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Headwall

Co-Aligned HP™
Compact VNIR-SWIR Hyperspectral Imaging System for Remote Sensing

FEATURES

- Best-in-class SWaP (Size, Weight, and Power)
- Perfect for mining, infrastructure, and environmental monitoring applications
- Factory integrated and flight tested
- VNIR (400 to 1,000 nm) and SWIR (900 to 2,500 nm) wavelength range
- Built-in GPS-IMU, solid-state storage
- Available with integrated LiDAR for high-resolution DEM (Digital Elevation Model) and 3D point cloud creation

DATASHEET

THE IDEAL SYSTEM FOR VNIR-SWIR REMOTE SENSING UAV MISSIONS

Headwall's original Hyperspec® Co-Aligned VNIR-SWIR sensor became the best-selling system of its kind. The next-generation **Co-Aligned HP™ VNIR-SWIR** features improved VNIR spatial resolution, as well as a greater number of spectral bands in an exceptionally small, light, and power-efficient form factor.

The Co-Aligned HP can be purchased as a payload for integration onto compatible UAVs or as part of integrated turnkey systems that include the drone. These include the DJI Matrice 600 Pro and the Freefly Alta X that is made in the USA and supports NDAA-compliance.

Optional sensors and accessories such as LiDAR and can be incorporated into payloads suitable for your needs.

PORTABLE & ROBUST

The Headwall Co-Aligned HP comes with a high-performance GPS/IMU and enables Light Detection and Ranging (LiDAR) to be added. Headwall's **Hyperspec® III** and browser-based **HSInsight™** interface makes setting up acquisition and downloading data easy.
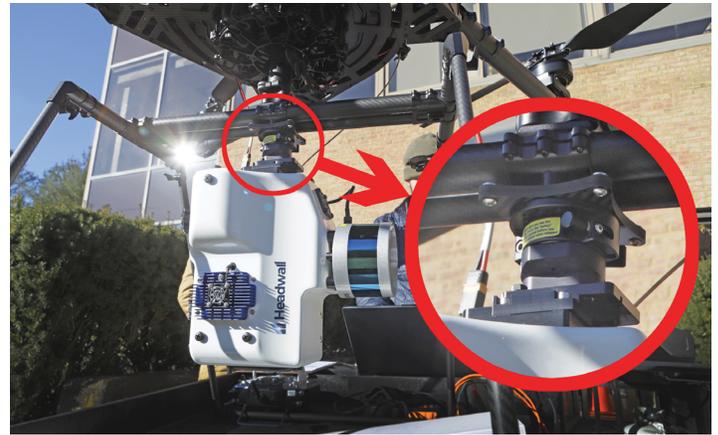

Figure 1. Headwall UAV systems utilize a quick-release mechanism between the drone platform and the payload that allows easy removal of the sensor suite for transportation or storage.
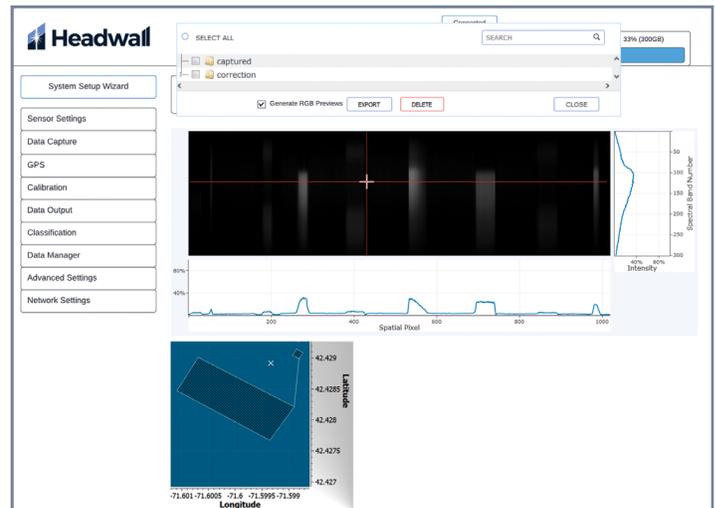
Figure 2. Our new platform-agnostic HSInsight interface provides control over acquisition settings. Calibrate, adjust settings, and select data-capture parameters using a web browser.
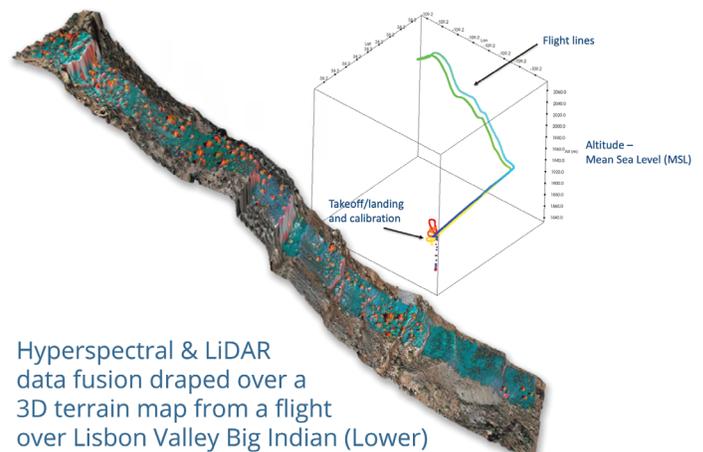
Hyperspectral & LiDAR data fusion draped over a 3D terrain map from a flight over Lisbon Valley Big Indian (Lower)

Figure 3. A single flight over challenging terrain captured both hyperspectral data over the VNIR to SWIR (400–2,500nm) wavelength range and a high-resolution LiDAR point cloud, enabling this exquisitely detailed orthorectified and geo-located 3D image.

FEATURE	HEADWALL	COMPETITION
Turnkey Systems, Everything You Need	✅	⊗
Industry-Leading SWaP	✅	⊗
Compact, Solid-State Hyperspectral Data-Acquisition System	✅	⊗
Available LiDAR and LiDAR-Hyperspectral Data-Fusion Options	✅	⊗
All-Reflective, Aberration-Corrected Optical Spectrometer Design	✅	⊗
Factory-Made Holographic Gratings	✅	⊗
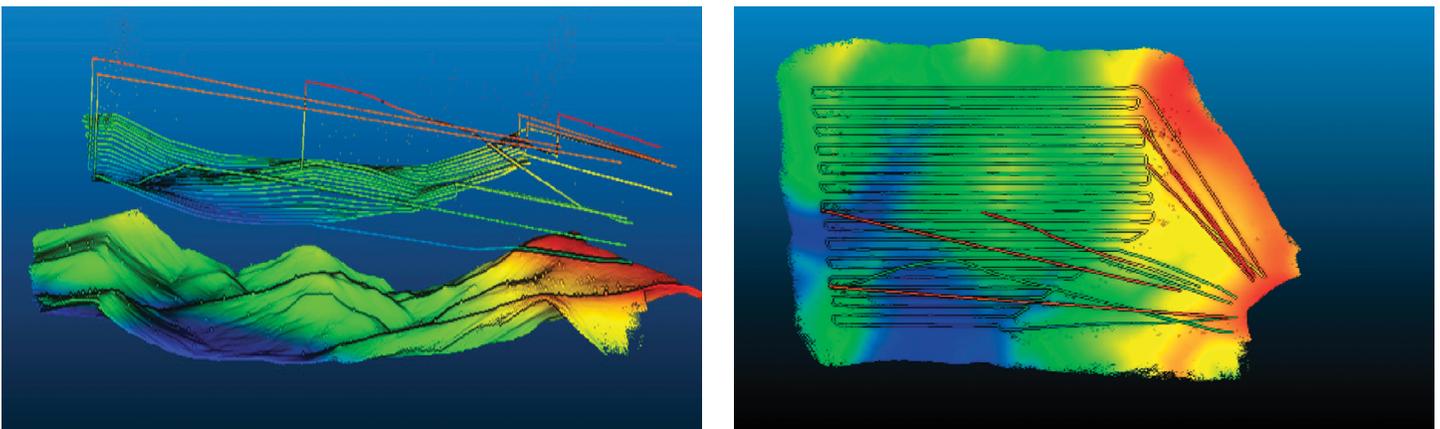
Figure 4. The images above are 3D point clouds generated from an optional LiDAR sensor that was part of the payload during a hyperspectral UAV mission to Cuprite, Nevada by a team from Headwall and the University of Arizona. LiDAR allows high-resolution digital elevation models (DEMs) to be created to enable more precise flight operations as well as more accurate orthorectification of the hyperspectral imaging data.

Headwall UAV systems are programmed to follow terrain at a constant altitude above ground level. The hyperspectral data that is captured from the air is post-processed and orthorectified so that a consistent nadir view of the mission area is achieved.

You can see on the left that the aircraft enters and departs the capture area along straight lines. While inside the 'capture polygon' designated as part of the flight plan, the hyperspectral sensor is activated and a "lawnmower" pattern is flown as shown in the image on the right.

SPECTRAL RANGE	VNIR, 400–1000nm	SWIR, 900–2500nm
MODEL	**CO-ALIGNED HP™**	
Spectral Bands	340	267
Spatial Pixels	1020	640
Camera Technology	CMOS	MCT
Pixel Pitch	5.86 µm	15 µm
Aperture	f/ 2.5	
Slit Length	6 mm	10.4 mm
Dispersion/Pixel	1.76 nm	6 nm
Entrance Slit Width	20 µm	15 µm
Spectral FWHM	6 nm	8 nm
Frame Rate (Sustained)[3]	250 Hz	200 Hz
ADC Bit Depth	12-bits	16-bits
Cooling	No	Stirling-Cooled
Spectrograph Design	Co-Aligned & Aberration-Corrected	
Digital Interface	GigE	GigE
GPS/IMU	Applanix APX-15	
Data Storage on Payload	480 GB Solid-State for Each Sensor	
Weight (sensor only)	4.0 kg / 8.8 lbs[5]	
Dimensions (sensor only)	272 x 211 x 165 mm[5]	
Power req (typical / max)	14.4 W / 36 W	37 W / 40 W
Operational Temp Range	0 – 40 °C	
Storage Temp Range	-20 – 60 °C	
Compatible UAVs	DJI Matrice 600 Pro, Freefly Alta X	

[1] Higher frame rates attainable with certain configurations

Figures 5–6. The Headwall Co-Aligned HP VNIR-SWIR system equipped with LiDAR is shown here. Contact Headwall Customer Support for more complete dimensional drawings of this configuration or the configuration without LiDAR. Please note that specs are subject to change.

ORDERING INFORMATION				
Part Number	Description	Integrated LiDAR?	UAV Incuded?	Compatible UAV
1007A-30427	Co-Aligned HP VNIR-SWIR	No	Yes	Freefly Alta X
1007A-30527	Co-Aligned HP VNIR-SWIR	Yes	Yes	Freefly Alta X
1007A-10427	Co-Aligned HP VNIR-SWIR	No	Yes	DJI M600
1007A-10527	Co-Aligned HP VNIR-SWIR	Yes	Yes	DJI M600
1007A-30414	Co-Aligned HP VNIR-SWIR	No	No	Freefly Alta X
1007A-30515	Co-Aligned HP VNIR-SWIR	Yes	No	Freefly Alta X
1007A-10445	Co-Aligned HP VNIR-SWIR	No	No	DJI M600
1007A-10545	Co-Aligned HP VNIR-SWIR	Yes	No	DJI M600

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