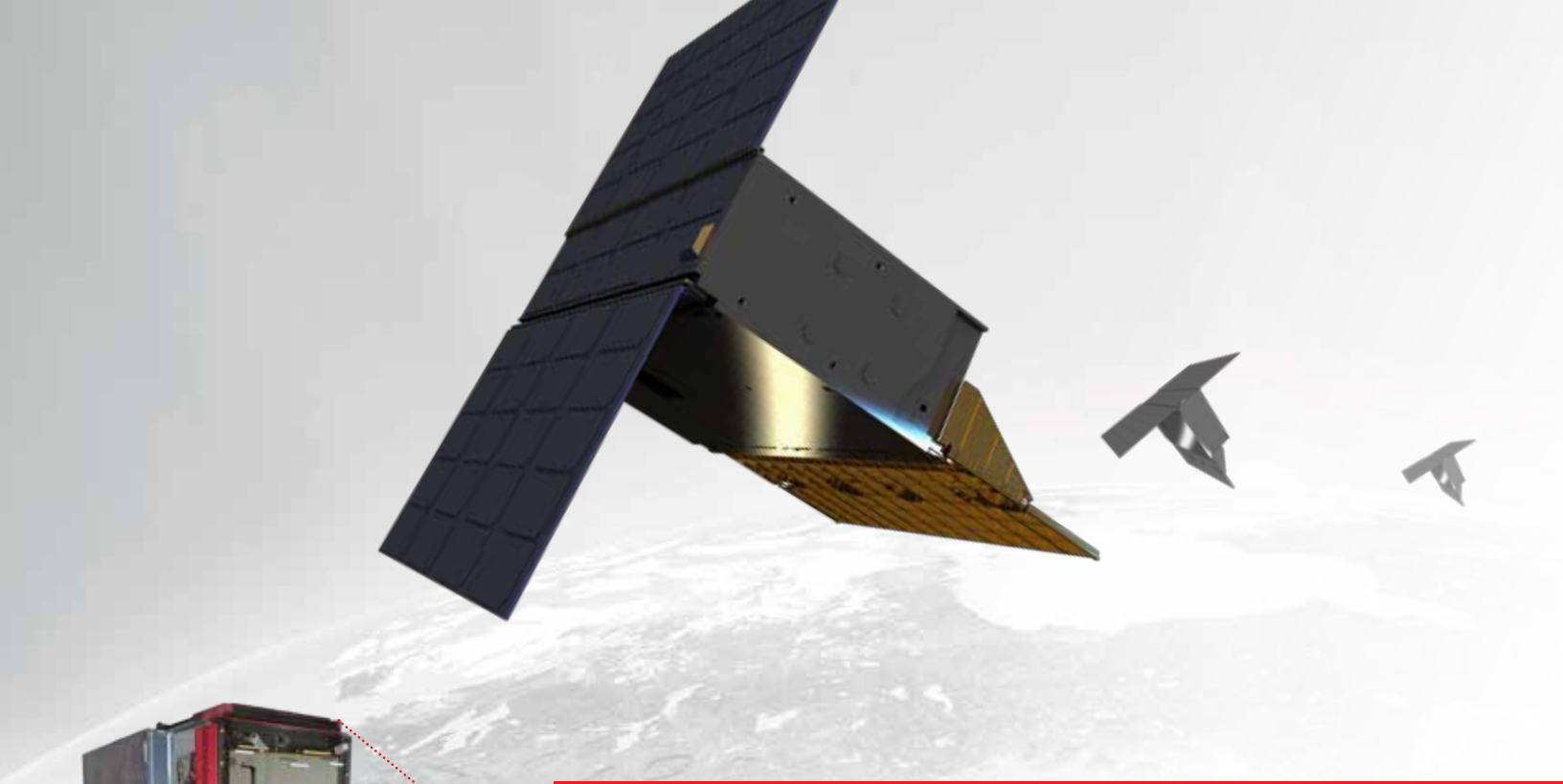
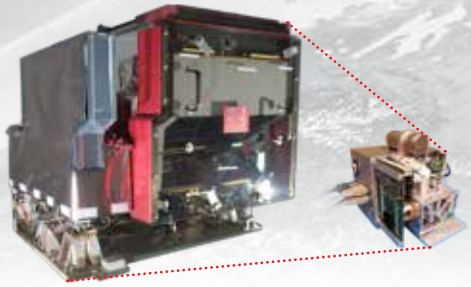




HYPERCUBE™

3D WIND MEASUREMENT

MINIATURIZING PROVEN HYPERSPECTRAL TECHNOLOGY FOR BETTER WEATHER FORECASTING

Weather forecasting models depend on detailed observations of the atmosphere to produce accurate forecasts. Satellites have significantly increased the amount of temperature and moisture data collected, but the availability of wind data at multiple levels of the atmosphere has lagged behind. Harris developed the HyperCube™ three-dimensional sounding instrument to bridge that gap.

BENEFITS

More detailed wind data, at more levels of the atmosphere, improves the accuracy and lead time of weather forecasting models

Better temperature, moisture, and wind data in the lower atmosphere improves severe weather forecasts and subsequent warnings

HyperCube™ technology can be easily configured for multiple missions and applications including weather, agriculture, and oil and gas

More detailed wind information has been identified as a top priority to improving weather forecasting models. Harris provides HyperCube™, a high-performance, cost-effective solution.

HyperCube™ is designed to measure vertical profiles of temperature and moisture, and the speed, direction, and elevation of winds in the atmosphere. Being a Fourier transform spectrometer, the HyperCube™ is much smaller, less expensive, and easier to implement than complex LiDAR wind measurement programs.

Enabled by the proven sounding technology of Harris, HyperCube™ uses more than 600 hyperspectral infrared channels to provide wind measurements at more than 30 layers of the atmosphere, at a fraction of the size of previous instruments.

Data accuracy is maintained using an onboard calibration target capable of precise, absolute calibration. HyperCube™ also offers collection time flexibility, allowing for more mission coverage than alternative technologies.

HYPERCUBE™ FEATURES

Constellation: 12 HyperCubes—overlapping ground tracks separated by 15 minutes

Channels: 637 (1600-2250 cm^{-1} at 1.26cm^{-1} spectral resolution)

Ground sample size: 5 km

Focal Plane Array: 25x25 MWIR

Thermal: 2 stage passive cooler (95K at FPA)

Mass: 12 kg (full satellite)

Volume: 6U-12U

Power: 13 W (instrument), 21 W total

NEdN: 0.1-0.2 mW/m2srcm^{-1}

Radiometric Accuracy: 0.5K

WIND VECTOR CHARACTERISTICS

Accuracy: 2-3 m/sec

Density: 30+ vertical layers

Frequency: Every 6 hours

HYPERCUBE™ 3D WINDS

The design of HyperCube™ improves upon the highly successful Cross-track Infrared Sounder (CrIS) aboard the National Oceanic and Atmospheric Administration's Suomi National Polar-orbiting Partnership satellite. CrIS, also a Fourier transform spectrometer, is one of the top contributors to weather forecast accuracy. Harris packages this proven technology in a smaller, lighter weight solution, called the HyperCube™.

HYPERCUBE™ CONSTELLATION

A constellation of 12 HyperCubes provides optimum wind measurements. Changes in the moisture profiles measured by multiple HyperCubes flying over the same area in succession can be used to derive wind speed and direction at multiple levels of the atmosphere. The solution delivers global coverage of 3D wind measurements every six hours.

FLEXIBILE SOLUTION

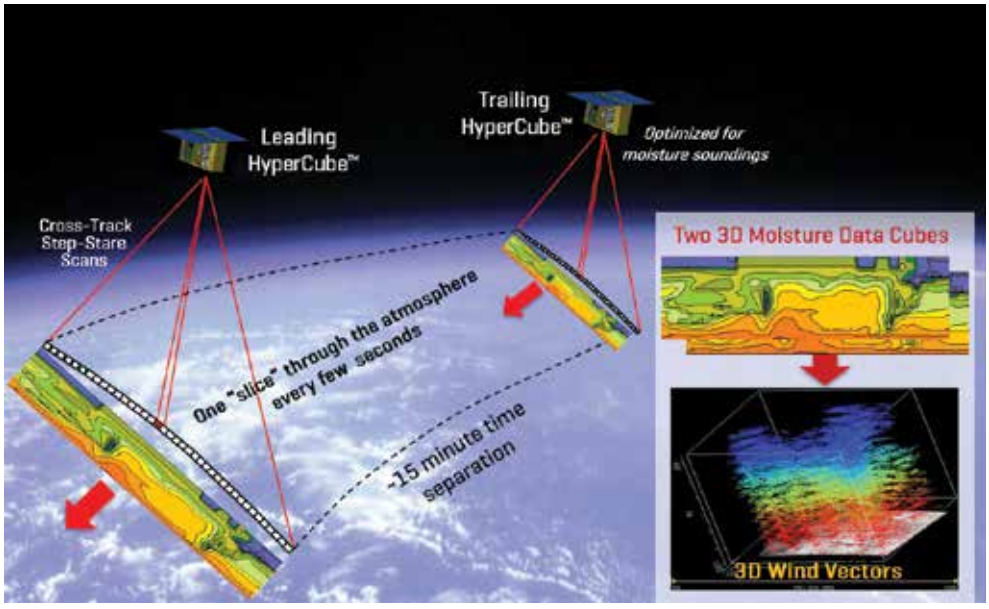
Because HyperCube™ combines small size and low cost with the latest developments in hyperspectral sounding, its technology meets a wide range of mission requirements. HyperCube™ technology can be easily configured for multiple missions and applications including weather, agriculture, and oil and gas.

KEY COMPONENTS

Scanner: The scanner consists of two mirrors that work together to reflect infrared light from the atmosphere toward the interferometer, resulting in greater efficiency and with fewer data gaps than with one mirror. The HyperCube™ scanner is a miniature version of the two-mirror scanner used by the Harris Advanced Baseline Imager on NOAA's GOES-R series weather satellites.

Interferometer: The interferometer consists of a laser, a series of mirrors, and a light sensor—detecting more than 600 channels of infrared light from the atmosphere to measure the vertical distribution of moisture at 1-kilometer vertical resolution. The HyperCube™ interferometer is a miniature version of the interferometer used by the Harris Cross-track Infrared Sounder on NOAA's JPSS series weather satellites.

Focal Plane Array (FPA): The planned operational HyperCube™ FPA is a state-of-the-art sensor consisting of a 25x25 array of pixels that convert the infrared light into a digital signal. The HyperCube™ FPA is larger and has more pixels than previous instruments, allowing it to collect more data faster.



About Harris Corporation
Harris Corporation is a leading technology innovator, solving customers' toughest mission-critical challenges by providing solutions that connect, inform and protect. Harris supports government and commercial customers around the world. Learn more at harris.com.

HARRIS® TECHNOLOGY TO CONNECT, INFORM AND PROTECT™