IAF EARTH OBSERVATION SYMPOSIUM (B1)
Earth Observation Applications, Societal Challenges and Economic Benefits (5)

Author: Mr. Alenxandre Wiefels
China HEAD Aerospace Technology Co., France

Mr. Jean-Daniel Tragus
China HEAD Aerospace Technology Co., France

# BRINGING SOCIAL ECONOMIC BENEFITS WITH SPACE-BASED VEGETATION MONITORING TECHNOLOGY

**Abstract**

Governmental organizations have long relied on coarse-resolution from Sentinel-2 or Landsat data to assess vegetative health and predict harvests in large regions as a crucial aspect of ensuring food security. More recently, with the advent of higher-resolution data sets, growers began calculating indices on a more granular level to assess crop conditions and implement precision farming practices in individual fields. This paper will present how we can deploy the two on-orbit Hyperscan satellites (JL1GP) to provide vegetation monitoring with its red-edge bands and how such application can bring social economic benefits.

The most common causes of plant stress are poor irrigation, inadequate nitrogen fertilization, disease, and pest infestation. Any of these problems can result in lower chlorophyll production in green plants. The addition of red edge data considerably enhances these vegetative indices and their applications by enabling users to detect anomalous crop health earlier in the growth cycle. For even a small farmer, this means there is more time to diagnose the issue, apply a remedy, and save the harvest. At a regional and national level, this can give government agencies advance notice of an impending crop failure preventing widespread societal consequences.

The spectral signature in the red edge is an excellent indicator of vegetative health. Agronomists, botanists, and other scientists who have traditionally assessed plant vigor and biomass density with three common vegetative indices are replacing visible red band values with red edge reflectance numbers in the formulas. Enhanced with the red edge, the most widely used indices as the Normalized Difference Vegetation Index (NDVI), the Modified Simple Ratio index (MSR), and the Green Chlorophyll (CIgreen) are now detecting changes in chlorophyll and nitrogen content earlier than previously possible. Inclusion of the Red Edge in these indices improves both the accuracy of the crop condition, classification and the differentiation of plant species. HEAD HyperScan (JL1-GP01/02) are two satellites that acquire images with a different spatial resolution (from 5 m to 150 m) in a total of 26 spectral bands. Its configuration improves the resolutions of the data acquired by the Sentinel-2 satellite, offering double resolution in the red-edge bands, which is an essential factor to monitor the state of the crop fields accurately.