Application Analysis based on the Satellite Remote Sensing Technology in Environmental Protection

Zhao Yu

Capital Normal University & College of Geospatial Information Science and Technology, Beijing, China

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Abstract: In order to do the work of the environmental protection, the management department needs to introduce an advanced satellite remote sensing technology to monitor the water environment, the atmospheric environment and the ecological environment, to improve on the level of monitoring modernization and provide reference that will be of help to the environmental protection department and to also develop a comprehensive protection strategy that will promote the development of an energy-saving society. So this paper is based on the current situation of satellite remote sensing technology in an environmental protection, and then analyzes on the existing problems and finally puts forward some reasonable countermeasures.

1. Introduction

China's social and economic development has increased in recent years, however according to the basic conditions of the actual environmental development based on the disasters and accidents that often occur, the current monitoring level of satellite remote sensing technology has been widely used in the actual protection process and is improving greatly and in many countries in the West they attach great importance to the development of environmental remote sensing monitoring technology and have achieved an excellent results. As far as the current situation is concerned, China's environmental monitoring level is more complicated because the task is more arduous, and the monitoring workload is very large, looking at it from the perspective of water environment, it is necessary to conduct a comprehensive monitoring rivers, lakes, and estuaries; from the atmospheric environment which needs to be the air pollution areas of the urban agglomerations and coastal areas and are to be monitored by the remote sensing technology, especially the monitoring of sulfur dioxide emissions. From the perspective of the monitoring of the ecological environment, it is necessary to dynamically monitor the daily changes of the regional ecological environment, and then comprehensively evaluate the environmental quality, including the nature reserves, water conservation areas, soil and water conservation areas, from the perspective of some major environmental disasters, it is mainly responsible for the comprehensive supervision of a major water conservancy projects and transportation projects to avoid a major environmental disasters. Also from the perspective of the environmental changes, the main monitoring of greenhouse gases provides an important reference for doing a good job in greenhouse gas emissions.

2. Current status of satellite remote sensing technology in environmental protection

2.1 Current status of remote sensing monitoring of water environment

In the process of monitoring the water environment, the monitoring unit mainly uses a remote sensing technology, including the ocean water color, satellite remote sensing technology and inland water body satellite remote sensing, but due to the complex environment of the inland waters, the water area is relatively small coupled with more human activities which is very susceptible to pollution. For the time being, the United States and other countries mainly target the marine water color satellite remote sensing technology, and the monitoring indicators mainly include suspended solids and water temperature, in terms of satellite remote sensing in inland water bodies, China mainly introduces the terrestrial satellite data from other developed countries.

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2.2 The current status of remote sensing monitoring of the atmosphere environment

In recent years, the developed countries such as Europe and the United States have used satellite remote sensing technology to conduct comprehensive monitoring of ozone, sulfur dioxide, nitrogen dioxide and methane, and have achieved an operational development on the whole, but because the physical quantity components are relatively small, the spectral characteristics are relatively simple, and the satellite remote sensing has relatively poor ability to monitor the atmospheric pollution parameters and most of them focuses on monitoring the greenhouse gases such as low temperature and humidity. In China's air pollution monitoring process, it mainly uses Fengyun series satellites and Environment No. 1 satellites, which are widely used in ozone detection and sandstorm monitoring.

2.3 Status of remote sensing monitoring of the ecological environment

Countries such as the United States mainly uses multi-source remote sensing information to comprehensively monitor the ecological environment, such as classifying land cover, evaluating the ecological environment quality and extracting the biophysical parameter information in order to obtain a corresponding results. However, from the current situation of monitoring in China, the development time of remote sensing monitoring technology in China's ecological environment is relatively short, especially in the dynamic evaluation of the ecological environment quality and the assessment of the large-scale ecosystem status, and there is a big gap with the foreign development. After the development in recent years, the satellite system is used to comprehensively monitor the land ecology and soil erosion, and the landscape ecological method is used to evaluate the entire ecosystem and some of the fragile ecological environments have been analyzed and good results have been obtained.

3. The application of satellite remote sensing technology in China's environmental protection

From the current point of view, China's satellite remote sensing technology has many problems in the process of environmental protection application which directly affects the effect of the ecological environment assessment and cannot provide a reference that can help for the ecological environment protection.

3.1 The lack of special satellite payloads for the environmental remote sensing monitoring

From the current point of view, China's environmental protection satellite payload is relatively scarce and the Fengyun meteorological satellites are mainly used for weather monitoring and forecasting, meanwhile the marine satellite series are mainly used for ocean water color remote sensing monitoring and forecasting; environmental satellite series are mainly used for land and resources surveys. So the above dangerous loads can be applied to the field of the environmental monitoring, but the effects are very limited, such as low spatial resolution and time resolution of the load, and the unreasonable setting of the spectral segment can not play an important role in actual monitoring.

3.2 The research on key technologies for the environmental remote sensing monitoring is weak

In recent years, China's environmental remote sensing application technology has been improved, but it is difficult to meet with the operational standards and the requirements of the remote sensing monitoring in particular, and the key monitoring technology of the remote sensing is weak, relying mainly on the original experience for monitoring, lacking its systematically and practicality. It is also difficult to meet with the scope requirements of the environmental remote sensing monitoring and in the key areas of satellite data processing, the actual model development are many unsolved problems. For example, the development level of image information processing such as hyper spectral and radar is relatively low, which has a very adverse impact on the goal of achieving an integrated environmental monitoring system in China.

3.3 The level of application system construction is backward

Affected by the traditional management and construction ideas, many satellites in China have achieved on-orbit operation. However, there is no corresponding application system on ground and the important role of their own resources cannot be fully utilized, and a complete application system is not established resulting in waste of resources, but after the development in recent years, China has established a relatively complete monitoring and evaluation process and in the actual operation process, there are still some problems, such as the specific business scheduling is not uniform, the task driving is unreasonable, and the environmental satellite data is received from the entire application. The whole process design is unreasonable, and the remote sensing data lacks accuracy which is difficult to meet with the requirements of fast processing and of multi-source or multi-load remote sensing data, which reduces the authenticity and effectiveness of data processing and cannot meet with the needs of current fast and mass production.

4. The future development of the environmental remote sensing countermeasures

4.1 R&D environment remote sensing special load

For satellites that are out of date, the environmental monitoring department needs to combine the actual situations and there is a need to update on time in order to complete the replacement of the equipment. In 2018, the core load on the “High Score 5” satellite developed by China - atmospheric trace gas differential absorption spectrometer (EMI), atmospheric main greenhouse gas monitor (GMI) and the atmospheric aerosol multi-angle polarization detector (DPC) Passing the on-orbit test summary review that can help the monitoring personnel to obtain an accurate information, and to continuously improve on the comprehensive observation book review of polluting gases in China, and play an important role in the environmental protection. In the R&D environment remote sensing special load process, it is necessary to adhere to the concept of a sustainable development, adhere to the national environmental protection and satellite planning as the guide, combining with the environmental pollution problems in China, in order to clarify the environmental protection objectives and effectively improve on China's environmental pollution monitoring response capability, and to also continue the development of multi-mode spectrometers and imagers and other loads as well, because the establishment of a comprehensive environmental monitoring system is to achieve all-weather and quantitative monitoring.

4.2 Increase the research on an environmental remote sensing application technology

First, to continuous research and development of operational application technology, combined with the specific needs of the current national environmental management, to operationalize the current water environment, atmospheric environment and the ecological environment, and to increase the development of pollutant remote sensing information research technology. Second, the development of the environmental remote sensing application research mechanism, which is the development of a new special satellite payloads, and then the feasibility assessment to meet with the basic requirements of the actual monitoring. Third, to establish a sound remote sensing application technical specification and standard system of the R & D personnel which need to continuously strengthen the basic and applied technologies of the environmental remote sensing technology to further consolidate the original environmental remote sensing physics foundation, standardize remote sensing calibration, real-time processing and information processing processes, and establish a sound technical and standards system.

4.3 To build an integrated environmental monitoring business application system

Under the premises of the current environmental monitoring system, the R&D personnel should formulate a scientific and rational environmental monitoring network plan, and further improve on the network monitoring capability, to also do a good job in monitoring and evaluating on the regional ecological and pollution sources, as well as to continuously integrate more on the remote sensing technologies so as to play an environmental monitoring network. The important role of

planning and to further enhances the effectiveness of the environmental assessments. Therefore, the environmental monitoring department should integrate on the current status of the environmental monitoring in China and build an integrated environmental monitoring operational application system.

5. Conclusion

In the application process of the satellite remote sensing technology in environmental protection, the environmental monitoring department should continuously develop a new remote sensing technology in combination with the environmental pollution problems, and to establish a sound environmental monitoring operational application system to improve on China's environmental monitoring level with the rapid development requirements so as to adapt to the current social and economic development of China.

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