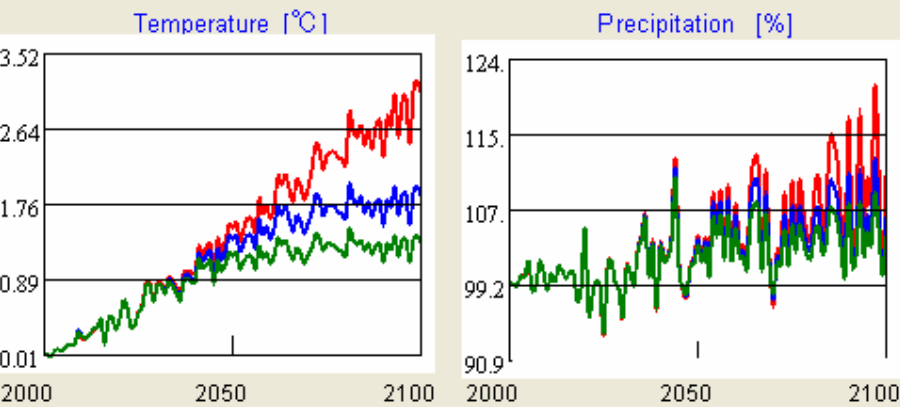
Time Slice: 1 Year x 100 Periods 10 Years x 10 Periods

Data Display:

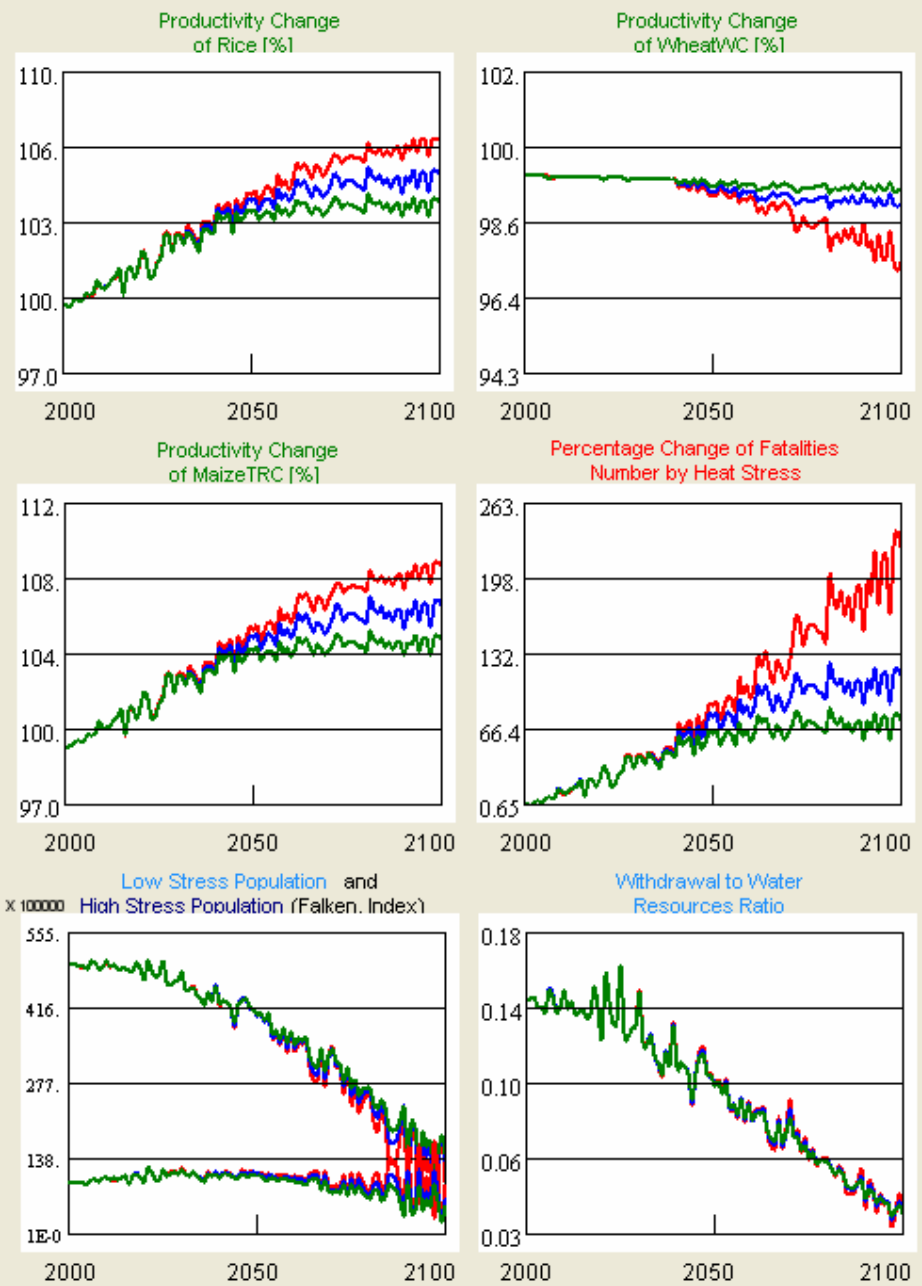
1. Stabilization Scenario



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,