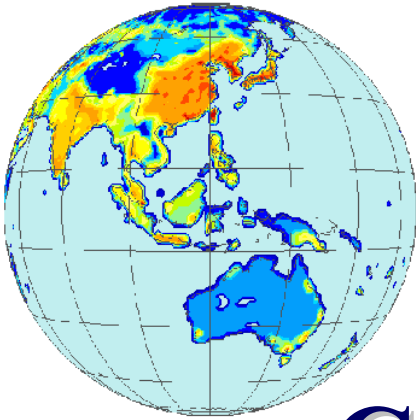




The Twelfth Asia-Pacific Seminar  
on Climate Change  
30 July - 2 August 2002  
Bangkok

# **Climate Change Impacts In the Asia-Pacific Region**

**- Outcomes from the AIM Model -**

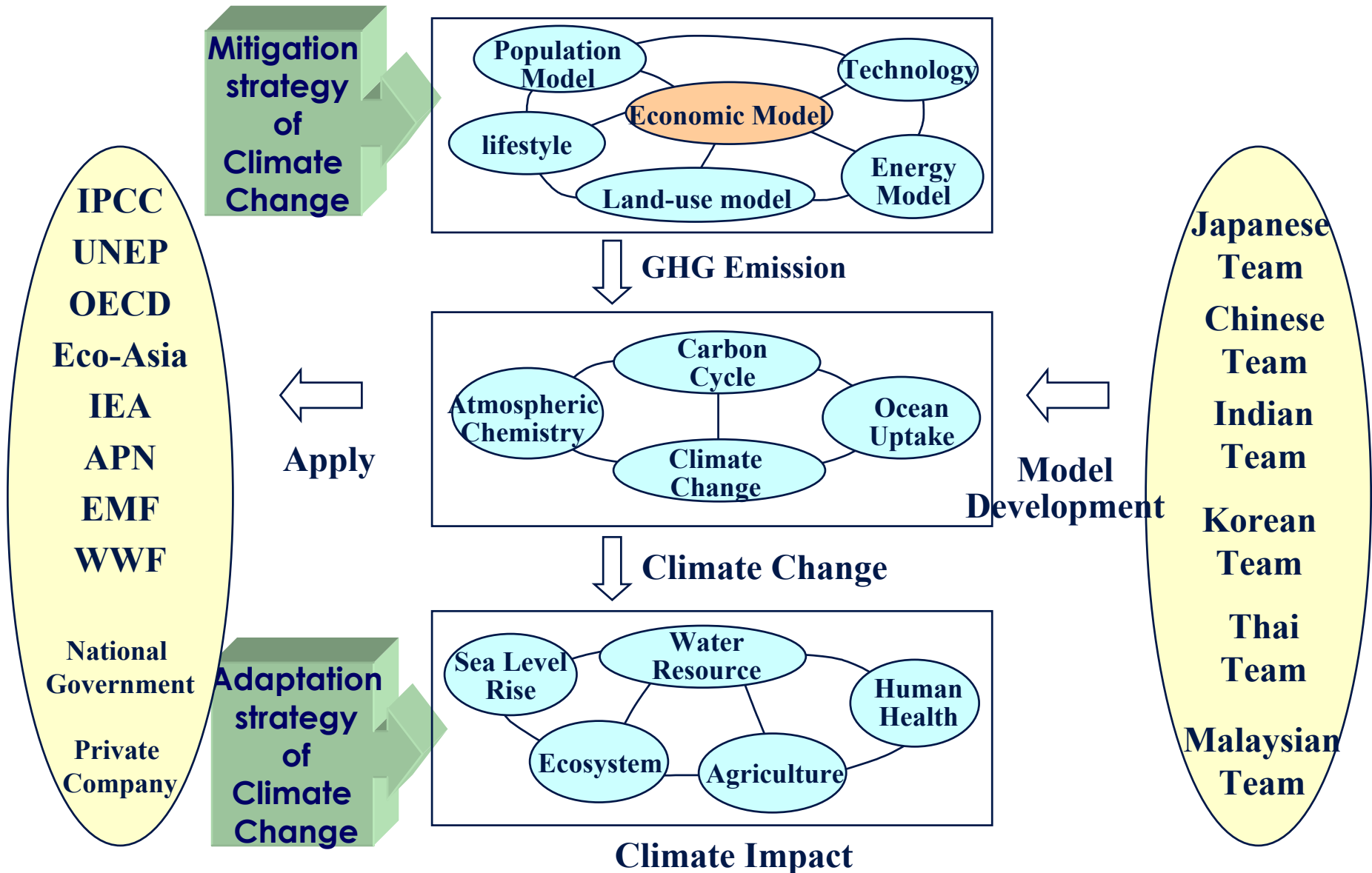
**Mikiko Kainuma**

National Institute for Environmental Studies

# **Contents**

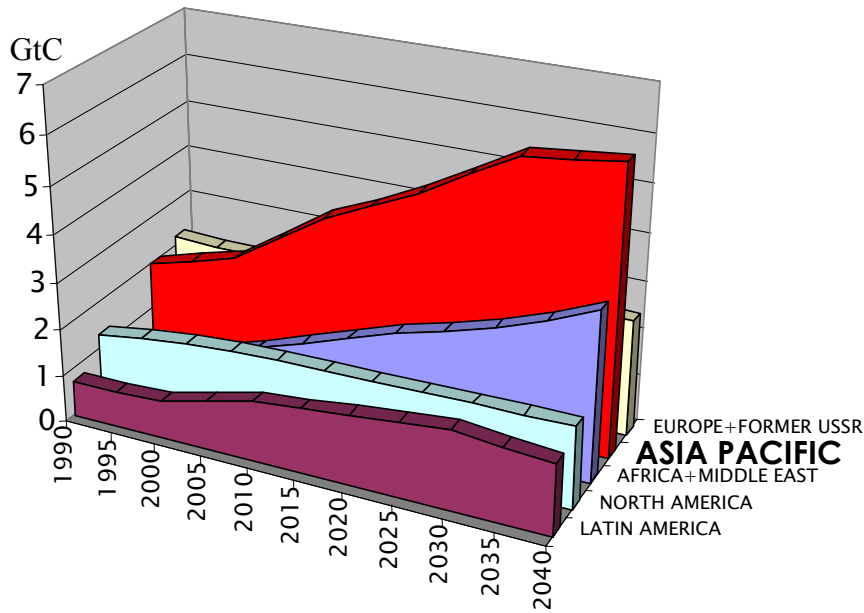
- 1. Introduction of the AIM (Asian-Pacific Integrated Model for Climate Change Analysis) model structure**
- 2. Environmental Impacts of projected climate change based on the IPCC/SRES emission scenarios**
- 3. Impacts and effectiveness of**

# Integrated Assessment Model of Climate Change: The AIM Approach

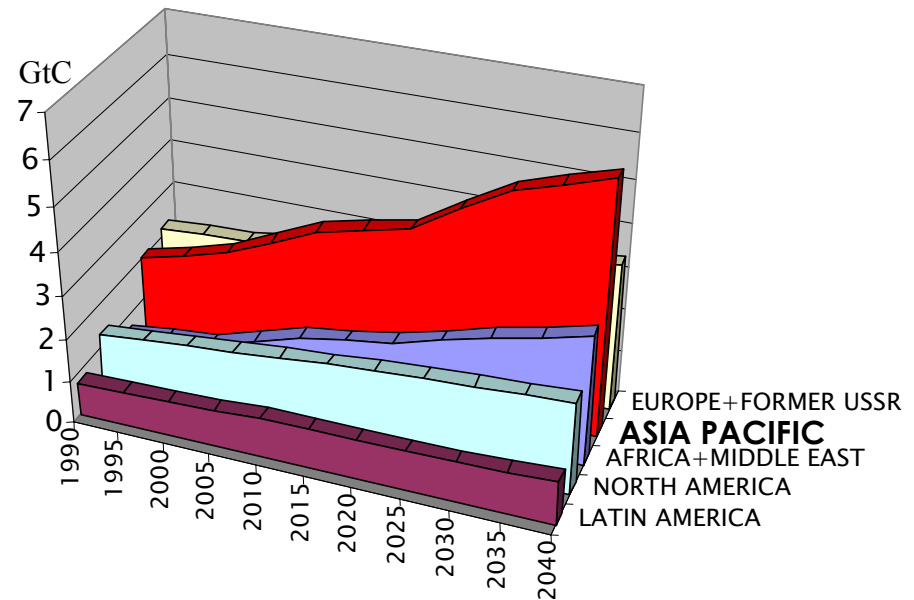


# CO<sub>2</sub> Emission (Gt-C)

## High Growth Scenario

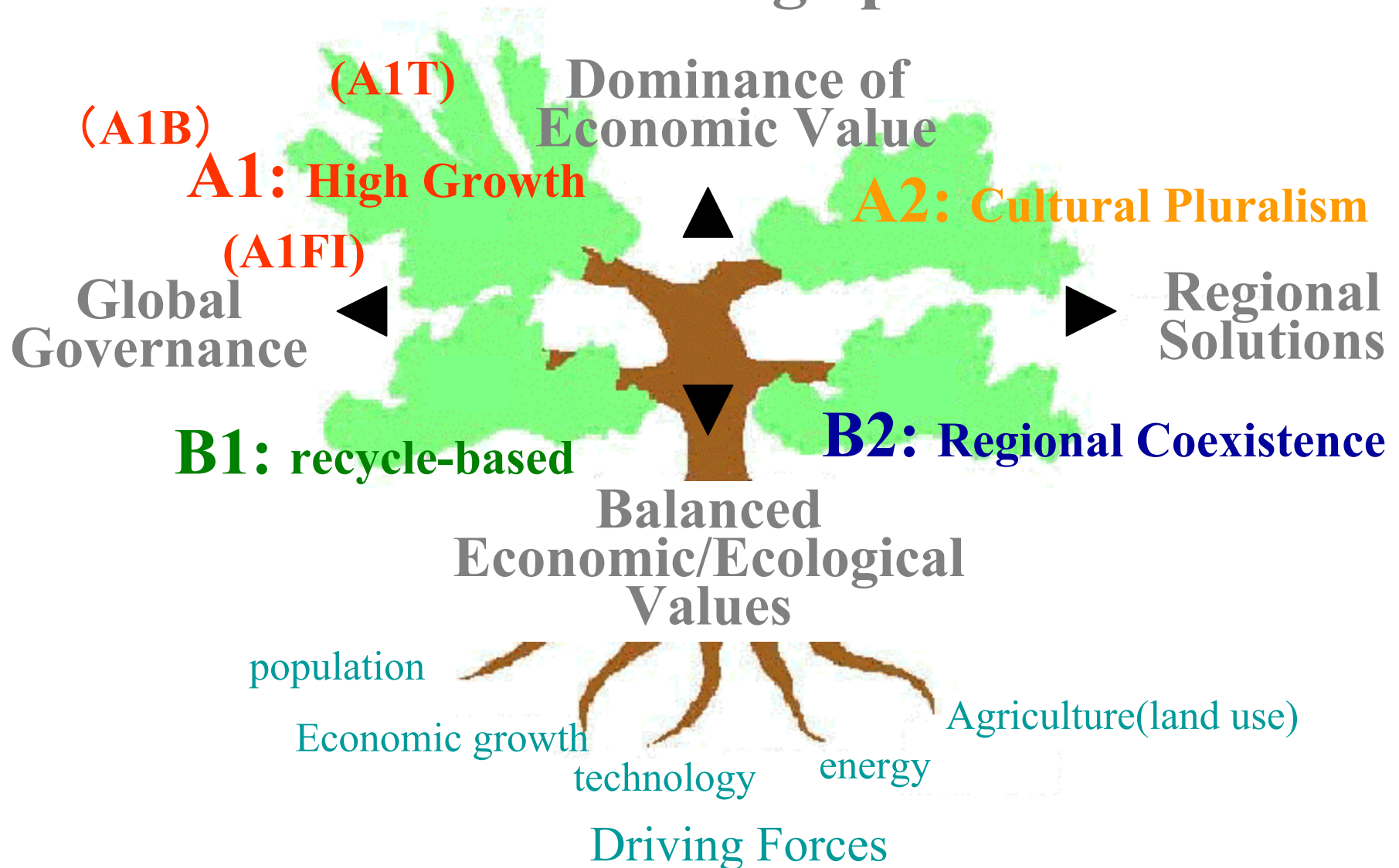


## Low Growth Scenario

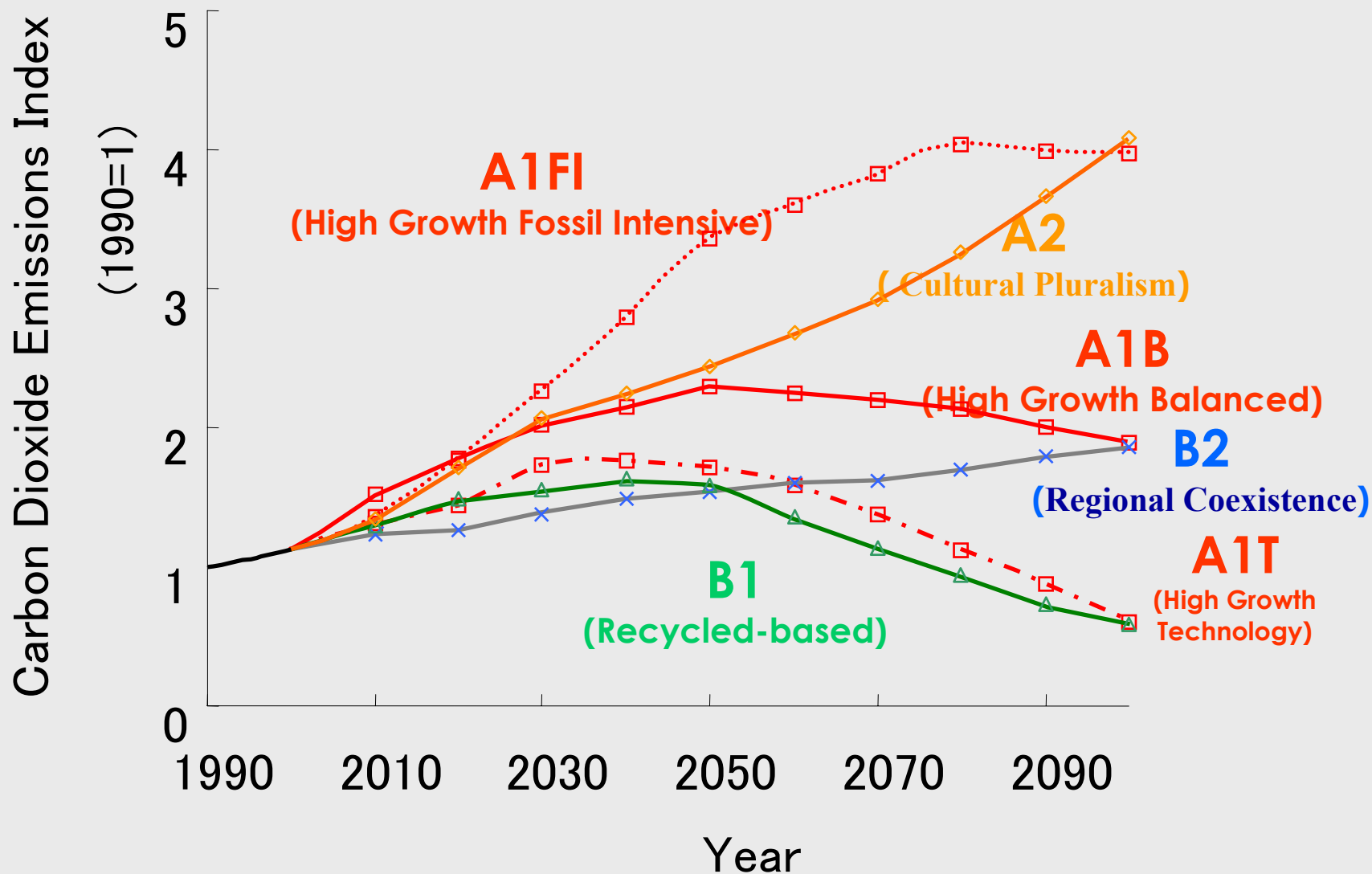


**Projection of CO<sub>2</sub> emission in the five regions**

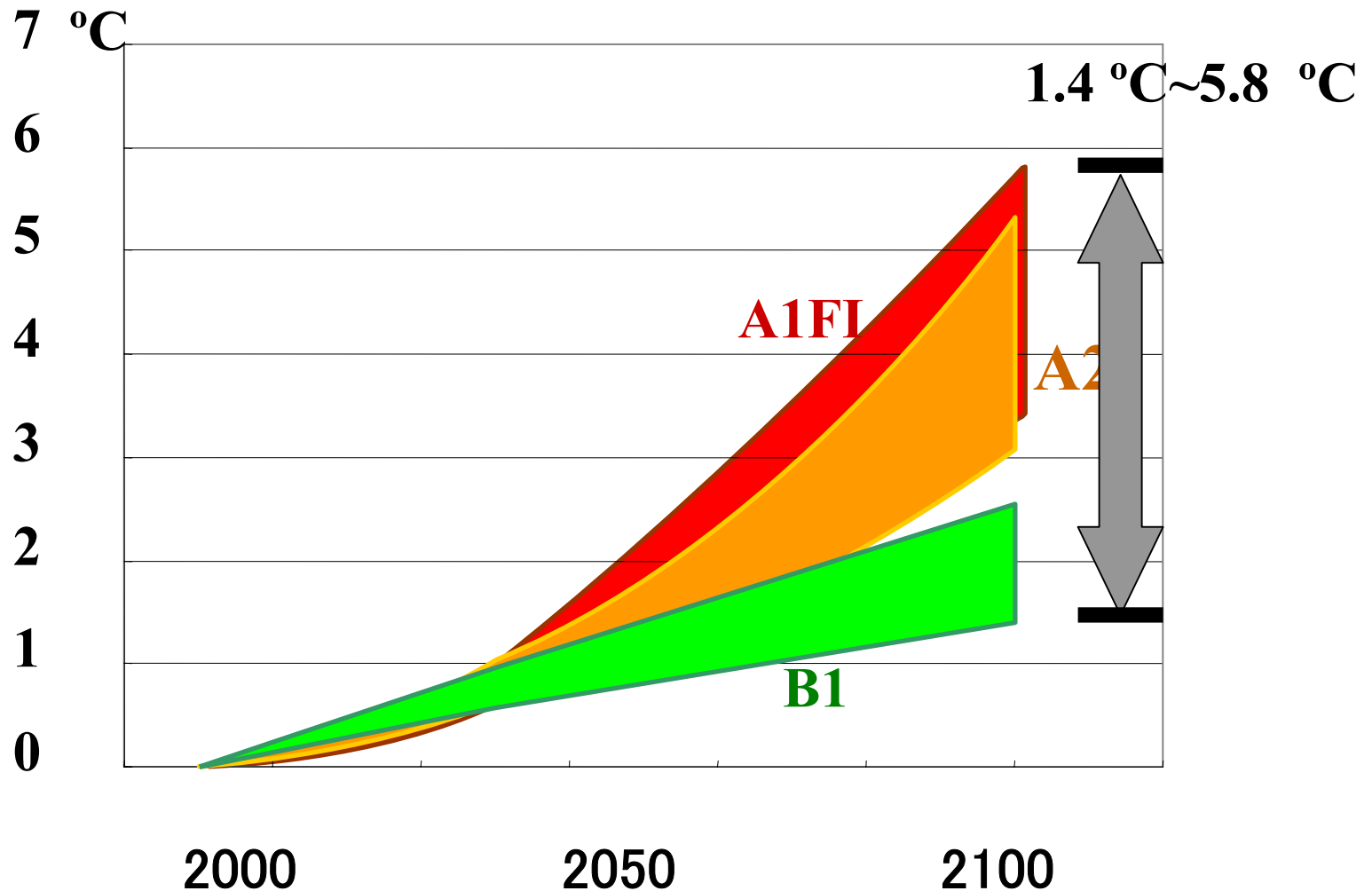
# Socioeconomic development scenarios for climate change prediction



# CO<sub>2</sub> Emission Projections Based on SRES Storylines

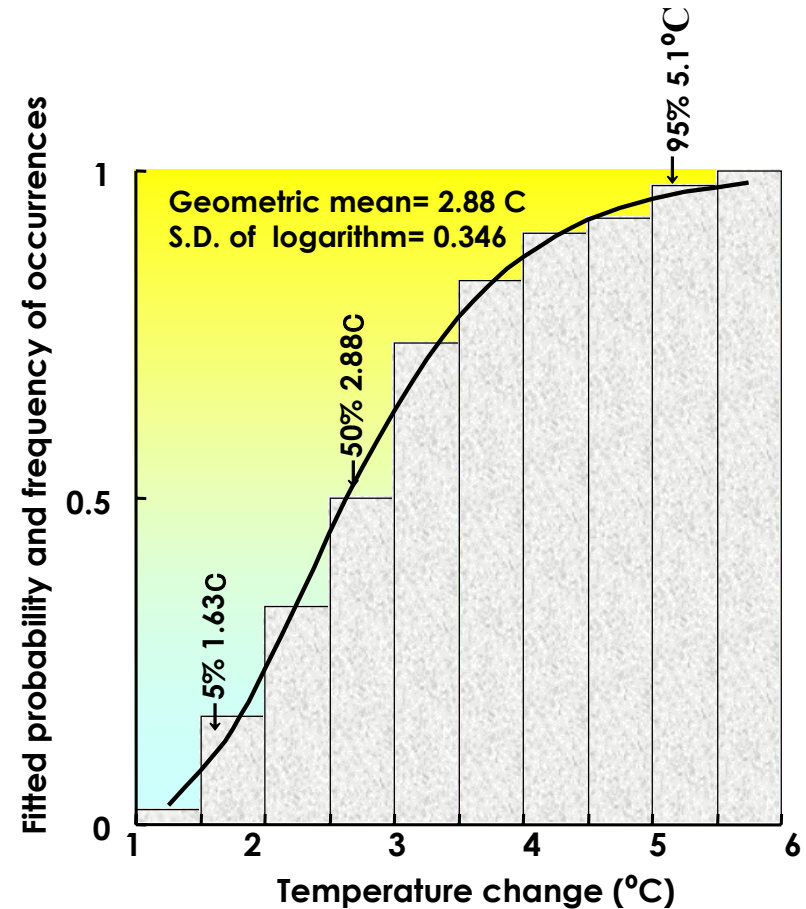
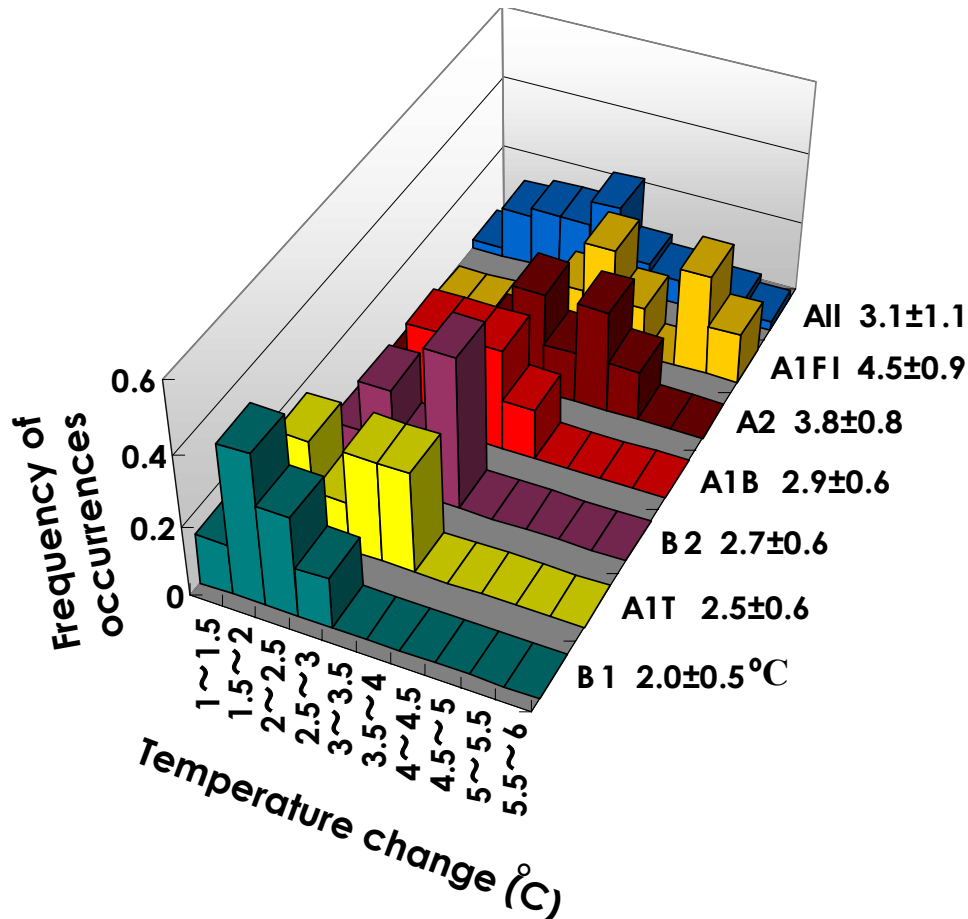


# Different development path would cause different climate change scenario



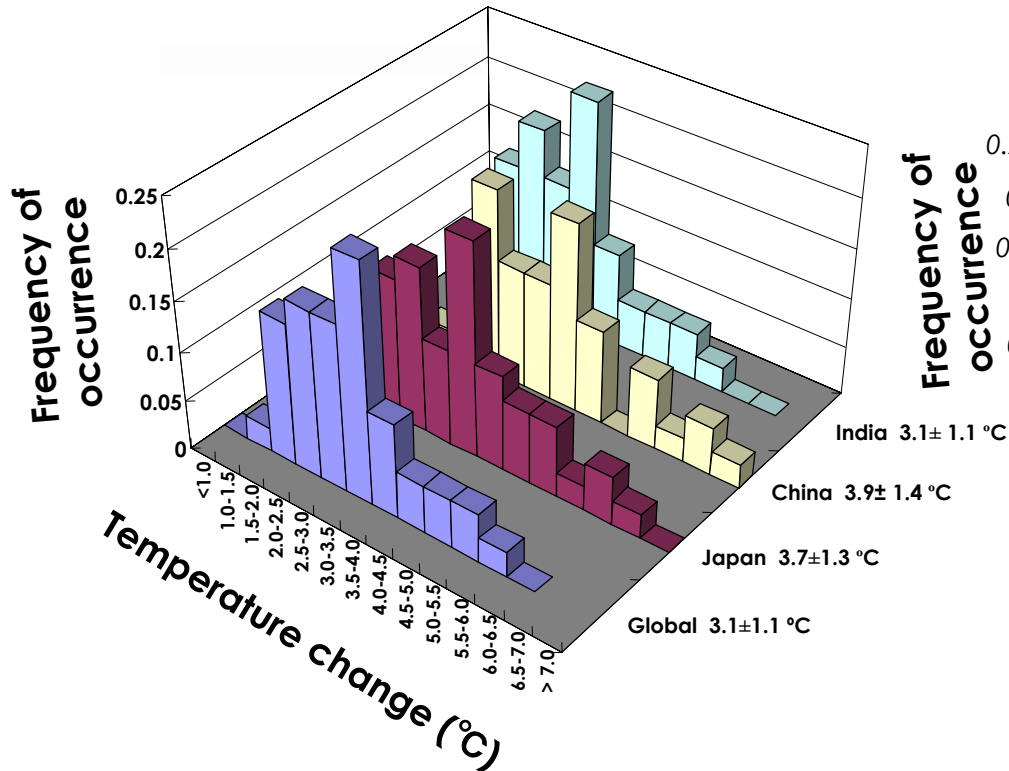
# Temperature change between 1990 and 2100

Simulated 7 GCMs are GFDL R15a, CSIRO Mk2, HadCM3, HadCM2, ECHAM4/OPYC, CSM 1.0 and DOE PCM

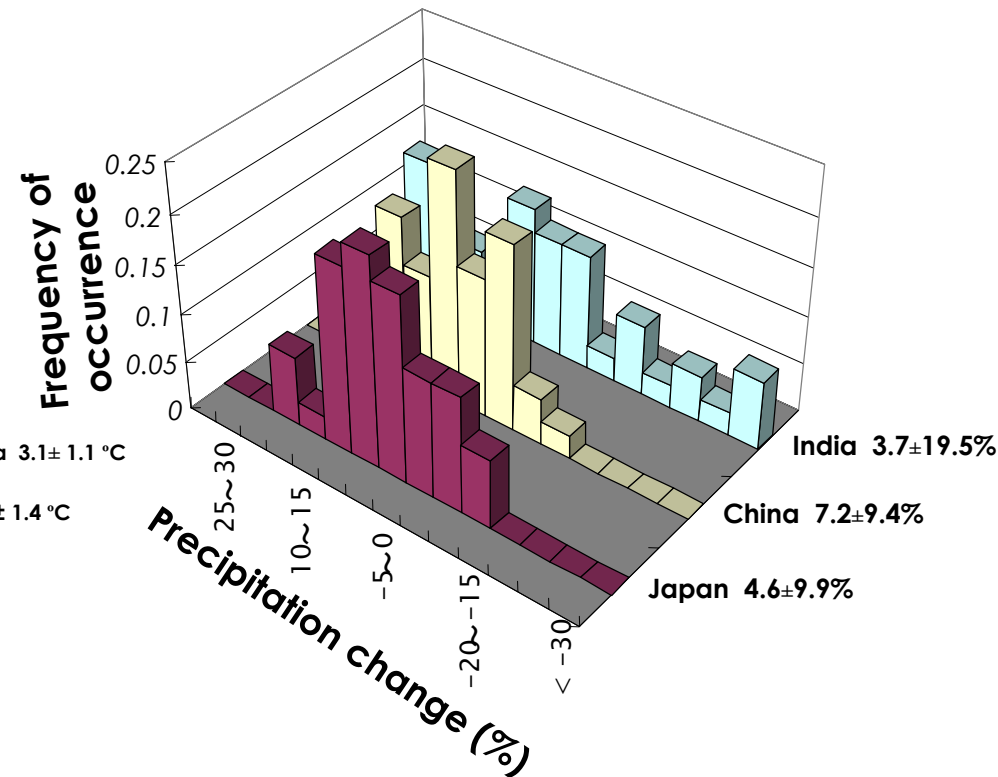


# Climate change in Asian-Pacific countries from 1990 to 2100, increase in DJF

## Temperature change

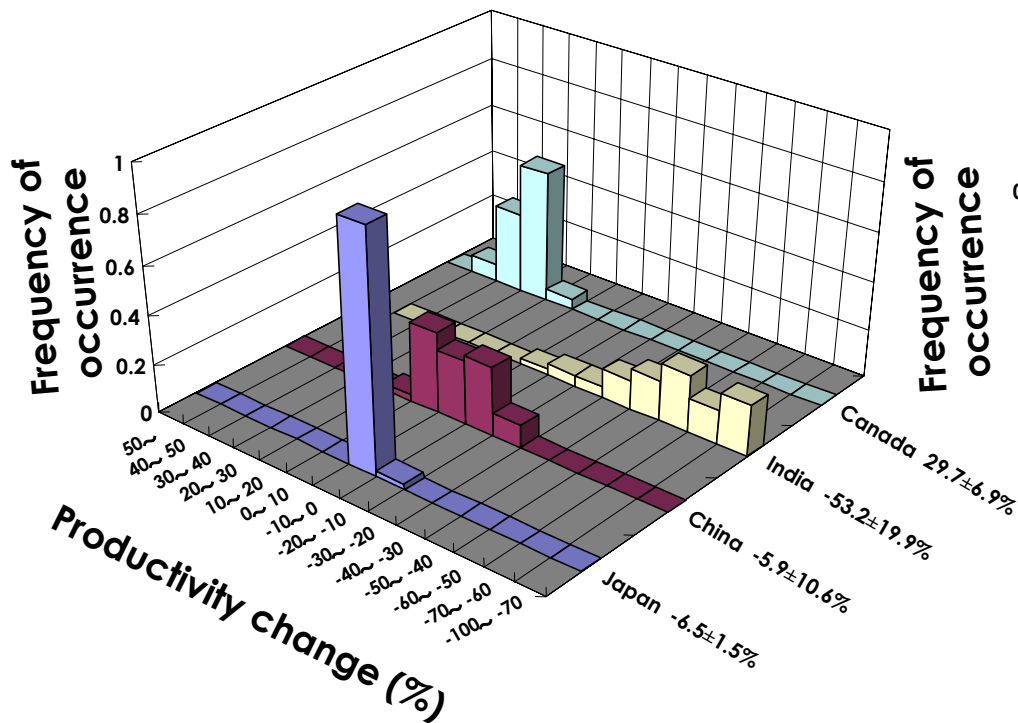


## Precipitation change

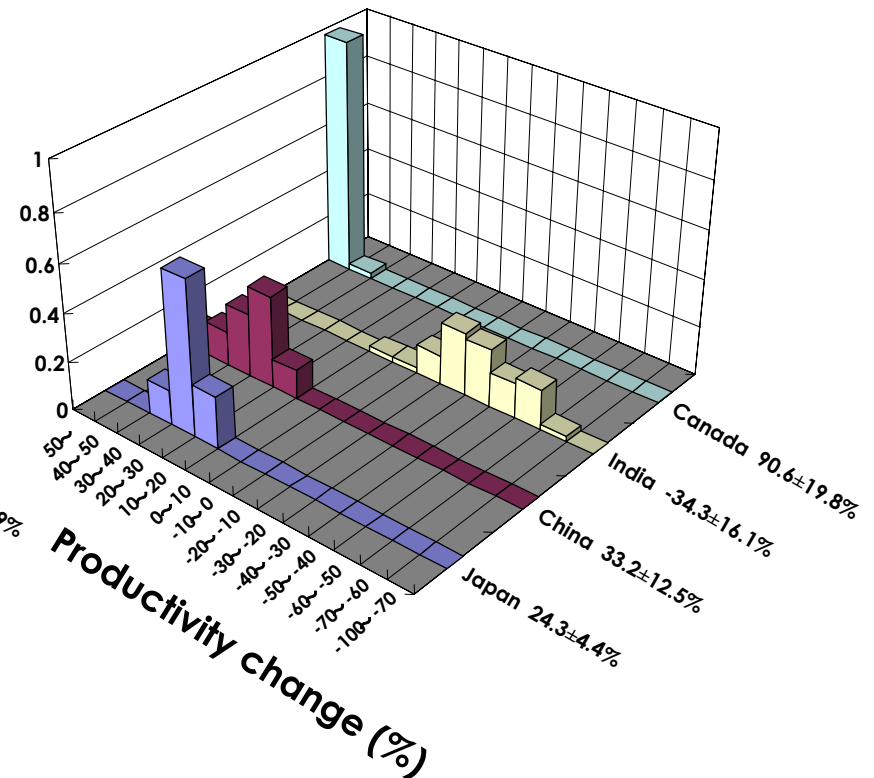


# Wheat productivity change in some countries from 1990 to 2100

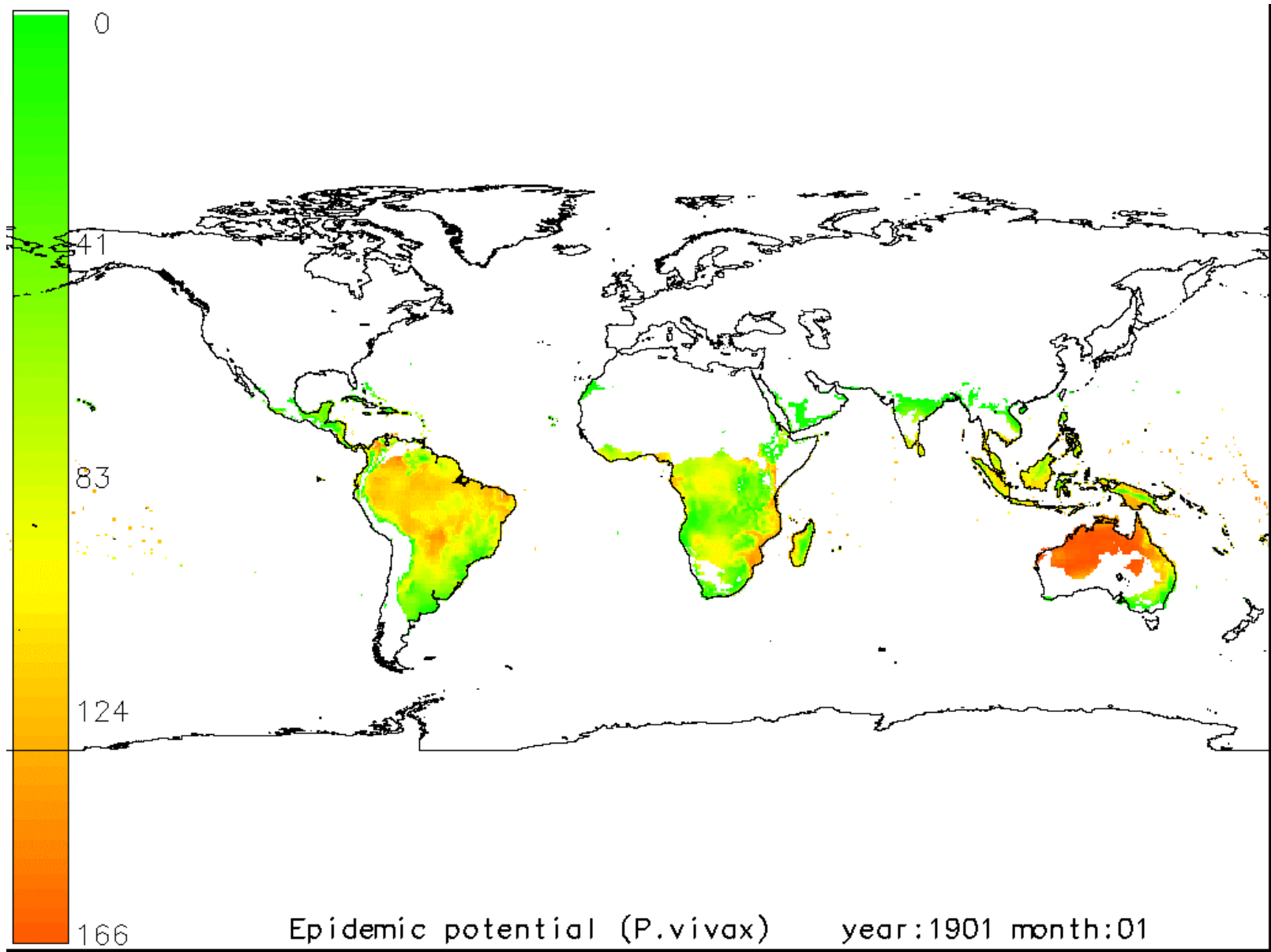
With CO<sub>2</sub> fertilization



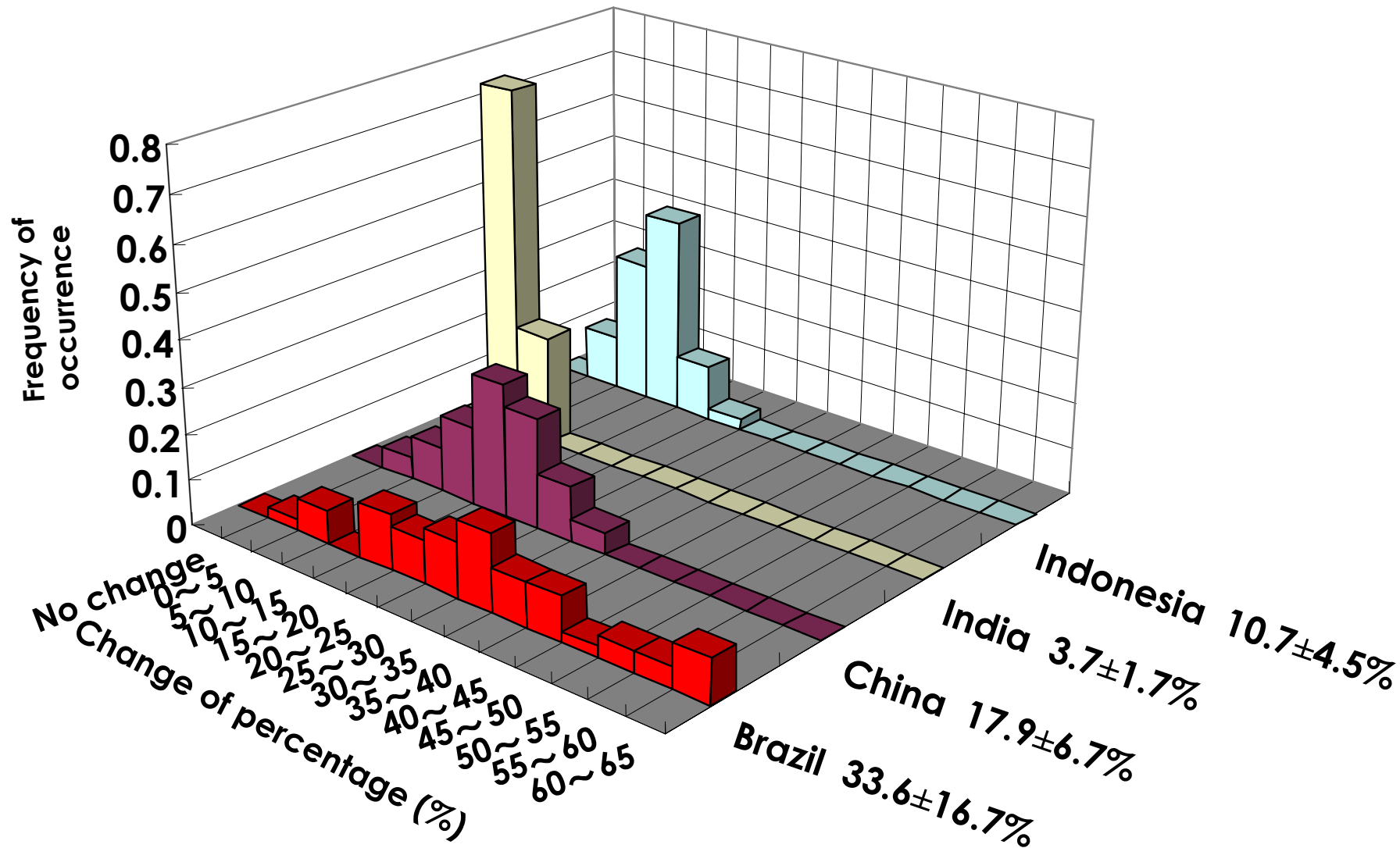
Without CO<sub>2</sub> fertilization



# A simulation of Malaria epidemic potential



# Change of country population ratio living in Malarial epidemic area from 1990 to 2100

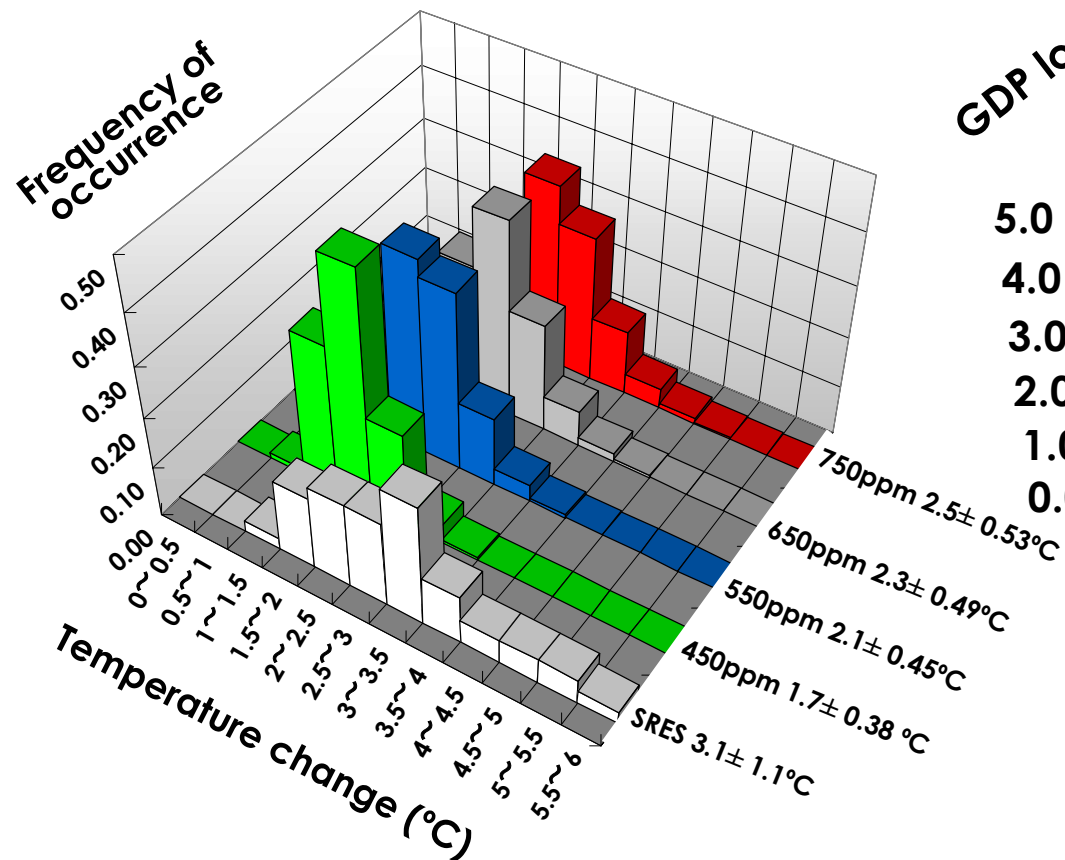


# **Impacts of Emission Reduction on global climate and global economy**

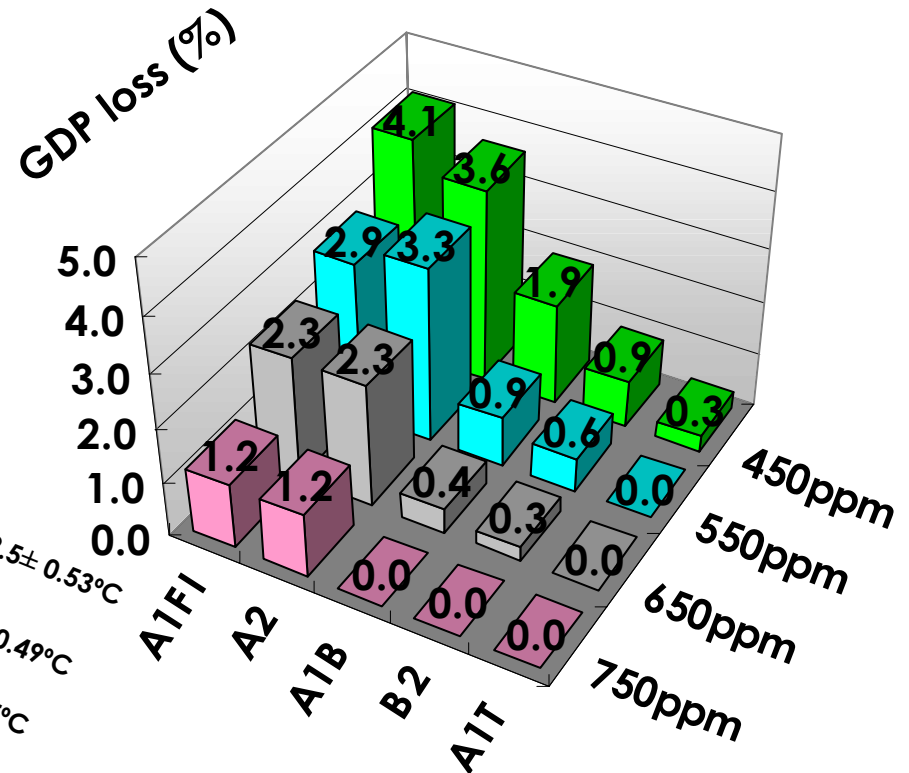
# Impacts of emission reduction on global climate and global economy in year 2100

Post-SRES

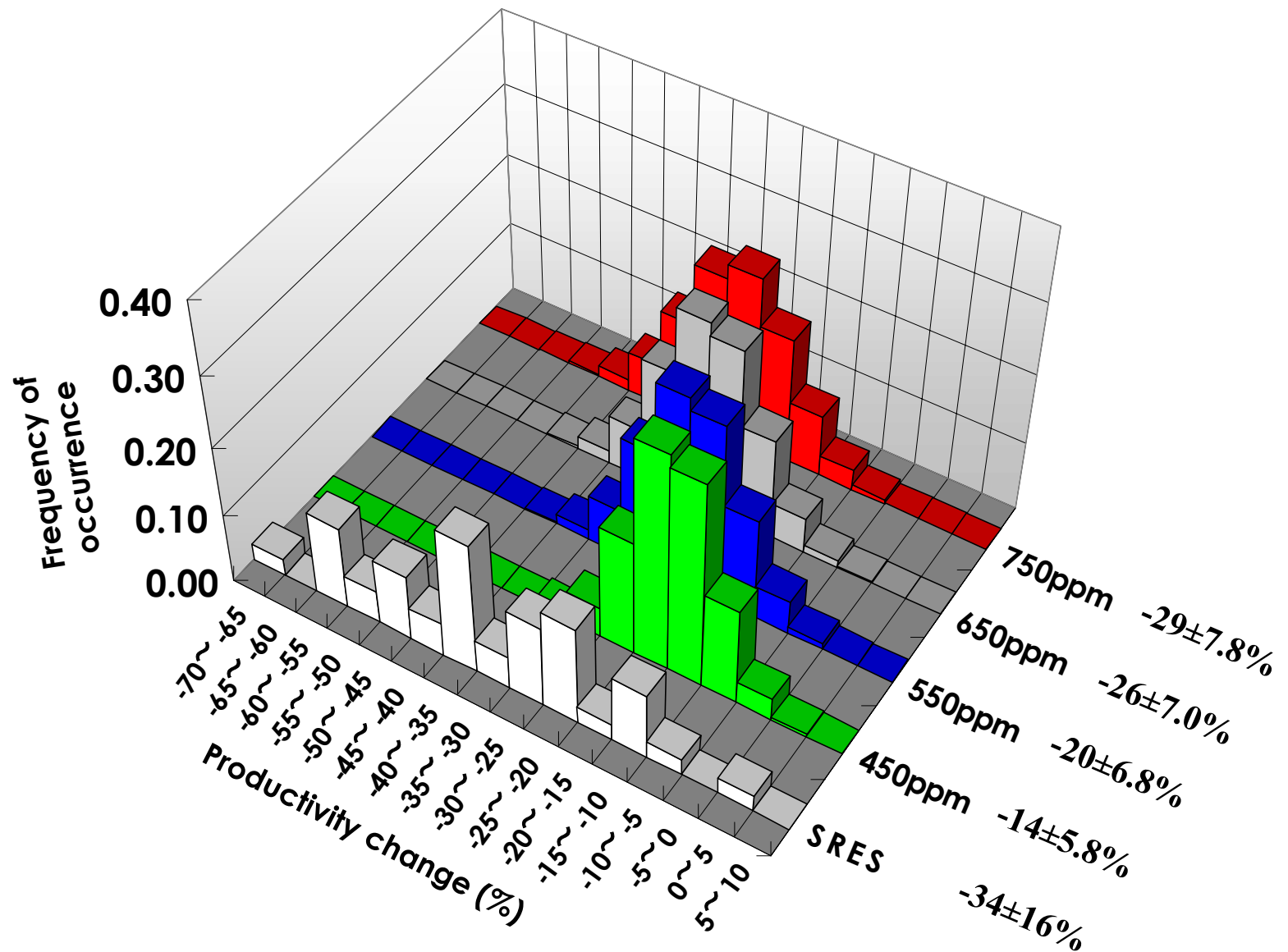
(1) Temperature change from 1990 to 2100



(2) Percentage reduction relative to baseline

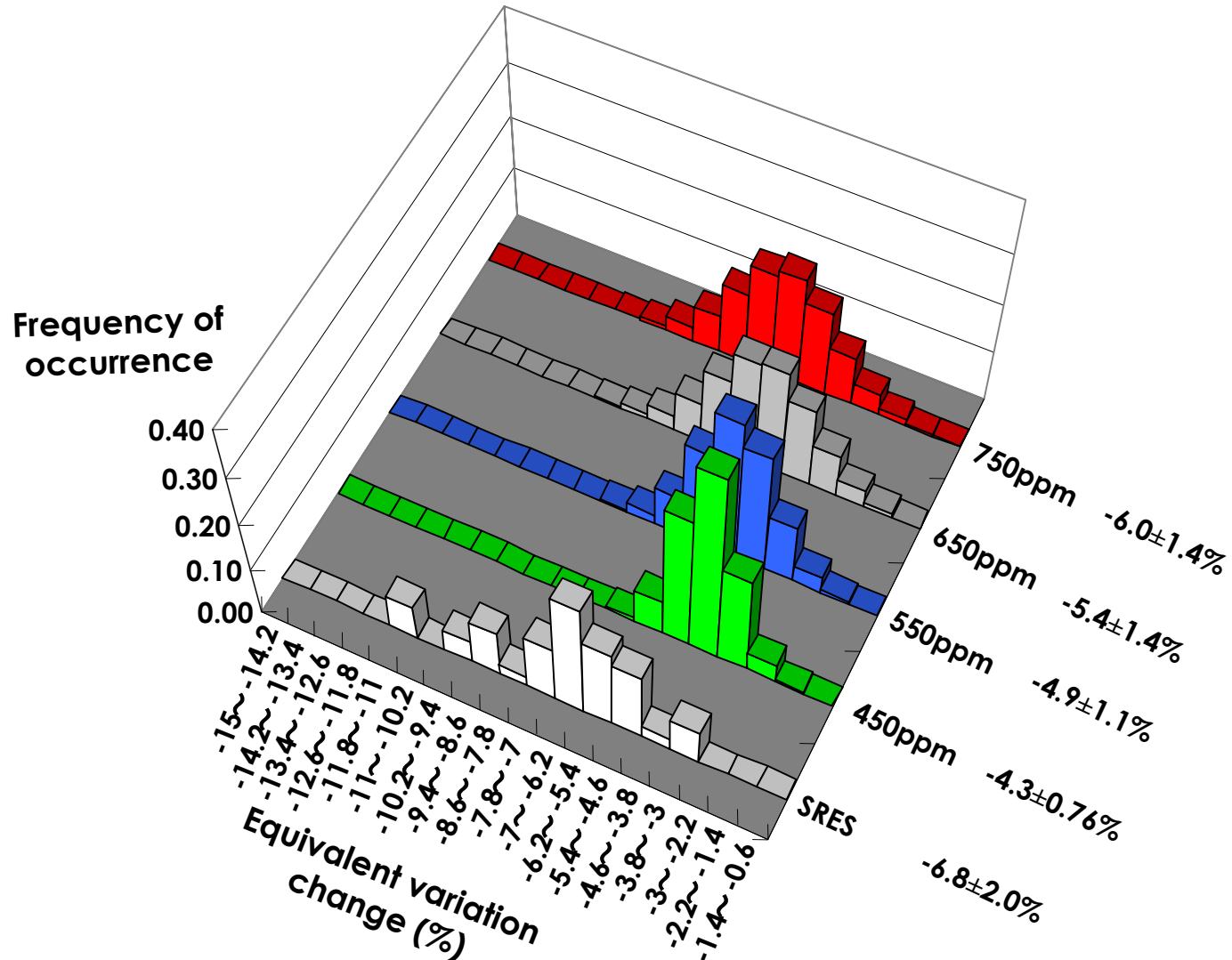


# Wheat productivity change in India from 1990 to 2100, with CO<sub>2</sub> fertilization

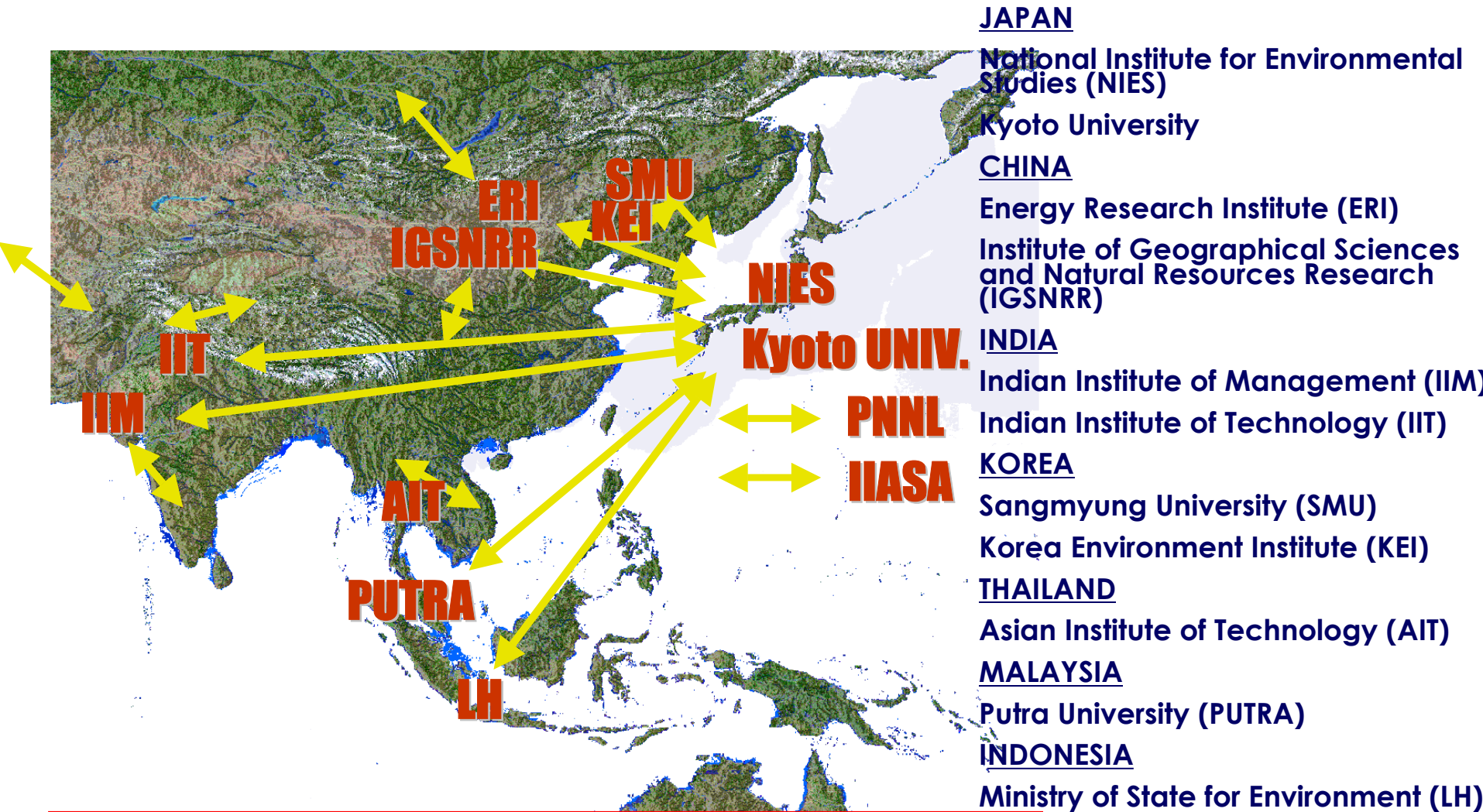


# Recovery of economic welfare decrease by climate change mitigation

*caused by crop productivity change, India, year 2100*



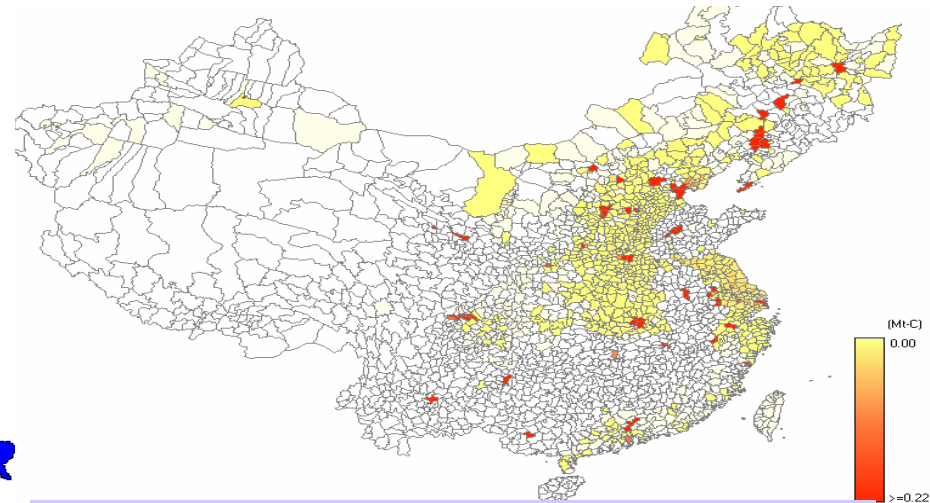
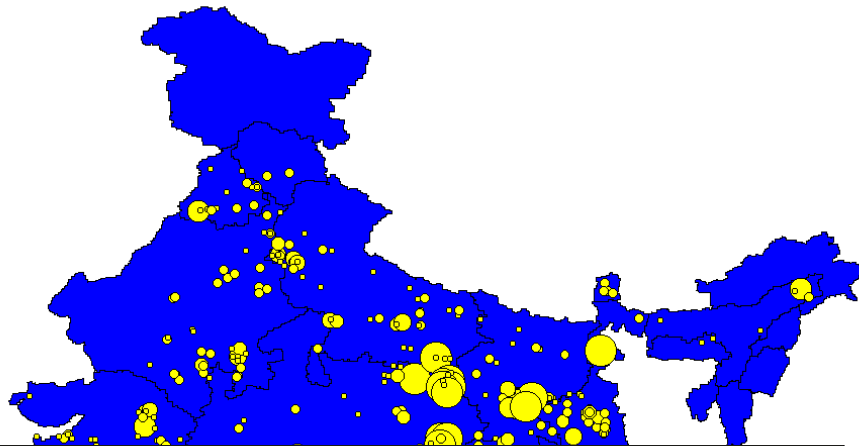
# The AIM as INTERNATIONAL COLLABORATION PROGRAM



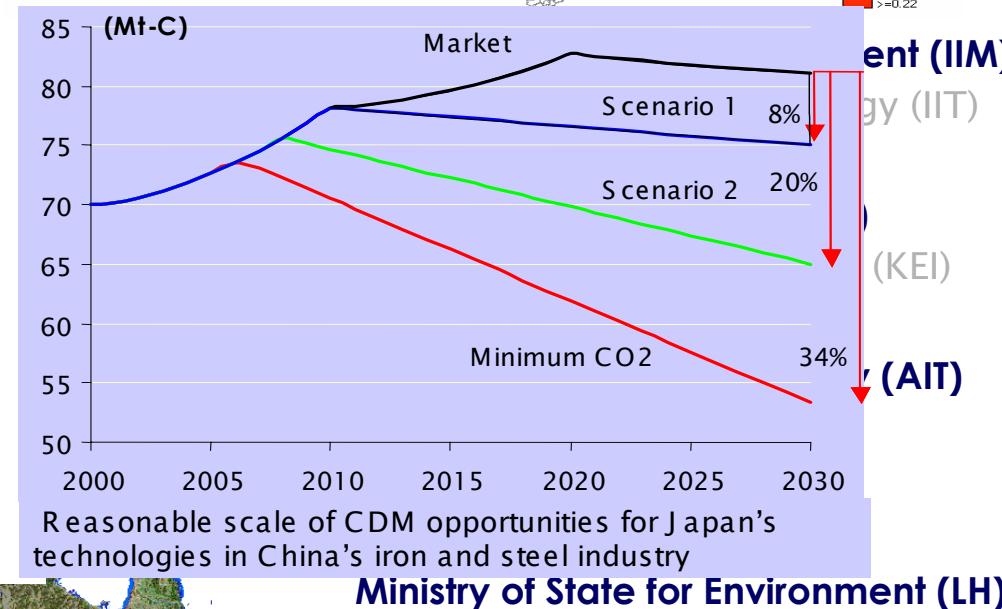
# AIM/Emission Model

CO<sub>2</sub> emissions in Mt-C from all iron and steel sources , 2000

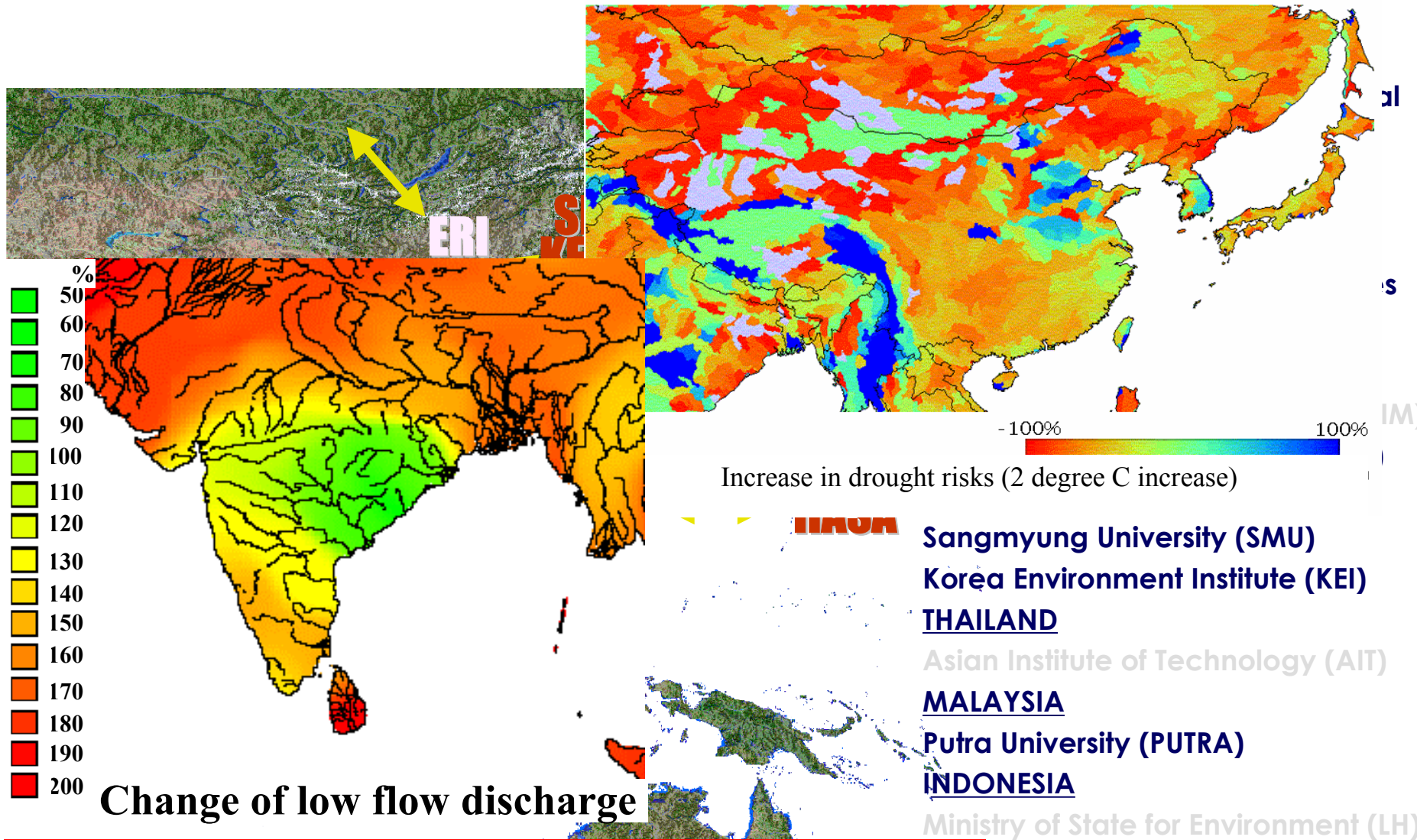
CO<sub>2</sub> from LPS in 2030



| Sector               | Subsectors                                   | LPS covered |      |      |      |
|----------------------|----------------------------------------------|-------------|------|------|------|
|                      |                                              | 2000        | 2010 | 2020 | 2030 |
| Energy               | Power (coal & Oil)                           | 82          | 111  | 131  | 150  |
|                      | Power (natural gas)                          | 12          | 17   | 20   | 23   |
|                      | Steel                                        | 11          | 17   | 23   | 29   |
|                      | Cement *                                     | 85          | 98   | 110  | 123  |
|                      | Fertilizer                                   | 31          | 41   | 52   | 62   |
|                      | Paper                                        | 33          | 38   | 43   | 48   |
|                      | Sugar                                        | 28          | 28   | 29   | 30   |
|                      | Caustic Soda                                 | 19          | 21   | 23   | 26   |
|                      | H <sub>2</sub> SO <sub>4</sub> manufacturing | 63          | 64   | 66   | 68   |
| Industrial processes | Aluminium (Al)                               | 3           | 4    | 5    | 5    |
|                      | Copper ore smelting (Cu)                     | 8           | 9    | 10   | 11   |
|                      | Lead ore smelting (Pb)                       | 5           | 6    | 7    | 8    |
|                      | Zinc ore smelting (Zn)                       | 3           | 4    | 5    | 5    |
| Total                |                                              | 383         | 458  | 524  | 588  |



# AIM/Impact Model



# AIM/Material Model

for economic development and environmental conservation



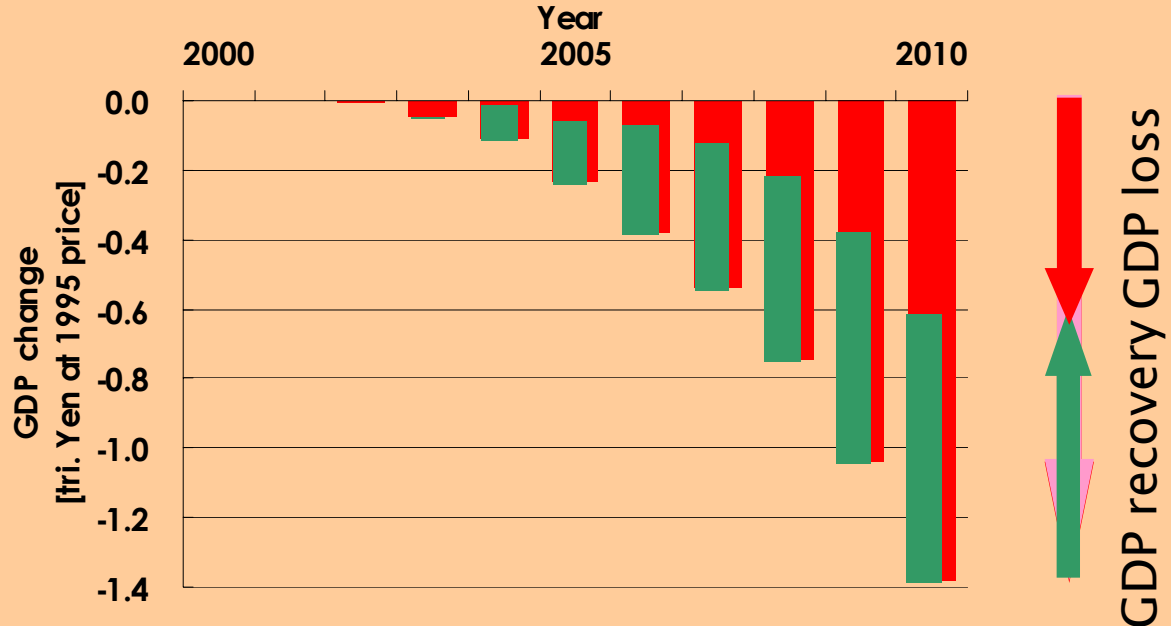
Japan

- Country Model
- Computable material
- Recursive and
- Including environmental investment
- Economic impact due to CO2 & waste constraints, and recovery by environmental investment

China

India

Economic impact due to CO2 and waste constraints

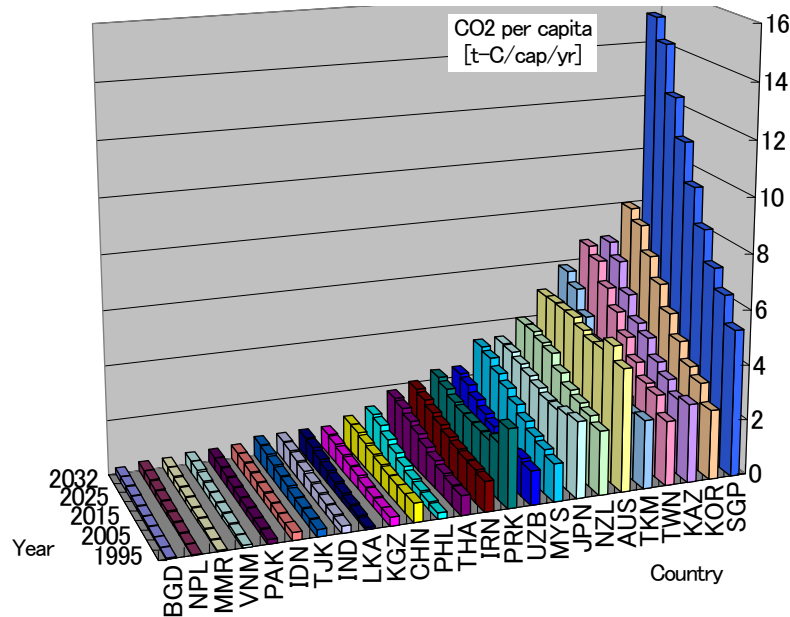


# AIM/Trend Model

Detailed Model Application (Model A)

25 countries

CO2 per capita

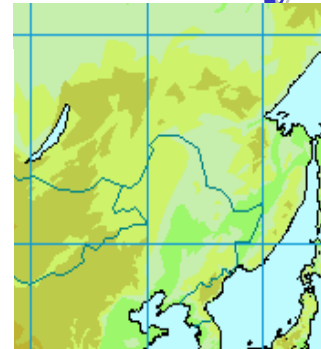


|     |               |     |
|-----|---------------|-----|
| PHL | Philippines   | SEA |
| PRK | Korea, Dem    | EA  |
| SGP | Singapore     | SEA |
| THA | Thailand      | SEA |
| TJK | Tajikistan    | CA  |
| TKM | Turkmenistan  | CA  |
| TWN | Taiwan, China | EA  |
| UZB | Uzbekistan    | CA  |
| VNM | Vietnam       | SEA |

Target Country

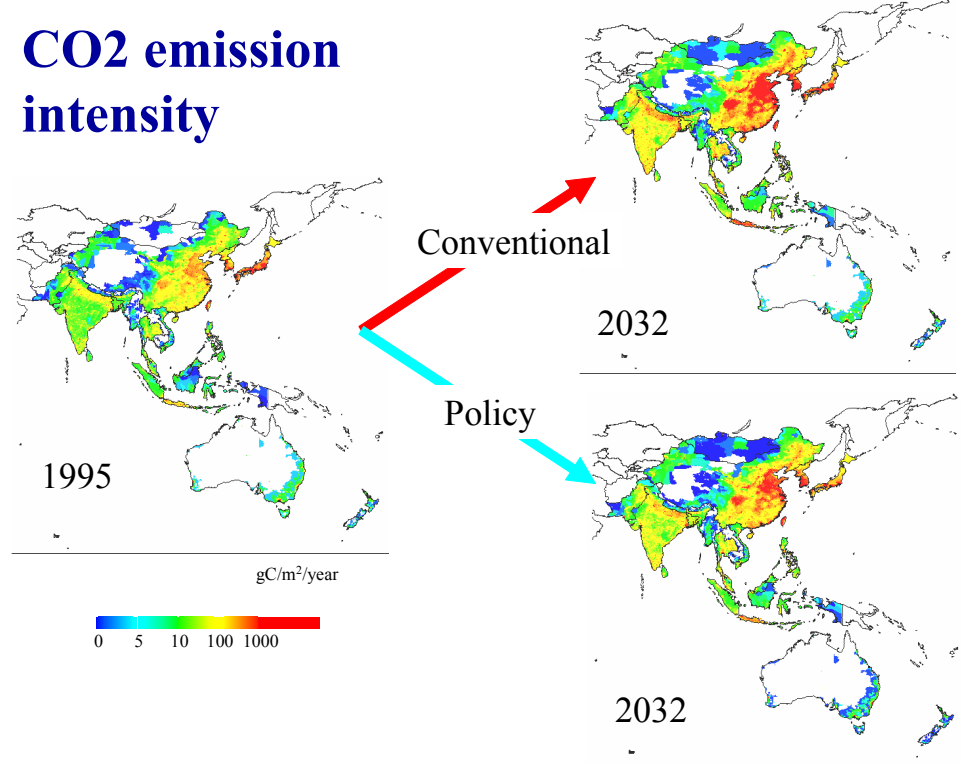
Simple Model Application (Model B)

17 countries



| Code | Country     | Group |
|------|-------------|-------|
| AFG  | Afghanistan | SA    |
| BRN  | Brunei      | SEA   |
| BTN  | Bhutan      | SA    |
| FJI  | Fiji        | SP    |
| KHM  | Cambodia    | SEA   |
| KIR  | Kiribati    | SP    |
| LAO  | Laos        | SFA   |

CO2 emission intensity



Thank you !