The Compact Hyperspectral Prism Spectrometer for Sustainable Land Imaging: Continuing the Landsat data record and enabling new discoveries

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Abstract

The Compact Hyperspectral Prism Spectrometer is being developed as a candidate imaging spectrometer technology for insertion into future Sustainable Land Imaging missions, which will follow-o the current Landsat-8 and Landsat-9 missions. The 2013 NRC report Landsat and Beyond: Sustaining and Enhancing the Nations Land Imaging Program recommended that the nation should "maintain a sustained, space-based, land-imaging program, while ensuring the continuity of 42-years of multispectral information." In support of this, NASA's Sustainable Land Imaging-Technology program aims to develop a new generation of smaller, more capable, less costly payloads that meet or exceed current Landsat imaging capabilities. By providing continuous visible-to-shortwave hyperspectral data at high spectral resolution, CHPS aims to fulfill these objectives. CHPS has been designed to support the continuity of legacy Landsat data products as well as providing additional spectral information for a broader range of land science products. CHPS features full aperture full optical path calibration, exhibits high uniformity, extremely low straylight, and low polarization sensitivity. Why these performance parameters are critical for meeting the demanding SLI measurement objectives will be discussed with comparison to grating-based imaging spectrometer architecture. In preparation for space-borne instrument development, Ball is currently developing an airborne instrument that will provide representative spectroscopic data and data products. We are now in year 2 of a 3-year program and anticipate conducting initial airborne engineering flights in 4th-quarter 2018. Data from this instrument will be made available to the science community.