

Interim Report on the Basic Strategy for Efforts Regarding Future Earth Observation (Provisional Translation from the Official Document in Japanese)

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I. Introduction

Understanding the dynamically changing earth on which we live as one system (earth system), in which the various elements and phenomena mutually interact, is not only a subject of intellectual curiosity as a science. Rather, it also is extremely important in terms of improving the welfare of humans, the sustainable development of society, and constructing a secure and safe society through various uses. In other words, deepening the understanding of the earth system contributes to, for example, appropriately responding to global-scale environmental issues such as global warming and climate change, alleviating the damage caused by natural disasters such as earthquake and volcano damage, storm and flood damage, and wildfires, and grasping the distribution of resources such as food and energy and forecasting their future trends, in addition to providing daily weather forecasts and disaster information.

At this time, it is important to understand the state of the earth system, in other words the respective elements, structures, and fluctuation mechanisms of the atmosphere, oceans, continents, biological and ecological systems, and human activity that compose the earth system, as well as the respective mutual relationships. To that end, data needs to be systematically collected through comprehensive earth observation, rather than accumulating individual and fragmentary data. The information extracted from this earth observation data can greatly affect a wide spectrum of fields ranging from policy-making to civil life, with a variety of earth observations conducted both within Japan and overseas.

The “World Summit on Sustainable Development (Johannesburg Summit)” was held from late August to early September, 2002, in the city of Johannesburg located in the Republic of South Africa. A “Plan of Implementation” was adopted on this occasion, which advocated the promotion of systematic observation of the earth related to climate change and other aspects, and the promotion of the development and wide-ranging use of earth observation technologies. Furthermore, as one part of “Science and Technology for Sustainable Development – A G8 Action Plan” adopted at the “G8 Summit (Evian Summit)” held in the French city of Evian in June 2003, there was a call for strengthened international cooperation on global observation. In such a manner, the importance of

earth observation, and in particular the necessity of systematic observation through international cooperation, has been recognized internationally as well.

Against a backdrop of increased international interest in such earth observation, the “Earth Observation Summit” was held in July 2003 in Washington, DC. There, the “Declaration of the Earth Observation Summit” was adopted, incorporating the formulation of a 10-year Implementation Plan regarding earth observation through international cooperation. In addition, it was agreed that the Framework for the Implementation Plan will be established at the second Earth Observation Summit to be held in Tokyo this April, and that the Implementation Plan will be formulated at the third Earth Observation Summit to be held in Europe at the end of this year.

A variety of earth observation efforts, including research observation, have been pursued by Japan’s related government ministries, R&D institutions, universities, and other such institutions. For example, global observation of the atmosphere, oceans, and continents from space using artificial satellites, wide-area observation using aircraft and marine vessels, and fixed-point observation from terrestrial observation bases have been conducted as operational observation or research observation. There are many observation programs that have been highly evaluated internationally among the earth observations conducted by Japan.

However, the formulation of systematic observation plans for Japan as a whole and effective collaboration between implementing institutions are still insufficient, with not enough systematic global observation data being collected. We need to promote the construction of an integrated earth observation system through collaboration of the related government ministries, in order to pursue strategic efforts. Furthermore, with the momentum for constructing an integrated system for earth observation at an international level, the need is growing to clarify Japan’s positioning and the ideal form of contribution within the international earth observation efforts, and to strategically pursue the international response.

For these reasons, the basic strategy for Japan’s efforts related to earth observation is formulated, in order to provide a guideline in the concretization of each government ministry’s measures and in the international response.

“Earth observation” here is taken as “the observation related to physical and chemical properties of the atmosphere, oceans, lands, and the interior of the earth, ecological systems, and ecological system functions, for the purpose of responding to global environmental issues such as monitoring and detecting the earth’s environmental changes and forecasting impact, steady monitoring of meteorological and oceanographic phenomena, creating maps (improving geographical information), exploring and managing resources, and enhancing earth science knowledge; that targets the entire globe or that is closely related to global phenomena even if the individual target of the observation is on a regional level.” From the purpose of earth observation, “earth observation data” includes not only such natural science data but also global socioeconomic data as well.

II. Basic Strategy Regarding Earth Observation in Japan

Earth observation imparts important basic data in, for example, elucidating global-scale environmental issues as typified by the global warming issue, alleviating the damage caused by natural disasters such as earthquake and volcano damage, storm and flood damage, and wildfires, and grasping the situation of resources such as food and energy, in addition to the understanding of the earth system. For this reason, earth observation is becoming essential in the international community as something that contributes to sound policy-making and socioeconomic activities for ensuring the sustainability and welfare of humans. With international movements in integrating the earth observation system, it is necessary for Japan to formulate a basic strategy on efforts regarding global observation in Japan.

Construction of an integrated earth observation system driven by usage needs:

Earth observation in Japan to date has been conducted under administrative purposes or research purposes, respectively, as a national government-led activity of related government ministries and institutions, or as research observation at R&D institutions or universities. However, mutual coordination and cooperation between institutions has been insufficient, and consequently it would be hard to say that effective and efficient global observation, based on a national strategic observation plan, has been conducted. Furthermore, we need to break away from a stage that focuses on developing equipment and uncovering usage needs for the data, and instead steadily promote earth observation based on usage needs.

As a result, coordination and cooperation between related institutions must be strengthened, and an integrated earth observation system driven by usage needs must be constructed based on a long-term strategy in anticipation of the future. In this case, it is important to clarify the division of roles between the related institutions, and to set a priority plan in allocating resources such as budget and human resources through selection and concentration.

Ensuring Japan's identity and demonstrating leadership in the integration of an international earth observation system:

Participation in the construction of a comprehensive, systematized, and sustained earth observation system, created through international cooperation, will promote effective and efficient earth observation under collaboration with each country and region. In this case, it is important to utilize the strengths of Japan's technologies and regional characteristics, and to ensure Japan's identity while at the same time demonstrating international leadership by focally approaching strategically important observation items, observation regions, and observation periods.

Establishment of an earth observation structure through strengthened collaboration with the Asia-Oceania region:

Many of the countries and regions located on the eastern part of the Asian continent are based under similar environmental and social conditions, such as

being affected by the Asian monsoon, being positioned in a zone with active tectonic activity, and having heavily populated coastal cities. Anticipated for such countries and regions is future prospective economic development and the facing of common issues. Furthermore, in light of the geographical conditions of Japan, located on the western coast of the Pacific Ocean, we need to pursue the construction of an earth observation structure centered around Asia and the Oceania region, under the appropriate division of roles with each country and region.

For this reason, collaboration must be further strengthened with Asia, and in particular the regions centering around East and Southeast Asia and Oceania. In terms of the developing nations in these regions, it is important to support the development of capacity concerning earth observation through fostering human resources and developing infrastructure, in order to contribute to the development of the applicable regions.

III. Basic Policies on Approaching Earth Observation in Japan

1. Construction of an Integrated Earth Observation System

In order to grasp the actual conditions of the geosphere, hydrosphere, atmosphere, cryosphere, and biosphere that comprise the earth system on various space and time scales, the related government ministries and institutions have constructed various observation systems using terrestrial, marine vessel, aircraft, satellite, and other platforms, and have collected earth observation data, under the respective operational plans and research plans. However, from the perspective of understanding the actual conditions and changes of the earth system, no one single observation plan or observation system can collect the necessary and sufficient data. Moreover, mutual coordination and cooperation between institutions is insufficient, resulting in blanks in observation items, regions, periods, and data circulation.

From the perspective of understanding the earth system utilizing earth observation data, we need to fill in these blank areas and to strategically promote comprehensive earth observation that eliminates unnecessary overlapping. For this reason, an integrated earth observation system must be established that promotes coordination and cooperation between the related institutions that conduct earth observation.

In this case, attention should be paid to the development of an integrated data system with which policymakers and researchers can effectively use not only natural science type earth observation data, but also related population statistics, energy statistics, and socioeconomic data such as for mining and industrial activities and for agricultural production. Moreover, we need to utilize existing observation systems, and at the same time construct a system that can allow flexible modifications and development if necessary, in such a way as introducing new observation systems in accordance with both domestic and overseas needs.

2. Promotion of an Observation Plan Driven by Usage Needs

Earth observation has a wide array of purposes, and the usage needs of earth observation data cover a wide range of aspects, such as policy-making, administration, research, education, commerce and industry, the

agriculture, forestry, and fisheries industry, the service sector, and civil life. Some of the observation to date that has collected earth observation data, has been conducted with such main purposes as developing technologies, uncovering usage needs for the earth observation data, or fostering users. However, in the future integrated earth observation promoted by Japan, the purpose of the observation must be clarified and must accurately meet the usage needs of earth observation data.

To this end, it is important to accurately grasp usage needs in a timely manner and sufficiently reflect these needs in formulating observation plans and developing observation systems. In this case, it is necessary for the data users to actively transmit requests, in addition to the efforts to compile usage needs by those conducting the observation.

In particular, in order to respond to global environmental issues and alleviate the damage caused by natural disasters, attention must be given to the high needs for both long-term and continual data collected through long-term monitoring, and earth observation data required for research and model development intended to elucidate the earth system process.

3. Promotion of International Collaboration and Cooperation

It is important for Japan to actively contribute to earth observation, data usage, and research, as well as to demonstrate international leadership, in the three respective levels of the East Asian and Southeast Asia region, the Asia and Oceania region, and the global scale.

In terms of earth observation, in order to fill in the time, space, and item gaps of observation data and in order to promote the circulation of data among countries, we need to strategically pursue the construction of an integrated earth observation system under international cooperation, while minimizing the expenses through the appropriate division of roles and joint work with the developed nations and developing nations respectively.

For this reason, in particular in Asia and the Oceania region in which Japan's advantage in earth observation can be ensured and effective contribution can be made, mutual cooperation must be pursued with countries and regions that possess earth observation capacity for the applicable region. Moreover, under collaboration with such countries and regions, we need to appropriately support the education and training, and infrastructure development, within the developing nations, increase earth observation capacity, and construct and strengthen the earth observation promotion structure in Asia and the Oceania region.

Furthermore, in this case, in order to mutually utilize useful information obtained through earth observation, it is important to gain the proactive participation of related countries, while at the same time endeavoring to further promote cooperation and coordination between the related countries.

4. Promotion of Long-Term Observation and Monitoring

Many earth observations require long-term observation and monitoring. However, much of the earth observation conducted at universities and R&D institutions in Japan are short-term research projects or research held through comparatively short-term competitive research funds, leading to a situation under

which it is difficult to ensure continuity.

In terms of important observation and monitoring that require long-term continuity, policies need to be examined that ensure long-term continuity, such as the development of a structure that allows for long-term operation in R&D institutions and implementation as part of the routine observation operations being conducted by related government ministries and institutions. We also need to examine the ideal form of the beneficiary payment by data users and the exploitation of private sector vitality through transferring the control from the national government to the private sector.

5. Promotion of R&D of Observation Technologies

In many cases, extended periods of time are required in developing new observation systems, such as new instrumentation and equipment or platforms such as marine vessels and satellites. It is important to take a pioneering and active approach, while utilizing the strengths of Japan's technologies, in light of the future earth observation direction and the trends of usage needs.

It is important to promote the R&D of analysis and utilization technologies for the large-volume data and information that will be required in the future, as well as instrumentation technologies that meet the various usage needs in observation, monitoring, and model research. Moreover, in order to make it possible to acquire data that meets usage needs with the necessary and sufficient quality, there is a need to endeavor to standardize measurement technologies, equipment, and data processing analysis methods.

In terms of instrumentation and equipment used in earth observation, innovative technologies such as automated sensors that allow long-term operation with superior cost-effectiveness are expected to dramatically advance and promote the efficiency of integrated earth observation systems. Consequently, we need to promote the development of innovative technologies.

6. Development of Advanced Data Usage Technologies

In consideration of the increase in opportunities to utilize observation through satellites and of the expansion of the usage of model output data, earth observation data is naturally anticipated to become large-volume. Consequently, in order to effectively and efficiently facilitate both the conversion from large-volume data to useful information and the use of the data, we need to promote the development of integrated data usage technologies and systems that utilize advanced computer technologies and telecommunication technologies.

Furthermore, advanced quality assurance and quality control are necessary in order to obtain useful information from earth observation data. For that reason, instrumentation, equipment, and observation systems must be advanced and standardized, while at the same time developing data usage technologies and systems that allow efficient quality control.

7. Disclosure of Data and Promotion of Circulation

Earth observation data achieves national interests, and at the same time holds significance as a public good of humanity. Consequently, the data should in principle be disclosed. Required for this is the

environment for all data users, from both Japan and overseas, to easily access the data as quickly as possible and at the minimum expense, after obtaining the data.

In disclosing the data, the data disclosure principles of international institutions need to be sufficiently respected. We need to examine the disclosure of earth observation data, collected as part of research activities, from the perspective of the protection of intellectual property, such as taking into account a preferential right of use for a fixed period of time for researchers.

In order to promote the circulation of data and allow easy access to the data from a wide range of users, we need to construct a common system or structure for data sharing, and at the same time pursue the standardization of a data format. In this case, it is important to utilize existing systems, structures, and specifications.

8. Development of a Promotion Structure

In Japan's future earth observation, in order to effectively and efficiently promote the construction and operation of an integrated earth observation system driven by usage needs, we need to examine the ideal form of a structure and organization that panoramically and strategically promotes coordination and collaboration between related institutions.

In addition to the efforts of the national government, we need to sufficiently examine several issues. These issues are the usage needs, such as for meteorological phenomena, resource, and geographical information, from the perspective of commercial use in the private sector, and the role of the private sector as a data user or provider, and include the utilization of private sector vitality. There further is a need to pursue collaboration between the government and private sector.

Meanwhile, there have been many cases conducted to date through cooperation with the private sector, such as environmental observation utilizing private marine vessels or aircraft, with a high necessity of further pursuing collaboration with the private sector. Moreover, earth observation data is also collected by some educational institutions and nongovernmental

organizations (NGO), with the need to examine the possibilities of effective utilization of the data collected by such private sector institutions.

In promoting earth observation, we need to gain understanding by endeavoring to actively disclose and explain to the citizens information about the significance and necessity of earth observation, the anticipated outcomes, and the obtained results.

IV. Procedure for Future Survey and Examination

This report has provided general details on the basic strategy for the efforts regarding future earth observation, as an interim report.

There are currently six sectional meetings under the Earth Observation Survey and Examination Working Group, for the following fields: (1) global warming, (2) global water cycle, (3) global environment, (4) natural disasters, map creation, and resources exploration, (5) stationary observation, and (6) geoscience. Detailed discussions are taking place for each field regarding earth observation needs, the current situation, and the direction of efforts approximately 10 years in the future. Moreover, surveys and examinations are taking place regarding interdisciplinary matters in two sectional meetings: (7) data systems and (8) international response.

In addition to the matters for examination that were raised in Chapter III, examinations will continue in the future regarding the policies on focalization, prioritization, and clarification of the division of roles of related institutions, in Japan's concrete efforts toward earth observation. These will be held in light of the deliberations status in the Expert Panel on Space Development and Utilization and will be based on the surveys and examinations of each sectional meeting, in order to summarize the final report.

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<http://www8.cao.go.jp/cstp/project/envpt/english>

Positioning of this report

In order to clarify the basic strategy for Japan's efforts regarding earth observation, the Environmental Research and Development Promotion Project Team within the Expert Panel on Promotion Strategy of Prioritized Areas recently compiled an interim report, in response to a report on the results of intensive surveys and examinations within the Earth Observation Survey and Examination Working Group (established on September 26, 2003). This Working Group was established under the Environmental Research and Development Promotion Project Team and is composed of well-informed individuals.

These surveys and examinations pay attention to the deliberations status of the Expert Panel on Space Development and Utilization that is being implemented concurrently. At the same time, with the cooperation of the Ministry of Education, Culture, Sports, Science and Technology (MEXT), they utilize information collected by the Earth Observation International Strategy Formulation Investigative Commission that was established under MEXT.

This interim report indicates the basic strategy for Japan's approach to earth observation. Surveys and examinations will continue to be conducted for priority items of earth observation that Japan should strategically approach, with the summarization of the final report scheduled for 2004.

In order to contribute to the government's focalization of R&D budget, this interim report will be reflected in "The guidelines for Science and Technology resource allocation" and is anticipated in providing a guideline in formulating efforts and international cooperation plans for earth observation for each ministry.