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

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POTENTIAL APPLICATIONS FOR THE HYPERSPECTRAL IMAGER DESIS

Abstract

Space-based satellite remote sensing can be roughly divided into the domains of 'temporal,' 'spatial,' and 'spectral' dimensions. Previous hardware enhancements such as DigitalGlobe's WorldView-4 satellite provided increased spatial resolution down to 0.31m, while emerging companies such as Planet Labs are aiming to give customers significant increases in temporal coverage, with cadences as rapid as 90 minutes for some locations on the ground through their SkySat satellite. Space-based hyperspectral imaging to date has been primarily a research endeavor, with imagers such as HICO aboard the ISS. Hyperspectral imagery derives from the collection and processing of information through analysis of the detailed spectrum of each pixel in the image of a scene. The full spectral shape, measured at high resolution, provides further insight into the physical, chemical, and biological processes in the scene, in a manner analogous to spectral analysis in astronomy, which is applied to celestial objects. The German Aerospace Center (DLR) has developed a new hyperspectral imager, the DLR Earth Sensing Imaging Spectrometer (DESIS), which will soon begin operation aboard the International Space Station's Multi-User System for Earth Sensing (MUSES) platform, through an innovative public-private partnership between DLR, NASA, and a US Commercial company. This paper explores the potential applications for which the DESIS hyperspectral imager will be used, in order to further an understanding of scientific research and humanitarian applications of hyperspectral imaging across domains such as agriculture, natural resource management, maritime domain awareness, change detections, and land use patterns.