国際宇宙ステーションからのハイパースペクトル撮像：Hyperspectral Imager Suite (HISUI)
Hyperspectral Imaging from International Space Station : Hyperspectral Imager Suite (HISUI)

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Hyperspectral Imager Suite (HISUI) is a spaceborne imaging spectrometer being developed by Ministry of Economy, Trade, and Industry (METI) of Japan for the deployment on International Space Station (ISS) Japan Experiment Module (JEM) in FY2018. It will be METI's fourth spaceborne optical imaging system after JERS-1 OPS (1992 –1998), ASTER (1999 -), and ASNARO-1 (2014 -). HISUI has one reflective telescope, two grating spectrometers, two area detectors, and a mechanical cooler, and covers 0.4 - 2.5 μm spectral region with 185 spectral bands, 20 m (cross track) x 30 m (along track) spatial resolution, and 20 km swath, from the altitude of 400 km. The basic specifications of HISUI are summarized in Table 1.

HISUI project is currently being promoted by three organizations each of which has a contract with METI : Japan Space Systems, NEC Corporation, and National Institute of Advanced Industrial Science and Technology (AIST). In addition, several scientists from universities and national research institutes are participating in the HISUI project.

The planned operation of HISUI onboard ISS will be three years from 2019. In this time period, ISS will have several advanced earth observing instruments such as a vegetation lidar (Global Ecosystem Dynamics Investigation, GEDI), a thermal camera for terrestrial vegetation (ECOsystem Spaceborne Thermal Radiometer Experiment on Space Station, ECOSTRESS) and a carbon dioxide sensor (Orbital Carbon Observatory 3, OCO-3). Synergy among these instruments will provide us new information on terrestrial ecosystem which cannot be obtained from indivisual observations by these instruments. Especially, simultaneous observation by GEDI and HISUI will enable combined analysis of biomass amount data from a lidar and physiological parameters of vegetation from an imaging spectrometer.

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Table 1. HISUI Specifications.

Spatial resolution	20 m (CT) x 30 m(AT)
Swath	20 km
Spectral coverage	0.4 - 2.5 μm
Spectral resolution	10 nm (VNIR) 12.5 nm (SWIR)
Number of band	185
Signal to noise ratio	>450 @ 620 nm >300 @ 2100 nm
MTF	> 0.2
Dynamic range	12 bits
Data compression	Lossless (70%)
Pointing capability	≈±5 ° (±35 km)
Data rate (70 % compression)	0.4 Gbps
Maximum data amount per day	690 Gbyte

The altitude of ISS is assumed to be 400 km.

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