Hydrospheric Atmospheric Research Center

Nagoya University

Foreword

Hydrospheric Atmospheric Research Center

Prof. Hiroshi UYEDA, Director

Research into understanding the global water cycle must move forward. Many problems need to be solved in order to understand and properly forecast heavy rainfalls, heavy snowfalls, flooding, and droughts. Human beings depend on water to survive on the Earth. Water exists on Earth in three phases, solid, liquid and gas, which makes the Earth very special. However our growing understanding of the relationship between the rapid changes of human activity and climate change has made it clear that human survival is not guaranteed without harmonic coexistence with nature on the Earth. Reliable knowledge regarding the global water cycle is required. It is therefore essential to promote observations of the nature of the water cycle over South, Southeast, and East Asia, and conduct integrated studies into the structure and variability of the multi-scale water cycle. The Hydrosphere Atmospheric Research Center, Nagoya University (HyARC), was established on April 1, 2001, with the purpose of promoting research that would lead to an understanding of the global water cycle.

The scope of HyARC includes 1) meteorology, 2) hydrology, 3) land-atmosphere interaction, and 4) biological effects on the material cycle in the hydrosphere. The global water cycle should be understood as the interactions occurring among the atmosphere, land, ocean, and the cryosphere at various temporal-spatial scales. We have been and will continue to conduct field experiments, satellite data analyses, modeling investigations in collaboration with other universities, research institutes, not only domestically but internationally as well. In this, HyARC hopes to take a leading role in an inter-university collaborative system.

History

Water is essential for life. It circulates on earth, and even small fluctuations of the water cycle may cause serious problems on human life. The fluctuation, viz. temporal and spatial distributional variation of water, results from multiple factors at different time and spatial scales. These include natural factors as well from human induced changes on the earth system. The complex nature of the multi-scale temporal and spatial variability of the water cycles makes its understanding and prediction difficult. It is therefore desirable, to overcome this difficulty, to conduct integrated studies of various aspects, such as physics, biology and chemistry and/or air, land and oceans, on the structure and variability of the multi-scale water cycles as parts of a whole water cycle system in the earth system.

The Institute for Hydrospheric-Atmospheric Sciences (IHAS) has been established 1 April 1993 to conduct integrated studies on the structure and dynamics of the hydrosphere and atmosphere aiming at understanding the relationship of processes in water and material cycles in a changing earth environment. IHAS had been appreciated by its important contribution in the coordination of national and international joint research projects on earth environmental studies. During the 8-years history of IHAS the global warming and connected environmental changes became an urgent societal issue, and hence serious discussion on the future research strategy has been made in the IHAS.

The conclusion was to bifurcate activities of IHAS. First to concentrate on the intensive integrated research of the water cycle which is to be conducted by a nation-wide collaborative Hydrospheric Atmospheric Research Center, HyARC. Second to disseminate achievements of the Science of Hydrosphere and Atmosphere acquired at IHAS. Third to conduct multidisciplinary studies on "Environmentology" in collaboration with researchers with broad background of science, technology and humanities. The conclusion was materialized with the joint efforts of many people in Nagoya University, the Government of Japan and the Scientific Societies who supported the idea.

HyARC designed to be a national core research center to facilitate national and international interdisciplinary cooperative studies on the global water cycles in order to reveal the multi-scale structure of the water cycle and to understand its variability.

HyARC comprises of 2 research divisions according to the time and spatial scales of the water cycles of interest. The division for Regional-Scale Water Cycle Processes conducts observational research for the various processes in the water cycles as well as development of numerical models.

The division for Global-Scale Water Cycle Variations conducts analysis of time-series data on variability of water cycle systems to develop numerical models. The target time scale ranges from seasonal to decades, and spatial scale from an observational site to Asia-West Pacific regions. HyARC puts emphasis on biological activities on land and in the oceans. The biological activities, maintained by water cycles, are invariably associated with material exchange between the cells and environments, and this is why the biota is situating at the crossover point of the water and material cycles. Biology is considered to play key roles in large scale and long-term variability of the water cycle systems, but little is yet known. This would be one of the challenges of the HyARC.

(Northwest view from roof)

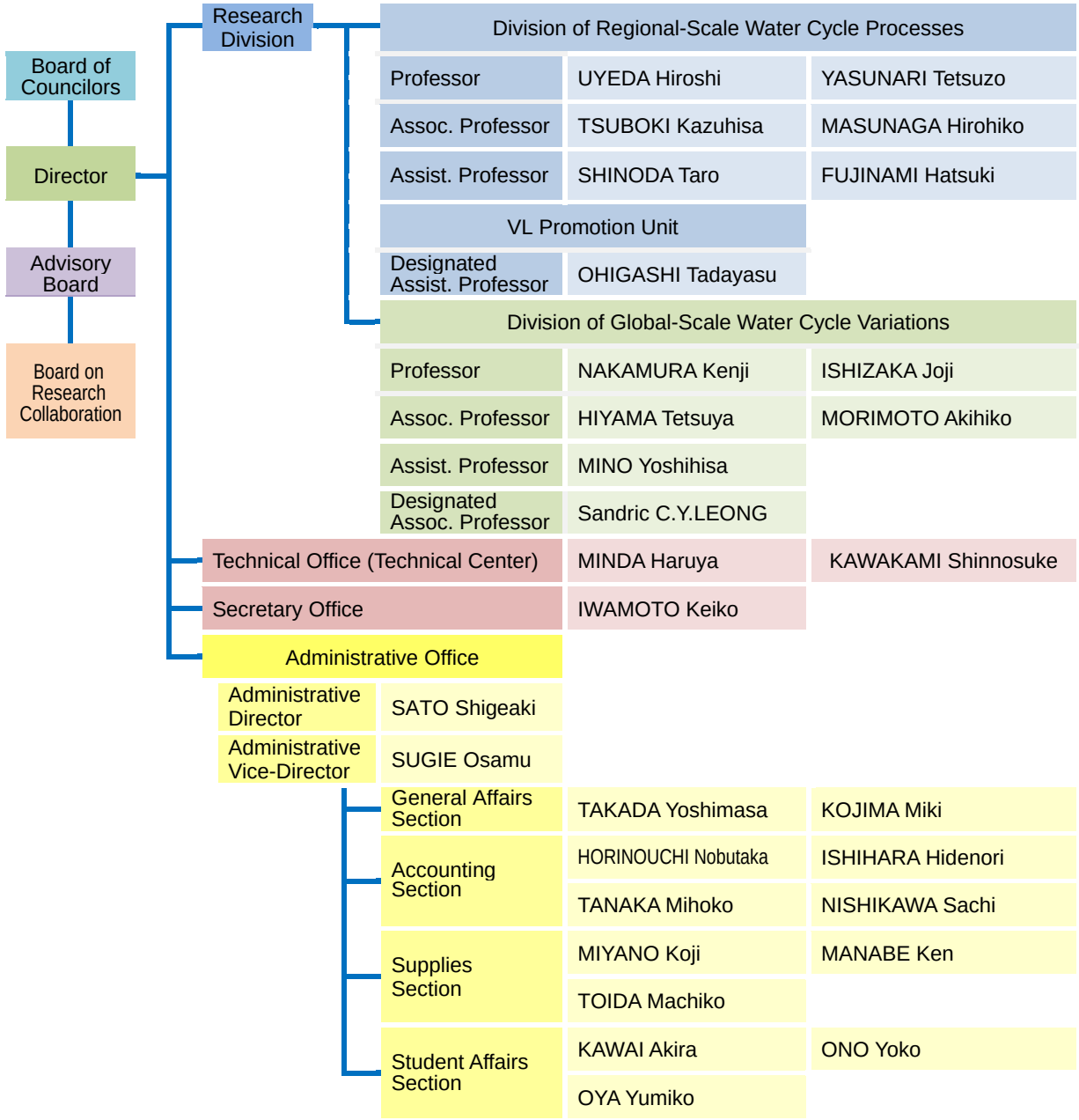
Organization

Purpose of Hydrospheric Atmospheric Research Center

The goal of HyARC is to reveal multi-scale structure of the water cycle systems and its variability in order to better understand the global climate system, and to improve predicting capability of future climate, water resources, and food production, which are quite important for human life. The HyARC has been established on 1 April, 2001 as an institute for collaborations with academic communities.

Organization

（as of April 2009）



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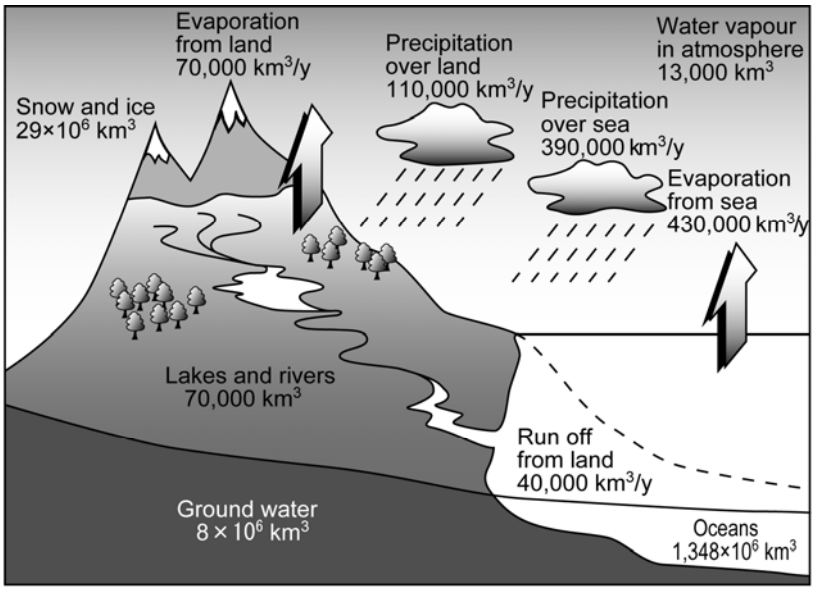
What is Water Circulation?

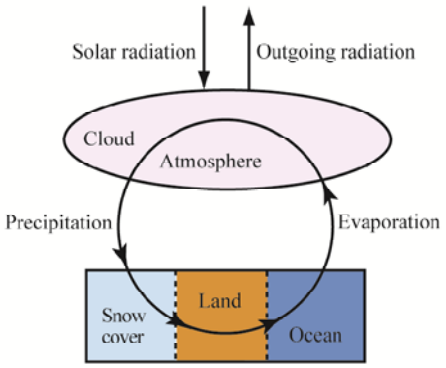
Water circulates in the whole of the Earth surfaces with different phases (states) such as ice (solid), water (liquid), and water vapor (gas). Water also plays an important role on the re-distribution of the energy and material on the Earth by not only the vertical interactions between the ocean and the atmosphere, land-atmosphere, and horizontal movement between land and ocean, but also global scale circulations in the ocean and the atmosphere via tropics - sub-tropics - temperate - cold regions. Our Earth has not homogeneous distributions of land and ocean, and terrestrial elevation; thus, temporal and spatial circulations of water have been changing with wide variability.

HyARC focus on the spatial and vertical structure of water cycle in Baiu / Meiyu front region in East Asia and area in Western Pacific Ocean. HyARC also mentions the activities of lives, and takes a leadership for investigations of water cycle, by carrying out the overall field experiments, using satellites dataset, and numerical models for water cycles.



The amount of water

(Reference : ENCYCLOPEDIA of HYDROLOGY AND WATER RESORCES,1998)



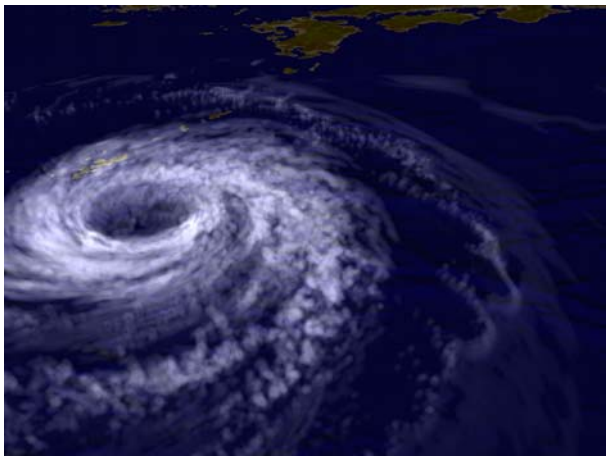
Water cycle

(Referernce: University of Tokyo Press)

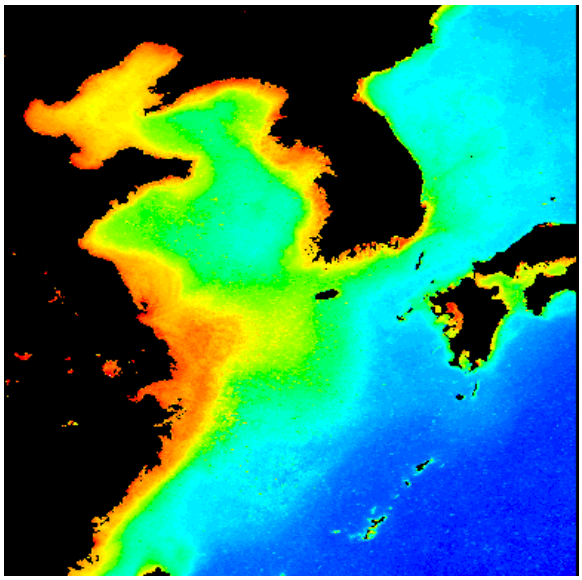
Cloud processes, including diabatic heating and radiation, have are important for the global energy and water circulation (left: cumulus cloud over the Western Pacific Ocean, right: stratocumulus cloud over the East China Sea).

Research Topics in HyARC

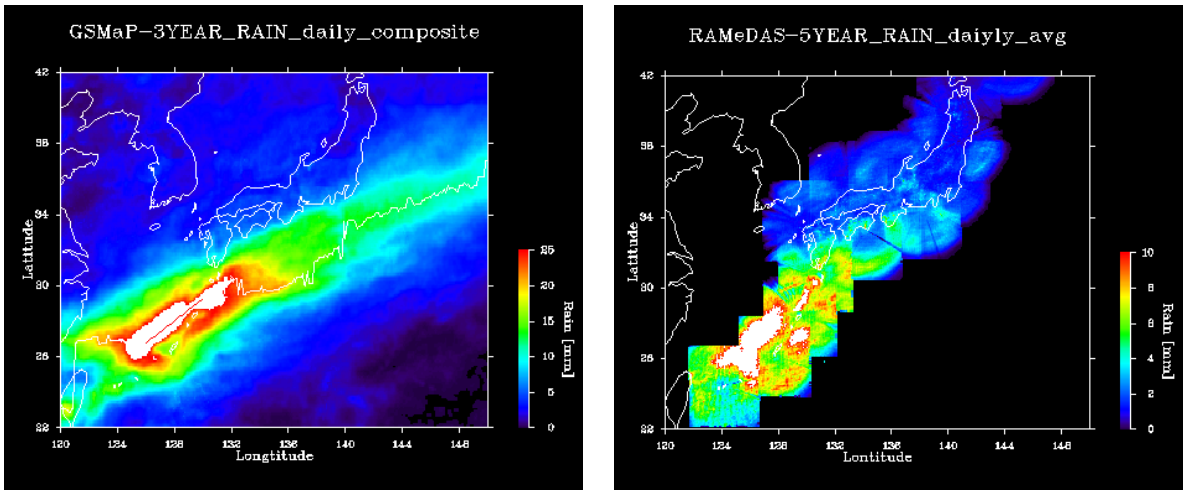
- Research on local atmospheric phenomena such as heavy rainfall, tornados, and generation of cumulonimbus due to atmospheric convection
- Research on organized precipitation systems including the Baiu frontal region and typhoon
- Study on biosphere-aerosol-climate interaction
- Research on the interactions between tropical atmospheric dynamics and convective clouds
- Research on transfer processes of water, heat and mass exchanges over various terrestrial ecosystems
- Research on precipitation activity in various spatial / temporal scales using satellite remote sensing
- Research on marine biological activity and related water cycles using satellite remote sensing



Three-dimensional typhoon T0418 structure simulated by the Cloud Resolving Storm Simulator (CReSS) using 1-km horizontal grid resolution. The white smoke-like color indicates the amount of liquid cloud water outlined by Persistence of Vision Ray Tracer (POV-Ray). Courtesy of Professor T. Aoki and Ms. S. Sato, Tokyo Institute of Technology.



Phytoplankton pigment (chlorophyll-a) concentration in August from 1998 to 2006 determined by ocean color remote sensing. Increased phytoplankton with nutrients from the influence of the Chinese river, Changjiang, reached almost Japan.



Average rain distribution after it started raining around Okinawa Island. Left: satellite data, right: Radar -AMeDAS.

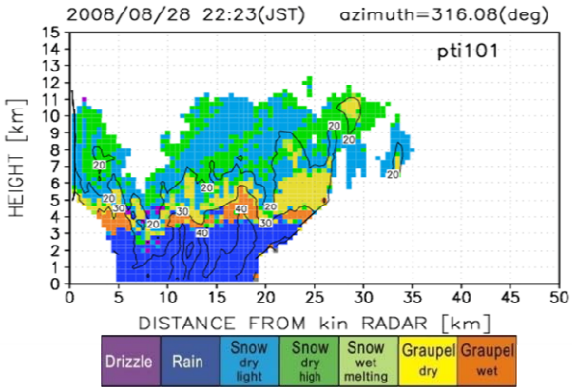
Research Division

Regional-Scale Water Cycle Processes

We investigate water cycle processes linked to the atmosphere, continents, and oceans by means of field experiments, data analyses, and numerical simulations. Our research targets include the dynamical and microphysical processes of cloud and precipitation systems and interactions among the atmosphere, land surface, and ocean, including the roles of vegetation and biological processes in the context of the global water cycle.

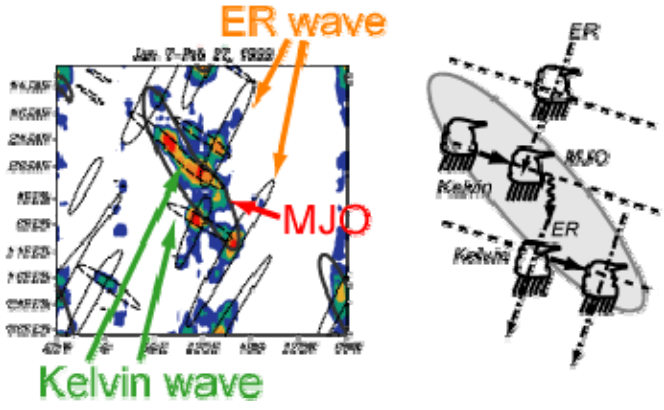
In field experiments, we perform observations of the water cycle in many different ways. Precipitation systems in the Baiu front and typhoons around the East China Sea and the Japan Islands are observed using polarimetric Doppler radars. At the same time, we are developing a cloud-resolving numerical model to examine the detailed structure of heavy rainfall/snowfall systems, typhoons, and tornados. In addition, we investigate the mechanisms of diurnal, intraseasonal, seasonal, and annual variations of Asian monsoon using reanalysis data and climate models. Satellite data are fully utilized for regions beyond the reach of ground observational networks.

In an effort to establish strategies to exploit observations and model simulations complementarily, we are exploring methodologies to validate cloud-resolving numerical simulations using ground-based and satellite data. Analysis tools and datasets obtained from our observational and modeling studies will be made available to the public. Our objective is to obtain a comprehensive understanding of the Earth's water cycle by continuing and further expanding ongoing research on individual processes and interactions among the atmosphere, hydrosphere, and biosphere.

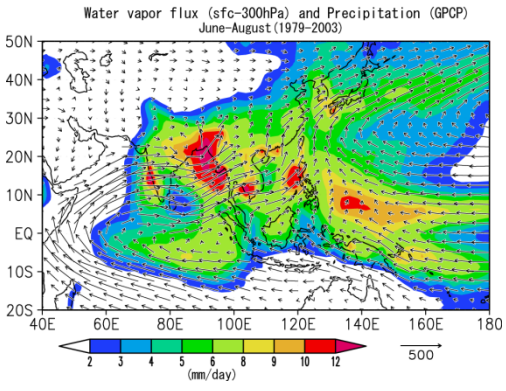


Vertical cross section of different types of precipitation particles detected by the polarimetric radar situated at Nagoya University along an azimuth of 316.08 degrees at 22:23 JST on August 28, 2008. Yellow and orange colors show the existence of graupel above the melting level.

A new X-band polarimetric Doppler radar situated at Nagoya University.



Satellite data analysis of the interaction among the Madden-Julian Oscillation (MJO) and equatorial atmospheric waves (and its schematic). The result offers a new insight into the atmospheric dynamics governing tropical convective clouds.



Spatial distribution in precipitation and moisture flux vectors over monsoon Asia in summer.

Current Research Field

Lab. of Meteorology

UYEDA Hiroshi (Professor) tel: (052) 789-3492 e-mail : uyeda@rain.hyarc.nagoya-u.ac.jp

Major works are field experiments in moist Asia and data analyses aiming to reveal the generation and development mechanisms of precipitation systems. Energy and water circulation in the area from the west Pacific ocean to the Baiu/Meiyu frontal zone are investigated by jointly synthesized observations and diagnostic analyses with numerical simulations, solving the problems of boundary layer flux, cumulus cloud formation and cloud physical processes. He is aiming to clarify the characteristics of precipitation systems in moist Asia and to reveal the impact of precipitation systems in climate change by investigation of various precipitation systems in Asia.

TSUBOKI Kazuhisa (Assoc. Professor) tel: (052) 789-3493 e-mail : tsuboki@rain.hyarc.nagoya-u.ac.jp

Water circulation of the atmosphere is characterized by clouds and precipitation. Their formation and evolution are diverse and complex. In order to study the mechanism and structure of clouds, both observation and numerical modeling are important. I perform field experiments and develop a cloud model (the Cloud Resolving Storm Simulator; CReSS) to study the nature of clouds and precipitation.

SHINODA Taro (Assist. Professor) tel: (052) 789-3494 e-mail : shinoda@rain.hyarc.nagoya-u.ac.jp

I have studied the development process and structure of deep convective clouds by using results of radar observations and numerical simulation. I am also interested in the generation of shallow convective clouds around the top of the convective mixing layer. Especially, I consider that the land-atmosphere interaction and the humidity in the middle troposphere are affecting the development of deep convective clouds. I will research the process of the boundary layer an cloud physics in order to improve the parameterizations utilized in GCMs (General Circulation Models) and RCMs (Regional Climate Models).

OHIGASHI Tadayasu (Designated Assist. Prof.) tel: (052) 789-3493 e-mail : ohigashi@rain.hyarc.nagoya-u.ac.jp

Extreme phenomena such as heavy rainfall/snowfall and high winds occur occasionally in the atmosphere. My interests lie in how extreme phenomena start, develop, and are maintained. Recent progress of both simulation models and computer performance enables us to create an apparently realistic computer-simulated atmosphere. This provides valuable information for us to understand the phenomena, while numerical models cannot completely simulate the real atmosphere. Observation provides us with accurate data. However, this information is fragmentary in space and time. By the complementary use of computer simulation and observation with imperfect information, I am attempting to clarify the mechanisms causing the extreme phenomena.

Lab. for Climate System Study

YASUNARI Tetsuzo (Professor) tel: (052)789-3465 e-mail: yasunari@hayrc.nagoya-u.ac.jp

The Asian monsoon provides abundant water for human life and diverse biosphere in this humid Asia. This monsoon system, on the other hand, plays an essential role in the earth climate system as a gigantic water cycling system. We are conductiong intensive and extensive studies on the Asian monsoon system and its variability with various time-space scales, particularly focusing on the energy and water cycle processes (i.e., precipitation and convective activity, water vapor transport, evapotranspiration, runoff etc) between land, atmosphere and oceans. We also focus on how some dominant vegetation in the monsoon Asia (e.g., tropical rain forest in southeast Asia, grassland in Mongolia, taiga in Siberia etc.) are maintained through the interaction between climate, water cycle and the eco-systems.

FUJINAMI Hatsuki (Assist. Professor) tel: (052)789-3474 e-mail: hatsuki@hayrc.nagoya-u.ac.jp

I study the space-time variability of convection and associated atmospheric circulation over the Asian summer monsoon regions using satellite data, global objective analysis data, and surface observation data. I focus on the land areas affected by Asian summer monsoon (e.g., the Tibetan Plateau, the plains of the eastern part of China, Nepal, and Bangladesh). The target timescale ranges from diurnal to interannual. I will investigate the relationship between land surface conditions (e.g., topography, vegetation, etc.) and the convective variability.

Lab. for Cloud and Precipitation Climatology

MASUNAGA Hirohiko (Assoc. Professor) tel: (052)789-5413 e-mail: masunaga@hayrc.nagoya-u.ac.jp

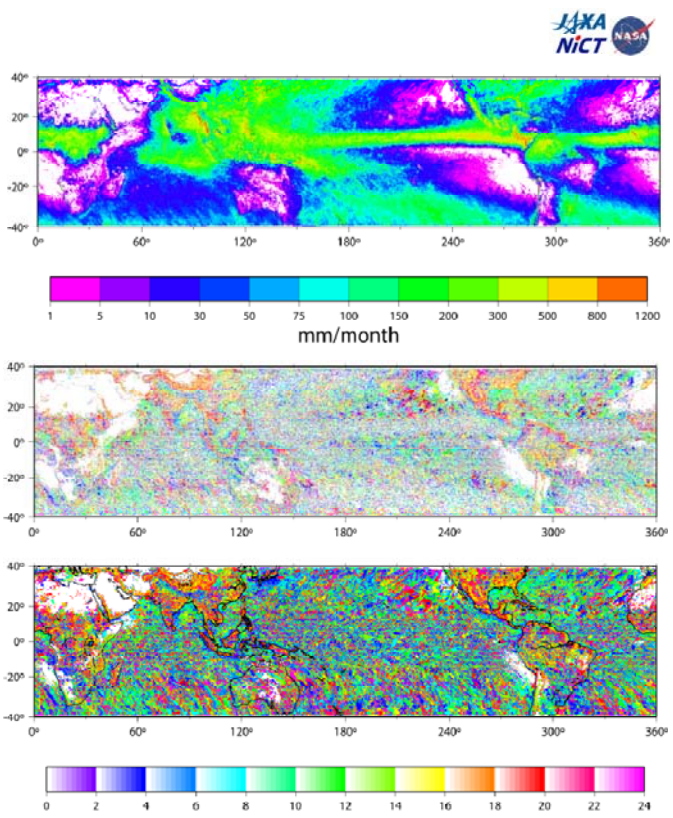
Clouds and precipitation are not only susceptible to ambient climate changes but are also crucial for climate formation. Our objective is to further understand the Earth's climate system by thoroughly and carefully examining clouds and precipitation present around the globe. Observations from satellite radars and radiometers, together with other research tools including numerical models, are instrumental in the projects we have underway. We also aim at contributing to international satellite programs via the development of data analysis algorithms.

Research Division

Global-Scale Water Cycle Variations

This division conducts scientific investigations on the nature and mechanisms of variability of the global water circulation system mainly by data analysis and global numerical modeling with an insight into interactions between the water cycle, material cycle and biological processes. The data from satellites and other sources, which are of different quality, will be assimilated into reconciled grid data by the use of the numerical model prior to data analysis.

Since the variability of the water circulation system depends not only on internal factors inherent in the system, but also on external ones, individual parameters of these factors will be examined for its responsibility for and sensitivity to the system variability by data analysis and the global numerical model. By combined use of the results from these examinations, we will clarify the mechanisms regulating the variability of the global water circulation system.



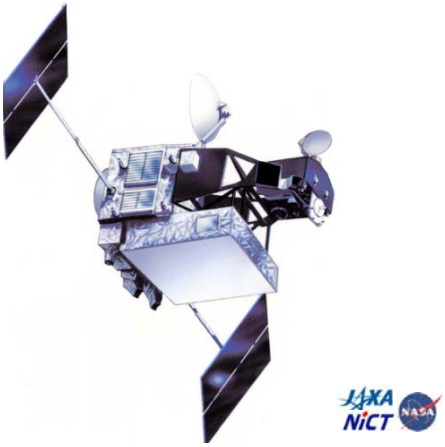
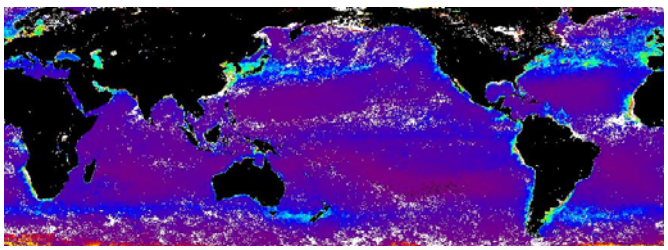
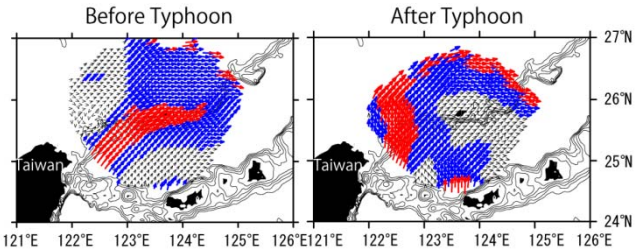


Image of Tropical Rainfall MeasuringMission(TRMM)

Global rainfall rate map derived from TRMM/ TMI during JJA on 1998-2002(upper), Maps of local time with TMI maximum rainfall rate with the saturation of 0-1 as an amplitude of diurnal variation(middle) and without above saturation (lower).

Global ocean primary production in April 2009. It is estimated by satellite-observed phytoplankton pigment (chlorophyll-a) concentration, sea surface temperature, and photosynthetically active radiation.





The Kuroshio northeast of Taiwan observed by long-range ocean radar before and after the typhoon passage. Red indicates a current velocity greater than 1 m/s. The Kuroshio flows northeastward before the typhoon approaches and flows northward after the typhoon passage.

Current Research Field

Lab. of Satellite Meteorology

NAKAMURA Kenji (Professor) tel: (052)789-5439 e-mail:nakamura@hyarc.nagoya-u.ac.jp

Satellites are powerful and essential tools for long-term global observation. Visible/infrared radiometers and microwave radiometers have a long history for clouds and precipitation system observation from satellites. Recently a spaceborne radar which can observe three-dimensional structure of rain over land or ocean, was realized. Satellite data, mainly the spaceborne radar data are analyzed in my laboratory. Not only precise and accurate rain distribution but also rain height distribution and diurnal variations were revealed from the radar data. These results are new and interesting to clarify the variation of precipitation systems on Earth. Retrieval algorithms are important for spaceborne Earth observation sensors, and evaluation and improvement of the algorithm are also performed.

Lab. of Eco-Hydrometeorology

HIYAMA Tetsuya (Assoc. Professor) tel: (052)789-3478 e-mail: hiyama@hyarc.nagoya-u.ac.jp

My research interests lie in the changes in terrestrial water storage and terrestrial vegetation under the pressures of humanity and climate change. The main target fields are the mid to high latitudes of eastern Eurasia, including the Lena River Basin, Yellow River Basin, and Yangtze River Basin. The gravity recovery and climate experiment (GRACE) data set is used to determine the global changes in terrestrial water storage. In addition, hydrologic tracers such as chlorofluorocarbons (CFCs) and stable isotope ratios of water (δD & $\delta^{18}O$) are used for more accurate estimation of the residence time and recharge area of terrestrial water. Analyses of tower-based surface fluxes and satellite-derived data sets are conducted to detect terrestrial vegetation changes in regional to continental scales.

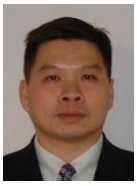
Lab. of Satellite Biological Oceanography

ISHIZAKA Joji (Professor) tel: (052)789-3487 e-mail: jishizak@hyarc.nagoya-u.ac.jp

Primary production of marine environment is conducted mostly by microscopic phytoplankton and is the most important process for energy and material flows through marine ecosystem. Primary production of the marine environment is studied by satellite remote sensing, ship observation, and analysis of the past dataset. Currently, coastal environment is the main target because it is under the influence of human impact through changes in freshwater input and nutrient load and under the influence of climate change through modification of ocean current and wind. The East China Sea, the Japan Sea, and Ariake Sound have been studied, and we are planning to study the Ise and Mikawa bays.

MINO Yoshihisa (Assist. Professor) tel: (052)789-3491 e-mail: kuro@hyarc.nagoya-u.ac.jp

Marine biological processes contribute significantly to the absorption of atmospheric CO_2 by the oceans, which in turn controls atmospheric CO_2 concentration on long time scales and thereby influences global climate. My study involves the evaluation of spatial-temporal variability in such biological processes, mainly carbon fixation by phytoplankton and sinking of biogenic debris, and the elucidation of their controlling mechanisms using stable isotopes ($\delta^{13}C$ and $\delta^{15}N$) in the marine organic matter. The physiological responses of algae to the environmental changes, associated with global warming, are also investigated with help of both laboratory experiments on algal cultures and field observations.



Sandric C.Y. LEONG (Designated Assoc. Prof.) tel: (052)789-3489 e-mail: sandric@hyarc.nagoya-u.ac.jp

Given the importance of marine environments especially coastal regions, it is essential to detect changes, develop control measures and ultimately to protect the quality of the marine environments. My primary interest lies in understanding how environmental and/or climate changes increasingly caused by human activities are altering aquatic communities with emphasis on primary productivity and phytoplankton physiology. My current work aims to determine phytoplankton adaptability and variation in varying environments, and to understand how alterations in environmental settings influence phytoplankton physiological variation. Another long-term goal of mine is to develop a method for detecting variability in the physiological properties of phytoplankton using optical absorption/fluorescence measurements.

Lab. of Bio-Physical Oceanography

MORIMOTO Akihiko (Assoc. Professor) tel: (052)789-3433 e-mail: amorimoto@hyarc.nagoya-u.ac.jp

Variability of the sea surface current field in the ocean, which affects the material cycle, is investigated by using satellite, ocean radar, and hydrographic data. I focus on the variability in the current field and the response of the ecosystem to the current variability in the Asian marginal seas such as the East China, Yellow, and Japan seas. The marine environments in the East China and Japan seas are drastically changing due to climate change and construction of the Three Gorges dam. To investigate the marine environment change, we conducted hydrographic observation in the Tsushima Straits, which connect the East China Sea to the Japan Sea.

Research Programme

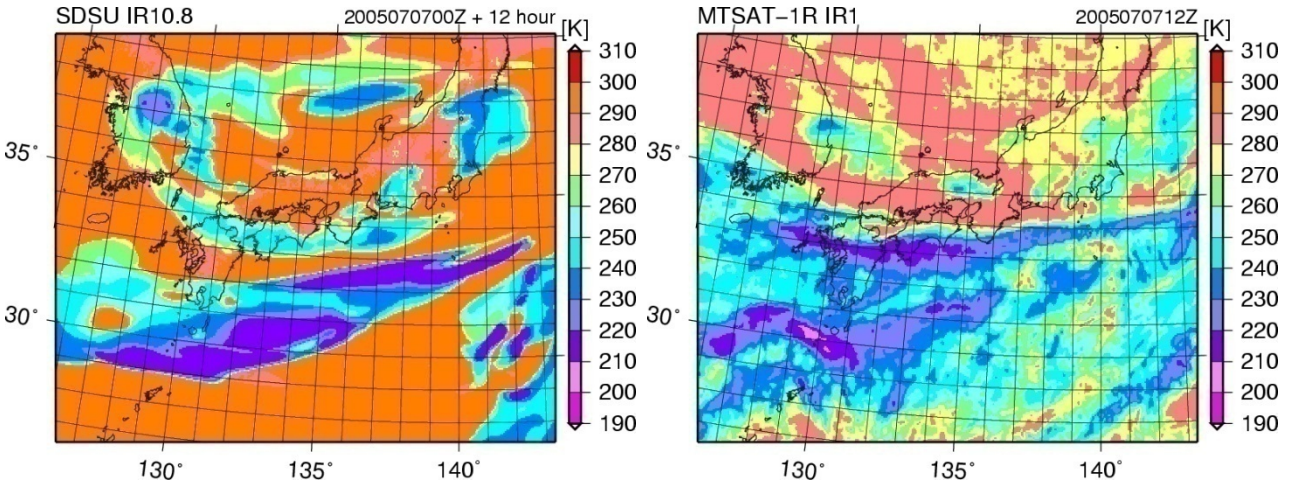
Formation of a virtual laboratory for diagnosing the Earth's climate system (VL)

To diagnose the Earth's climate system facing global warming, a virtual laboratory (VL) was established in 2007 as a joint program conducted by the following four research centers: (1) Center for Climate System Research (CCSR), the University of Tokyo, (2) Center for Environmental Remote Sensing (CEReS), Chiba University, (3) Center for Atmospheric and Oceanic Studies (CAOS), Graduate School of Science, Tohoku University, and (4) Hydrospheric Atmospheric Research Center (HyARC), Nagoya University. The duration of this program is seven years. Each participating institute contributes to the program by exploiting their own strengths, for example, archiving datasets of greenhouse gases, aerosols, microphysical parameters of clouds, vegetation parameters, and the structure of cloud and precipitation systems. These data are crucial for validating and evaluating global circulation models (GCMs) and regional cloud-resolving model simulations. Furthermore, we aim at training young scientists through the research program. While a short training course is conducted every year by one of our participating institutes in turn, we exchange our staff and young scientists to give seminars.

The VL members at HyARC conduct water budget studies with focus on cloud and precipitation using the Cloud Resolving Storm Simulator (CReSS) and the Satellite Data Simulator Unit (SDSU). In this program, we investigate six themes as follows:

(1) Development of the CReSS model
(2) Establishment of methodology to validate CReSS simulations using the SDSU
(3) Implementation of a data assimilation scheme for the CReSS
(4) Establishment of methodology to use CReSS simulations for improving the cloud parameterizations for GCMs
(5) Development of a two-way nesting scheme linking GCM and CReSS
(6) Establishment of data analysis techniques for X-band polarimetric radars

We started a pilot study to validate the cloud-top height (temperature) computed from CReSS simulations using the SDSU to compare that with satellite data provided from CEReS, Chiba University (see Figure). We are exploring methodologies to validate CReSS simulations in order to improve the microphysical scheme in the CReSS.



(Left panel) Horizontal distributions of infrared brightness temperature calculated using the SDSU and simulated by the CReSS at 12 UTC on July 7, 2005 around the western Japan Islands. (Right panel) Same as the left panel, but for multi-functional transport satellite (MTSAT) observation. Courtesy of Dr. M. K. Yamamoto and Professor A. Higuchi, CEReS, Chiba University.

Study consortium for Earth-Life Interactive System

What is Study consortium for Earth-Life Interactive System (SELIS)?

As scientists work towards solving the current global environmental issues, there is a great need for a more complete understanding of the earth system. To achieve this aim it is essential to establish and promote a synthetic science of the Earth-Life Interactive System – a science that treats the close interaction between the atmosphere, the hydrosphere, the geosphere, and the biosphere. James Lovelock, a British environmental scientist, proposed the radical new "Gaia" concept- a proposal that the Earth's environment is actively controlled by the biosphere. However, the extent and ways in which the real earth system behaves like "Gaia" remain major unresolved issues. The mission of the new institute **SELIS (Study consortium for Earth-Life Interactive System**) is to achieve a deep understanding of the earth system – a system on which all the living creatures depend - and through this to propose a new discipline to study our planet Earth.

The departments and institutes contributing to SELIS in Nagoya University

- Hydrospheric Atmospheric Research Center (HyARC)
- Solar-Terrestrial Environment Laboratory (STEL)
- Center for Chronological Research (CCR)
- Graduate School of Environmental Studies (GSES)
- Graduate School of Bio-agricultural Studies (GSBS)

HyARC, STEL, CCR and GSES were participated in the 21st COE program "Sun-Earth-Life Interactive System" (the precursor of new SELIS) - and GSBS – an important new addition – which together will underpin research and education of the "Earth-Life Interactive System". Our organization is unique in Japan. We envisage SELIS playing an important role as an international base for both research and education related to studies on the earth system and environmental change in Asia. Collaboration with international global change programs such as ESSP, WCRP and IGBP will be an important part of this process. Within the university, SELIS is committed to educating students in earth environment studies, through a lecture series "Earth Study", cross-disciplinary seminars, and other activities.

Purpose of SELIS

To understand the seamless-earth system - including the biosphere and humanosphere - and its changes, it is essential to further develop interdisciplinary research and education. Under these circumstances, we have established a new virtual institute **SELIS** within Nagoya university (NU) involving HyARC, STEL, OCR, GSES, and GSBS, which will function as an international center of excellence for global change studies, in collaboration with related national and international institutions and organizations. The purpose of this new SELIS is to promote an interdisciplinary study on the the seamless-earth system. Special attention will be paid to active roles of the biosphere and ecosystems in the earth climate system and its changes. In June 2009 a **Global COE Program** for the environmental studies at NU has been approved by the Ministry of Education, Science, Sports and Culture (MEXT), and SELIS is also playing an important role on coordinating interdisciplinary environmental studies in this Global COE Program.

SELIS website: http://www.selis.hyarc.nagoya-u.ac.jp

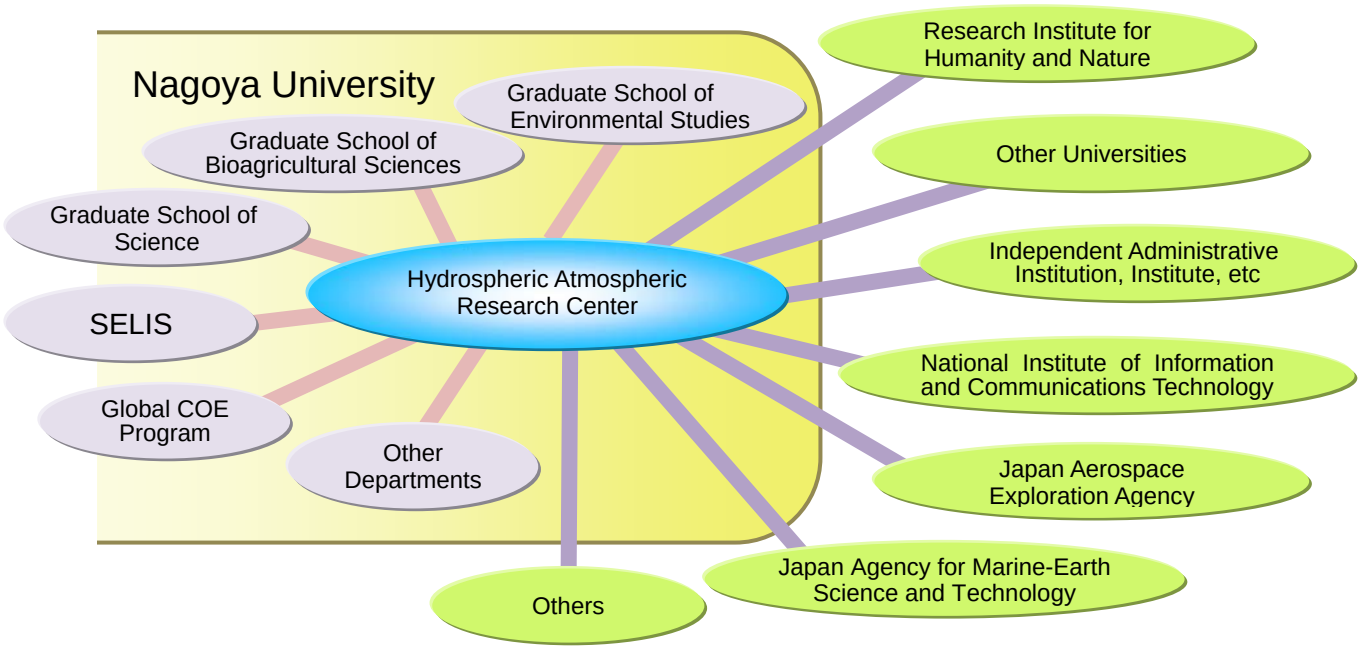
Other Important Activities

The Hydrospheric Atmospheric Research Center is also receiving research students, commissioned researchers and other researchers. Further, concerning UNESCO-IHP (International Hydrological Program), HyARC is receiving trainees dispatched from countries of especially East Asian and Southeast Asian for a short term every year who obtain special lectures and training on studies of global water cycles. As enlightening activity for the public, the Research Center holds every year some public lectures spoken in a plain language and explaining the basic scientific issues of global water cycles, global environmental problems and other subjects.

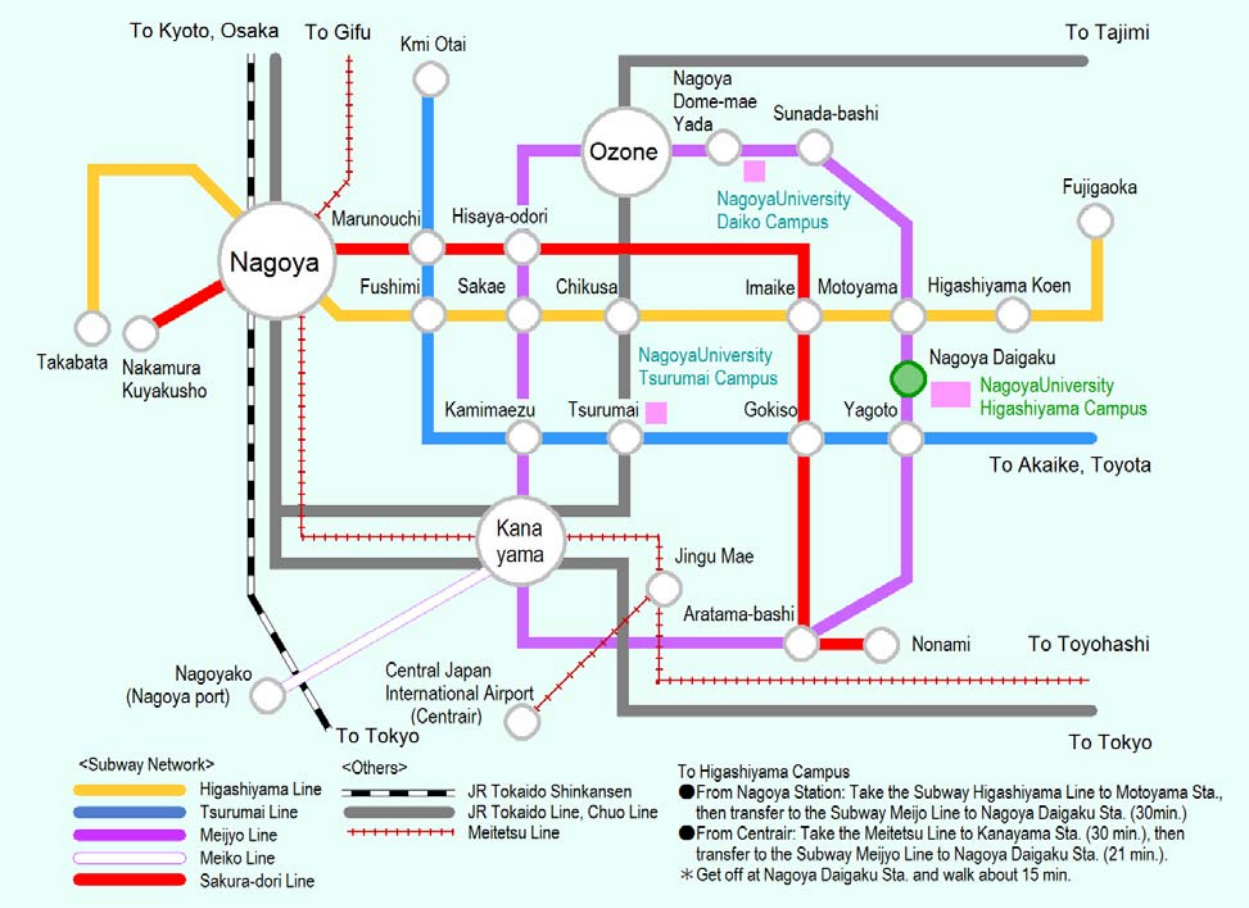
The water cycle is a very important component of the Earth's environmental system. HyARC arouses Special Research Projects and promotes basic studies on global water cycles in cooperation with researchers from other universities and institutes. HyARC is closely connected with the Research Institute for Humanity and Nature (RIHN). We participate in cooperative projects related to global water cycles in the world. Further the staff of HyARC connects actively with researchers working in other universities and institutes.

IHP Training Course: Technical Tours at Japan Aerospace Exploration Agency in Tsukuba.

As a member of the former Institute for Hydrospheric-Atmospheric Sciences, we took part in the GEWEX Asian Monsoon Experiment endorsed by the WCRP (World Climate Research Program) and managed the Experiment as a secretariat in and outside Japan. Moreover, we coordinated a process study in the Northwestern Pacific ocean under Joint Global Ocean Flux Study (JGOFS) being supported by International Geosphere-Biosphere Program (IGBP). Similar activities are also carried out by HyARC.



Access Guide



Map

Higashiyama Campus

1 ～ 3 Subway Meijo Line “Nagoya Daigaku” Station

City Bus “Nagoya Daigaku mae” Bus Stop

Toyoda Auditorium
Nagoya University Symposion

Hydrospheric Atmospheric Research Center

Nagoya University

2009

Address: Furo-cho, Chikusa-ku, Nagoya 464-8601 JAPAN
Phone: +81-52-789-3466 FAX: +81-52-789-3436
URL http://www.hyarc.nagoya-u.ac.jp/english/