The Green Innovation Policy in Japan

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Yasushi TAGUCHI

Director,
Environment and Energy Division,
Research and Development Bureau,
Ministry of Education, Culture, Sports, Science and Technology (MEXT)

文部科学省
MEXT
MINISTRY OF EDUCATION, CULTURE, SPORTS, SCIENCE AND TECHNOLOGY-JAPAN

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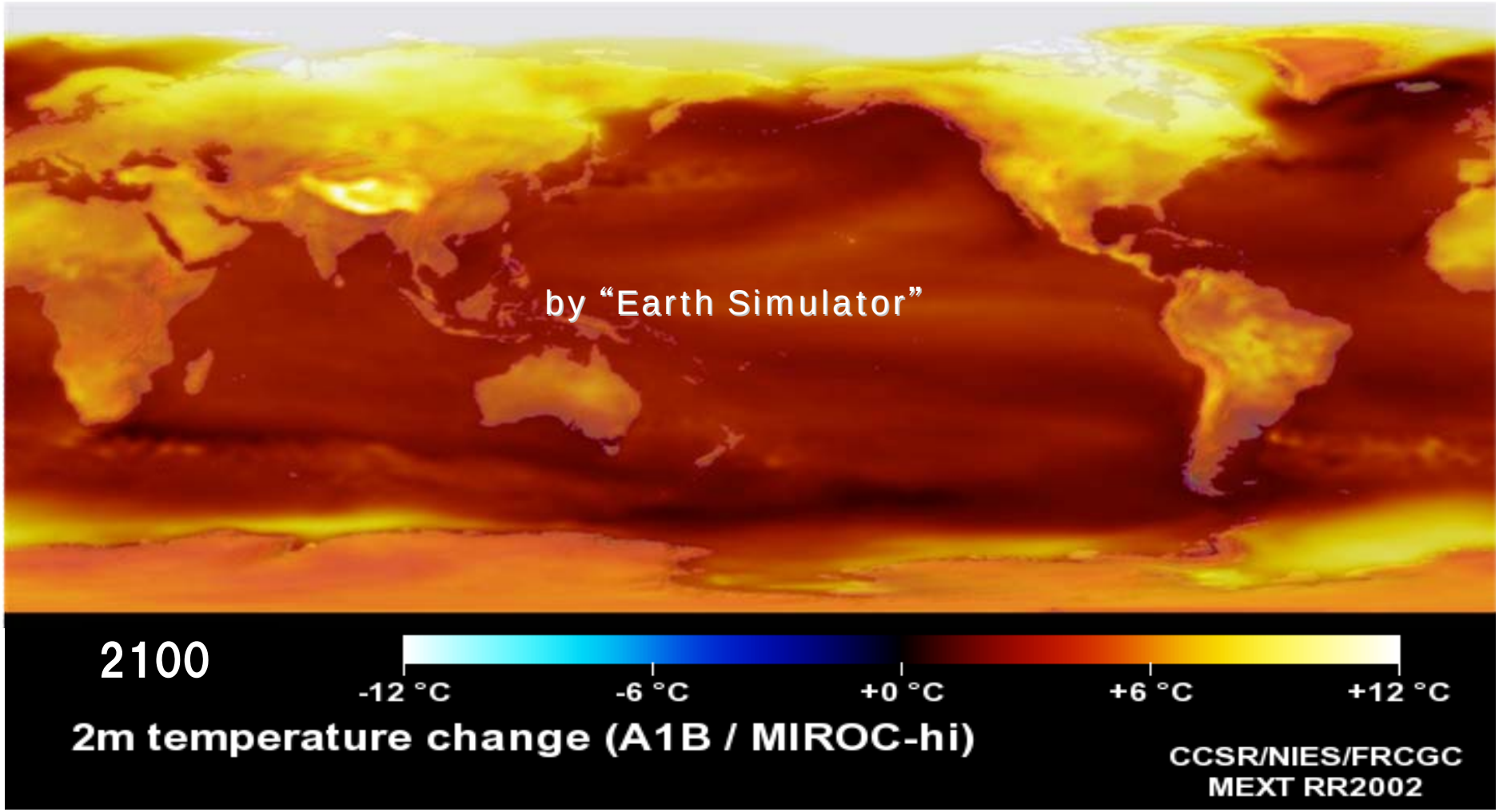
Introduction

GHG emissions will undermine the sustainable society.

- The observed increase in global average temperatures is very likely due to the observed increase in GHG.
- Continued GHG emissions would cause further warming and induce changes in the global climate system.

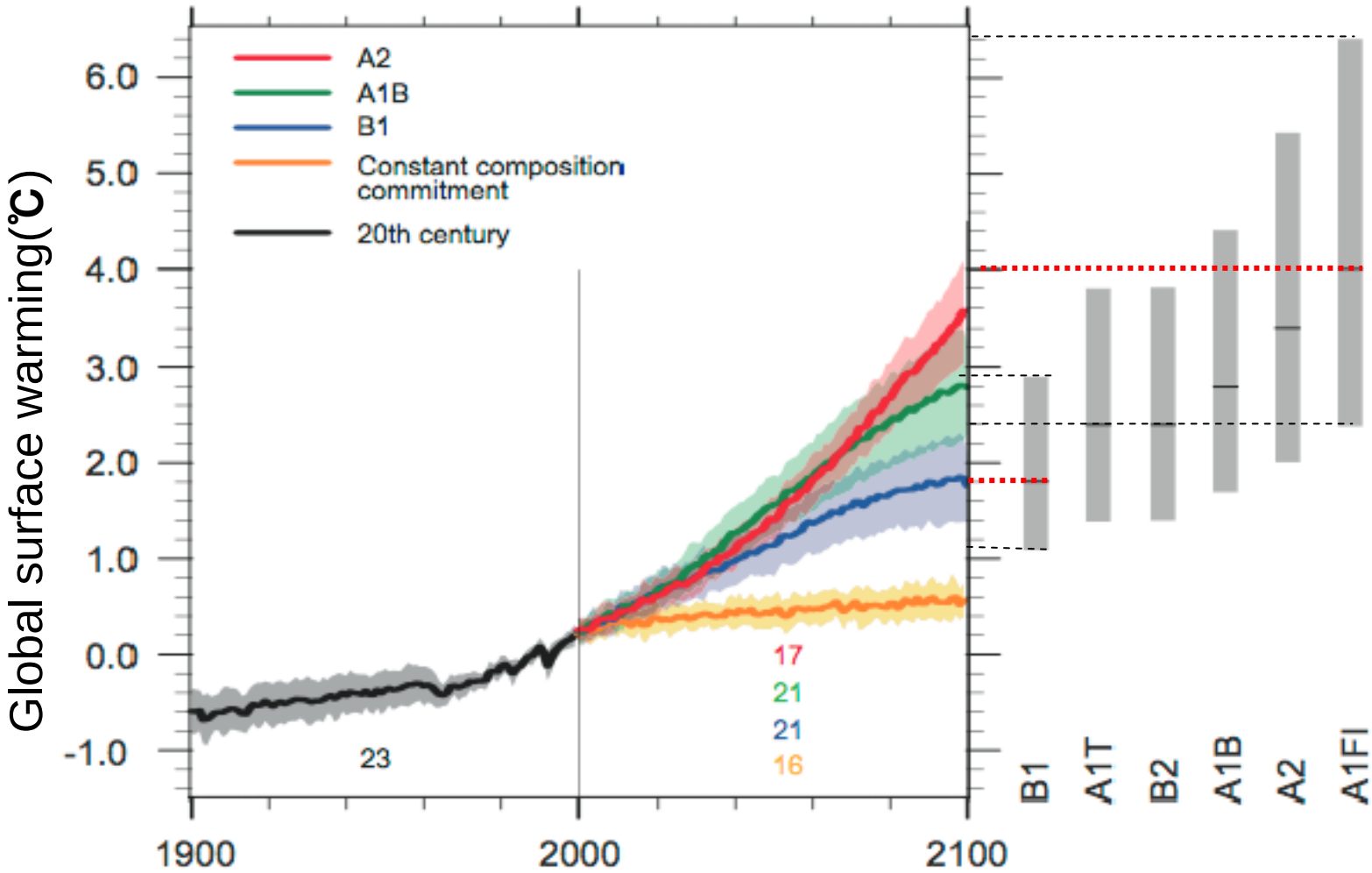
(IPCC AR4 / 2007)



- **The best estimate for the low scenario(B1) is 1.8 ℃ *(likely range is 1.1 ℃ to 2.9 ℃),***
- **The best estimate for the high scenario(A1FI) is 4.0 ℃ *(likely range is 2.4 ℃ to 6.4 ℃).***

(IPCC AR4 / WG1)

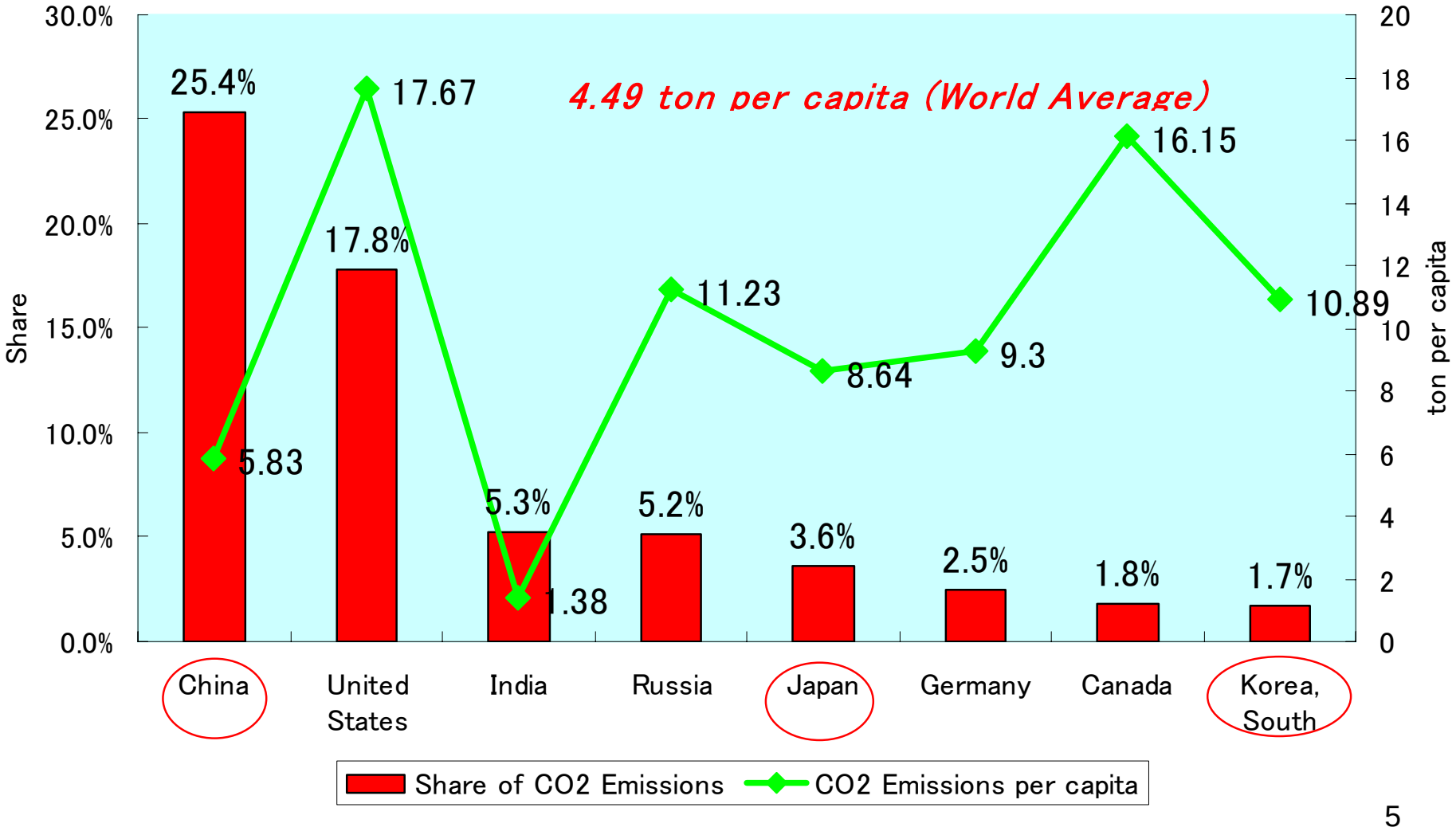
MULTI-MODEL AVERAGES AND ASSESSED RANGES FOR SURFACE WARMING



How much CO2 Emission ?

2009 Major countries' share of CO2 Emissions and CO2 Emissions per capita

<Source: International Energy Statistics>



Recent Major Action in Japanese Government

The Energy and Environment Council

The Council on National Strategy and Policy (Chairman : Prime Minister)

Important Basic Policy, National Vision

The Energy and Environment Council
(Chairman : Minister of State for National Policy)

Consideration of Innovative Strategy for Energy and Environment

For the purpose of redesigning the strategy for Energy and Environment, The Energy and Environment Council was set up in June, 2011 and is considering an innovative strategy for energy and environment. (Based on the Decision by the Cabinet in May, 2011)

[Member of the Energy and Environment Council]

Chairman :Minister of State for National Policy

Vice Chairman :Minister of Economy, Trade and Industry
Minister of Environment (holding concurrently Minister for the Restoration from and Prevention of Nuclear Accident and Minister of State for the Nuclear Power Policy and Administration)

Member :Minister of Foreign Affairs
Minister of Education, Culture, Sports, Science and Technology
Minister of Agriculture, Forestry and Fisheries
Minister of Land, Infrastructure, Transport and Tourism
Minister of State for Economic and Fiscal Policy
Assistant Chief Cabinet Secretary appointed by the Chairman

Secretariat Director :Vice Minister of State for National Policy

The Schedule for Innovative Strategy for Energy and the Environment

Jun. 7, 2011

Set up the Energy and Environment Council as a subcommittee of the Council on the Realization of the New Growth Strategy

Jul. 29, 2011

Interim Compilation of Discussion Points for the Formulation of "Innovative Strategy for Energy and Environment was decided.

It was decided to create specific scenarios for reducing dependency of nuclear power and to seek to realize distributed energy systems

Oct. 3, 2011

The Third Energy and Environment Council
Set up "Cost Estimation and Review Committee"

Cost Estimation and Review Committee	The Advisory Committee for Natural Resources and Energy	Atomic Energy Commission	Central Environment Council
Report was issued on Dec. 19	Report was issued on Dec. 20		Report was issued on Dec. 9

Dec. 21, 2011 : The Fifth Energy and Environment Council
Basic Policy towards the presentation of choices on the strategy for Energy and Environment was decided.

Dec. 22 The Fifth Council on National Strategy and Policy
Above elements are reflected on The Strategy for Rebirth of Japan

The Energy and Environment Council	The Advisory Committee for Natural Resources and Energy	Atomic Energy Commission	Central Environment Council
Consideration of Green Growth Strategy	Original Plan of choices for Energy Mix	Original Plan of choices for Nuclear Energy Policy	Original Plan of choices for Global Warming

Spring : The Energy and Environment Council
Presentation of choices on Energy and Environment Strategy
→ Promotion of national discussion

The Energy and Environment Council	The Advisory Committee for Natural Resources and Energy	Atomic Energy Commission	Central Environment Council
Green Growth Strategy (Draft)	New Energy Basic Plan (Draft)	General Principle of New Nuclear Power Policy (Draft)	New counter-measures on global warming (Draft)

Summer : The Energy and Environment Council
Decision on the Innovative Strategy for Energy and the Environment

The 4th Science and Technology Basic Plan

I. Basic Understanding

1. The unprecedented crisis in Japan and changes in the world
2. Positioning of the Basic Plan
3. Achievements and issues from the 3rd Basic Plan
4. Principles for the 4th Basic Plan

II. Achieving Sustainable Growth and Development toward the Future

1. Basic policy
2. Reconstruction and revival from the disaster
3. **Promoting green innovation**
4. Promoting life innovation
5. System reforms directed at promoting STI

III. Coping with the Major Challenges Facing Japan

1. Basic principle
2. Promoting measures for achieving the priority issues
3. System reforms directed at achieving the priority issues
4. Strategic development of international activities

IV. Reinforcing of Basic Research and Human Resources Development

1. Basic principle
2. Drastic enhancement of basic research
3. Development of S&T-related human resources
4. Formation of an international-standard research environment and foundations

V. Creating and Promoting Policies together with Society

1. Basic principle
2. Deepening relationship between society and STI
3. Promotion of effective STI policy
4. Expansion of R&D investment

Administrative Structure of Science & Technology Policy

Prime Minister

Cabinet Office
Council for Science and Technology Policy (**CSTP**)
S&T Basic Plan , Resource Allocation Policy ……

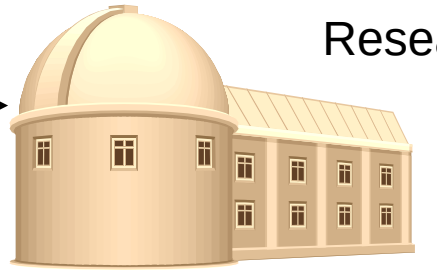
Coordination

Ministry of Education, Culture, Sports, Science and Technology (**MEXT**)

Other Ministries

Universities

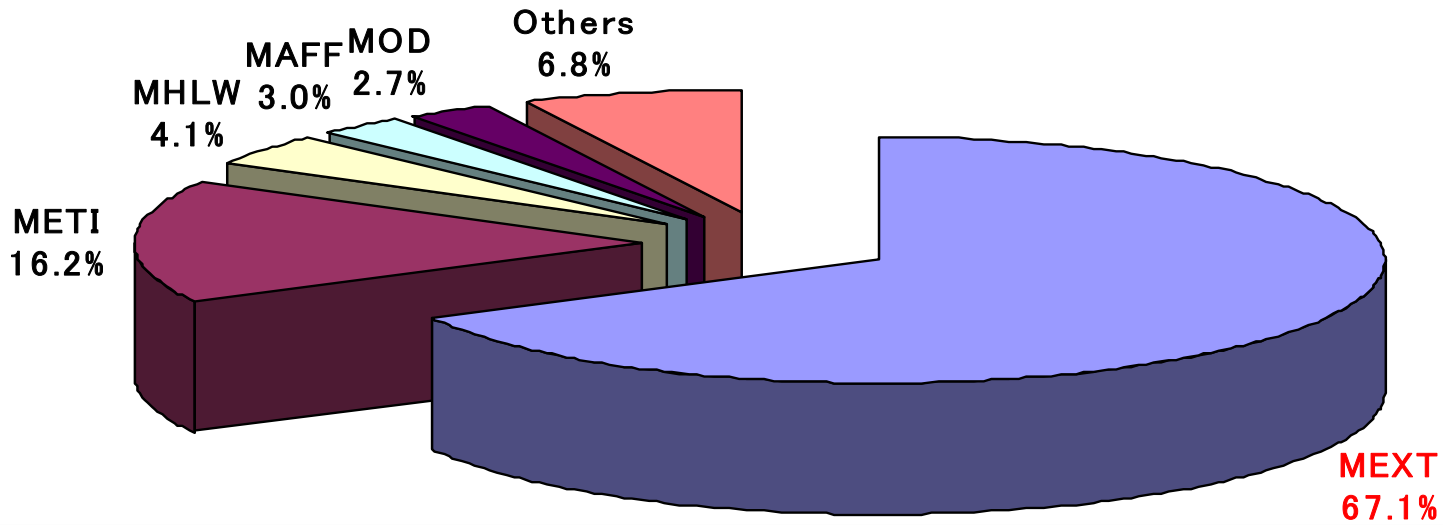
Cooperation



Research Institutes

Research Funding Agencies

Science and Technology Related Budget in FY2011



Ministry		S&T Related Budget	
		JPY Tri.	USD Bil.
MEXT	Ministry of Education, Culture, sports, Science and Technology	2.45	(30.63)
METI	Ministry of Economy, Trade and Industry	0.59	(7.38)
MHLW	Ministry of Health, Labor and Welfare	0.15	(1.88)
MAFF	Ministry of Agriculture, Forestry and Fisheries	0.11	(1.38)
MOD	Ministry of Defense	0.1	(1.25)
Others	Others	0.25	(3.13)
Total	Total	3.65	(45.63)

Note The exchange rate : USD 1 = JPY 80

MEXT's Strategy for Green Innovation

MEXT's Strategy for Green Innovation

MEXT
MINISTRY OF EDUCATION, CULTURE, SPORTS, SCIENCE AND TECHNOLOGY-JAPAN

Social System Transformation for Low Carbon Society

Other ministries & Local governments

Universities & Research Institutes

Field Experiments

Social System Reformation Program

Mitigation

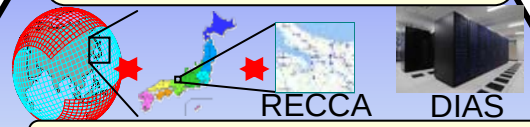
To develop "Game Changing Technologies"
- Advanced Low Carbon Technologies (ALCA)
- Biomass Engineering (Riken)
- Environmental Materials (NIMS)

Strategic Basic Research Programs

R&D of Nuclear Energy (FBR & Fusion)

Adaptation

Climate Change Adaptation Strategy Initiative



Climate Change Projection Program (KAKUSHIN Program)

Program for Risk Information on Climate Change

Earth Simulator

Comprehensive Earth Observation System

Global Contribution

IPCC GEOSS

Technology Transfer to other countries

Global "Environment-Leaders" Training Program

Scenario

Social Scenario Research for Low Carbon Society

Establishment of the "Low Carbon Social Strategy Center" (JST)

Scenario

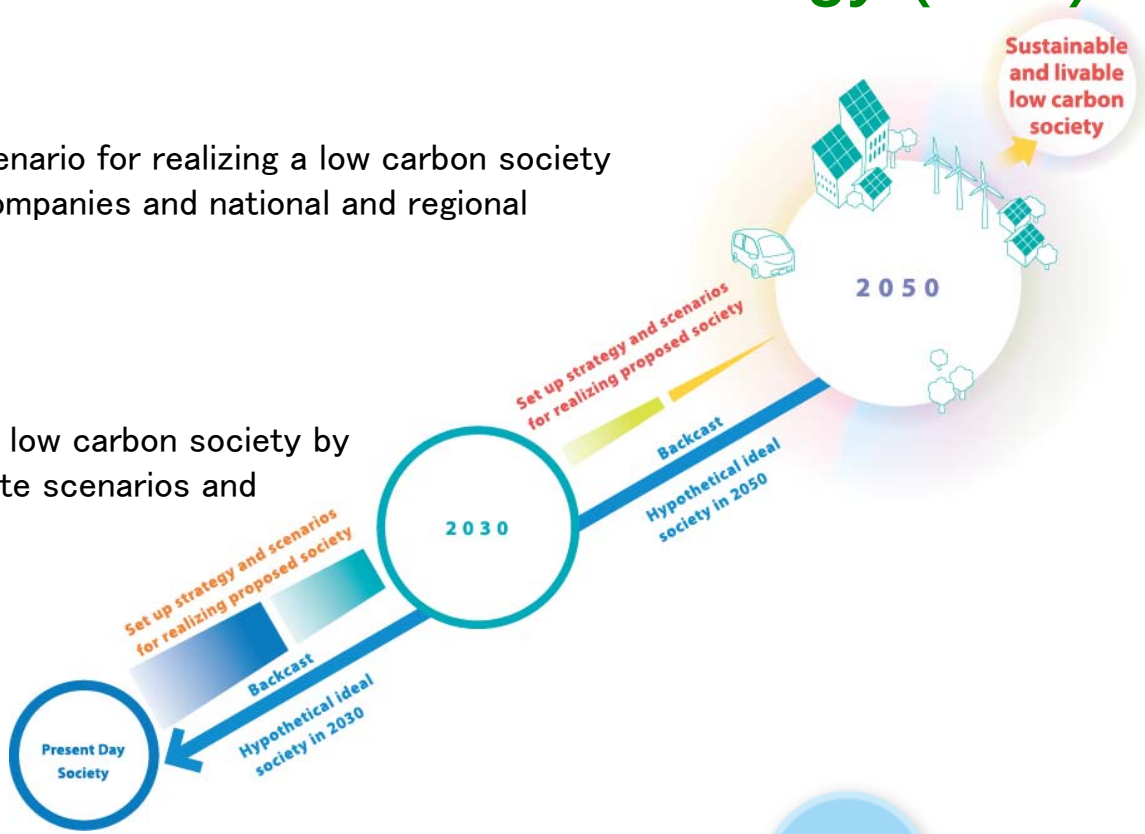
Center for Low Carbon Social Strategy (LCS)

PURPOSE

The role of LCS is to draw an integrated scenario for realizing a low carbon society and publish widely for use by households, companies and national and regional governments.

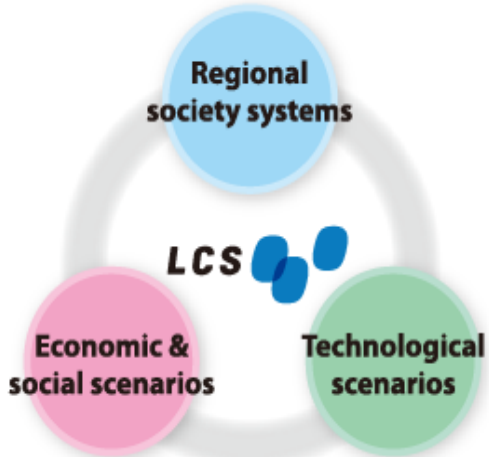
METHOD

The LCS has set the objective of realizing a low carbon society by 2100. To achieve this objective, we will create scenarios and strategies for achieving milestones at 2030 and 2050 by means of Japanese knowledge on technologies inclusive of the humanities and social science.



RESEARCHES

1. **Propose Regional Social Systems**
   We study sustainable low carbon society systems that suit the characteristics of each region.
2. **Create economic and social scenarios**
   We study optimal economic and social systems for 2030 and 2050.
3. **Create technological scenarios**
   We study ways to promote the wider use of solar cells, storage batteries, fuel cells and other low carbon technologies.



Three Main Research Topics

Mitigation

Advanced Low Carbon Technology R&D Program (ALCA)

What we do

Creation of Cutting Edge Technology for Realization of the Low Carbon Society over the World in Future

Promote R&D, under competitive funding, of new basic high potential scientific knowledge and discovery to realize continual and steady reduction of greenhouse gas emission in middle and long term. We expect to obtain fruits of research leading to the Green Innovations.

Making Conceptual Breakthrough and Creation of "Game Changing Technology"

ALCA contributes to the reduction of Greenhouse Gas Emission in middle and long term (2030～2050) and the realization of low carbon and wealthy society.

Research Area (FY2011)

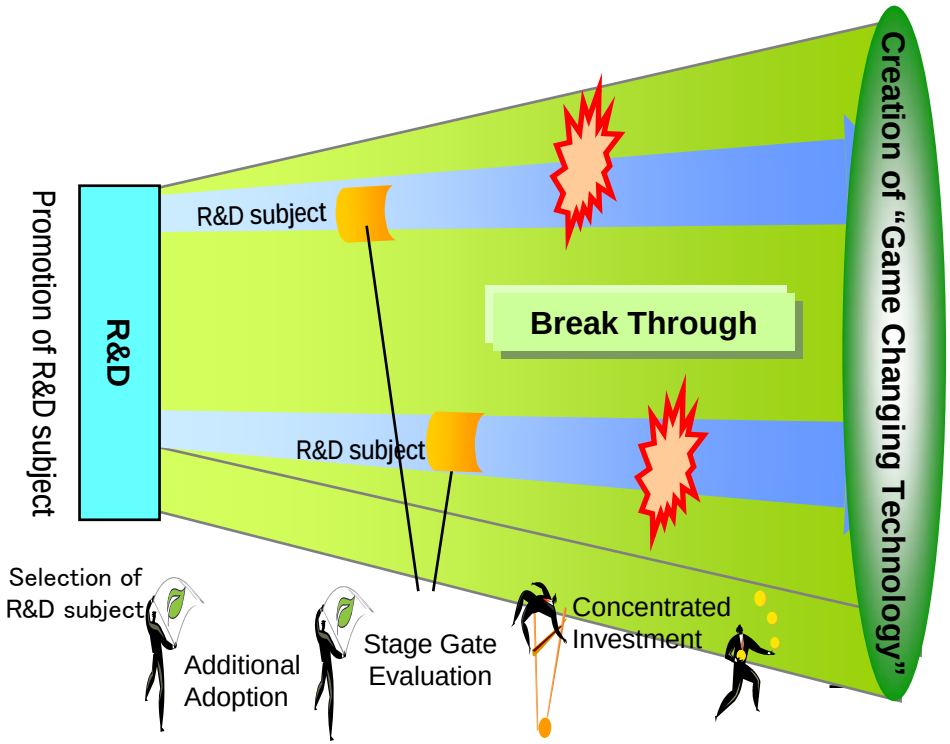
Designated Research Area

a. Solar Cell and Solar Energy System
b. Superconducting System
c. Electric Storage Device
d. Ultra Heat-Resistant Material and High Quality Recycling Steel
e. Biotechnology

Non-Designated Research area

Scheme

- R&D Period : Maximum 10 Years
- Research Fund : 10M ～ 100M yen/Year
- Subject to tough Stage Gate Evaluation



Mitigation

Strategic Basic Research Programs

Policy Oriented Funding Program for Basic Research :

MEXT (Ministry of Education, Culture, Sports, Science and Technology) designate **"Strategic Sectors"**

JST set **"Research Areas"** and fund for R&D activities in the areas.

Examples of Research Areas for Promoting Green Innovation

- Creation of Innovative Technologies to Control Carbon Dioxide Emissions (2008-2015)
- Innovative Technology and System for Sustainable Water Use (2009-2016)
- Creation of Basic Technology for Improved Bioenergy Production through Functional Analysis and Regulation of Algae and Other Aquatic Microorganisms (2011-2019)
- Creation of essential technologies to utilize carbon dioxide as a resource through the Enhancement of plant productivity and the exploitation of plant products (2011-2019)
- Establishment of core technology for the preservation and regeneration of marine biodiversity and ecosystems (2011-2019)
- Phase interfaces for Highly Efficient Energy Utilization (2011-2019)

Mitigation

R&D on Nuclear Energy : Fusion

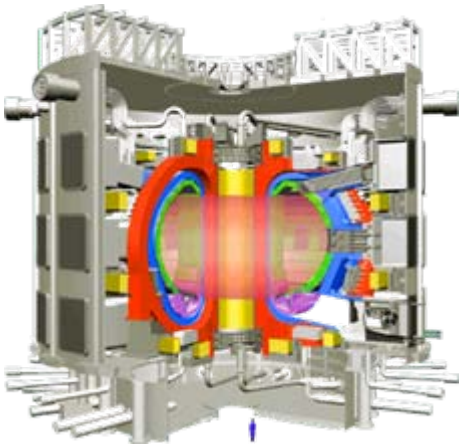
Promotion of Nuclear Fusion R&D

Leading-Edge R&D for Realizing the Energy of Tomorrow

Utilize and promote internationally collaborative R&D such as the ITER Project which consists of 7parties including Japan, China and Korea and the Broader Approach Activities for the realization of fusion energy other than the framework of ITER Project, which is abundant in resources, inherently safe, environmentally friendly, and has the potential to resolve global energy and environmental issues.

Nuclear fusion R&D

The ITER Project



Parties

Japan, EU, U.S.A., Russia, China, Korea, India

Location

Cadarache (France)

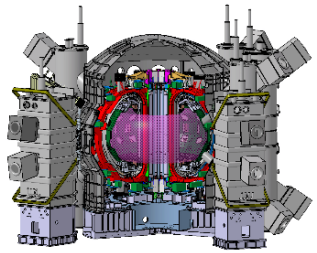
Director-Generalof ITER Organization

Mr. Osamu Motojima (Japanese)

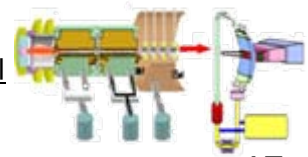
The Broader Approach Activities

(IFERC) International Nuclear Fusion Energy Research Center

Satellite Tokamak Programme

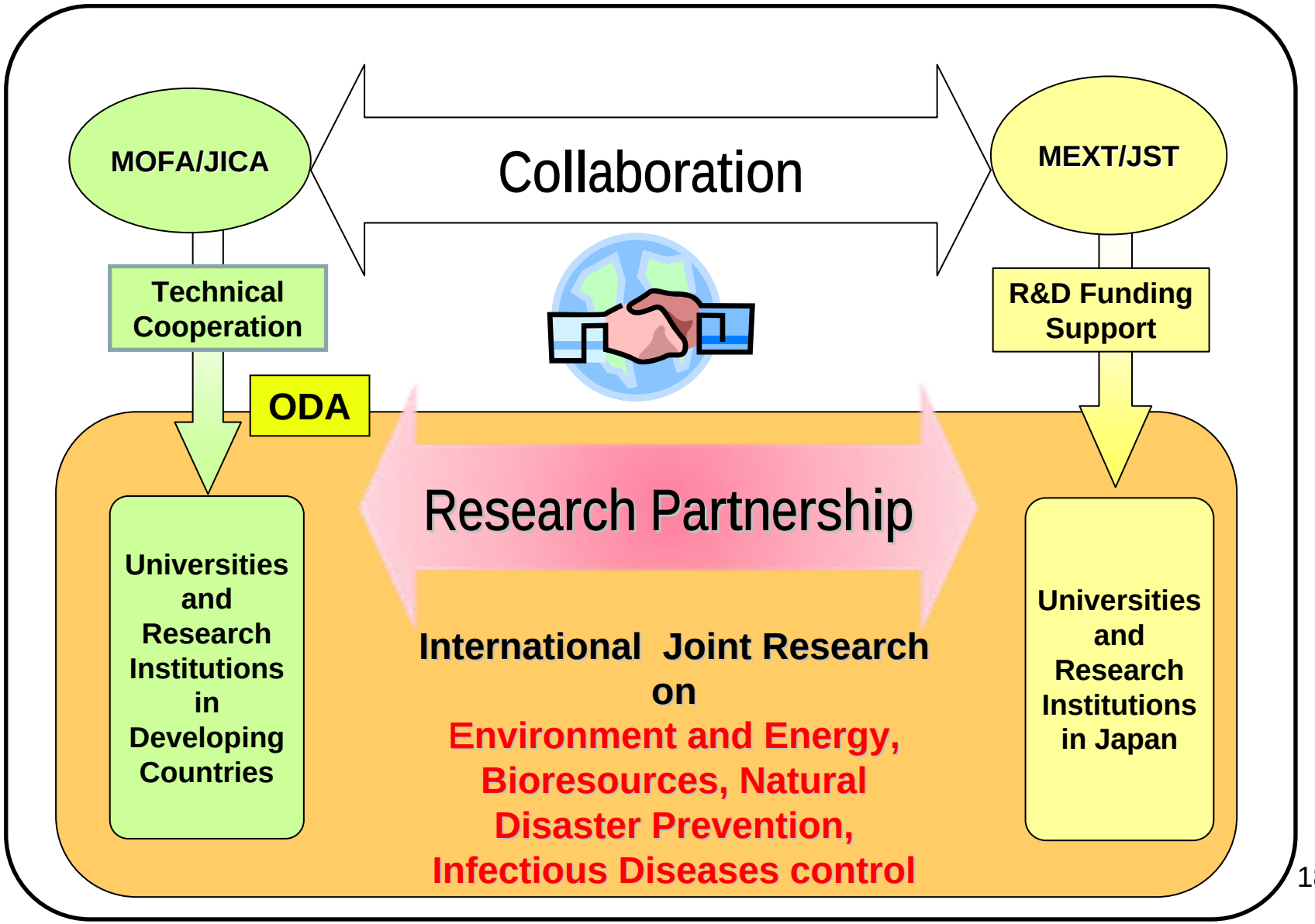


IFMIF/EVEDA (Engineering Validation and Engineering Design Activities for International Fusion Materials Irradiation Facility)



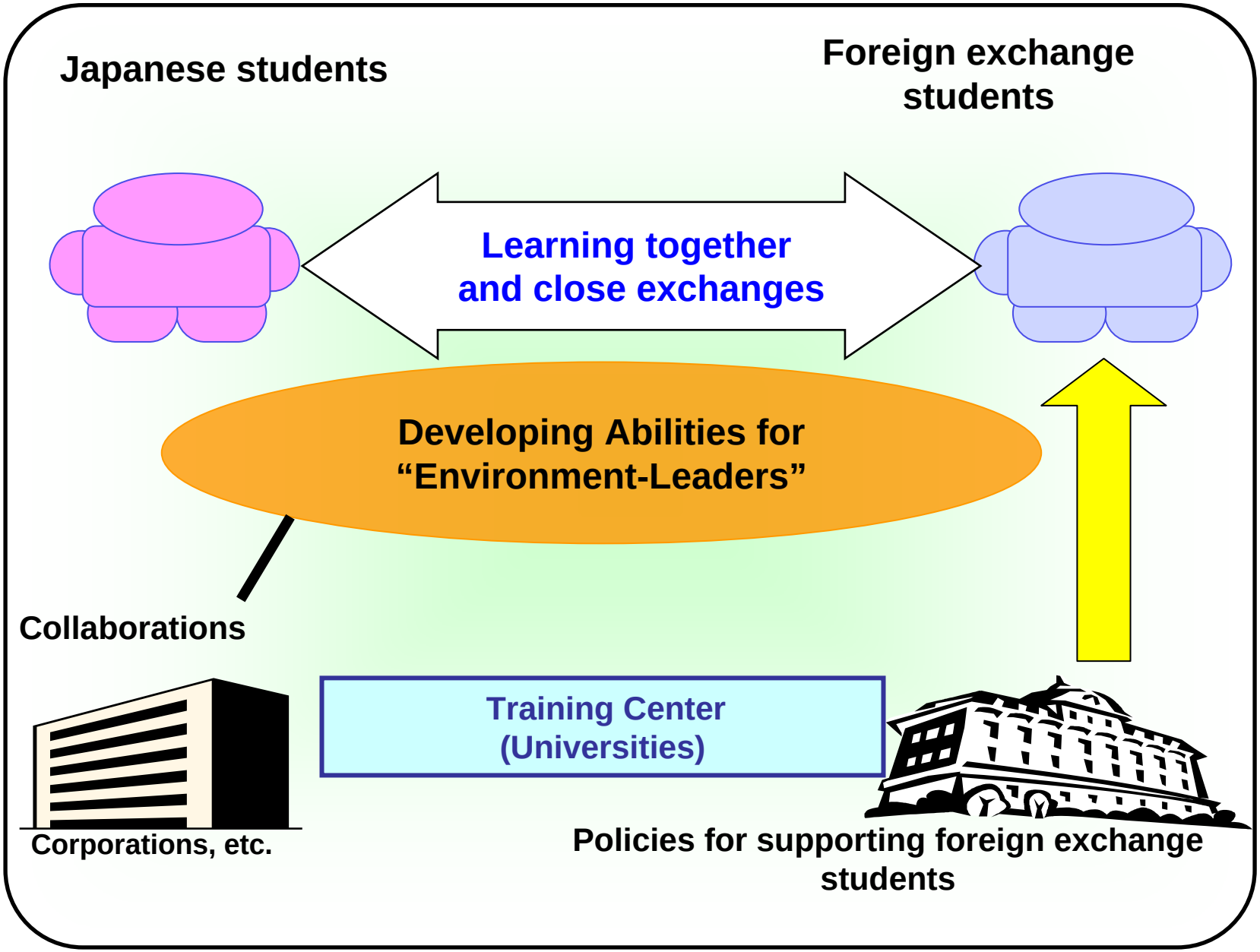
Global Contribution

Science and Technology Research Partnership for Sustainable Development (SATREPS)



Global Contribution

Global "Environment–Leaders" Training Program



Global Contribution

GEOSS : Global Earth Observation System of Systems

Outline of GEOSS 10-year Implementation Plan

Through int'l cooperation, integrate satellite, ground and ocean earth observation and information systems to put in place a comprehensive and sustainable global earth observation system of systems within 10 years

- Aim to produce information necessary for policy-making in fields that will benefit society: disasters, health, energy, climate, water, weather, ecosystems, agriculture, biodiversity
- Establish intergovernmental meetings on earth observation (**Group on Earth Observations:GEO**), an **int'l framework for the promotion of GEOSS**

Group on Earth Observations (GEO)

GEO ministerial meetings (Earth Observation Summit)
once every few years

GEO Plenary (86 countries + EC, 61 participating organizations), as of April 2011

4 Co-chairs from 2 developed and 2 developing countries (US, EC, South Africa, China)

Executive Committee (13 countries)
(China, Korea, Japan, New Zealand) (EC, France, Germany) (Russia) (South Africa, Niger) (US, Brazil, Chile)

Committees
- Architecture and Data Committee
- Capacity Building Committee
- Science and Technology Committee
- User Interface Committee

GEO Secretariat
In WMO building, Geneva

Activities for GEOSS in Japan

Data Integration and Analysis Systems (DIAS) :
The University of Tokyo, JAXA, JAMSTEC

Asian Water Cycle Initiative (AWCI) :
The University of Tokyo (UT)

Forest Carbon Tracking (ALOS Kyoto & Carbon Initiative) : JAXA, NIES

Global Monitoring of Greenhouse Gases from Space (GMGG) : JAXA, NIES

GEO Grid : AIST

Global Mapping Project :
MLIT, GSI

Japanese Biodiversity Observation Network (J-BON) :J-BON Community

GEOSS Asia Pacific Symposium (GEOSS-AP) :

Global Contribution

Belmont Forum

PURPOSE

‘the Belmont Challenge’

delivering knowledge needed for action to avoid and adapt to detrimental environmental change including extreme hazardous events

The Belmont Forum has developed a funders’ vision for the priority knowledge and capabilities derived from environmental research that society needs, and the underpinning research challenges over the next decade to deliver them.

MEMBERS

CSIRO(Australia), BMWF(Austria), FAPESP(Brazil), NSERC(Canada), NSFC(China), EC, ANR(France), BMBF/DFG(Germany), MoES(India), MEXT/JST(Japan), RCN(Norway), NRF(South Africa), NERC(UK), NSF(USA), ICSU, ISSC

PRIORITY RESEARCHES

- Coastal vulnerability
- Freshwater Security
- Ecosystem Services
- Carbon Budgets
- Most vulnerable societies

Adaptation

Earth Observation, Projection, Integration

Earth Observation

- Monitoring the global temperature, concentration of Greenhouse gases, soil moisture, forest and land use, precipitation, three-dimensional distribution of cloud and aerosol by earth observing satellites.
- Observing the ocean, land and atmosphere by research vessels, buoy etc.

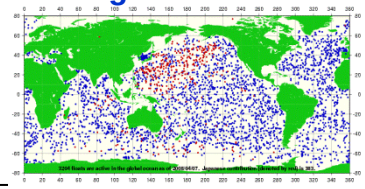
①Satellite observation data

Satellite remote sensing

②Ocean Observation data

Triton buoy

Argo float



③Land observation data

Moisturization of Siberian Area

Projection

- Generating projection information applicable to adaptation using the Earth Simulator which is one of the world highest performance super computers

Earth Simulator

Integration

- Providing the scientifically and socially valuable information by processing various kinds of earth observation data to foreign or domestic institutes

DIAS

Promotion of data use/sharing

Overseas Institutes

Observation based on needs

Contribution to social needs

Needs

Climate Change, Water resource management, Prevention or reduction of disasters

Weather, Energy, Agriculture/Desert, Ecology, Biodiversity, infectious disease

Adaptation

Earth Observation Missions

Advanced Land Observing Satellite-2 (ALOS-2)

Launch：2013(FY)
Missions：Global Land monitoring (Radar)

Greenhouse gases Observing SATellite (GOSAT)

Launch: 2009.1.23
Mission：Greenhouse Gases Monitoring （CO_2 、CH_4）

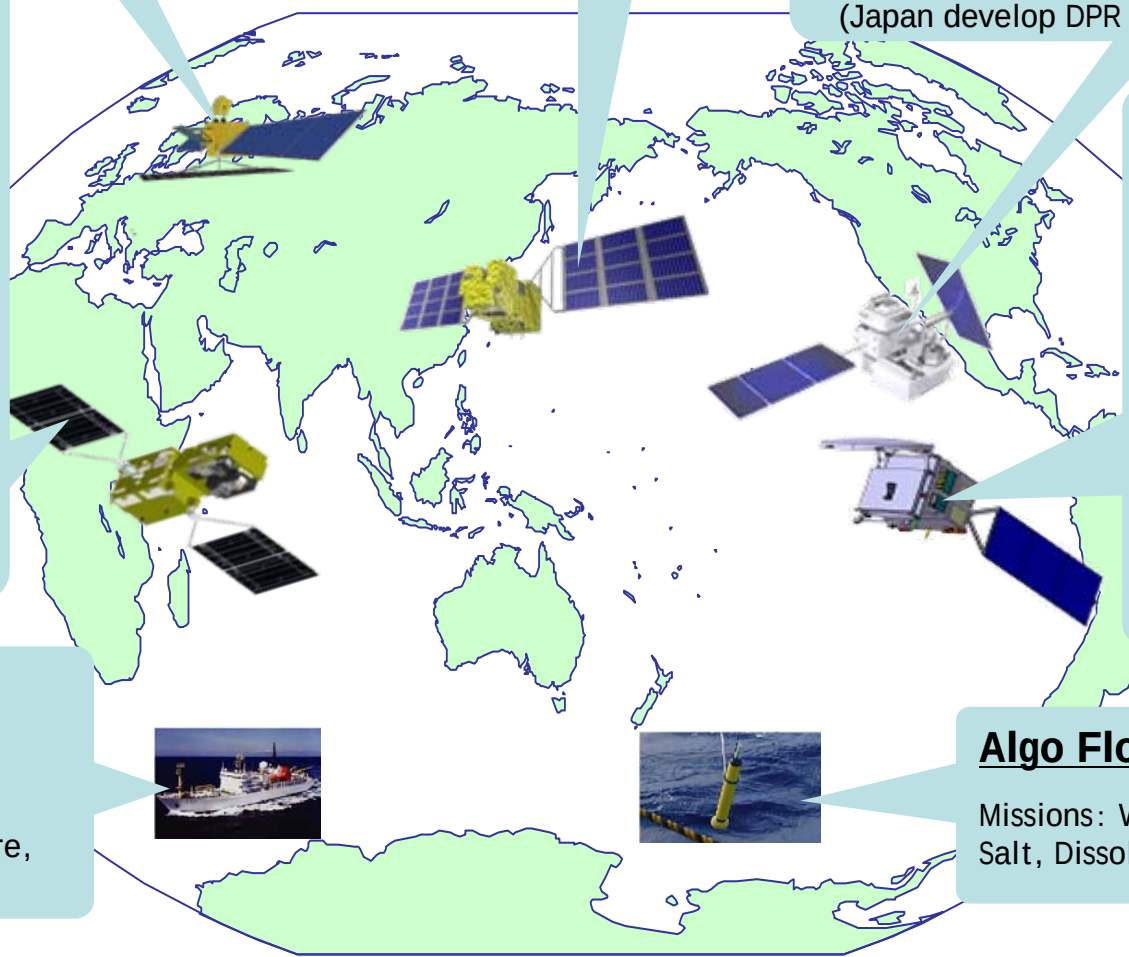
Global Precipitation Measurement (GPM)/Dual-frequency Precipitation Radar (DPR)

Launch：2013(FY)
Mission：Global Precipitation Monitoring
(Japan develop DPR on board GPM)

Global Change Observation Mission（GCOM）

＜GCOM－W＞
Launch：2012(FY)
Mission：Global Sea Surface Temperature, Precipitation, Sea Ice etc

＜GCOM－C＞
Launch：2014(FY)
Mission：Global Cloud, Moisture, Vegetation etc



EarthCARE/ Cloud Profiling Radar（CPR）

Launch:2013(FY)
Mission：cloud and aerosol particles observation
(Japan develop CPR on board ESA's EarthCARE mission.

Oceanographic Research Vessel M/V Mirai

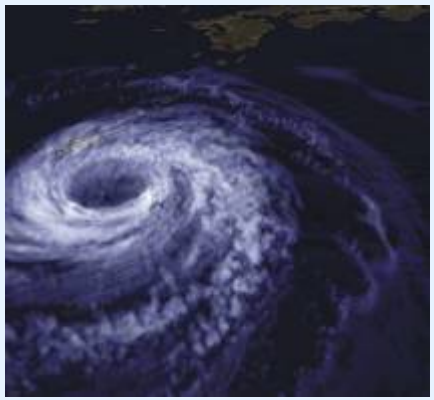
Missions: Water temperature, Salt, Current Speed etc

Algo Floats

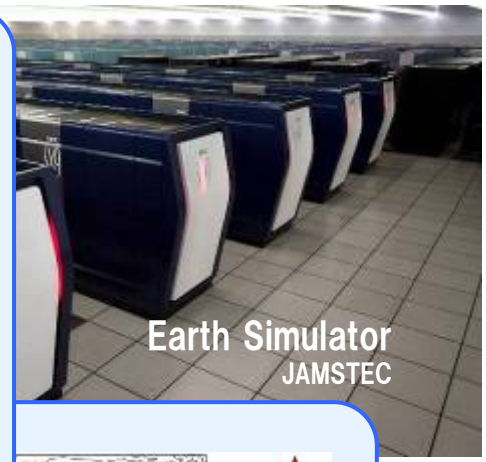
Missions: Water temperature, Salt, Dissolved oxygen etc

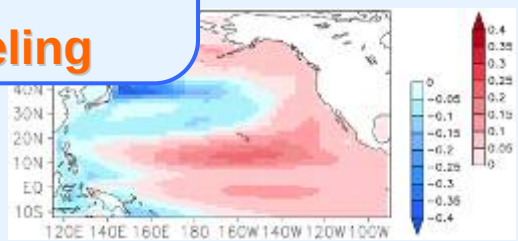
Adaptation

Innovative Program of Climate Change Projection for the 21st century (KAKUSHIN Program)

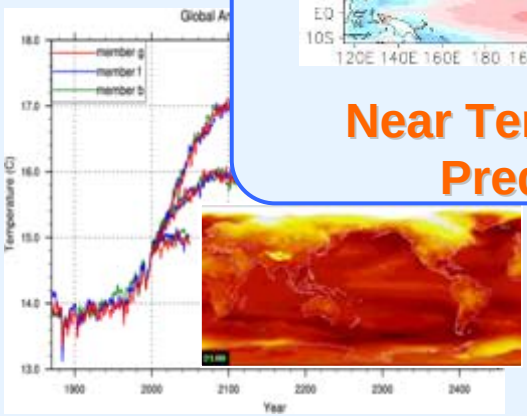


Cloud Modeling

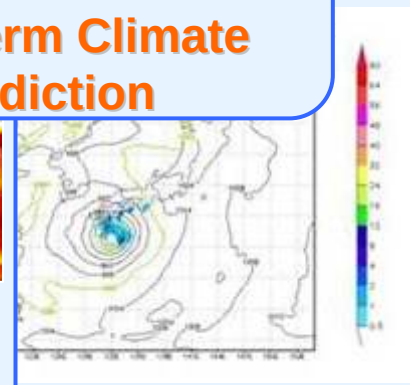




Near Term Climate Prediction



Long Term Global Change Projection



Extreme Event Projection

Participating groups and their studies

- ***Long-term global environmental projection***
  − Japan Agency for Marine-Earth Science and Technology (**JAMSTEC**) et al.
- ***Near-term climate prediction***
  - Atmosphere and Ocean Research Institute of the University of Tokyo et al.
- ***Extreme Event Projection***
  - Meteorological Research Institute (MRI) et al.
- ***Cloud Modeling***
  - Hydrospheric Atmospheric Research Center, Nagoya University
- ***Subgrid-Scale Parameterization***
  - Department of Earth and Planetary Science, the University of Tokyo

Program plan

- ***A 5-year initiative (FY 2007-2011)*** by the ***MEXT*** (Ministry of Education, Culture, Sports, Science and Technology) launched in April 2007
- The Program is to follow-up and develop the ***"Kyo-sei" Project (FY 2002-2006)***
- The ***Earth Simulator*** (to be updated) be further utilized.
- The Program intends to ***contribute to the possible AR5.***
- ***Coordination*** *with studies outside the Program in impact, adaptation and response strategies to be closely kept.*

Adaptation Innovative Program of Climate Change Projection for the 21st century (KAKUSHIN Program) ～ Latest Findings ～

- **Long-Term Global Change Projection ：**

  CO2 emission rate from fossil fuels required to realize RCP2.6 concentration scenario have to be almost zero or negative in the latter half of 21st century.

- **Near-Term Climate Prediction ：**

  With various prediction experiments, we found that some of decadal climate changes are predictable for lead time more than 5 years.

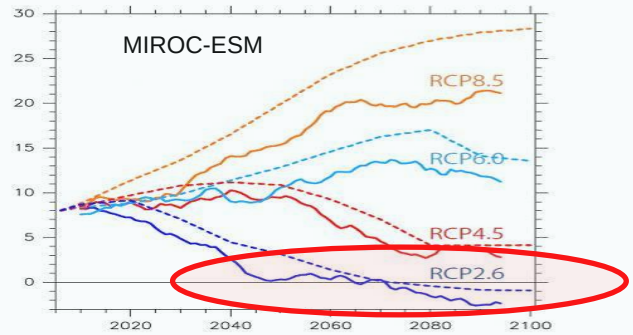
- **Extreme Event Projection ：**

  We found an eastward shift of typhoon tracks and an increase in maximum surface wind velocity approaching coastal regions.

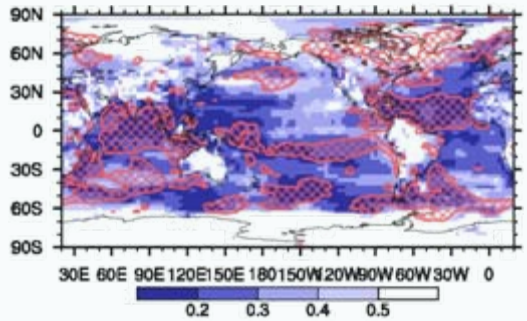
- **Contribution to IPCC AR5 ：**

  The experiments follow the CMIP5 protocol, and the outputs will be distributed through the CMIP5 servers.

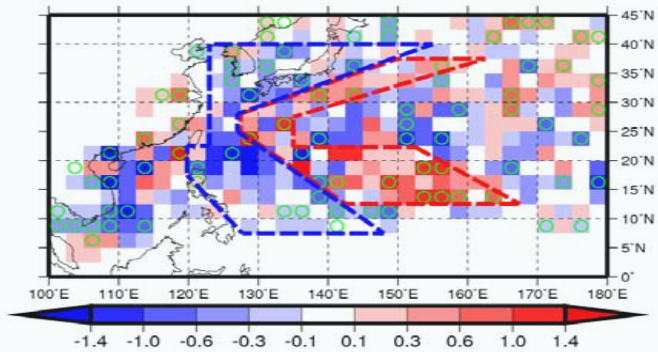
CO2 emission rate from fossil fuels required



RMS errors of 3-7-yr-lead prediction



Typhoons approaching land【2075-2099 vs 1979-2003】



Adaptation

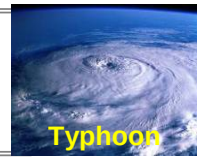
Program for Risk Information on Climate Change

Back Ground

- Japan has suffered frequently from natural disasters. (typhoon, earthquake, flood, landslip, etc.)
- Climate change increased risks preventing sustainable development.
- It is important to set the target value based on scientific researches in frameworks on climate change.

Mission

Generating a basic information regarding climate change risk management with climate change projection methods.



Program Contents

Ⅰ. Global environmental change projection, detection and attribution

- Precise prediction of climate change over the next some decades

Ⅱ. Climate change projection contributing to stabilization target

- Long-term climate projection considering carbon-nitrogen cycle and based on emission scenarios

Ⅲ. Research for risk information on climate change

- Probabilistic projection of climate change
- Concerning the worst case scenario

Ⅳ. Research for climate change impact assessment

- Impacts of climate change on issues regarding sustainable development
- Contribution to cost benefit analysis

Ⅴ. International collaborative research for climate change risks

- Providing risk information and capacity building to vulnerable nations

- **Generating risk information by sophisticating climate change projection and impact assessment methods**
- **Contributing to the solution of global issues through international collaborative research**

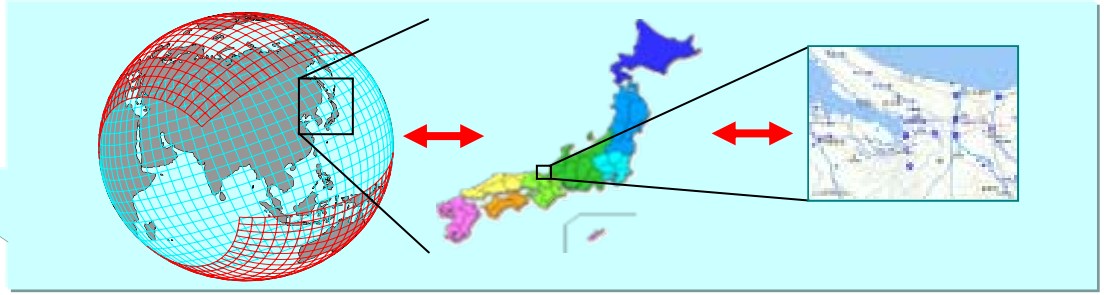
Adaptation

Climate Change Adaptation Strategy Initiative

Research Program on Climate Change Adaptation (RECCA)

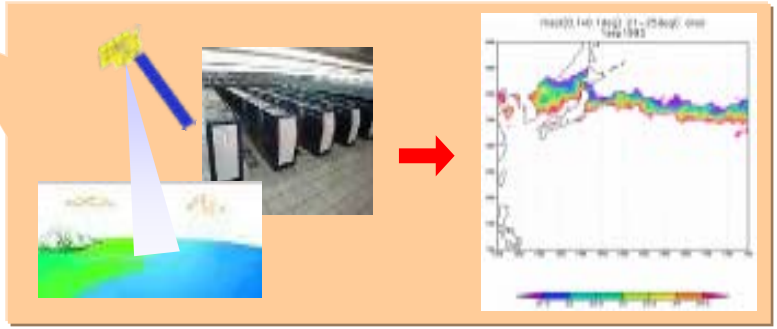
Advanced Data Downscaling Methods

It is to develop multiple downscaling methods including dynamic and statistical ones, and new forward-thinking techniques. The goal is to take advantage of global climate change projection model for local-scale one and for impact assessments.



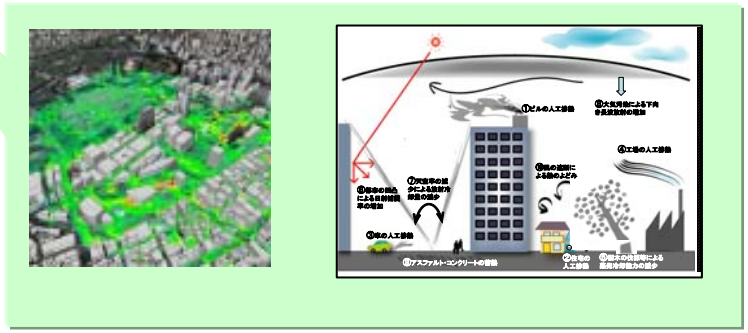
Data Assimilation Technology

It is to develop an assimilation technology for observation data to reduce uncertainty of the simulation model. The model supplies scientific knowledge to review regional climate change impact assessment and adaptation



Simulation Technology for Climate Change Adaptation

R&D for climate change adaptation simulation technology for regional climate change impact assessments and adaptation measures planning.



Data Integration and Analysis System (DIAS)

The mission of DIAS is to produce the scientifically and socially valuable information by integrating and analyzing earth observation data, numerical model outputs and socio-economic data effectively.

■ Construction of database collaboration in ministries, institutes etc.
■Clearinghouse function for earth observation data
■Storage function for large scale data such as earth observation data
■Empirical research for data integration and analysis

Thank you very much!

有り難うございました。謝謝！고마웠습니다.

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