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NICT NEWS

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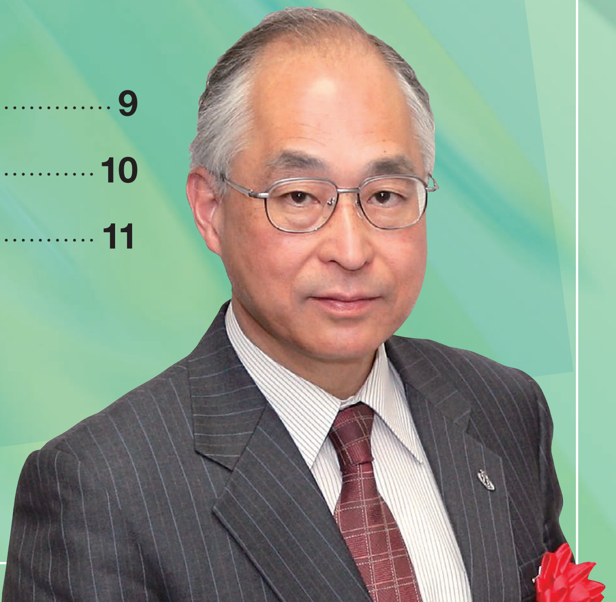
Special Feature on Applied Electromagnetic Research Center



NiCT

Getting Disaster Situations Instantly, in Greater Detail

Development of High-Performance Aircraft Mounted Synthetic Aperture Radar

Profile

Seiho Uratsuka

Group Leader
Radio Wave Remote Sensing Group
Applied Electromagnetic Research Center

After completing a master's program at graduate school, joined the Ministry of Posts and Telecommunications Radio Wave Laboratory (current NICT) in 1983. Engaged in research in areas of remote radar sensing of snow and ice and synthetic aperture radar. Doctor of Engineering

Assessing disaster situations

When a disaster occurs, obtaining the disaster situation and its progression as quickly as possible and in greater detail is very important for minimizing the human and economic cost due to the disaster.

A very important way to obtain this information for large-scale disasters is through aerial photography taken from helicopters and other small-scale aircraft. However, this can be difficult in poor weather or at night-time, and getting detailed information over wide areas can take time because of the relatively low altitude.

Disaster observation by using imaging radar

A type of aircraft mounted 3D-imaging radar called Pi-SAR* was developed in the past at NICT, and its effectiveness has been shown with emergency observations at actual volcanic eruption and earthquake disaster sites. Using this equipment, areas of over 10 km wide, flying distances of over 50 km can be observed in a single pass from an altitude of 12,000 m. Observations show detail to a resolution of 1.5 m. The main benefit of this equipment is that observations are not obstructed by cloud or rain, and can be made during the night.

Use of this radar at disaster sites was reported about volcanic eruptions in 2000 (Mt. Usu in Hokkaido and Miyake Island) in CRL (current NICT) News No. 290 (May, 2000) and NICT News No. 331 (Oct. 2003), and about the 2004 Niigata earthquake in NICT News No. 345 (Dec. 2004). In all of these examples, the technology was useful practically in preventing the increase of human and property damage, and as data to aid in recovery. For the volcanic disasters in particular, periodic observations of volcanic activity as it changed from day to day and regardless of weather or smoke conditions provided data that was widely used (Figure 1).

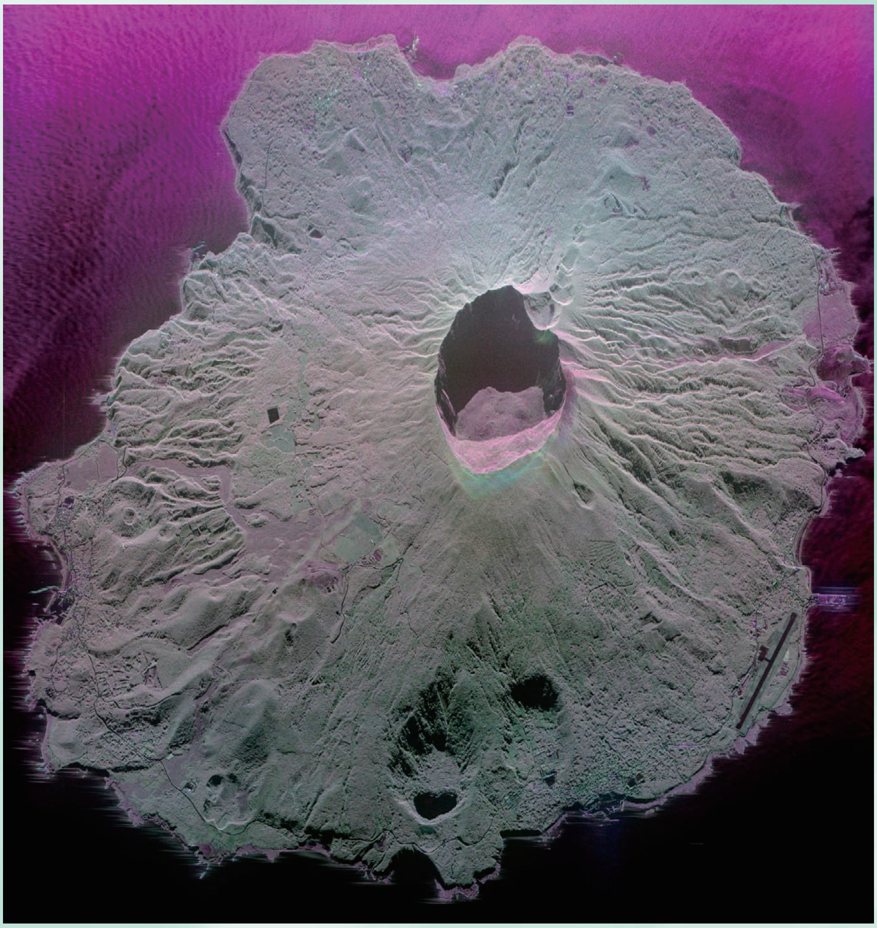


Figure 1: Image of Miyake Island in March, 2001
The figure shows the situation on Miyake Island eight months after the large-scale eruption, with continuing eruption of smoke and volcanic gases. Miyake Island is approximately 9 km in diameter, with the summit at approximately 700 m in height. The large crater in the center was created by the eruption, and is approximately 1.5 km in diameter and 400 m deep.

Instantly, in greater detail

Pi-SAR has the highest resolution in the world for aircraft mounted Synthetic Aperture Radar (SAR) used to observe disaster and global environmental conditions and has also produced excellent scholarly results (A collection of Pi-SAR results, entitled "Earth Surface Observer" is available).

Figure 2: Aircraft Equipped with Pi-SAR2
The antennas are mounted beneath the wings in center of the aircraft.

Figure 3: Part of the Central Japan International Airport Observed by Using Pi-SAR2
Resolution is approximately 30 cm. The shape of a large aircraft parked at the terminal can be seen clearly. The box shows an aircraft of the same shape observed with Pi-SAR (at 1.5 m resolution).

However, this system does not yet have adequate performance for practical use on general disasters of smaller-scale than volcanoes and earthquakes, such as ground damage from floods. This shortcoming was apparent in observations of the Niigata earthquake described above as well.

It was difficult to interpret small-scale break-up that often occurred in roads and streams. On the other hand, residents of the disaster area were able to use the data to identify disrupted areas in the region.

In order to achieve high performance from Pi-SAR, the data is processed numerically in the laboratory after observations are made from the aircraft. This requires several days before the observations can be made available.

In order to overcome these shortcomings and to achieve higher performance for practical application during disasters, we began to develop new piece of equipment, Pi-SAR2, in 2006. The objectives of this new equipment are to improve clarity for interpretation, to achieve resolution under 1 m, and to perform high-level processing on the aircraft in semi-real-time, so that the data can be made available to the site on the ground while the aircraft is still in the air.

We completed the high-performance radar section and did its aircraft-mounted testing in 2008 (Figure 2). The results demonstrated resolving power to 30 cm, and part of this test data is shown in Figure 3.

Future initiatives

We plan to develop the on-board, semi-real-time processing equipment and data transfer components from fiscal 2009 to fiscal 2010, and expect to achieve the aforementioned objectives.

We are expecting to evaluate this system using simulated disaster tests. However, in case an actual large-scale disaster does occur, all of the equipment has been located near the Nagoya airport where the aircraft parks and arrangements have been made so that it can be rapidly deployed at any time for making observations.

Technically, we have further updated the radar to achieve the highest-performance in the world. The resolving power is on the order of 10 wavelengths, and this will require new knowledge relating the imagery to objects and conditions on the ground. These types of issues will also be a part of our future objectives.

We have achieved performance that meets the original objectives in using our synthetic aperture radar for disaster observation, but considering various aspects of disaster situations, further study is still required. We are continuing to refine technical aspects and make efforts to introduce the technology in actual disaster response systems, while collaborating with disaster prevention related facilities and the like.

Development of Cloud Profiling Radar Mounted on EarthCARE Satellite

Aiming to Reveal Uncertain Factors in Global Warming

Profile

Nobuhiro Takahashi

**Research Manager
Environment Sensing and Network Group
Applied Electromagnetic Research Center**

After completing a doctorate, joined the Communications Research Laboratory, Ministry of Posts and Telecommunications (current NICT) in 1994.
Visiting researcher at NASA's Goddard Space Flight Center from 1996 to 1999, transferred to the National Space Development Agency (NASDA, current JAXA) from 1999 to 2001. Engaged in development of cloud and rainfall observation radar, including analytical research with the precipitation radar on the Tropical Rainfall Measuring Mission (TRMM) satellite. Doctor of Science.

Predicting global warming

The problem of global warming has recently reached the point that it permeates our daily lives. News and television commercials often have an ecological focus, and reduced CO_2 emission is frequently a sales point for new products. People generally claim to be aware of global warming issues, citing a recent mild winter, or the so-called "guerrilla rain storms," but in fact they have only vague images regarding the possible effects of global warming in 10, 20 or 100 years. In order to understand what the world will be like in the future, meteorological research institutes all over the world are employing super computers and numerical weather forecasting models to predict global warming.

These weather models agree in their prediction that global temperatures will rise (if greenhouse materials such as CO_2 continue to increase at the current rates), but predictions of how much it will rise depends heavily on which model is used (these issues are discussed in reports such as the evaluation from the Fourth Inter-governmental Panel on Climate Change (IPCC)). One reason for this diversity in the values forecast by climate models may be that the role of clouds in determining weather is still not well understood and the models do not yet express it correctly. High altitude clouds (cirrus, etc.) contribute to warming effects by blocking the escape of heat from the earth, like a blanket. In contrast, low altitude clouds (stratocumulus, etc.) have the opposite effect, reflecting light from the sun and reducing air temperature at the ground level. As global warming progresses due to increasing CO_2, the balance of radiation from the earth through the clouds changes: Different researchers make opposing claims that this will either accelerate or suppress temperature change. It is extremely difficult to predict the effects of clouds because they are determined

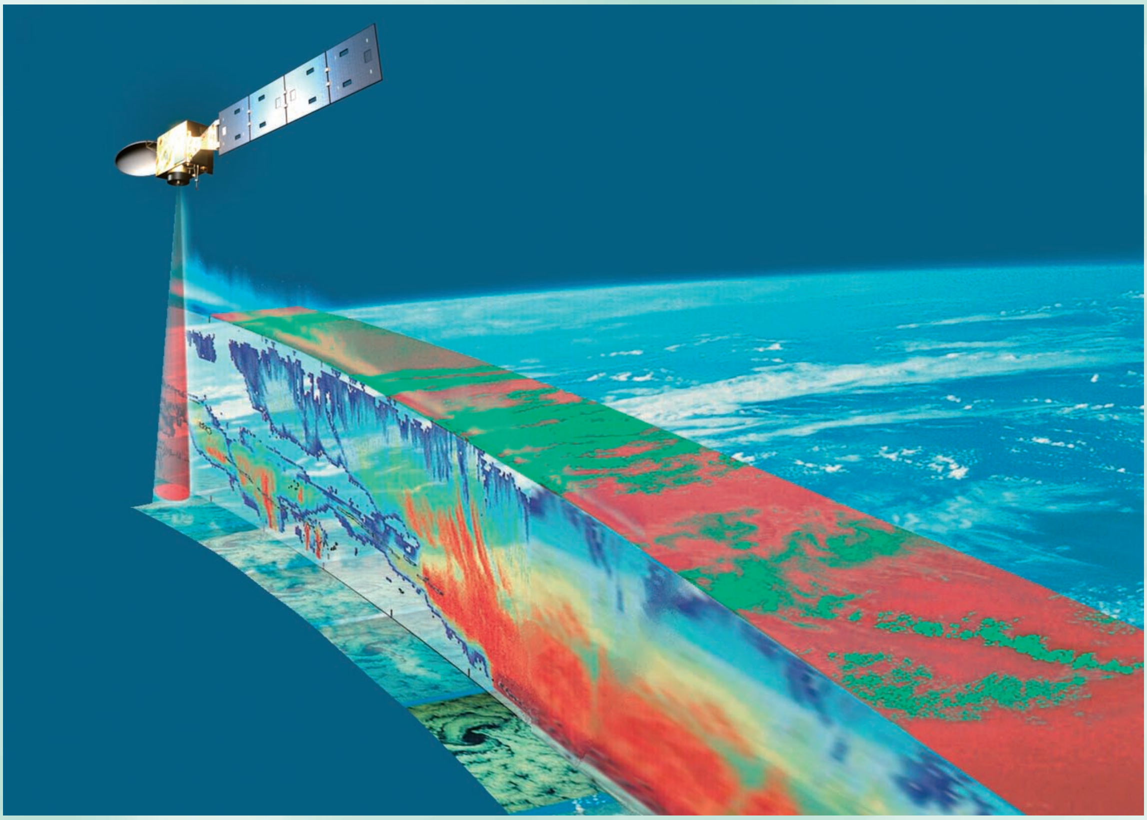


Figure 1: A Portrayal of EarthCARE Satellite Observation

by factors like the size, thickness, density and phase (water or ice) of cloud particles, and each cloud droplet forms by using atmospheric dust particles called aerosols as condensation nuclei. It has been pointed out that the quantity of aerosols in the air changes the characteristics of cloud and affects global warming.

The EarthCARE mission

EarthCARE is the abbreviation of "Earth Clouds Aerosol Radiation Explorer," expressing that the satellite observes clouds and aerosols above the earth's surface, with the objective of revealing the mechanisms which balance radiation from the surface. The satellite program is also designed to care for the earth, which is also suggested by its naming. The program is a joint project between the European Space Agency (ESA), the Japan Aerospace Exploration Agency (JAXA) and NICT, and launch of the satellite is planned in 2013. Figure 1 shows a portrayal of observation with the EarthCARE satellite. A major feature of the EarthCARE satellite is that it is equipped with both 94 GHz cloud profiling radar (wavelength approx. 3 mm) and laser remote sensor called Lidar. These will allow the satellite to measure vertical information of clouds such as cloud altitude, which will help clarify changes in cloud characteristics in various regions and seasons and the effect they have on the radiation balance. A better understanding of these cloud characteristics and their effects on the radiation balance will help in comparing global warming prediction models and identifying their advantages and disadvantages, thereby making further improvements possible.

NICT contribution (development of cloud profiling radar)

The cloud profiling radar under development for the EarthCARE satellite is used for measuring the three dimensional structure of clouds and also measuring the speed of vertical movement within the clouds by using the function of Doppler speed-measurement. The function of Doppler speed-measurement in EarthCARE is attracting attention worldwide as the first attempt of the satellite radar to use the technology to measure motions in clouds and rainfall.

For the EarthCARE mission, NICT and JAXA will jointly develop the cloud-profiling radar, and the ESA will handle development of Lidar and other instruments as well as launching of the satellite. NICT had experience developing the cloud radar mounted on an aircraft since 1996, and has used results from that development and started to develop the cloud-profiling radar mounted on a satellite. We began basic studies of key components of the instrument mounted on the satellite in 2000. The results from this have already been used, for example, high power transmitter tube for space of the satellite, CloudStar which is currently operated by NASA. Since 2007, NICT has begun full-scale design and development of the cloud-profiling radar in cooperation with JAXA. Using its previous experience developing cloud radar, NICT will develop the transmitter/receiver subsystem and the quasi-optical feed and JAXA will handle the 2.5 m diameter large antenna, signal processing unit, and the overall radar system. Figure 2 shows an overview of the cloud-profiling radar.

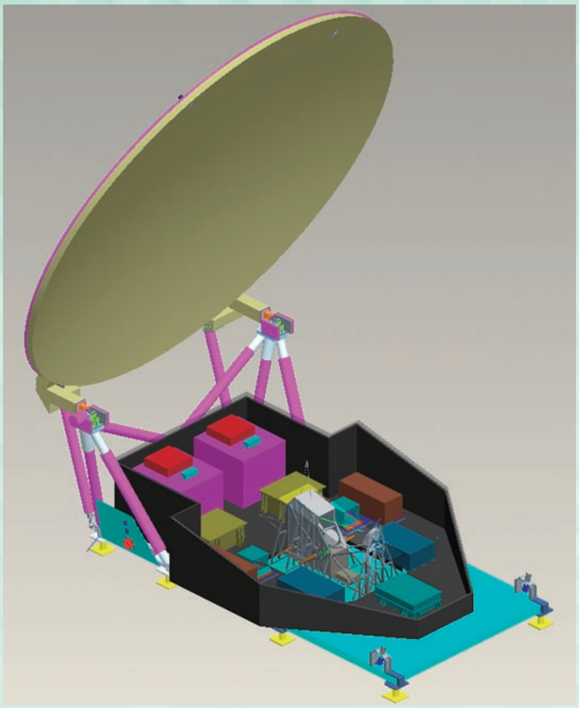


Figure 2: Overview of the Cloud-profiling Radar Mounted on EarthCARE Satellite

The transmitter/receiver subsystem, as functions, generates 94 GHz electric wave, amplifies and transmits, receives the scattered wave from the ground, clouds and other objects, and sends this signal to the signal processing component. It also provides a Dopplar measurement function. The quasi-optical feed has a function to separate the transmitted wave from the radar and the received scattered wave by using a polarizing grid. NICT will manufacture the flight models of these instruments that will be mounted on the actual satellite. NICT also develops the algorithms to be used for processing the data from the cloud-profiling radar.

NICT's instrument development is currently in the engineering model development phase for the evaluation of both the design as the spaceborne instrument and the performance of the instrument. We plan to begin development of the flight model in the latter half of this fiscal year.

These instruments are being developed in cooperation with manufacturers in Canada and Germany. Language and cultural barriers, as well as the recent changes in economic conditions have presented difficulties, but we continue to work daily towards the success of this mission. We hope that this report has helped readers understand our efforts developing EarthCARE at NICT, as one aspect in response to the problem of global warming.

Increasing Reliability of the Use of Radio Wave

Project for Radio Propagation Trouble Research

Profile

Mamoru Ishii

**Director
Project Promotion Office
Applied Electromagnetic Research Center
(formerly Research Manager, Space Environment Group)**

After completing graduate school at Kyoto University in 1993, joined the Communications Research Laboratory (current NICT) in 1994. Engaged in research in upper atmosphere physics, optical measurement techniques, and radio observation. Specialist member of the Ministry of Public Management, Home Affairs, Posts and Telecommunications Commission for Data Communications. Director of the Japan Geoscience Union. Doctor of Science.

Initiatives for reliable use of radio waves

There are various initiatives at NICT towards reliable use of radio waves, namely, development of networks that can be used during disaster situations, and communications devices that are resistant to the effects of external electromagnetic radiation. On the other hand, what about the effects of natural phenomena on radio wave use? Many readers may have seen notices on their television screen indicating that the picture quality may be disrupted by weather conditions. The Space Environment Group studies the effects on the use of radio waves, which are caused by natural phenomena, and particularly the Sun, and space environments.

Effects of the sun on the earth

It is generally thought that the void of space is pure vacuum, with nothing in it, but the void of space near the earth is always exposed to high-temperature "solar wind" emitted from the sun. The light and heat of the sun is generated by the nuclear fusion of hydrogen into helium. In other words, the sun is an enormous nuclear furnace floating in space and visible from the earth. Man-made nuclear reactors are designed to prevent leakage of radiation, with multiple layers of protective shielding, but what protects us from the sun?

In fact, it is known that the earth is protected from the sun by two factors that form a protective layer over it. These are the earth's magnetic field and the atmosphere.

The solar wind perpetuates the magnetic field of the sun, and due to its high temperature, its constituent atoms and electrons become separated, forming "plasma", which carries an electrical charge. Since plasma is not able to cross a magnetic field, the magnetic field of the earth forms a barrier that prevents the solar wind from reaching the ground. The atmosphere also protects the earth from electromagnetic waves such as X-rays and ultra-violet radiation emitted from the sun, which are dangerous to life. Plasma is created in the upper layer of the atmosphere when these dangerous electromagnetic waves are stopped, forming a region called the ionosphere. But, occasionally, the energy of this solar wind manages to create effects in areas closer to the surface. A famous example is the aurora which can be seen in the night sky near the north and south poles. Another case is that the thickness of the ionosphere can change, and those can affect radio wave use.

Effects on satellite positioning

Before the age of satellite communications, the international communication over long distances was done with short-wave radio, using the fact that the waves reflect repeatedly between the ionosphere and the earth's surface. At that time, monitoring the state of the ionosphere was an important national policy. Now, with the advent of satellite communications and under-sea cables, short-wave radio communication is no longer as important as before. Instead of it, effects on satellite positioning, as used for automobile navigation systems, have shifted into the focus. Satellite positioning systems on the earth's surface receive signals from multiple artificial satellites, each carrying a highly-accurate atomic clock, and distances to the satellites can be calculated, assuming the propagation speed of the waves, to obtain the position. If any disturbances appear in the ionosphere, the wave speed can differ significantly from the assumed speed, leading to incorrect distances and thus positioning errors. These errors can be as large as several tens of meters, and are the largest source of errors in satellite positioning (Figure 1).

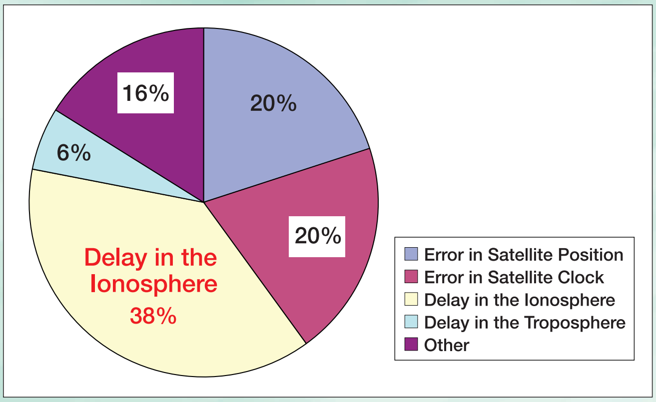


Figure 1: Causes of Satellite Positioning Error (from the Ministry of Land, Infrastructure Transport and Tourism documents)

Development of ionosphere models

We are promoting to develop the technology to estimate disruption in the ionosphere in two main directions: with an ionosphere observation network in Southeast Asia, and by developing ionosphere models. This time, we introduce the latter below.

As mentioned above, the ionosphere is affected strongly by the Sun, but it is also affected by weather conditions close to the surface. For example, strong winds from weather fronts or typhoons can generate waves called atmospheric gravity waves. These are amplified as they reach higher altitudes, and have been known to cause variation in the ionosphere. So, in order to predict such disruption in the ionosphere, meteorological phenomena close to the surface in addition to effects of the sun must be considered.

To develop predictive models of these complexities in the ionosphere, we are advancing two approaches in parallel. The first is to create an empirical model using neural networks, and the second is to create a theoretical model integrating both the atmosphere and the ionosphere.

Neural networks are a method of reproducing human brain mechanisms in a computer and can be used to predict the most likely conditions based on a large volume of past data. The red line in Figure 2 shows values predicted by a neural network, while the blue line represents actual measured values (Variation in Total Electron Content Unit for the Year 2003). The example shows that the model was able to predict values with extremely high accuracy.

In contrast, the theoretical model integrating both the atmosphere and the ionosphere expresses various components of the atmosphere and how they vary using mathematical equations, and these are then computed. A difficulty with this is that the characteristics of the ionosphere and the atmosphere near the surface are very different, and the equations that describe them are very different, so it is no simple matter to link the two. For example, water vapour, which is very important near the surface, is almost non-existant in the ionosphere, and electrical and magnetic fields, which are important in the ionosphere, have almost no effect on physical processes in the atmosphere. The respective fields of study even still differ on basic issues like the axes used to express height: positive is used for “up” when referring to the ionosphere, while “down” is positive when refering to the atmosphere.

Figure 3 shows a preliminary result. The bottom figure shows how a wave generated near the surface is transmited upward. This disrupts the extraordinarily high-altitude atmosphere, and finally the disruption is reflected in the ionosphere. Four main peaks can be seen in the upper figure. A similar phenomenon is currently actually being observed by satellite.

It will be difficult for the ionosphere to obtain detailed observations to the degree available for surface weather, but continued development of higher precision forcasting technology is important in support of high-level uses of satellite positioning in the future. By incorporating a method currently used in weather forecasting called "Four-dimensional assimilation", we hope to increase our understanding and prediction accuracy for the ionosphere and contribute to realizing more reliable use of radio waves.

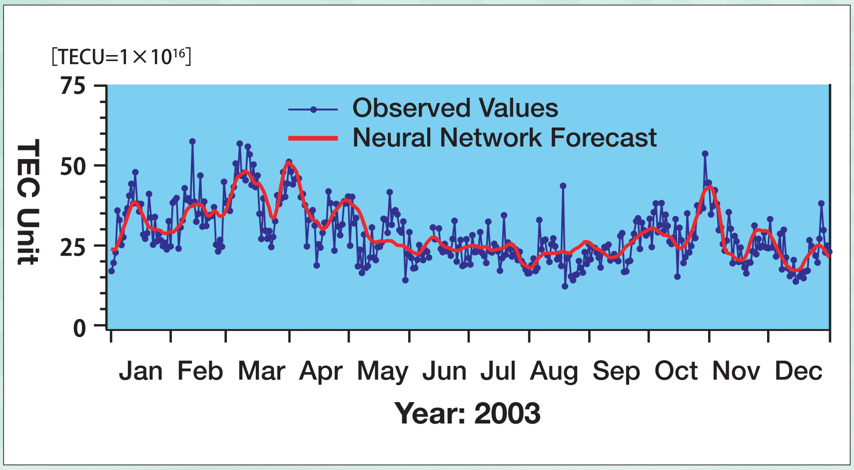


Figure 2: Comparison of Total Electron Count Unit Forcast Using Neural Network with Observed Values

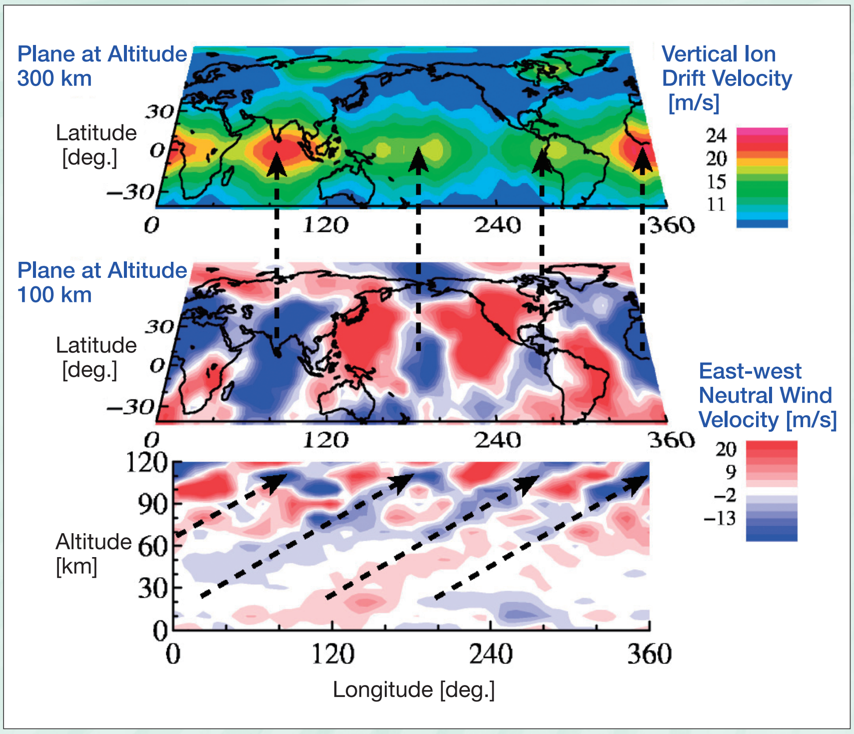
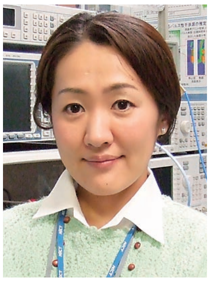


Figure 3: Reproducing Phenomena by Using the Combined Atmosphere/Ionosphere Model

Exploring the Mechanisms of Electromagnetic Interference in Electronic Devices

Development of Real-time Measuring Instrument for Statistical Electromagnetic Wave Spectrum

Profile



Kaoru Gotoh

Senior Researcher
Electromagnetic Compatibility Group
Applied Electromagnetic Research Center

After completing graduate school, became an assistant at the Sugadaira Space Radio Observatory of the University of Electro-Communications, and joined the Communication Research Laboratory (current NICT) in 2003. Current research work is related to international standardization of methods for measuring electromagnetic emissions from Industrial, Scientific and Medical (ISM) devices, and Electro-Magnetic Compatibility (EMC) for communications systems. Doctor of Engineering.

Influence of electromagnetic waves on electronic devices

Electronic devices that make use of electromagnetic (EM) waves, such as mobile phones, are becoming an essential part of our daily lives through various types of wireless communication and broadcasting services. Through rapid technical development in recent years, electronic devices are becoming smaller, and their capabilities and performance have increased by leaps and bounds. The latest, stylish products with a variety of features are very attractive for users, but these technical advances also present complex problems in electromagnetic compatibility (EMC).

With decreasing size and increasing functionality of devices, an increasing number of modules that use high-speed signals must be integrated into the limited space of a compact chassis. As a result, EM interference problems are induced in the devices caused by the EM noise emitted from the modules in the devices themselves. In particular, if EM noise is picked up by the radio-frequency components in the device, it can lead directly to performance degradation of the wireless communication function of the device. This type of interference problem is called "Intra-EMC", and it is becoming a serious problem in current development environments where new products are demanded on shorter cycles. In order to address EMC issues effectively during the development of devices, methods for evaluating EM emissions should be established.

These could then be used to measure “how much degradation of communication performance due to EM noise there is” and “how effective EMC countermeasures are.”

Statistical evaluation of amplitude fluctuation of EM emissions

In our research group, we are making efforts in research aiming to establish technology for evaluating the effects of EM emissions on electronic devices. As a part of this work, we are conducting research and development in the probabilistic evaluation of EM noise fluctuations, and on a particular method for measuring Amplitude Probability Distributions (APD). NICT, together with the EMC-Lab (an R&D company of the Basic Research Center with participation from NICT staff), have developed a measuring instrument and have obtained standardization with the Special International Committee on Radio Interference (CISPR) for its specifications. Currently we are moving to the stage of introducing the use of APD measurement for product compliance testing. The CISPR Products committee is now studying introduction of the method for testing ISM products like microwave ovens. NICT is taking the main role in the standardization activity, including establishing the APD project and proposing international measurement campaigns.

On the other hand, it was necessary to solve significant technical issues on the APD measuring instrument introducing the new instrument to the industrial world in development environments, overcoming the intra-EMC problem. For evaluating the influence of

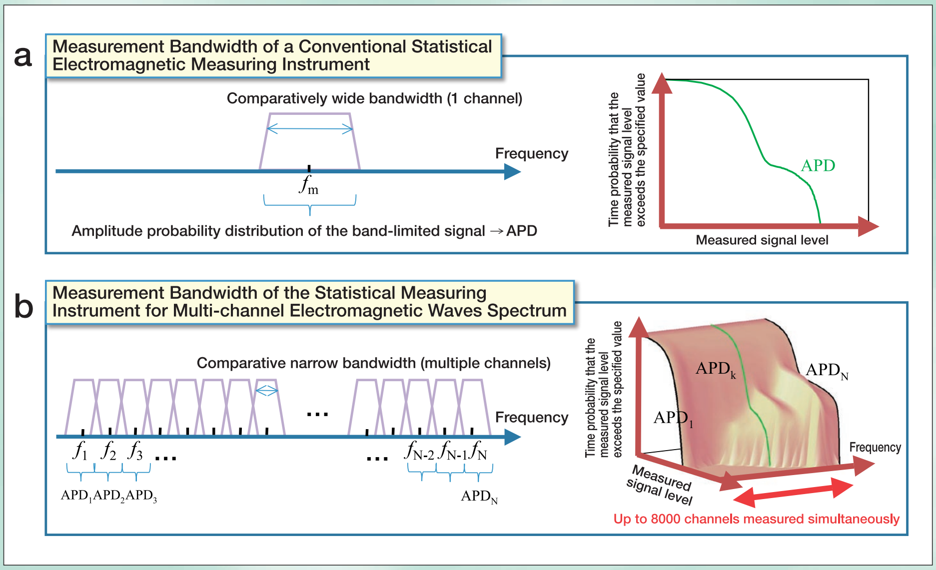


Figure 1: Example of Measurement by Statistical Measuring Instrument for Multi-channel Electromagnetic Waves Spectrum

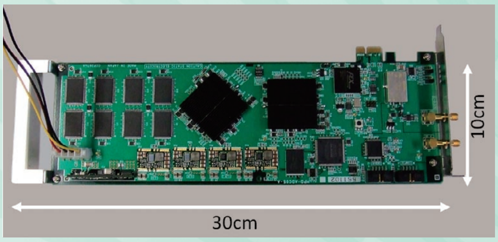


Figure 2: Signal Processing Board of Statistical Measuring Instrument for Multi-channel Electromagnetic Waves Spectrum

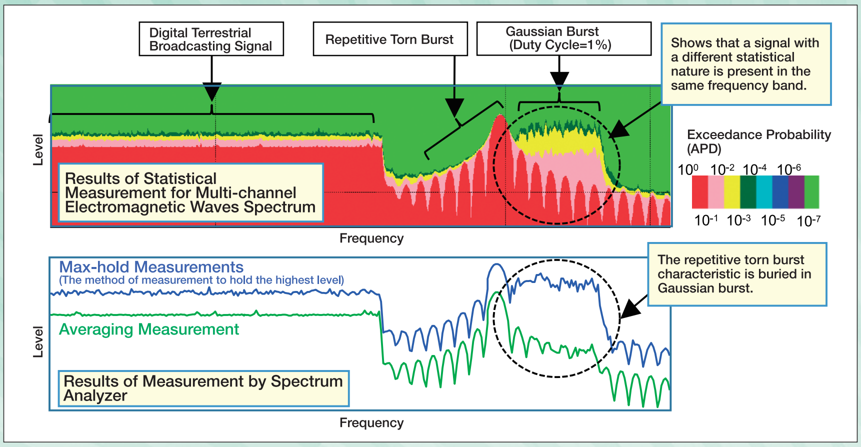


Figure 3: Measurement Examples by Statistical Measuring Instrument for Multi-channel Electromagnetic Waves Spectrum

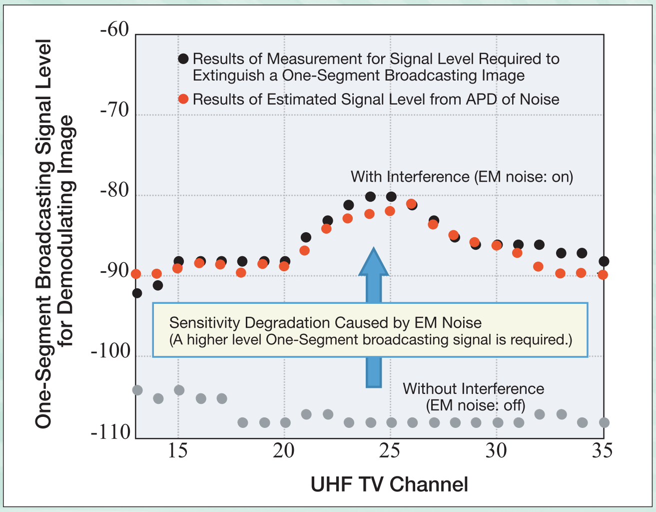


Figure 4: Results of Both Measuring and Estimating the Minimum Signal Level Required to Demodulate a One-Segment Broadcasting Image

EM noise on communications performance of devices, it is necessary to correctly measure the statistical amplitude of EM noise within the frequency bands used for communications. However, even though most current wireless communication systems employ multi-carrier methods using multiple subcarriers to transmit information, the existing measuring instruments can only measure statistical electromagnetic amplitude for a single frequency at a time. When several thousand channels must be measured, measurements for each channel must be done sequentially, which is certainly not a practical approach. (Figure 1 a).

Statistical measuring instrument for multi-channel electromagnetic waves spectrum

Therefore, we have developed "a statistical measuring instrument for multi-channel electromagnetic waves spectrum" to measure multi-channel APD which uses the Fast-Fourier Transform (FFT). When measuring EM emissions for EMC, it is necessary to maintain a wide dynamic range as much as we can because it is not possible to have prior knowledge about the nature of the emissions, which is different from the performance by a receiving terminal of the wireless communication equipment. That development was not easy to achieve. Also, to reduce development costs, we used a signal processing board available on the market rather than dedicated hardware (Figure 2). We established the equipment with two measurement modes that measure each statistical amount of digital terrestrial television broadcasting and sub-channels of wireless LAN. This could make it possible to measure simultaneously statistical amount of more than 8,000 channels (Figure 1b). Measurement examples are shown in Figure 3.

Thereby, we are able to know definitely and quantitatively what kind of EM emission is spread on which frequency band. In addition, by developing this equipment, it has been possible to check up that the measured electromagnetic wave gives the influence to wireless communications and broadcasting. Figure 4 shows the results estimating the effects of the measured electromagnetic wave on a One-Segment broadcast from statistical measurement of multi-channel EMC emissions. The estimated results coincide closely with the signal level at which a One-Segment broadcast image blacked out while the signal level was being gradually decreased. It can be thought that developers of the equipment using electromagnetic waves are able to develop efficiently the equipment which is excellent enough to have little deterioration of communication performance in this way for employing effective EMC countermeasures, while evaluating electromagnetic waves emitted from internal circuits through this equipment.

Future initiatives

Applications of the statistical measuring instrument for multi-channel electromagnetic waves which we have developed are not limited to the area of intra-EMC. The ability to simultaneously evaluate statistical amount of electromagnetic waves for multiple channels means that it is also possible to elucidate the nature of electromagnetic noise fluctuating in time. It can also be used in modeling EM sources, and is promising for regulating EM emission levels, studying interference problems for new communication services, and evaluating EM environments. In the future, we plan to conduct research and development on even more useful methods for evaluating EM emissions.

Award of the First NICT Fellowship

Recipient of the first fellowship, Dr. Harunobu Masuko, Executive Research Supervisor of NICT (Left) and Dr. Hideo Miyahara, President of NICT (Right).

Dr. Harunobu Masuko, Executive Research Supervisor of NICT received the first NICT Fellowship Certificate at the award ceremony held on April 16, 2009.

Since Dr. Masuko joined the Radio Wave Laboratory in 1979, he has engaged in research on radio-wave remote sensing and developed aircraft-mounted Synthetic Aperture Radar (SAR) which was able to create high-precision ground images with resolution to 1.5 m, the highest precision in the world at the time. This aircraft-mounted SAR has been highly evaluated for its ability to quickly provide reports to the relevant agencies of the damage situation when a disaster occurs and for its social and administrative significance. This fellowship was awarded in recognition of these remarkable achievements.

In the ceremony conferring the award, after explaining its purpose, Dr. Kumagai, Vice-president of NICT introduced Dr. Masuko's remarkable research achievements, including the developments which pioneered world-wide use of aircraft-mounted and satellite-mounted SAR. After being handed the certificate by the NICT President, Dr. Masuko, as a new fellow, gave an address, which was a retrospective of his research and development. He talked about how he had wanted to improve on the performance being achieved in the USA, which was the best at that time; how he made great effort in spite of his research budget which was insufficient for his research and development; how the introduction of observation instruments into aircraft was pioneering those days; and how it played an important role in environmental measurements and other fields in Japan.

(Akihito Kato, Planning Manager, Strategic Planning Office, Strategic Planning Department)

Winner ● Ryutaro Suzuki

Group Leader, Space Communication Group, New Generation Wireless Communications Research Center

◎DATE: 11.13.2008

◎NAME OF THE PRIZE:
Outstanding Service Award

◎DETAILS OF THE PRIZE:
Recent Activity on Space Communications Projects
- ETS-VIII, WINDS, and STICS -

◎NAME OF THE GROUP:
2008 JUSTSAP-PISCES SYMPOSIUM STEERING COMMITTEE

◎Comments by the Winner:

With a long and continuous history of research in space communications between the USA and Japan, I was involved in distance education experiments with the University of Hawaii, using ETS-V almost 20 years ago, and am currently planning more collaboration using WINDS (Wideband InterNetworking engineering test and Demonstration Satellite). Our research results in satellite-to-ground optical communications experiments using OICETS (Optical Inter-orbit Communications Engineering Test Satellite) also gathered much attention as a basic technology for energy-transmission from future solar power-generation satellites. I understand this award as recognition of this collaborative research history.

Winner ● Daisuke Kawahara

Senior Researcher, Knowledge Clustered Group, Knowledge Creating Communication Research Center

Co-Winner: Sadao Kurohashi

◎DATE: 3.4.2009

◎NAME OF THE PRIZE:
Best Presentation Award of the 14th Annual Meeting of the Association for Natural Language Processing

◎DETAILS OF THE PRIZE:
Coordination Disambiguation without Any Similarities

◎NAME OF THE GROUP:
The Association for Natural Language Processing

◎Comments by the Winner:

With regard to this research, we achieved improvements in the accuracy for systems that analyze construction, case and parallel structure in texts. Conventional methods for coordination disambiguation were based on similarity of parallel structures, but the proposed method is based on a broad scope of linguistic knowledge gathered from the Web, without using similarity. The amount of information on the Web will continue to increase, making these methods even more useful. Therefore, we hope to develop our research in this direction even further in the future.

Winner ● Chikara Hashimoto

Specialist Researcher, Language Infrastructure Group, Knowledge Creating Communication Research Center

Co-Winner: Sadao Kurohashi

◎DATE: 3.4.2009

◎NAME OF THE PRIZE:
Best Paper Award of the Association for Natural Language Processing 2008

◎DETAILS OF THE PRIZE:
Construction of Domain Dictionary for Fundamental Vocabulary and its Application to Automatic Blog Categorization with the Estimation of Unknown Words' Domains

◎NAME OF THE GROUP:
The Association for Natural Language Processing

◎Comments by the Winner:

I am very happy to receive the award for the best paper from the Association for Natural Language Processing 2008. In conventional processing of word-meaning, the thesaurus has been a central resource because resources have been essential for expressing meaning relationships between words. We proposed that words have horizontal relationships according to the domain to which they belong in addition to the vertical relationships between words indicated by higher and lower ranks in the thesaurus. This research assumes only 12 domains, but in the future we plan to refine our domain system.

Winner ● Tetsuji Nakagawa

Specialist Researcher, Knowledge Clustered Group, Knowledge Creating Communication Research Center

◎DATE: 3.11.2009

◎NAME OF THE PRIZE:
IPSJ Yamashita SIG Research Award

◎DETAILS OF THE PRIZE:
Dependency Parsing Using Gibbs Sampling

◎NAME OF THE GROUP:
Information Processing Society of Japan

◎Comments by the Winner:

In this research, in order to perform multi-language dependency parsing efficiently using a variety of information in the text, we proposed an approximate solution using Gibbs sampling, and verified the effectiveness of the method experimentally.

At this time, I am very happy to receive this IPSJ Yamashita SIG Research Award.

I would like to express deep gratitude to those who supported me with this research.

NICT Recruiting Permanent Research Staff in Fiscal 2010

NICT is an Incorporated Administrative Agency conducting research and development in information and communications technology to support the upcoming ubiquitous network society, while maintaining a consistent and integrated perspective from basic to applied R&D. In order to promote its research and development in information and communications technology, NICT is recruiting broadly and publically for applications from excellent and ambitious research staff regardless of nationality, or age.

Recruiting Period ● April 1 to May 31, 2009 (Deadline for Receiving Applications)
No. to Be Accepted ● A few permanent research staff per research theme

Synopsis of Research Domains and Themes

- Research on integrated wired and wireless network architectures
- Research on wireless communications, ubiquitous mobile communications, network control and organization technology
- Research on novel nano-material properties and nano-device technology
- Research on universal communication technology for overcoming barriers of language, culture and proficiency
- Research on 3D imaging technology for building super-presence environments
- Research on secure network technology, encryption and authentication technology
- Research on the geospace environment by integrating sensing technology with ICT

For detailed information, please see "Employment Information" on the NICT Web site.

http://www2.nict.go.jp/m/m612/research_staff.html

Information for Readers

In the next issue, we will feature an interview regarding the reliability of materials through terahertz technology.

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4-2-1 Nukui-Kitamachi, Koganei, Tokyo 184-8795, Japan
Tel: +81-42-327-5392 Fax: +81-42-327-7587
E-mail: publicity@nict.go.jp
URL: http://www.nict.go.jp/index.html

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