



# IDEAS

International Digital Earth Applied Science Research Center

Joint Usage/Research Center for Digital Earth to Address Emerging Complex Systemic Problems  
Accredited by Minister of Education, Culture, Sports, Science and Technology



**International Digital Earth Applied Science Research Center  
Chubu Institute for Advanced Studies**



**CHUBU UNIVERSITY**



# IDEAS

International Digital Earth Applied Science Research Center

## From the Director

---

As environmental pollution and climate change have shown us, human activities are causing dramatic changes to our planet Earth, which is the very basis for our existence. These impacts have led to the concept that we are witnessing the dawn of a new geological epoch, referred to as the “Anthropocene.” Besides ongoing changes in population structure, plus geopolitical risks and the rise of populism, a chain of diverse threats such as intensifying natural disasters and infectious diseases on a global scale are having an enormous impact on society and the economy.

With the aim of achieving the Sustainable Development Goals (SDGs), the global community today is in the midst of a paradigm shift, a transition toward sustainable society after a period of high economic growth that was driven by science and technology. Expectations regarding science are also changing, from research into the fundamental character of nature and society, toward science that explains the current changes in nature and society and can design the shape of our future.

To pursue sustainability, from the local to the global level it is necessary not only to integrate diverse scientific disciplines but also to engage in interdisciplinary research and collaborate with a diversity of stakeholders. For this we need an “Earth” that is an overarching information platform constructed in cyberspace and multi-dimensional, has multiple levels of visual resolution and can be displayed in real time. We call this “Digital Earth.” Today at last we have an immense amount of Earth observation information and spatial data and have seen tremendous advances in geographic information systems (GIS) and geoinformatics to utilize that information and data. On top of that we have information and communications technologies on a global scale, plus the rise of citizen science and information from social media being enabled by Internet technology. In essence, the enabling environment for Digital Earth is coming together.

The International Digital Earth Applied Science Research Center (IDEAS) was established in April 2011 to create Digital Earth, with the aim of focusing on the complex systemic problems facing society today through collaboration among researchers in both the arts and sciences disciplines, and helping to design a sustainable society by visualizing the big picture of problems and identifying interconnections based on scientific evidence. In 2014 we were accredited as a Joint Usage/Research Center by the Minister of Education, Culture, Sports, Science and Technology (MEXT).

We expect Digital Earth to be used not only to solve global environmental problems, but also to think about a sustainable future for the Earth, by serving as a communication platform and as a collaborative lab to solve complex systemic problems that have multifaceted and interconnected aspects such as the environment and disasters. Japan’s Fifth Science and Technology Basic Plan (2016-2020) refers to a human-centered “Society 5.0” that deals with both economic and societal issues using advanced approaches to integrate cyberspace and physical space. (The “5.0” refers to next transformation of society following the first four stages—hunter-gatherer, agricultural, industrial, and information society). We believe that Digital Earth can play a crucial role in this transformation.

Going forward, we hope to collaborate extensively with researchers, governments and civil society to make significant advances in this research. We appreciate your understanding and support in these endeavors.

Director of Chubu Institute for Advanced Studies,  
Director of International Digital Earth Applied Science Research Center (IDEAS), Chubu University  
FUKUI Hiromichi



### **Professor FUKUI Hiromichi, D.Sc.**

**Director of Chubu Institute for Advanced Studies, Director of International Digital Earth Applied Science Research Center (IDEAS), Chubu University**

After graduation from the Graduate School of Science at Nagoya University, he has held various posts including work at a private think tank, Keio University (professor), and the Science Council of Japan

(member), before starting his current position in 2011.

In his field of expertise in global environmental studies and spatial information sciences, he is conducting research for the development of Digital Earth and its applications for disaster prevention and reduction as well as environmental preservation.

Major publications in Japanese include “The Leading Edge of Integrated Policy Studies I,” “Introduction to Global Security,” “GIS and Public Participation,” and “Toward Sustainable Society.”



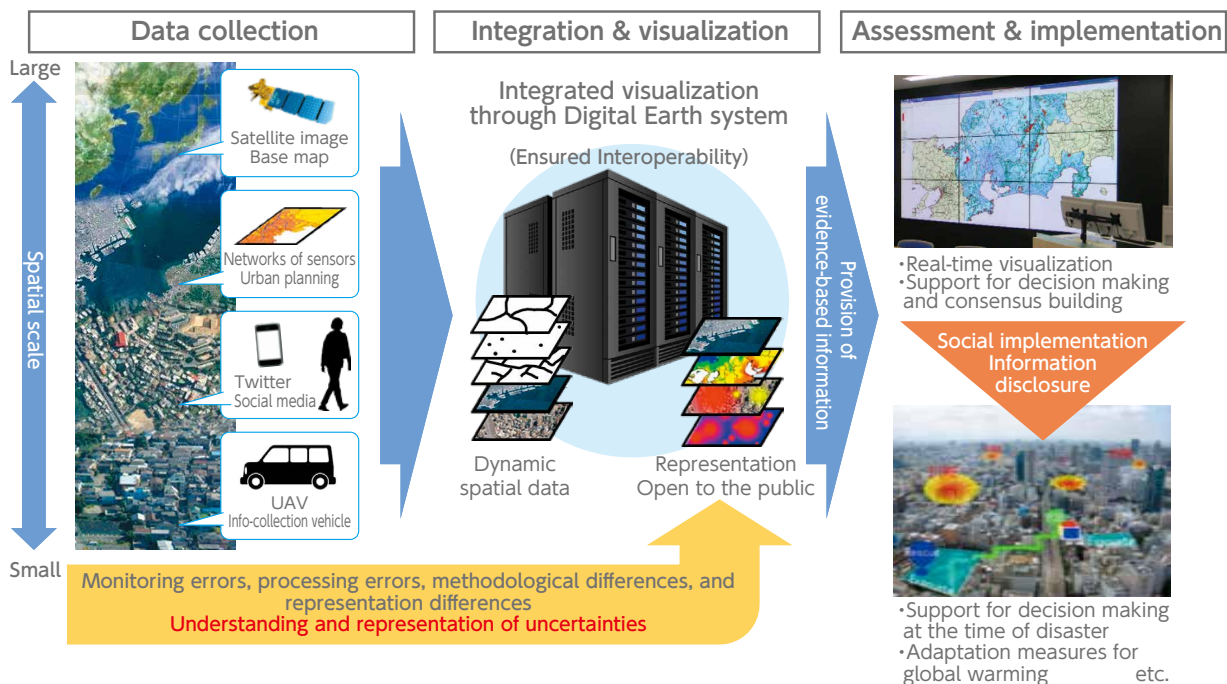
# ● ABOUT

## International Digital Earth Applied Science Research Center (IDEAS), Chubu Institute for Advanced Studies, Chubu University

IDEAS was established to engage in the development of research approaches to solve complex systemic problems on the theme of “Digital Earth” by applying GIS and spatial information science.

### About Digital Earth

Digital Earth is a digital model of the Earth recreated in cyberspace, consisting of a wide range of data on the environment and society combined with locational information. Using Digital Earth we can visualize a variety of natural phenomena and societal issues in the real world and develop an understanding of their interactions in order to solve complex systemic problems. By sharing the cyberspace containing Digital Earth, stakeholders can have a forum for coordination of work and communication from different perspectives about the future of the Earth.

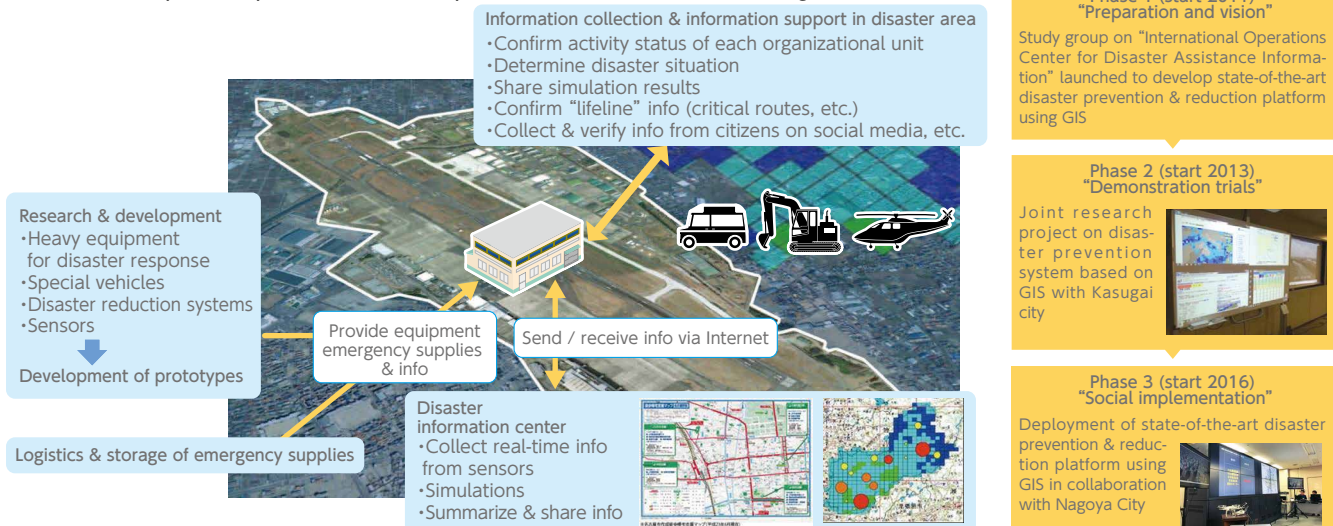


### Two research areas of Digital Earth

IDEAS is engaged in two research areas under the concept of Digital Earth.

- (1) Development of technical components for the design and improvement of Digital Earth
- (2) Case studies of the use of Digital Earth to support decision-making to address complex systemic problems

#### Case study : Concept of International Operations Center for Disaster Management Information



# JOINT USAGE • JOINT RESEARCH

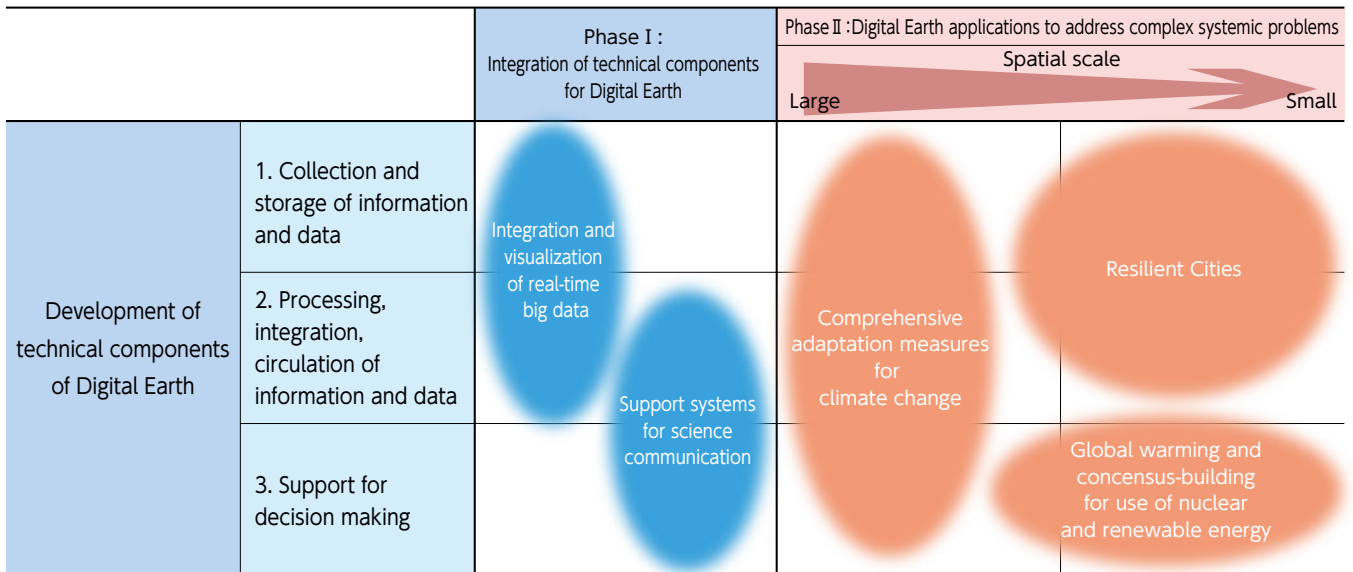
## Joint usage / research center for Digital Earth to address emerging complex systemic problems

IDEAS has been playing a leading role in conducting and promoting Digital Earth research in Japan since IDEAS was accredited as the “Joint usage/research center for Digital Earth to address emerging complex systemic problems” by Minister of Education, Culture, Sports, Science and Technology (MEXT) on April 1, 2014.

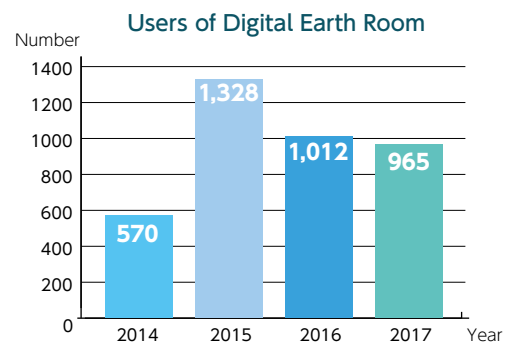
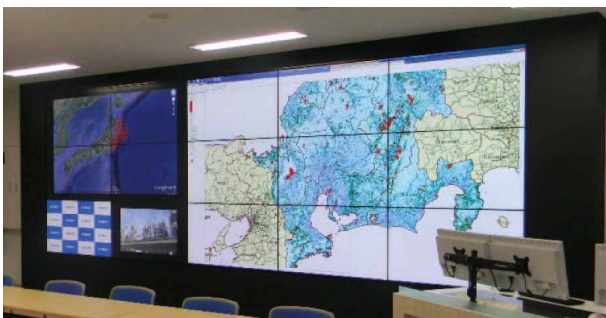
**Purpose** Via joint usage / research, we promote research and development of Digital Earth, working with researchers in a wide range of areas, including GIS, remote sensing, information sciences, and social sciences.

We also make Digital Earth available for researchers who are addressing complex systemic problems such as environmental issues and disasters, in order to advance science in fields related to building a sustainable society.

### System diagram of joint usage / research center for Digital Earth



### Research facilities for joint usage / research



The “Digital Earth Room” is one of the prime facilities provided for joint usage / research. The equipment can present multiple image inputs on a 15-screen multi-panel display via an image processing server, and can comprehensively show a variety of information transmitted from the Digital Earth server. In recent years this facility has also been used for disaster management research with local authorities, as well as environmental communication based on citizen science.



Crisis management info-collection vehicle equipped with a 360° camera, computer, plotter, satellite Internet link, and satellite mobile phone line

Unmanned aerial vehicles (fixed-wing and multirotor aircraft)

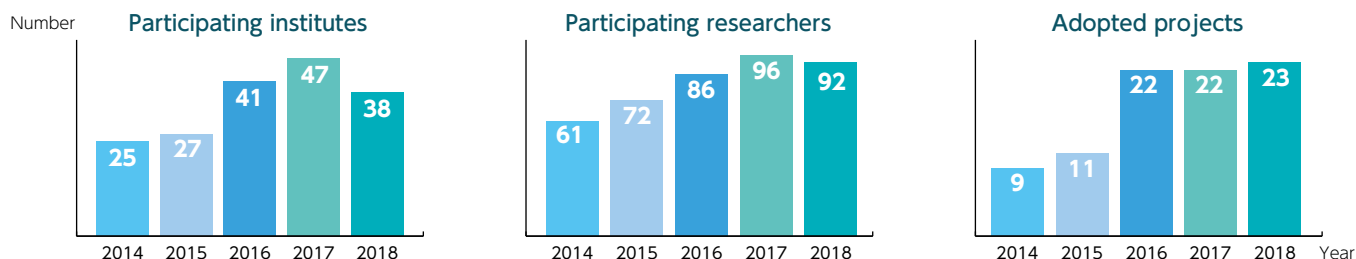


# JOINT USAGE • JOINT RESEARCH

## Research topics from open calls for joint usage / research

(1) Specific project research	Category 1: Integration of technical components for Digital Earth	"Development of real-time sensing data integration methods and standard data models"	Research to develop methods to acquire data from various sensor systems (land, sea, air, space based) then provide and/or utilize the data via web service on OGC standard.
		"Construction and analysis of basic data and visualization of uncertainty "	Construct and analyze basic information on urban areas (e.g., population), and/or establish methods to comprehensively visualize/display uncertainty.
		"Development of science communication systems"	Research to develop open, evidence-based communication methods and provide information using multiscreen Digital Earth Room.
		"Big data analysis and application of artificial intelligence (AI) and/or machine learning to Digital Earth"	Research on dynamic big data analysis methods and their application to complex systemic problems, and/or research on decision-making support using AI with Digital Earth.
	Category 2: Digital Earth applications to address complex systemic problems	"Digital Earth applications for disaster prevention and reduction"	Research to design and develop disaster prevention and reduction information services by gathering, analyzing and integrating disaster information (e.g., earthquake, tsunami, and torrential rain) using Digital Earth.
		"Digital Earth applications for environmental and energy-related issues"	Research to demonstrate and test the use of Digital Earth to address complex systemic problems relating to the environment and/or energy.
"Digital Earth applications for Sustainable Development Goals (SDGs) indicators"		Research to integrate information into Digital Earth to visualize and assess progress with the SDGs and global indicators.	
(2) General research	Collaborative research with IDEAS researchers (topic can be determined by applicant but should be related to Digital Earth).		
(3) Research meeting	Research meeting held collaboratively with IDEAS researchers (the topic can be determined by applicant but should be related to Digital Earth).		

### ● Participation in joint research: institutes, researchers, adopted projects



# MEMBERS

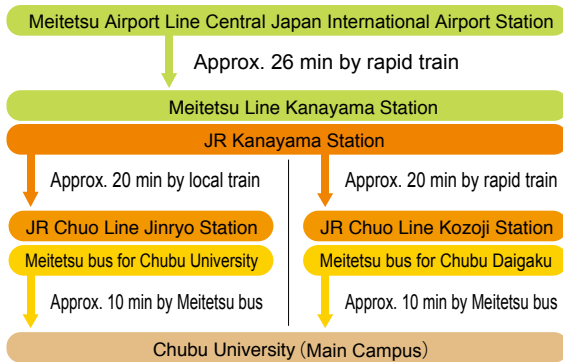
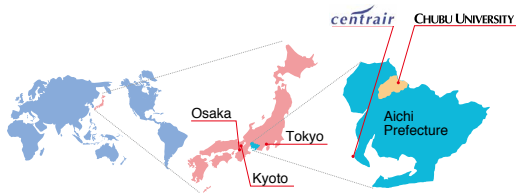
	Name	Title	Affiliation
Director	FUKUI Hiromichi	Professor	
Faculty	TAKEJIMA Kiyoshi	Associate Professor	
	SUGITA Satoru	Associate Professor	
	YASUMOTO Shinya	Senior Assistant Professor	
Affiliated Faculty	HONDA Kiyoshi	Professor	College of Engineering
	FUJIYOSHI Hironobu	Professor	College of Engineering
	WATANABE Nobuya	Associate Professor	College of Humanities
	IZUTSU Jun	Associate Professor	College of Engineering
Affiliated Researcher	KAWAMURA Shinya	Researcher	Chubu Institute for Advanced Studies
Steering Committee	TAKEDA Makoto	Professor	College of Engineering
	MINAMI Motoyasu	Professor	College of Bioscience and Biotechnology

\*The Steering Committee also includes all full-time and affiliated faculty listed above.

# ACCESS

from **centrain**

Access Information to CHUBU University from Central Japan International Airport .



# IDEAS

International Digital Earth Applied Science Research Center

Chubu Institute for Advanced Studies  
Chubu University

1200 Matsumoto-cho, Kasugai, Aichi 487-8501, JAPAN  
 Phone: (+81) 568-51-9959(Office) Fax: (+81) 568-51-4736  
 Email: gis@office.chubu.ac.jp

