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Earth Observation Applications, Societal Challenges and Economic Benefits (5)

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NIGHT IMAGE & VIDEO CONSTELLATION: NEW APPLICATIONS BRINGING SOCIAL  
ECONOMIC BENEFITS FROM SPACE

**Abstract**

What would be better than using space technology to get a global understanding of our living planet? Applications derived from Earth observation (EO) satellite can bring social economic benefits in the context of health and economic crisis. During the Covid-19, several commercial value-added products were developed to address new social economic challenges. In this paper, we are presenting innovative value-added products derived from a EO satellite constellation which collects night imaging, video from space as well as hyperspectral imagery.

The NightVision Video Constellation (JL1-SP JL1-GF satellites), developed by CGSTL of China and commercialized by HEAD, which is currently the only operational constellation, consists of nine on-orbit satellites offering true color night imagery at 1m range and color video from space. It is a multi-channel and radiation calibrated satellite constellation designed to detect buildings and street light. During the Covid-10 lockdown period in 2020, night image collected from space allowed the province government in China to carry out lock-down control by measuring the brightness of urban building area, industrial area and commercial centers which were supposed to be closed. Other use cases include infrastructure application by using night image to control the usage and the distribution of street light network. The brightness of street light can be detected by night image with algorithm to measure light intensity, thus implement a better electricity assumption control of a city. Another use case such as using night image during electricity cut incident, daily monitoring on the incident area can be fulfilled with the nine on-orbit satellites.

This constellation offers color video space at 1m resolution with three time per day. This paper will present few video demonstrations with use case such as vehicle speed measure and ship detection application. A dedication algorithm was developed for traffic management by measuring the speed of the vehicle. By defining the default authorized speed, the algorithm thus distinguishes three categories of vehicle driving below, accepted or above the authorized speed.

Another two on-orbit satellites, HyperScan, with two identical satellites (JL1-GP1), offer 25 bands at 5m, 10m and 20m resolution and provides operational imagery for applications such as vegetation assessment and disaster management thanks to its spectral characteristics such as red-edge spectrum, Sensitivity to chlorophyll, biomass as well as Smoke Penetration, Fire Point Recognition, Cloud and Snow Discrimination. The on-board AI system allows fire point recognition, cloud detection and ship recognition functionalities.