Building up the Digital Earth Together, Sharing Global Data Resources Each Other

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At this great milestone as we farewell the 20th century and step into the new era, we are pleased to host the International Symposium on Digital Earth and welcome specialists and scholars from all over the world to Beijing, a city of great history and culture. Here, we can trace the historical tracks of information technology, from the use of fire on the Great Wall as information signals to today's communication satellite networks and now, we can review our latest achievements in the fields of information sciences.

In order to improve the quality of life on this planet, mankind has made unremitting efforts and made tremendous progress. Accompanying the technological and economic progress, however, are increasing concerns over environmental deterioration and natural resource depletion. We have come to realize that we will not be able to sustain the constant improvement of our societies unless we take a global and systematic approach to the development. Global sustainable development is a major issue confronting everyone on this planet and "Digital Earth" is the ideal platform to develop and implement the right solutions.

Those solutions must come from global collaboration. That is why we are here. We are here to ensure we build the spatial information framework, the Digital Earth, for the common interests of mankind. We want to ensure that digital information technology will help narrow the gaps between the rich and the poor, instead of expanding the polarization of peoples. There is only one earth. Its digital representation should encompass all the entities and processes on this planet. We hope to find the strategies through establishing a forum for international exchange and collaboration. This is the objective of this Symposium.

Early in the 1970s, Chinese scientists had put forward the creative proposition for a complete digitization of the surveying process. At present, the Chinese government is actively promoting the *informationalization* of the country by digitizing and networking national information infrastructure. We are also actively contributing to the development of global databases. We have promised to participate in the joint establishment and share of data in the one by one kilometer global grid database, the one to one million scale digital elevation models, and the scientific database Coddata-D. The Chinese government is an enthusiastic member in such international programs as Global Mapping, Pacific Ocean Mapping, Study of the International Geosphere and Biosphere, Deep Sea and Continental Drilling, Continental Glacier Landing, Exploration of the Polar Regions, Standard Cross Section of the Stratum, Categorization of World Cultural Heritages, and Protection of Biological Diversity. Scientists in China have also made well-acknowledged contributions in numerous research fields. Among these are the research on the eminence of the Qingzang Plateau and its environmental effects, the paleomonson climate, the low trough of the ozone layer, the sunspot cycle, historical earthquakes, tectonic movement, magnetosphere and magnetic storms in the central and lower latitudes, and diving robots for deep sea explorations. These achievements are made with the great support from our government and our people as well as cooperative efforts from the scientists and scholars presenting here. On this special occasion, on behalf of the Chinese scientific community, I would like to express our hearty gratitude.

We are facing unprecedented challenges in the post-industrialized society characterized by economic prosperity but also environmental deterioration and resource depletion. Accompanied by the trend of financial and economic globalization, there has emerged economic turbulence, enterprise merger, regional reconstruction and polarization too. We believe that "Digital Earth" will provide the scientific grounds for developing strategies to address these global issues. Spatial information technology has shown its effectiveness in supporting macro adjustment and control of regional economic development as well as management of individual sectors in the economy. We have successfully utilized the technology in industry restructuring, regional economic design, agriculture, forestry, animal husbandry, sideline production, fishery, and various engineering projects. Along with enrichment of spatial information technologies, "Digital Earth" is capable of providing the ideal technical mechanism to meet the needs of regional and global development. The 20th century has been a great era during which significant progress was made in science and

technology. Earth Observation Systems make it possible to obtain timely, accurate, and multi-spectral global coverage information through satellite remote sensing. They also facilitate the acquisition of massive amounts of data on the material, energy, and information flows of every strata of the earth through geophysical and geochemical observations. When these data are integrated, analyzed, and visualized, they will have profound impacts on people's consciousness and on the temporal and spatial dimensions of various global and regional problems, which will bring about subsequent changes in their behavior and booster their appreciation and confidence in the accuracy and comprehensiveness of the earth observation systems.

There are numerous promising projects. Monitoring for the temporal and spatial changes of global chlorophyll can be applied to the assessment of primitive productive forces and crop evaluation. Information on the temporal and spatial shifting regulation of the subterranean heat area can help forecast the occurrence of severe natural disasters. Geochemical charting is useful for fixing promising mineral reserves and for background analysis of environmental pollution. The geoscience communities in China and around the world have already paid much attention to the EI NINO phenomenon as well as impacts on global changes from ozone depletions in the South Pole and the Qingzang Plateau. They believe that the Digital Earth technology will have great potential in these projects.

"Digital Earth" is a fundamental work of the Earth Sciences. As a common framework for describing Earth's information in the temporal and spatial domains, "Digital Earth" is at present mainly used for information integration of Earth Observation Systems and provides functions for data's acquisition, storage, transfer, analysis, and processing. Its emphases are on establishing a unified coordinate system and on developing multi-dimensional dynamic virtual display.

The further development of "Digital Earth" should be taken as a knowledge innovation program with complex systems. In addition to integrating multi-source Earth data, we should develop Earth dynamics models that represent the behaviors and relationships of Earth objects and processes, design information atlases that illustrate temporal and spatial patterns, and enhance the analytical and synthetic capabilities for knowledge discovery and scientific forecasting.

Realization of the grand objectives of "Digital Earth" presents a great challenge. We must rely on the joint efforts across disciplines including the Earth Sciences, Information Science, Space Science, Life Science, and other social and physical sciences. Individual disciplines would need to be improved and reorganized so as to establish the disciplinary echelons and enable better interdisciplinary interactions. We need to establish a unified system that integrates the theories of Earth Information Science and the computer information technology. Such a system presents a new domain of science and technology in which global resource and environmental problems can be researched comprehensively and resolved systematically. Through this unified system we can promote international cooperation, global sustainable development, and maintenance of world peace.

Facing the challenges and opportunities of the information society in the twenty-first century, countries are adapting various measures to develop their own information infrastructure and to integrate them with the global information frameworks. In China, fiber optics communication networks have connected every province. Television education and other networks for distance learning have reached villages in remote regions. Mobil phone usage is surging and owners have surpassed forty million accounts. Our coastal ports have been connected with submarine cables and with "the Continental Bridge between Europe and Asia". We have launched meteorological and resource satellites and have undertaken the launching of a series of iridium satellites. In addition, we have organized successive surveys for the Very Long Baseline Interferometry network in the Asian and the pacific areas.

By initiating this International Symposium, we hope to learn advanced technologies from different countries and to absorb their merits and avoid shortcomings. We are also pleased to present the results and experiences in such areas as the prevention and improvement of desertification, control and prevention of flood, earthquake disaster and local diseases, rational exploration and use of resources, fine seeds popularization and its capability in sustainable development.

"Digital Earth" is an example of global complex systematic engineering with many issues of common interest waiting to be further discussed and with agendas particular to individual regions and countries as well. Let's seek the common grounds and appreciate the differences between each other. When considering there are different scale requirements from the global level to regional ones, it is necessary first to work out the scientific framework and data structure for handling data of multiple scales. In addition, we need to define the

specifications for data sharing, which include metadata standards and data exchange protocols. Furthermore, we need to establish a network mechanism for global data transfer, which is necessary to ensure a complete coverage and timely updates of information. We will also need to develop the mechanisms for distributing the data and information. User interfaces ought to be improved to facilitate easy search and navigation on the Web. Finally, issues related to information security and management regulations need to be addressed through coordinated international efforts. To tackle all these issues, we need not only the collective wisdom and hard work of scientists but also the whole society's attention, as well as the involvement of the related units in the United Nations and the participation of every country's government.

"Digital Earth " offers a great tool that allows us to resolve global problems and overcome difficulties in developing mutual economic relationships between countries. Knowledge is power. We hope everyone in the world is empowered by the Digital Earth. Nowadays, 88 per cent of Internet users live in the developed countries but they account for only 17 per cent of the world population. The one-fifth richest world population occupies 86 per cent of the world's total value of domestic production, 82 per cent of export market and 68 per cent of direct foreign investment. As a contrast, the one-fifth poorest world population occupies a mere one percent in each of these categories. One must recognize the devastating fact of global polarization and its consequences. We must ask ourselves how to turn "Digital Earth" into a public cause, that reflects the spirits of equality and mutual benefits, promotes friendly cooperation, enables joint explorations and sharing of resources. Let's make efforts to further international exchange and cooperation for the purpose of making happiness for all the people, for the maintenance of world peace, for the elimination of poverty and backwardness, and for the sustainable development of social economy.