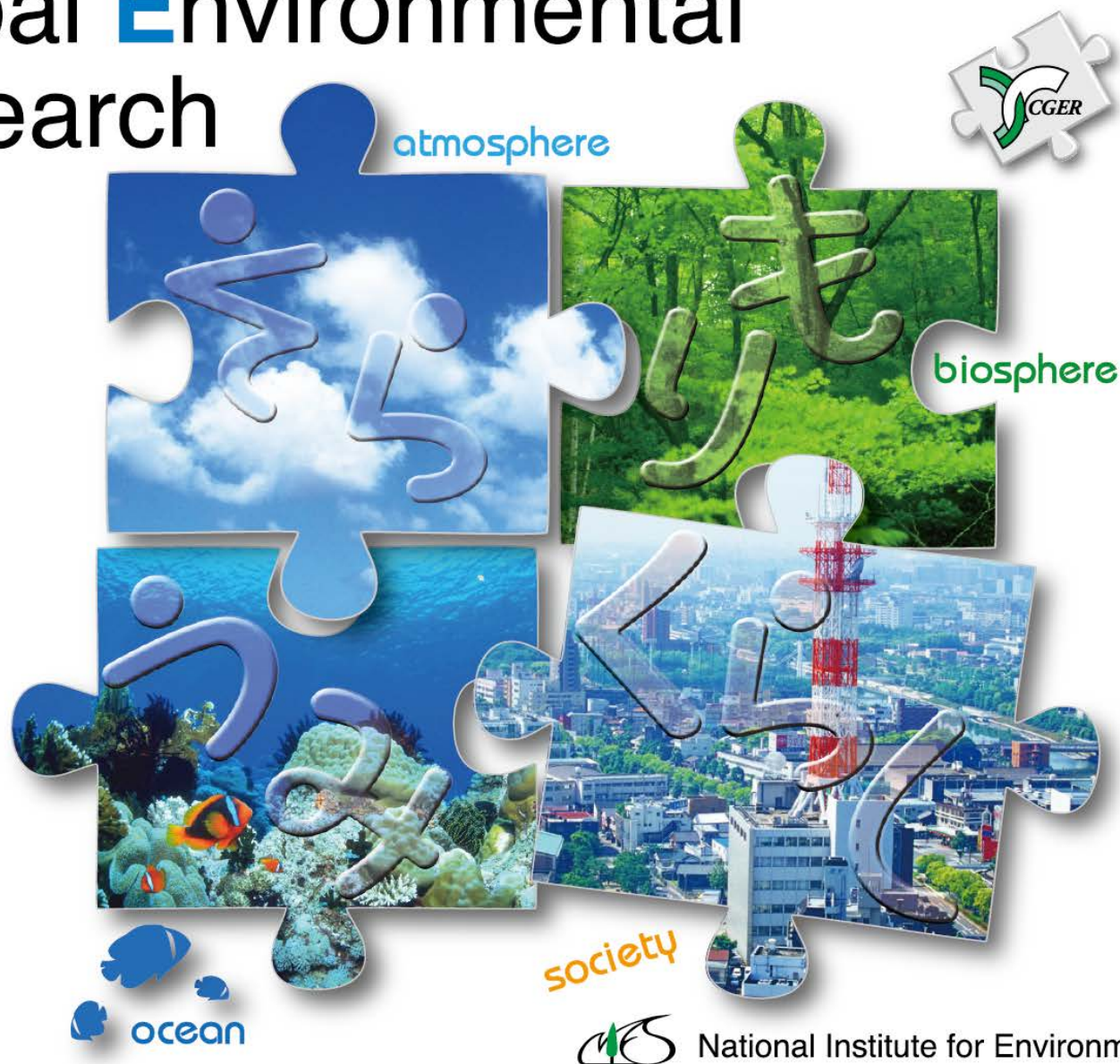


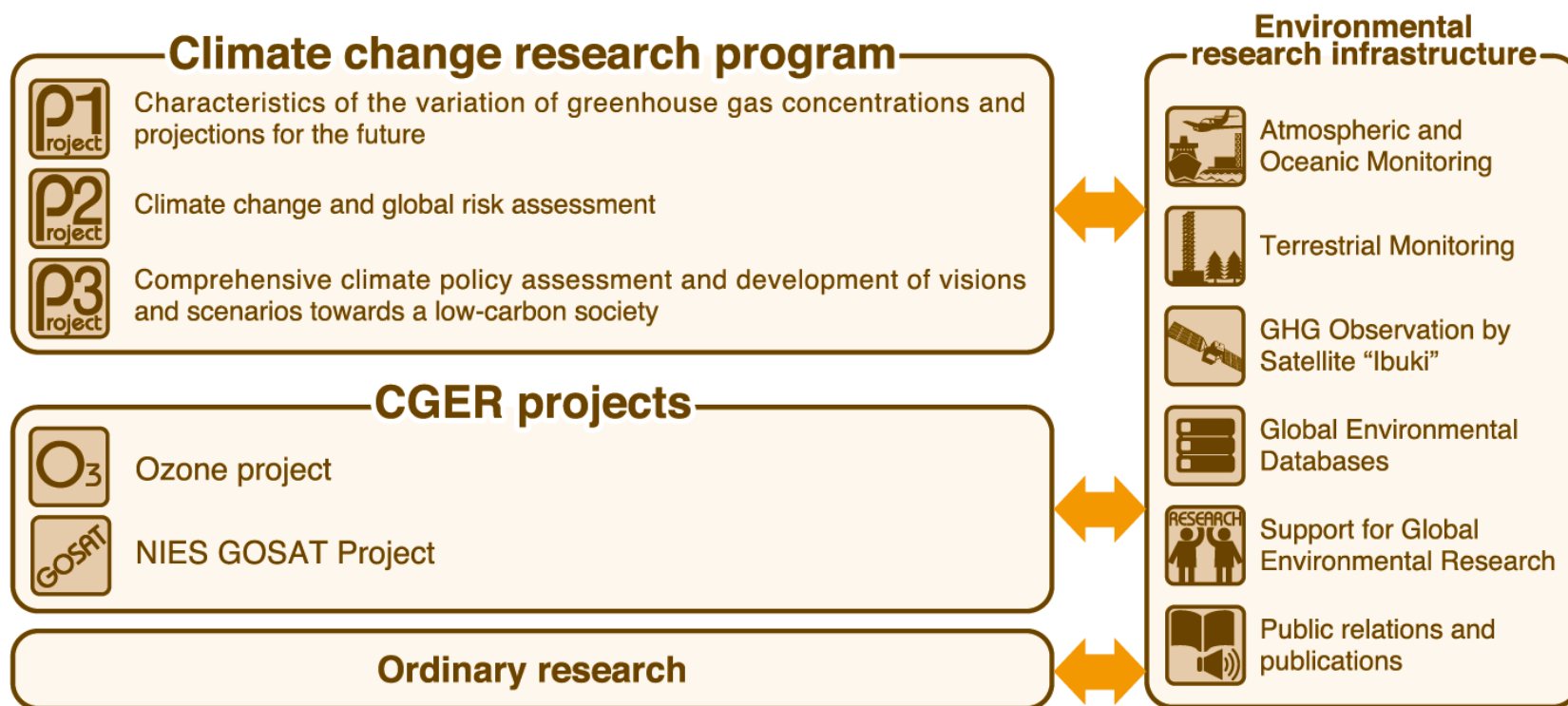
Center for Global Environmental Research





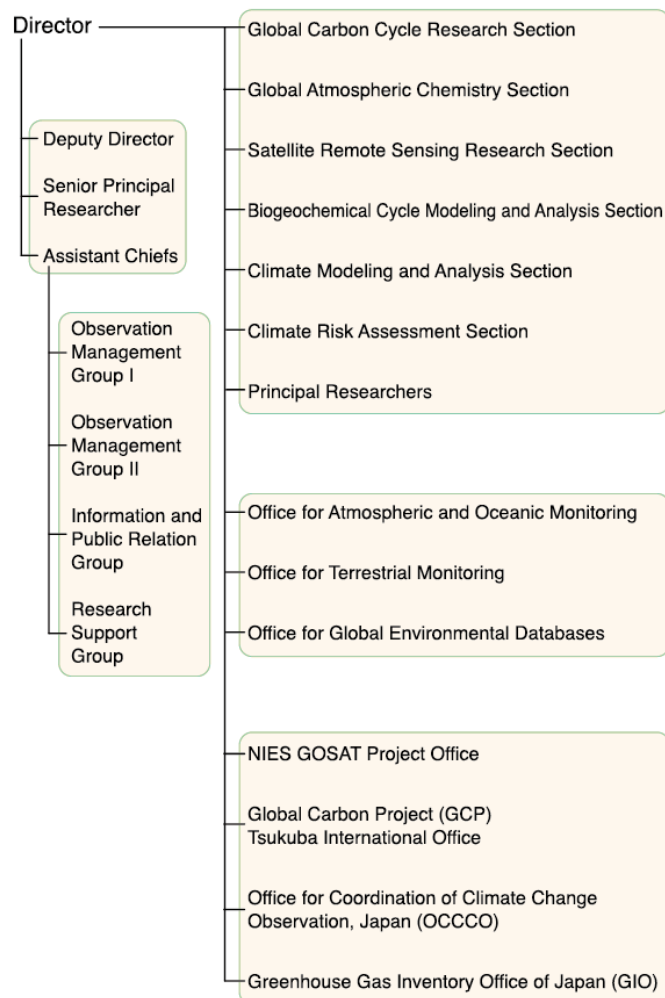
Mission / Research and other activities

As well as conducting research aimed at investigating the global environmental system and clarifying the factors which influence climate change, the Center for Global Environmental Research (CGER) performs climate risk assessments and future climate change projections alongside several other related research projects. In addition, CGER conducts research on climate policies for environmental preservation and actively contributes to finding solutions for the protection and conservation of the environment.





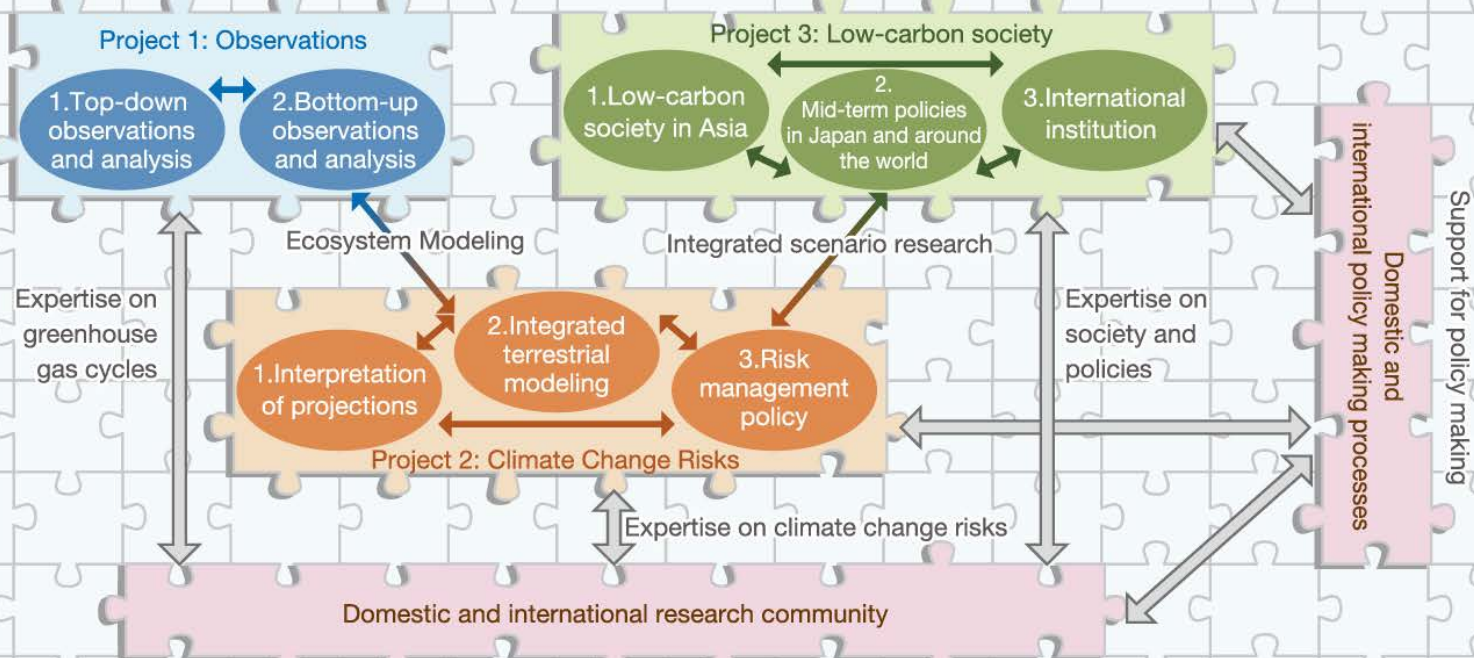
Organization / Time line



1974	■ National Institute for Environmental Studies (NIES) established
1990	■ NIES restructured ■ Center for Global Environmental Research (CGER) established
1992	■ Supercomputer system installed ■ Hateruma Global Environmental Monitoring Station completed
1993	■ Monitoring of greenhouse gases by aircraft (Siberia) and freight ships (Pacific Ocean) starts
1994	■ Cape Ochi-ishi Global Environmental Monitoring Station completed
1996	■ Data Handling Facility for ILAS and RIS starts data processing
1998	■ Comprehensive Stratospheric Monitoring in Rikubetsu, Hokkaido , begins
1999	■ AsiaFlux Network activities initiated
2000	■ Tomakomai Flux Research Site starts observation
2001	■ NIES becomes independent administrative institution, restructured ■ The 1st Mid-Term Plan commences ■ CGER moves to Climate Change Research Hall ■ Teshio Carbon Cycle and Larch Growth (CC-LaG) Site starts observation
2002	■ Greenhouse Gas Inventory Office (GIO) of Japan established
2004	■ Global Carbon Project (GCP) Tsukuba International Office established ■ Greenhouse Gases Observing Satellite (GOSAT) Research Team established
2005	■ Observation of greenhouse gases using commercial airlines commences
2006	■ Fuji Hokuoku Flux Observation Site starts observation ■ CGER restructured to 4 research sections and 3 offices as a result of NIES reform ■ The 2nd Mid-Term Plan commences ■ NIES GOSAT Project Office established ■ Office for Coordination of Climate Change Observation (OCCCCO), Japan established
2007	■ Supercomputer system renewed
2009	■ Launch of GOSAT "Ibuki"
2011	■ CGER restructured to 6 research sections and 3 offices as a result of NIES reform ■ The 3rd Mid-Term Plan commences

Climate change research program

Clarifying the variation mechanisms of greenhouse gases,
Assessment of climate change impacts and risks, Climate policy assessment



We conduct research in order to assemble and disseminate scientific knowledge with the aim of finding solutions to various climate change problems.

We implement research with an emphasis on observing the global variation in greenhouse gases in the atmosphere, clarifying historical climate change and predicting future change, as well as assessing the global impact of climate change risks. We also study international adaptation and mitigation policies.

Project 1

Based on comprehensive model analysis from integrated observations using ground-based observation sites, ships, aircraft and satellite, with an emphasis on Southeast Asia, we seek to clarify the characteristics of the changes in concentration of greenhouse gases, which are known to cause global warming. In doing so, we not only gain knowledge about changes in anthropogenic emissions and natural sinks, but also contribute to improving the accuracy of projections of future GHG concentrations and climate change impacts.

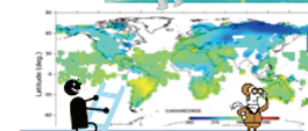
Sub-theme 1: Estimations of global flux distributions

Top-down estimations of GHG fluxes

CO₂, CH₄, N₂O
O₃, F-gas, SPM



Satellite



Ground-based monitoring stations

Integrating atmospheric data

Improving inverse modeling

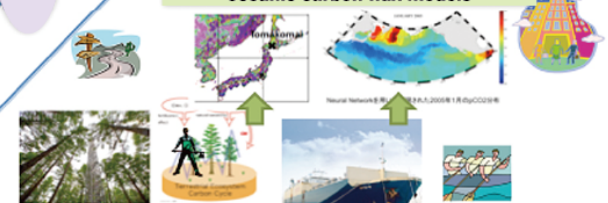


Information on emissions reduction

Estimating carbon fluxes from natural and anthropogenic sources

Improving the accuracy of flux distribution estimates

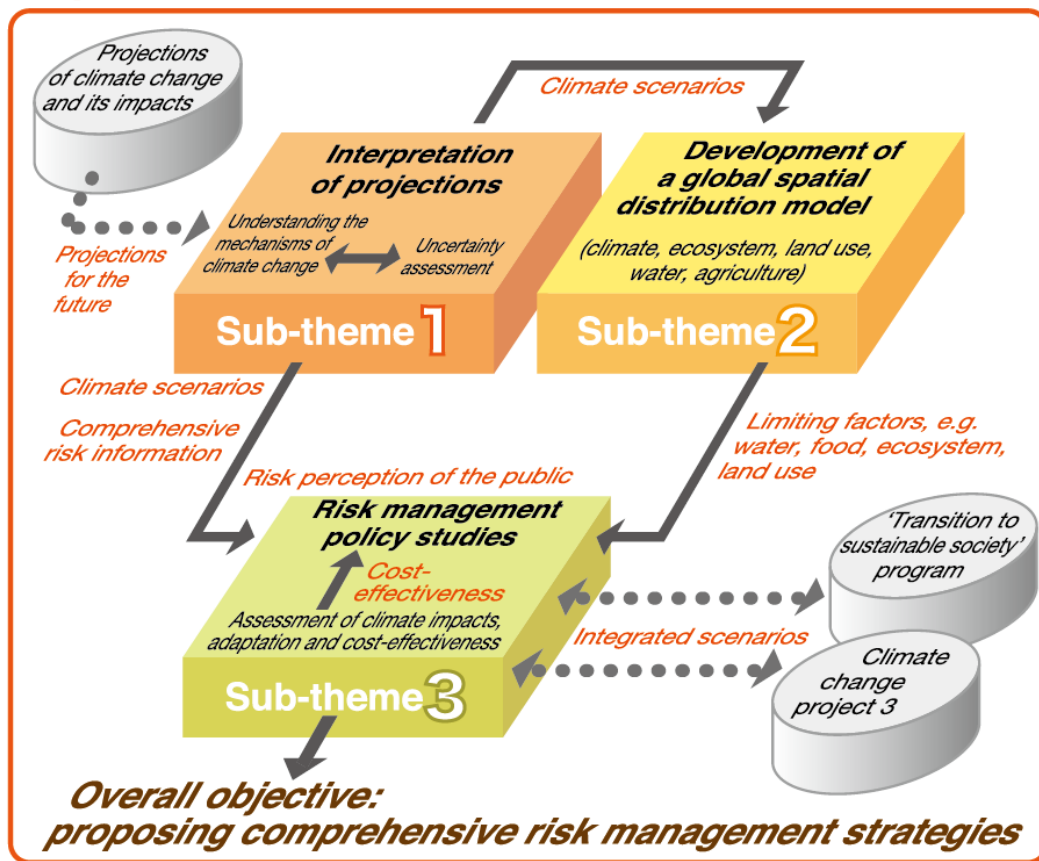
Improving terrestrial and oceanic carbon flux models



Sub-theme 2: From field observation to modeling
Bottom-up estimation of GHG fluxes

Characteristics of the variation of greenhouse gas concentrations and projections for the future

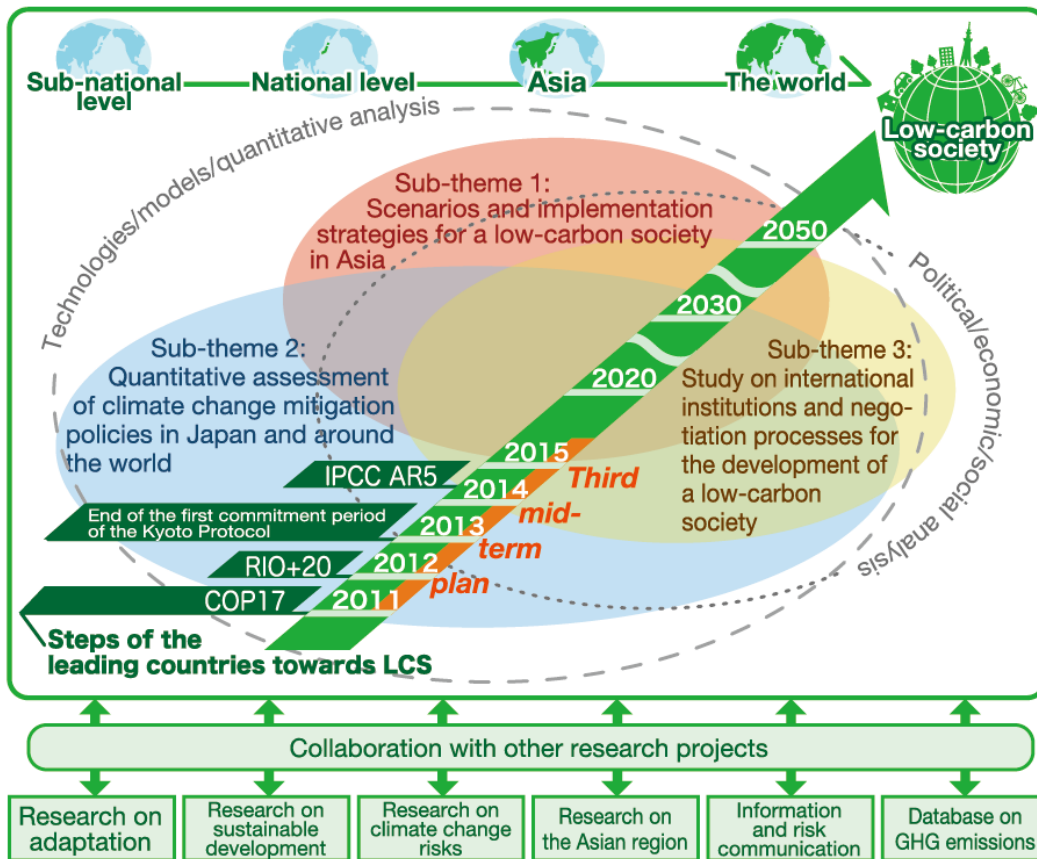
Project 2



Based on the results of projections on climate change and its impacts made by NIES and other research institutes, we interpret the projections and conduct research which will assist in providing appropriate risk information. We also undertake research on global scale modeling with an emphasis on various terrestrial elements, and perform integrated analysis of climate change impacts on these elements as well as those factors that limit the efficacy of climate change policies. Furthermore, in addition to collating the available knowledge on climate change impacts and the cost-effectiveness of countermeasures such as adaptation and geo-engineering, we also carry out research on risk management policy.

Climate change and global risk assessment

Project 3

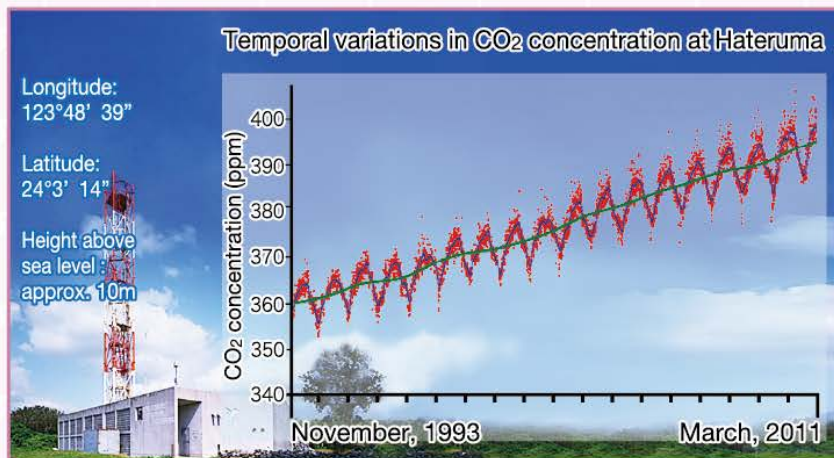


Moving towards a low-carbon society, we aim to propose mid- and long-term visions, scenarios and policy options which will become necessary in the future, not only for Japan, but also for Asia and the rest of the world. For this purpose, we analyze different assessment schemes for domestic and international political frameworks, and develop an integrated assessment model for quantification of future scenarios on climate change mitigation and adaptation. We also conduct analysis of major countries' decision making processes and international negotiations relating to climate change policies.

Comprehensive climate policy assessment and development of visions and scenarios towards a low-carbon society

Strategic monitoring of the global environment

Ground-based monitoring of greenhouse gases



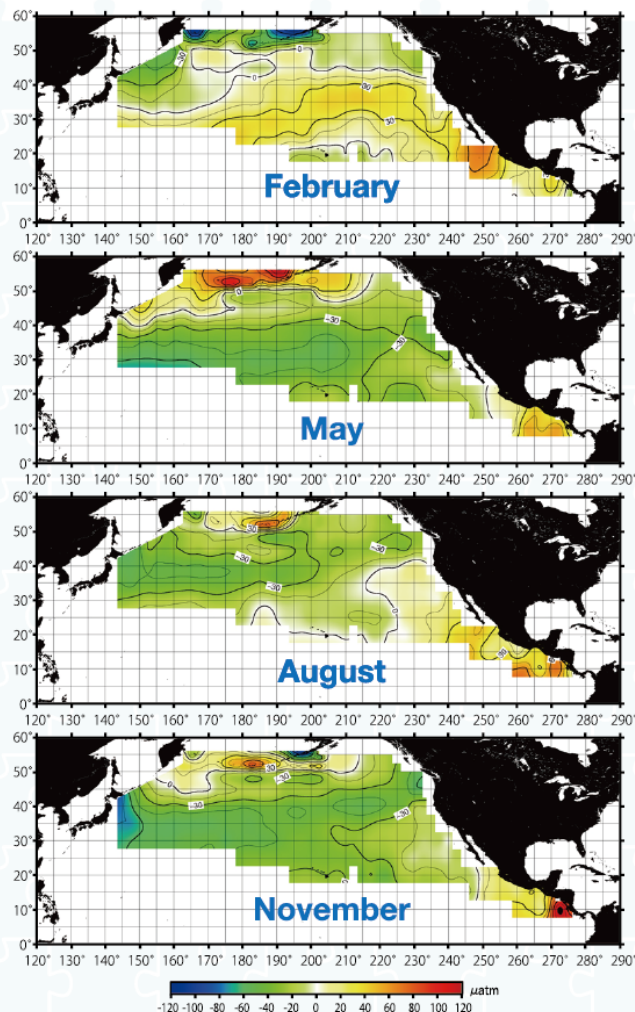
We carry out long-term, high-frequency observations of greenhouse gases at our Cape Ochi-ishi and Hateruma monitoring stations. Taking advantage of these fixed monitoring platforms, we can concurrently observe various atmospheric components and develop observation techniques.



Cape Ochiishi

Hateruma

波照間ステーション
地
上落石ステーション



Through monitoring of the partial pressure of CO_2 (pCO_2) in the sea surface water on the Northern Pacific and Japan-Australia routes, we clarify the distributions and long-term variations of the difference in pCO_2

between the ocean and the atmosphere. We carry out simultaneous atmospheric observations of the longitudinal distributions and temporal variations of GHGs and related gases. In addition, on the Asian ship route we investigate the temporal variation and the distribution of atmospheric tracer gas emissions from Asian countries.

PYXIS ▶

Car freighter, Toyofuji Shipping Co., Ltd.



◀ Difference of pCO_2 between the ocean and the atmosphere in February, May, August and November averaged through 1995-2006. Positive value denotes emission from ocean and negative value denotes absorption.

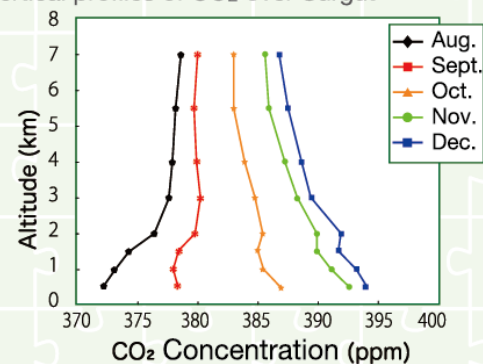
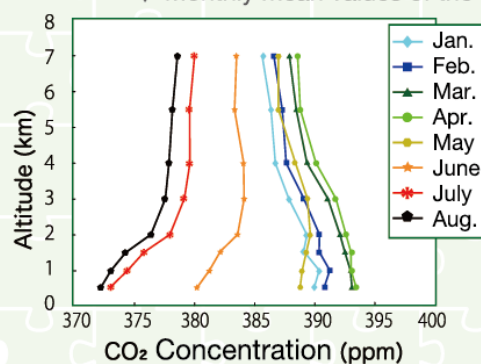
定期日本
船舶アジア
北太平洋

We carry out monitoring of vertical profiles and temporal variations of greenhouse gases and their isotope ratios in the free troposphere over Siberia in order to understand the role of terrestrial ecosystems in the global carbon cycle.

Monitoring sites in Siberia ▶



▼ Monthly mean values of the vertical profiles of CO₂ over Surgut

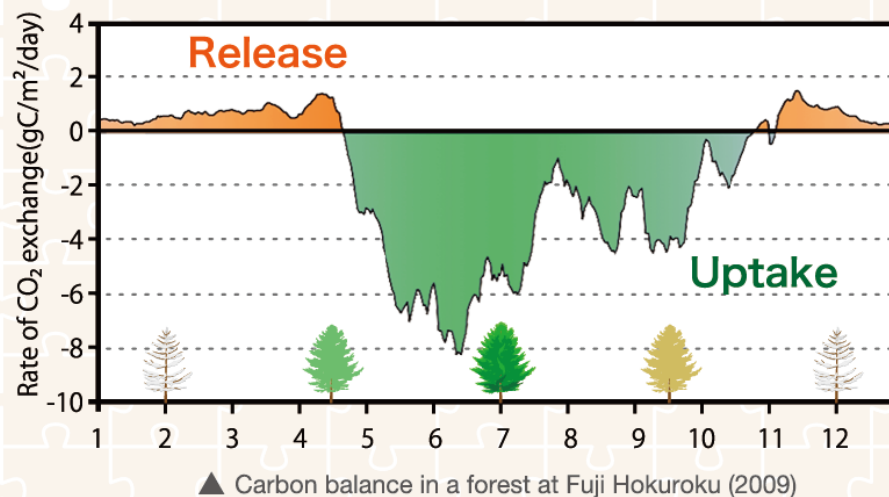


スルゲート
ヤクーツク
シベリア上空
ノボシビルスク

Aircraft monitoring of greenhouse gases over Siberia

FLUXカ

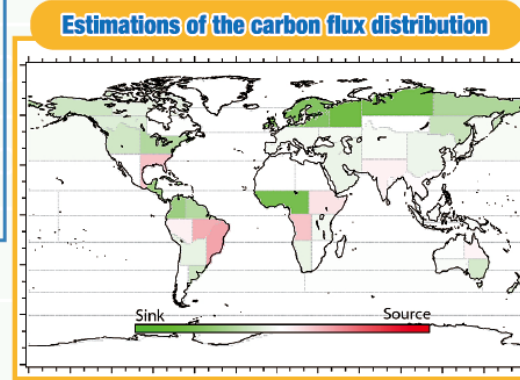
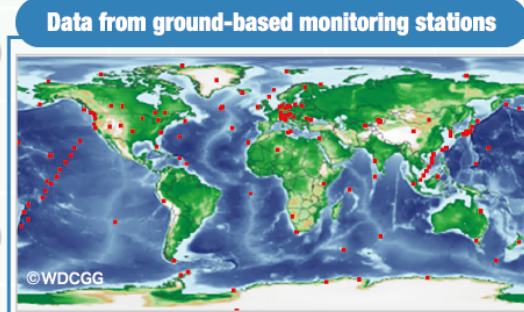
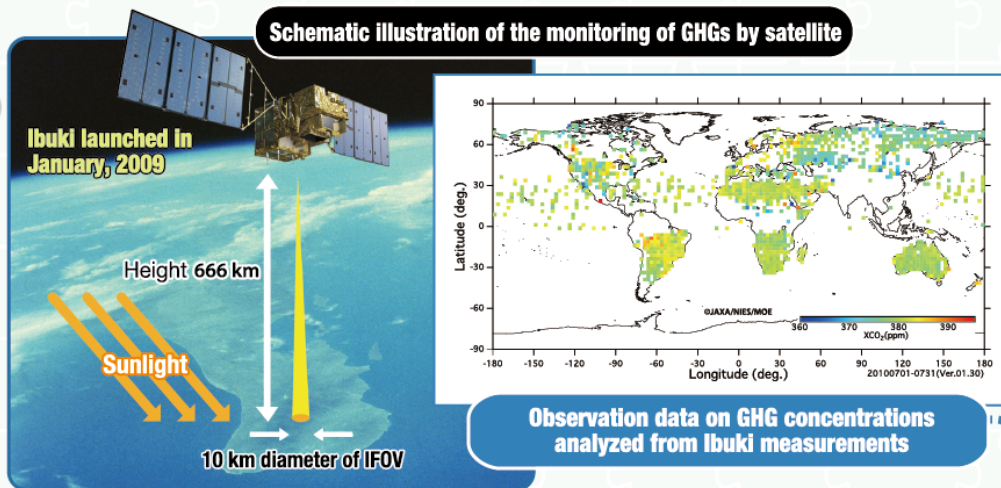
ラ天塩
林マ苦小牧
ツ富士北麓



▲ Monitoring tower

We conduct monitoring of CO₂ and other greenhouse gas fluxes in larch forests at the Fuji Hokuroku, Teshio and Tomakomai monitoring sites in Japan. We also monitor the carbon sequestration processes in forest ecosystems by means of direct observation from observation towers and by indirect means using spectral reflection. Furthermore, by standardizing observation methods and facilitating data distribution, we contribute to the strengthening of the Asian monitoring network.

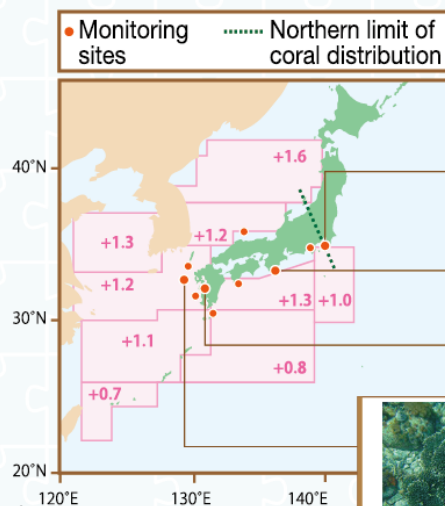
Global greenhouse gases observation by satellite



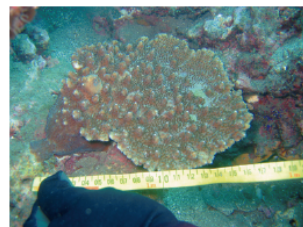
Through the analysis of monitoring data collected by the Greenhouse gases Observing SATellite (GOSAT) called Ibuki, we work to refine the global distribution and seasonal and annual variation of CO₂ and CH₄ concentrations as well as terrestrial GHG sources and sinks in sub-continental regions.

宇宙から
観測する
GOSAT

Through monitoring of the water temperature and the distribution of reef coral and its symbiotic microalgae zooxanthellae, whose northern latitudinal limit is Japan, we assess the impact that rising water temperature, caused by global warming, has on marine life. Furthermore, with the help of automatic cameras placed in alpine areas, as well as aerial pictures, we monitor and assess how climate change affects the seasonal change and the spatial distribution of alpine flora. We also engage in standardizing observation methods and providing data to the general public.



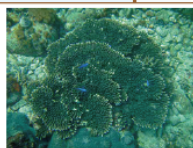
Rising water temperature around Japan in the past 100 years (source: Japan Meteorological Agency) and northward range expansion of corals



Acropora solitaryensis community moving northwards (Tateyama City, Chiba prefecture) (Photo: Shinji Hagiwara)

The appearance of 20 new species has been reported in Kushimoto, Wakayama Prefecture (Nomura et al., 2008)

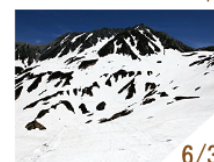
The expansion of Acropora solitaryensis community has been confirmed in Amakusa, Kumamoto Prefecture (Nojima & Okamoto, 2008)



Acropora hyacinthus (left) and Acropora muricata (right) moving northwards (Goto, Nagasaki prefecture) (Photo: Kaoru Sugihara)

高山帯植生分布 サンゴ共生する褐虫藻

Seasonal change on Mt. Tateyama photographed from a fixed spot (2010)

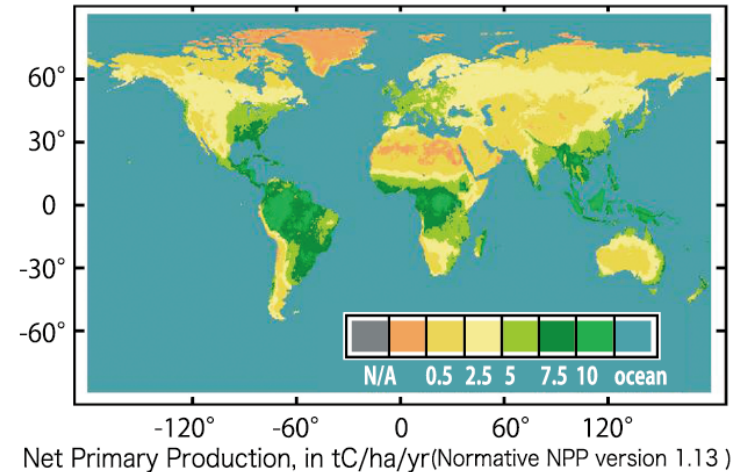


Global Environmental Database

In addition to developing and maintaining databases comprised of data from natural sciences such as global environmental monitoring, as well as social and economic sciences related to climate change, CGER is engaged in developing analysis tools and improving the support system in order to facilitate the efficient use of these databases.

Carbon Sink Archives ▶

Database allowing an inter-comparison of terrestrial CO₂ flux estimations by different models



Supporting Global Environmental Research

As well as operating various offices and secretariats for global environmental research and supporting research carried out at NIES and other research institutes using the supercomputer system, CGER promotes collaboration among researchers. CGER also facilitates the efficient dissemination of research results, and contributes to raising awareness about environmental problems among the public.



▲ The Summer Open House
Event: Laboratory tour



▲ Supercomputer
(NEC SX-8R/128M16)



NIES GOSAT Project Office

The NIES GOSAT Project Office carries out routine processing of monitoring data from the Greenhouse gases Observing SATellite (GOSAT) “Ibuki”, performs data validation in order to assess and improve the quality of data, and provides data products to registered researchers and to the public.

<http://www.gosat.nies.go.jp/>



Global Carbon Project (GCP) Tsukuba International Office

The GCP is engaged in developing an international research network and program on carbon cycle research and carbon management.

<http://www.cger.nies.go.jp/gcp/>



Office for Coordination of Climate Change Observation, Japan (OCCCCO)

The OCCCCO, the secretariat of the Japanese Alliance for Climate Change Observation (JACCO), supports the activities of JACCO to promote cooperation among organizations, ministries and institutions with the aim of developing a comprehensive climate change observation system in Japan.

<http://occco.nies.go.jp/>



Greenhouse Gas Inventory Office of Japan (GIO)

GIO engages in the preparation of Japan's national greenhouse gas (GHG) inventory, as well as assists developing countries in Asia primarily by capacity building activities in improving their national GHG inventories.

<http://www-gio.nies.go.jp/index-j.html>