

## Geo-graphic Information Science and Digital Earth

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**ABSTRACT** The development of Digital Earth (DE) falls into research of the Earth Science. It provides comprehensive and huge data for Earth Science research under the network environment, and may be used as a new concept and model to depict and explain the phenomena and process on the Earth. It can also serve the global strategy in the information age. The key to DE, from the point of scientific view, included the global change of Environment, the estimation of primary productivity, earth surface thermal field monitoring, development of series of small satellite, database updating and sharing, etc.. It is important that the advancement of the Digital Earth needs more wide international and regional cooperation.

“Digital Earth” is one of the fundamental works on Earth System Science. It focuses on the Metasynthesis of huge data of Energy, Mass and Information flow among the Geo-sphere. By the way of integrating Earth Observation System(EOS)、Global Position System(GPS) and the Distributed Network Geographical Information System(GIS), “Digital Earth” extends the concept of Mapping、Airborne / Satellite Remote Sensing、Space exploring and Depth-drilling.

“Digital Earth” provide data for Earth System Science research. It gets volumes of data, compress and store them, and process them into unified、normalized and comparable data. Furthermore, it makes the data sharable and provides useful network services. Besides, it is easier to do research on Geo-Information “Tupu” (special and temporal graphic analysis methodology) on the basis of “Digital Earth” by data mining and modeling methods used in the research, such as diagnosis, and virtualization.

In the information epoch, “Digital Earth” is a global stratagem. Different from positive view, “Digital Earth” is also a double-edged sword. It can not only benefit to humanity, serve to the sustainable development of society and economy, but also can become an accomplice of war. It's closely connected with the national security, the international trade, the re-distribution of resources, and multipolarization of economy, the prevention and cure of disasters in addition to the environment protection and industry restructuring. Moreover, it can impel the development of the spatial science and technology, and information industry, etc.; Also it can boost employment and economic growth. Our country must develop it by ourselves to guarantee national security and rights; on the other hand, international exchange needs to be enforced to share information. We advocate that active and far-sighted attention from all quarters of the society on this issue, and we call for high emphasis and sound leadership from government leaders.

Also, “Digital Earth” is coming to a new Geo-Information multi-dimension model. It's trying to model the surface-earth information (up to ionosphere, down to Moha surface) from the point of dynamics. In the environment of geographic information system, it realizes the data fusion of remote sensing information, geo-chemistry, Geo-physics, traditional geology, nature, humanities and the statistic datum observed by ground observation network. At the same time, it has powerful capacity of integrated analysis for ground-detected radar, earthquake and geomagnetism data, ocean sonar information and electromagnetic wave information.

Until now, the “Digital Earth” Stratagem has Some Scientific hot spots. The first aspect is on Key technique, such as Specialization in micro-satellite serials, Information sharing of database and database updating through satellite, and Data-mining and Geo-Information pattern series, etc.. The other lies in Applied-basic study, for example, Assessment of chlorophyll's content and primary productivity, Monitoring of earth surface radiation and thermofields, Spectrum differentiation of the landscape geo-chemistry, and Urbanization.

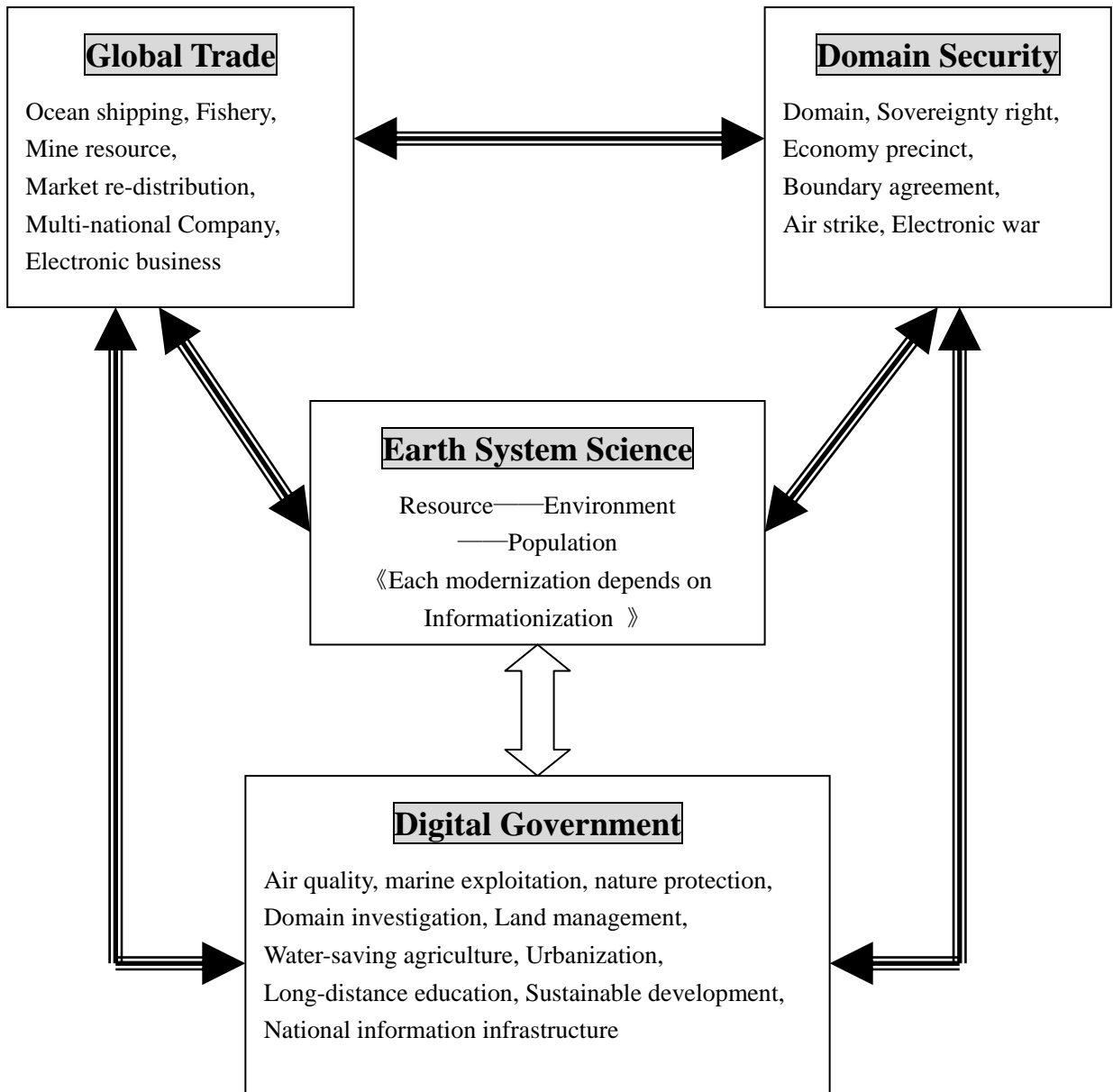
Now, it gets more and more urgent for “Digital Earth” to be enacted as an important multidisciplinary knowledge innovation project. What's following will highlight this. Being in face of the coming 21<sup>st</sup> century, Geo-information Science and Bio-informatics certainly will be the preferential application field and foreland of Information Science and Spatial Techniques, which embodies the scientific technology's general polarizing trend to macrocosm and microcosm. Second, the modernization of the Geo-science presses for the support of Information Science and Spatial Techniques. space, terrain and marine observation and research, all need the help of micro-satellite group, all-weather probing(SAR), submarine synthetic radar sonar, and high resolution display techniques. Third, the intelligent processing of information, such as data mining, knowledge

discovery, and intelligent search, also needs the

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Geo-science experts' participation, so as to reciprocate each other's advantage. Finally, the implementation of such crucial project as Environmental/Resources spatio-temporal information system, natural disaster's timely monitoring, forecasting, and decision making, and precision agriculture, etc., all need the cooperation of multi-discipline and multi-department.

In addition, "Digital Earth" is a great opportunity to enhance international communications and cooperation. In the field of Earth science, there are over 50 programs in the world for international cooperation, such as IGBP, CEOS, Global SAR and deep-sea exploring, ODP, etc., while China takes part in only one third of them. At the same time, it can enhance the understanding and cooperation with adjacent countries, and offer information and scientific basis to exploitation of international rivers, rights of oceans and survey of national boundaries. It also help to know both sides, communicate bilaterally, make a difference between inside and outside and ensure the safety of national defense., as well as Support the third world countries in curing poverty , relieving disaster, preventing and curing land deterioration, and supporting ecological agriculture technology, etc. , for the Third World, especially to enhance the South-to-South cooperation.

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