

Research on Development of Integrated Scenarios on Climate Change and Assessment of Climate Policies Using Asia-Pacific Integrated Model

(FY2008-2010)

Principal Investigator : **Toshihiko MASUI**, National Institute for Environmental Studies (NIES) <Bc-088>

NIES, Kyoto University, Mizuho Information & Research Institute, Inc.

This study develops the global and national scale integrated scenarios describing future socioeconomic activities, greenhouse gas emissions, climate change, and climate change impacts by using the improved Asia-Pacific Integrated Model. The long

term global scenarios reflect the Asian developing countries' perspectives. The outcomes contribute to promotion of the climate policy in Japan and other Asian countries.

Quantification of above- and below-Ground Forest Carbon Budget Using Airborne Laser Altimetry

(FY2009-2011)

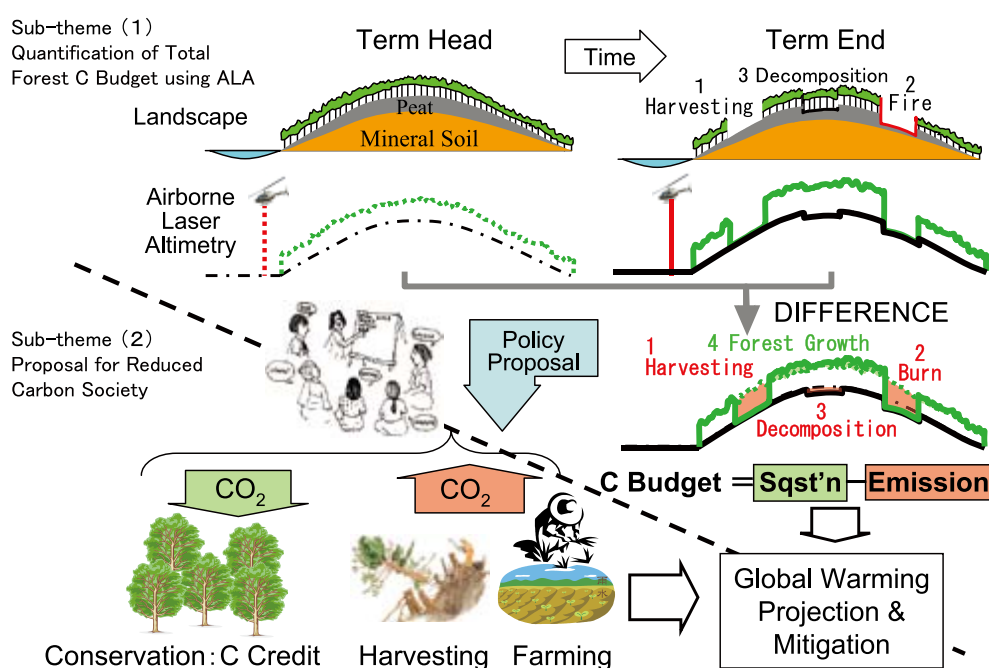
Principal Investigator : **Tatsuo SWEDA**, Ehime University

<B-091>

Ehime University, Waseda University

The objectives of this research are to quantify the forest carbon budget using Airborne Laser Altimetry (ALA) and to apply the results to forest carbon management. The high-frequency and precision measurement of forest canopy height by ALA enables us an accurate estimate of forest carbon stock, the multi-temporal measurement of which results in forest carbon budget. The target study

areas are degraded swamp forest of Borneo and boreal forest of northwestern Canada, where massive carbon emission is either considered underway or suspected in near future due respectively to devastation by aborted paddy reclamation and warming-induced melting of permafrost, and its exact quantification and early detection are much sought after.



Impact of Integrated Effect of Land Cover/Use Change and Aerosol Forcings on Climate Change in Asia

(FY2009-2011)

Principal Investigator : **Tetsuzo YASUNARI**, Nagoya University

<B-092>

Nagoya University, Japan Agency for Marine-Earth Science and Technology, Tokyo Metropolitan University

Impacts of agriculture-induced nitrate aerosols and Secondary Organic Aerosols (SOA) are important for Asian monsoon climate. In addition, Volatile Organic Compounds (VOCs) from vegetation are likely to have large impact on aerosol production and related cloud/precipitation processes over Asian

monsoon region. This study focuses on unravelling these integrated vegetation-aerosol processes using a full-aerosol process model coupled with CHASER, an atmospheric chemistry climate model, and to validate these effects using high-resolution climate data analysis in the past several decades or longer.

Development of a Next Generation System for Monitoring the Atmospheric Environment and Estimating the Emission Inventory of Related Species

(FY2009-2011)

Principal Investigator : **Toshiki IWASAKI**, Tohoku University

<B-093>

Tohoku University, Meteorological Research Institute, Japan Agency for Marine-Earth Science and Technology, National Institute for Environmental Studies

This research project aims at developing a four Dimensional Data Assimilation (4DDA) system for minor constituents, such as O₃, CO₂ and aerosols, based on the chemical transport models. 4DDA is a technique, which is widely used for weather prediction, optimally uses observation data to estimate the atmospheric states. The core system is composed of

Ensemble Kalman Filter to cope with the difficulty associated with diffusive transport and chemical reactions. Through the data assimilation processes, information is obtained to improve chemical transport model as well. Final goal is to analyze concentrations of O₃, CO₂ and aerosols, and surface fluxes of CO₂ and aerosols.

Quantitative Studies on the Cycles of Some Global Warming Gases and Related Materials through their Isotopomers.

(FY2009-2011)

Principal Investigator : **Naohiro YOSHIDA**, Tokyo Institute of Technology

<B-094>

Tokyo Institute of Technology, National Institute for Environmental Studies, Sophia University, Japan Agency for Marine-earth Science and Technology

The aim of our research is to refine scientific understanding concerning global warming to be employed in the IPCC 5th Assessment Report. Researchers in atmospheric observation, isotopomer analysis,

isotopic fractionation theory and 3D chemical transport modeling in joint collaboration will apply isotopomer information to reveal the gas cycle linked to global warming with high accuracy and precision.

Transboundary Pollution in the Atmosphere, Oceans and Inland Environments such as International Rivers

Study on the Prediction of Acidification and Nitrogen Leaching in East Asia Ecosystems with a Catchments Scale Model

(FY2008-2010)

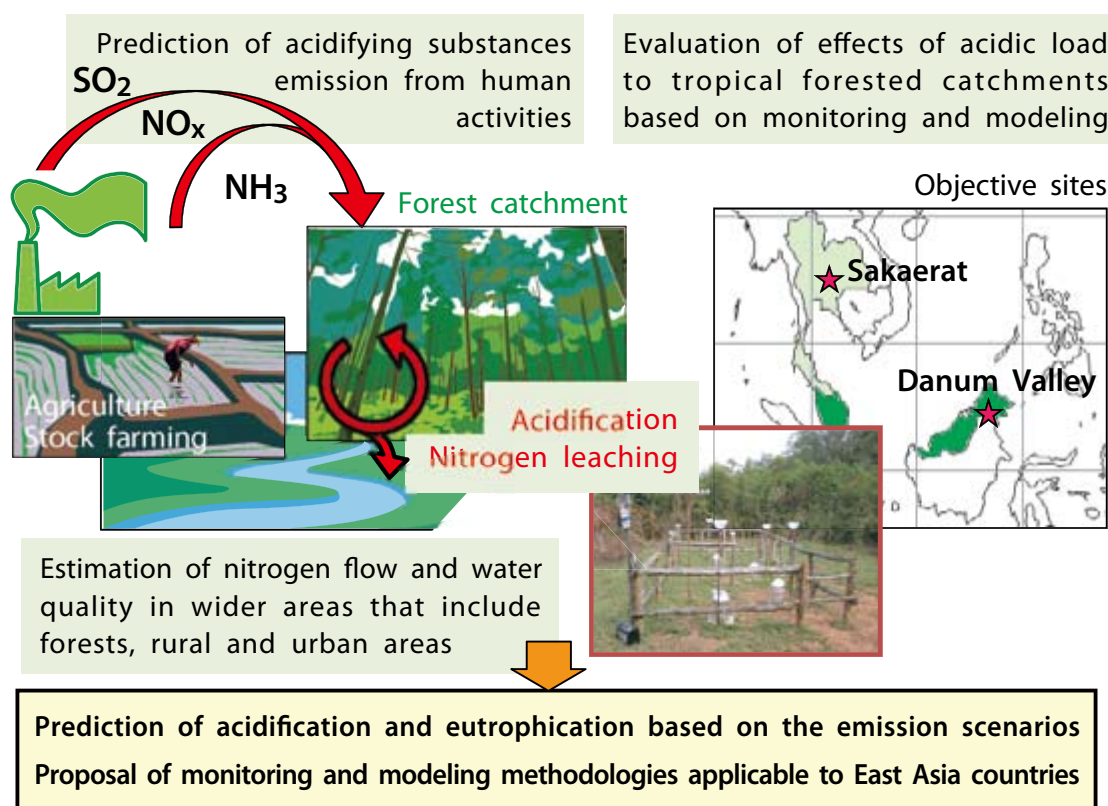
Principal Investigator : **Junko SHINDO**, National Institute for Agro-Environmental Sciences (NIAES)

<C-082>

NIAES, The University of Tokyo, Acid Deposition and Oxidant Research Center

In order to predict the acidification and nitrogen leaching of East Asian ecosystems, monitoring of input, internal cycle and leaching of acidic substances and their modeling are conducted in tropical catchments in Thailand and Malaysia. Land-use changes caused by food and biofuel production, etc., and induced changes in acidic deposition are taken into account. It was shown that the element cycle in the

forested ecosystems was strongly regulated by water dynamics in rainy and dry seasons, and that ammonia emission associated with agriculture contributed largely to the atmospheric nitrogen deposition in the objective area. This study will support EANET monitoring by providing basic data and an improved evaluation method, and will contribute to the air quality and ecosystem management in East Asia.



Study on Transboundary Pollution of POPs in Eastern Asia Region and its Countermeasures

(FY2008-2010)

Principal Investigator : **Masatoshi MORITA**, Ehime University

<C-083>

Ehime University, National Institute for Environmental Studies, United Nations University

The aim of the study is to prevent transboundary pollution by Persistent Organic Pollutants (POPs) from rapidly industrializing East Asian countries. Research project includes development of monitoring method, retrospective analysis for trend analysis, simulation model for understanding transport and fate, and preparation of scenario for pollution reduction in co-operation with scientists from Asian countries and United Nations.

Improvement of Kosa Forecasting Model Assimilated with the NIES-lidar Network Data and Health/Environment Effective Research for Attached Bio-Aerosols onto Kosa Particles

(FY2009-2011)

Principal Investigator : **Masataka NISHIKAWA**, National Institute for Environmental Studies (NIES) <C-091>

NIES, Meteorological Research Institute, Oita University of Nursing and Health Sciences, Kanazawa University

The mineral dust generated from arid areas in the interior of China and Mongolia is known as kosa aerosol (Asian mineral dust). In this study, a high quality assurance method and a system for real-time data processing by NIES-lidar system will be developed to monitor kosa events. Those lidar-network monitoring data should be useful to improve a forecasting system (MAGINGAR). Another objective is to reveal both respiratory health effect and natural environment influence by biological materials including bacteria mixed with kosa aerosols.

Research on the Impacts of Asian Dust on our Health and Environment

(FY2009-2011)

Principal Investigator : **Masao NASU**, Osaka University

<C-092>

Osaka University, Osaka Ohtani University

"Asian Dust" is a transportation of a large amount of soil particles originated from arid regions in China and Mongolia. Even in Japan, more than one million tons of dust particles are estimated to fall on the ground per year. One of the major public concerns on "Asian Dust" is whether Asian Dust particles are harmful to our health or not: "Can they be carrying any pathogenic microbes?", "Do they act as allergens?". We do not have enough scientific evidence and we have started to collect Asian Dust particles by an airplane to avoid contamination of soil particles from the ground. We analyze the collected dust particles from the view points of environmental microbiology and toxicology.

Studies on the Origin, Long-Range Atmospheric Transport and Photochemical Transformation of Organic Aerosols in East Asia and the North Pacific

(FY2009-2011)

Principal Investigator : **Kimitaka KAWAMURA**, Hokkaido University

<C-093>

Hokkaido University, National Institute for Environmental Studies, University of the Ryukyus

The purpose of this study is to evaluate the influence of long-range atmospheric transport of pollutants from mainland China to the outflow regions in Japan, and surroundings by analyzing organic aerosols at molecular levels to better provide the fundamental knowledge for policy makers. In particular, we will determine water-soluble organic compounds

such as dicarboxylic acids that are photochemically produced by the oxidation of volatile organic compounds such as toluene emitted from the polluted regions. Further, radiocarbon will be determined in the organic carbon and major organic species such as oxalic acid to evaluate the relative contribution from biogenic and anthropogenic sources.

Source-Identification of Polycyclic Aromatic Hydrocarbons (PAHs) in Asian Environments and the Evaluation of the Long-Range Transport of PAHs

(FY2009-2011)

Principal Investigator : **Hideshige TAKADA**, Tokyo University of Agriculture and Technology

<C-094>

Tokyo University of Agriculture and Technology, National Institute for Environmental Studies, Keio University, Tokyo University of Pharmacy and Life Sciences, The University of Tokyo

Polycyclic Aromatic Hydrocarbons (PAHs), one of the unregulated hazardous chemicals, are contained in petroleum products and also derived from various combustion processes. Source-identification facilitates effective regulation on the emission of PAHs to the environments. The present study aims to make

quantitative source-identification of PAHs in Asian atmospheric and aquatic environments. This study also reveals the range and magnitude of atmospheric transport of PAHs to Asian environments. This gives scientific basis for international reduction of the emission of PAHs in this region.

East China Sea Marine-Litter Prediction Experiment Conducted by Citizens and Researchers

(FY2007-2009)

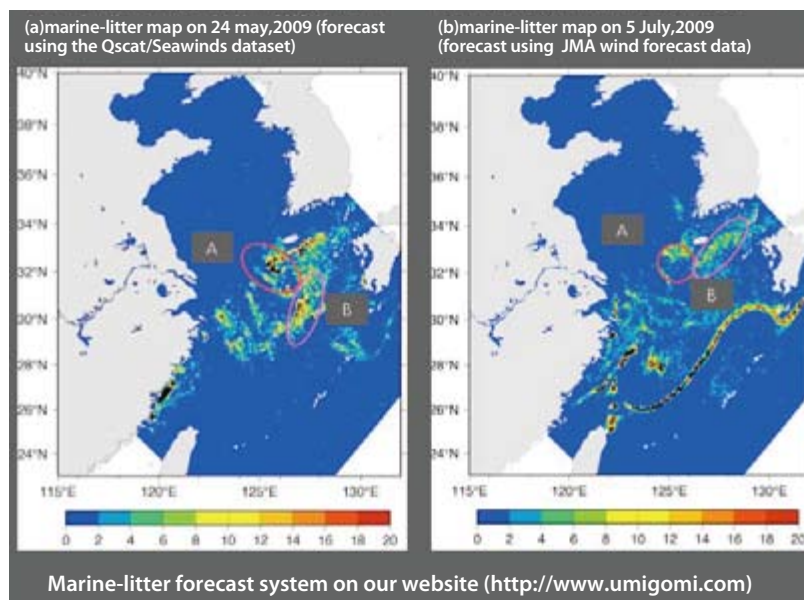
Principal Investigator : **Atsuhiko ISOBE**, Ehime University

<D-071>

Ehime University, The University of Tokyo, National Institute for Land and Infrastructure Management, National Institute of Advanced Industrial Science and Technology

The temporal variability of the marine-litter amount has been investigated at a Goto-Island beach by voluntary civic organizations together with oceanographers. Based on these data, the oceanographers specified major marine-litter sources, and are forecasting the litter amount. In addition, the oceanographers using ocean radars and aerial photography

attempt to establish marine-litter monitoring methods. Information of the marine-litter sources will be available for public awareness to reduce its occurrence. On-board marine-litter recovery procedures will be proposed using the forecast system developed in this project.



Dynamics of Marine Organisms Carried by Ship Hull/Ballast Water, and Detection of their New Settlement

(FY2007-2009)

Principal Investigator : **Hiroshi KAWAI**, Kobe University

<D-072>

Kobe University, National Institute for Environmental Studies, Hiroshima University, Marine Ecological Institute, Inc., Chiba University, The University of Tokyo, Tokai University

In order to assess the contributions of large-scale cargo ships for intercontinental introductions of marine organisms, we have been monitoring the biodiversity and succession of the biota in the ballast tanks and ship hulls of bulk carriers, as well as investigating the biodiversity of introduced organisms in their ports of call for elucidating the early

settlement processes, and made risk assessment of barnacle introductions. The results will provide a valuable basis for drawing up guidelines to reduce or prevent species introductions, and to contribute to the conservation of the coastal ecosystems of Japan as well as the countries trading with Japan.

Study on Potential Threat Caused by Organic Pollutants in Japan Sea Region

(FY2009-2011)

Principal Investigator : **Kazuichi HAYAKAWA**, Kanazawa University

<D-091>

Kanazawa University, Hyogo Environmental Advancement Association,
Japan Environmental Sanitation Center

The countries surrounding the Japan Sea are rapidly developing industrially and economically, and this area is one of the regions significantly changed in the world. Unfortunately, the development is accompanied by pollution and destruction of the environment. It is unclear what corrective measures need to be taken because little is known about the generation and behavior of the pollutants. The goal of this project is to identify the locations of potential threats by clarifying the origin and behavior of two markers of organic pollutants in the Japan Sea region : Poly-

cyclic Aromatic Hydrocarbons (PAHs, compounds that have two or more aromatic rings such as benzo[a]pyrene) and Persistent Organic Pollutants (POPs, compounds that do not decompose easily in the environment and remain for long time such as DDT and dioxin). This project will contribute to understanding the environmental pollution in this region and to developing effective measures on an international scale to prevent the environmental pollution and to conserve resources.

Development of Integrated Environmental Management for Changjiang River Basin to Conserve the Sound Environmental Conditions in East China Sea

(FY2009-2011)

Principal Investigator : **Kunio KOHATA**, National Institute for Environmental Studies (NIES)

<D-092>

NIES, Fisheries Research Agency, Ritssho University

Recent surveys in East China Sea have found the plankton species which causes serious red tide along the coast of China in central parts of the continental shelf, and indicated the threat to change East China Sea ecosystems. In order to enjoy the continual blessing of East China Sea, we should understand a scientific meaning of this omen precisely to take effective measures for marine environment conservations. This study aims to show realistic measures

to reduce the nutrient load flowing into East China Sea from Changjiang delta which accomplishes remarkable economic developments, and to evaluate them with our marine ecosystem model. Such research result is expected to afford scientific knowledge and concrete methodology for Japanese government to promote measures for marine environmental conservations.

Conservation and Recovery of Large-Regional Ecosystems

Establishment of Methods for Assessing Forest Degradation Caused by Deforestation and Maintenance of Biodiversity (FY2009-2011)

Principal Investigator : **Ko HARADA**, Ehime University

<E-091>

Ehime University, Osaka City University, Kyoto University, Forestry and Forest Products Research Institute, Kyushu University, Fukuoka Women's University, The Research Institute of Evolutionary Biology

In this study, we are planning to investigate the forest degradation in Southeast Asia, especially on the island of Borneo. We will study the relationship between genetic and ecological deterioration caused by disturbance of forests by recent human activities and establish methods for assessing forest degradation. In order to do this, we will examine the relationship between the reproductive systems of tree

species and their genetic vulnerability to disturbances. In a comprehensive survey of soil microorganisms, we are planning to isolate a set of organisms that can be used as indicators of forest degradation. Knowledge obtained in this study may contribute to policy-making decisions on biodiversity issues at international congresses.

Studies on the Conservation Measures of Swamp Forests through Sustainable Use of Ecological Resources by Local Communities (FY2009-2011)

Principal Investigator : **Ryuichi TABUCHI**, Forestry and Forest Products Research Institute (FFPRI) <E-092>

FFPRI, Fishery Research Agency, Kyoto University

There are exceptional swamp forests managed by local communities in sustainable ways even under the rapid deforestation in Southeast Asia. The present study aims to provide policy options for sustainable use of ecological resources in swamp forests by learning from the past and on-going forestry projects with community participation. It evaluates the poten-

tial and allowable yields of ecological resources in swamp forests as well as their changes over the last half century. It elucidates the incentives and motivation of local communities to conserve swamp forests. It also reveals problems of community forest managements together with possible solutions of them.