

APPLICATIONS OF THE RESOURCE SATELLITES FOR ENVIRONMENT AND DISASTER MONITORING AND FORECASTING IN DISASTER MONITORING AND ASSESSMENT

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ABSTRACT:

The Satellite Constellation for Environment and Disaster Monitoring and Forecasting is a new generation of in-building remote sensing constellation. Just as the name, the new constellation was especially designed for the environment and disaster monitoring and forecasting. And the constellation is also shortly named as Resource Satellites. The Satellites of The Satellite Constellation for Environment and Disaster Monitoring and Forecasting started to launch continuously since 2006. Recent years launched several of the Resource Satellites, played important role in Environment and Disaster Monitoring and Forecasting. By now, this satellite works well, and high-quality remote sensing data are acquired and transmitted to the ground steadily. The Resource Satellites, with wide-swath and short revisit-period character, is more suitable for the disaster emergency applications. Since the satellite launched, the Resource Satellites had been widely used for the monitoring and assessment of the disaster, such as blizzard, floods and earthquake. Based on a series of the Resource Satellites applications in the past months, the RADAR has been turned out to be more suitable for the wide-region disaster monitoring and assessment, such as earthquake. In this paper, the characteristics and working-condition of constellation and instruments would be introduced in brief firstly. In the second part, based on the study on the application capability evaluation and the technological route, the Resource Satellites data were applied for the disaster monitoring and assessment of the blizzard in GUANGDONG, the FLOODS in FUJIAN and the Earthquake in SICHUAN. Finally, the application capability of the Resource Satellites is evaluated in detail. And a technical application method, for blizzard monitoring, risk forecasting and disaster assessment, are established, which would contribute to expanding the application benefit of the satellite constellation.

1. INTRODUCTION

1.1 Optical satellite

Since the first Resource Satellites has been launched in recently years, there are several satellites in the orbit. They are coming into being the satellite constellation which including 2 meters' and 3 meters' satellites.

1.2 RADAR

The RADAR has particular technical characteristics, since the first RADAR has launched a few years ago; the RADAR has obtained large numbers of images. Now, we have launched several RADAR satellites.

2. APPLICATION

2.1 Overview

In recently year, with the improvement of spatial resolution, temporal resolution, spectral resolution and technological innovation, satellite images play an important role in weather forecasting, marine environmental monitoring, atmospheric monitoring, geological survey and analysis, survey of land and

resources, resource management, urban planning, urban environmental survey, construction, transportation, agriculture yield estimation, forest surveys, hydrological observation, mapping, Environmental monitoring and assessment of disasters and so on.

Resource satellites have launched in recently, but the promotions have been opened quickly, and resource satellites bring great value in various fields.

In the second national survey of land resources, we have obtained large numbers of images for mapping. And we support images to forestry bureau for indicating forestry resources.

2.2 Application in Environment and Disaster Monitoring and Forecasting

In the paper, we will introduce the application of resource satellites, especially in Environment and Disaster Monitoring and Forecasting.

2.2.1 Technological advantages

(1) Optical satellite

(I) Efficiency of data collection

Now, we have several satellites, we can collect a large number of images in a short term.

When the situation of a disaster has happened, for example, Fire, typhoon and so on, we can collect enough images at the first time.

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(II) a lot of archived data

We have a lot of archived data. We can use the archived data for monitoring the potential disaster.

(2) RADAR satellites

The biggest advantage of RADAR satellites is that who can collect images when the weather is bad. RADAR satellites can collect images without the restrictions.

We can use it in the floods, snowstorms and so on, the optical satellites can't collect images when the weather is bad.

2.2.2 Application Case

Guangdong Rainstorm

We collect RADAR images which can cover large part of Guangdong when the rainstorm breaks out. We monitored disaster area dynamically with the help of RADAR images. We do a lot of assessment of the disaster, and then, we reported it to government agencies.

Fujian Flood

In 2008, the flood breaks out in Fujian, we use RADAR satellites to collect images of all the rivers, and we monitored the bridges and roads which had been destroyed in the flood. And find out where would be submerged in the future.

Anhui huaihe Flood

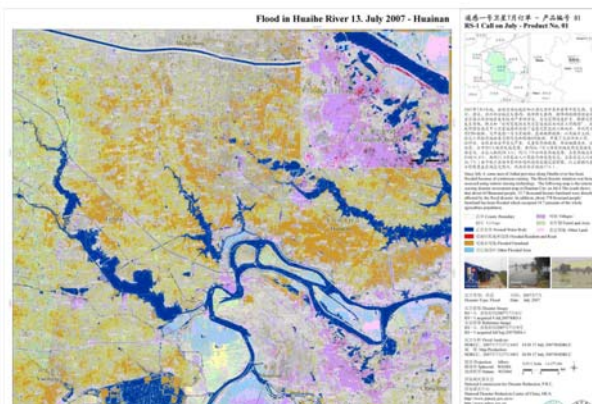
In 4th, July, 2008, the flood had break out in Anhui, Huainan City is the hardest hit. Ministry of Civil Affairs used ETM+, RADAR images, the basis of geographic data, disaster information, and GPS data to assess the disaster.

In 10th, July, 2008, National Committee for Disaster Reduction used two SAR images to monitor Huainan area.

Data-processing staffs form National Committee for Disaster Reduction, who used SAR images to get some information about the disaster.

They had test the scope of the flood affected population, the submerged area of the crops, and so on. The get a lot of valuable data, and then, they reported to the Committee for Disaster Reduction. The State Council Office of emergency response gave them high priority.

Our RADAR satellites pay an import role in estimating damage. Huainan, Anhui Province under the picture shows the map of flood disaster evaluation.



Frozen disaster in 2008

In 2008, thee frozen disaster had broken in near 10 provinces. Spring festival transport was almost at a standstill. Thousands of people could not go back home.

We use radar satellites to snow disaster areas around the clock to the dynamic monitoring. And we use that radar data have a stronger reaction for metal objects, vehicles, power lines, and so on; we monitor the main road and car. We provided the latest disaster, the timeliest monitoring data to our command.

Researches and applications have shown the optical remote sensing potential for the snow detection, classification and assessment. Both snow and cloud behave higher reflection within optical and near-infrared range, so it is possible to distinguish snow and cloud from the land background in the remote sensing data. Based on the cloud detection with multi-optical data and texture analysis, the cloud area can be distinguished from the snow area. And the snow distribution can be assessment by spatial analysis.

5.12 Wenchuan earthquake

When the earthquake broken out in 12th, May, 2008, we response it at the first time, because the RADAR can collect images when the weather is bad, so we use it to monitor the barrier lakes, we support real-time, accurate monitoring data to decision-making. And we provided detailed information on a powerful remote sensing, which including earthquake damage zone, barrier lake, landslide disasters such as earthquake monitoring.

3. SUMMARY

Radar satellites have predominance in full-time, the all-weather imaging capabilities and three-dimensional image and strong sense of superiority, which can pay an important role in monitoring and assessment of earthquake, floods, and rainstorms. We using high-resolution radar remote sensing data, the various towns and areas of secondary disasters to the rapid, systematic and continuous monitoring, And in accordance with the characteristics of radar images for housing damage, landslides and barrier lakes, such as the distribution and scale, we can do quantitative evaluation. We provide detailed and reliable scientific evidence.

Optical satellites have collected so many images in recently year, and we will launch several Follow-up satellites in the future. Our satellites have the ability to meet the need of disaster monitoring and assessment.

We have been focused for a long time to put remote sensing technology into the operational disaster monitoring and assessment applications. We will do more work to solve the problem about disaster monitoring and assessment.

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