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MICRO/NANOSATELLITE SOCIAL UTILIZATION DESIGN FOR ILLEGAL WASTE DISPOSAL
DETECTION

Abstract

Illegal waste disposal is now serious problem in Japan. There have been many reports that a company or business person illegally dumps the waste in an out-of-sight place such as mountains, sea coast, or deserted island. The waste not only for spoiling the scenery, but also poisoning the environment with contained toxic substances. Japanese ministry of the environment has taken measured by revising a ministerial ordinance and budgeting for provision for prefectural and city governments. However many illegal waste is left because the cost of recovery is enormous. Early detection of a waste and perpetrator is required to limit the increase of waste. In recent years, satellite image is considered to use monitoring a waste disposal point. Japanese Hyogo prefecture government and a remote sensing group conducted a cooperative projects which use Advanced Land Observing Satellite (ALOS) image for detecting an illegal waste disposal in 2009. It is proved that 2.5m resolution image can be used for detecting a change of scenery such as tree-clearing. Utilization of a micro/nanosatellite in a practical system is anticipated recently. Micro/nanosatellite can be used for illegal waste disposal detection system. The development of smaller size satellite which is called micro/nanosatellite has been started at many universities in last decade. Micro/nanosatellite development cost is a few percent of a bigger satellite cost. Great reduction of the cost brings a satellite into real use. On this research practical system for deterring illegal waste disposal which use micro/nanosatellite is studied. The system contains satellite constellation, satellite operation and image processing team, and municipal government team. Satellite constellation is constructed with about 60 kg micro/nanosatellites. 2.5m resolution imager is required. A satellite observes forest in middle area of Japan which includes 7 prefectures. Irregularity of ground surface and surface material change is analyzed with processing satellite images. Local officer conduct a field survey and implement a legal action. To conduct both operation, satellite observation and field survey, is very important. Satellite observation helps to plan survey point and timing. Satellite image is also useful to share the situation of illegal waste issue with public and government. Wide recognition of the subsistent of satellite and its benefit acts as a deterrent. Detailed satellite operation sequence and municipal government action will be reported in a full paper.