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OSK Hyperspectral Product Data Sheet

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GHOST Constellation

Specification	Description
Satellites on Orbit	5 GHOST satellites launched to date
Active Commercial Satellites	GHOST 3 - GHOST 5 providing commercial imagery and data analytics
Satellites Ready for Launch	1 satellite (G6) planned for launch in Q1 2027
Orbit Type	Sun-synchronous orbit (SSO)
Coverage	Global
Revisit Rate	Up to twice weekly

GHOST Satellites

Specification	Description
Sensor Type	Spaceborne hyperspectral imaging sensor
Spectral Coverage	Full VNIR–SWIR
Spectral Range	400 – 2500 nm (VNIR & SWIR, including methane absorption features and vegetation red-edge)
Spectral Bands	472 bands
Spectral Bandwidth	~10 nm FWHM
Native Spatial Resolution	~8.3 m Ground Sample Distance (GSD)
Delivered Spatial Resolution	10 m GSD (downsampled per NOAA license requirements for data, not derived products)
Geometric Accuracy	< 20 meters (post-geocorrection)
Imaging Mode	Linescan (1) (Pushbroom hyperspectral)

Collection Type	Tasked satellite collections
Off-Nadir Capability	$\pm 25^\circ$
Minimum Area Collection	$\sim 4.3 \text{ km} \times 12 \text{ km}$ (swath $\times$ along-track)
Maximum Along-Track Coverage	Up to $\sim 60 \text{ km}$ per collection

(1) Linescan Mode: Uses the full 512-pixel width while slewing the satellite to match ground speed, maintaining square pixels ($\sim 8\text{m} \times 8\text{m}$). Supports both along-track and cross-track (E-W or W-E) collections. These additional collection geometries reduce the number of collections needed to cover a target due to increased swath and multi-directional capabilities. Offers high SNR and efficient area coverage.

Timeliness: Reaction & Latency

Product	Description
Reaction	Definition: from the time a tasking request is received until it is ready for uplink to the spacecraft. Time: 24hrs to 72hrs depending on day of the week
Latency	Definition: from the time a task is successfully collected on orbit until it is delivered to the customer end point. Time: 24hrs to 72hrs depending on day of the week Note: NOAA restriction requires imagery to be delivered not sooner than 24 hours.

Data Products

Product	Description
L1B	Imagery file is radiometrically corrected to Top-of-Atmosphere (TOA) radiance. No geometric correction is applied to the imagery. An Input Geometry Model (IGM) is provided to enable user-applied georeferencing and rectification.
L1BR (Georectified)	Imagery file is radiometrically corrected to Top-of-Atmosphere (TOA) radiance and is georectified.
L2A	Imagery file is atmospherically corrected to surface reflectance. No geometric correction is applied to the imagery. An Input Geometry Model (IGM) is provided to enable user-applied georeferencing and rectification.
L2AR (Georectified)	Imagery file both atmospherically corrected and georectification applied.
Radiometric Units	Watts / (sr · μm · m ²)
Primary Delivery Format	ENVI (scene-based)
Image File	.hsi
Image Header	.hdr
Geometry File	.igm
Geometry Header	.hdr
Metadata Delivery	Embedded within image headers and geometry files
Example Metadata Fields	Acquisition time (UTC), satellite/asset name, radiance units, imaging mode, integration time, frame rate
Calibration Metadata	Radiometric and geometric calibration parameters included
Additional Metadata	Full metadata files available upon request

Tasking & Delivery

Specification	Description
Tasking Model	Customer-requested satellite tasking (subject to feasibility)
Revisit Support	Designed to support repeat collections and monitoring use cases
Off-Nadir Tasking	Up to $\pm 25^\circ$
Minimum Taskable Area	~4.3 km $\times$ 12 km (~50 sqkm)
Extended Coverage	• Ability to image up to ~60 km along track (4.3km x 60km) • 10 km x 10 km Area collect
Delivery Model	Scene-based delivery
Tasking Mechanism	• Orders API (On Roadmap) • Spreadsheet (via Customer Support) • Tasking User Interface (Available Early 2026))
Delivery Mechanism	• Orders API (On Roadmap) • Cloud S3 Bucket • Customer Specified Endpoint (i.e. FTP)

Derived Products (Analytic Products)

Methane Products

Specification	Description
Detections	Methane detection bands in GeoTIFF format
Report	PDF report with concentration map, flow rate, and windspeed

Optional raw data	Individual ENVI data cubes (10m resolution) atmospherically corrected using the QUAC algorithm
Detection Rate	100kg/hr at 3 meter/s
Latency	Time: up to 72hrs depending on day of the week

Mining Products (Exploration Minerals)

Specification	Description
Detection Format	GeoTIFF mosaic. 8.3m resolution RGB and 20+ mineral bands in a color-balanced mosaic
Report	PDF map format with visual of thresholded mineral detections
Optional raw data	Please see the L2A data product in Data Products Section
Delivery Timeline	Depending on AOI size & number of minerals to be detected

Liquid Hydrocarbons

Specification	Description
Detections Format	Spreadsheet with location of detections and statistical scoring for end user thresholding: ACE Score (Adaptive Cosine Estimator), F-Statistic, Spectral Information Divergence (SID), ROI Pixel Count
Report	PDF map format with visual of thresholded mineral detections
Detection Threshold	~ 256 sqm
Optional raw data	Individual ENVI data cubes (10m resolution)
Delivery Timeline	Time: up to 72hrs depending on day of the week

Vegetation Products

Specification	Description
Detection Format	GeoTIFF. 8.3m resolution RGB image strips 20+ Vegetation health indices
Report	PDF map format with visual of thresholded detections
Optional raw data	Please see the L2A data product in Data Products Section
Delivery Timeline	Depending on AOI size

Appendix: Metadata

Each hyperspectral datacube provided as part of this proposal will include a standard set of metadata. These metadata are extracted from the STAC catalog at delivery and are included in format appropriate methods. The archive format for OSK is binary ENVI with header files, and these values were extracted from those files.

Metadata Item	Description	Data Type	Example Value
samples	Number of samples in the image (cross track)	Int	512
lines	Number of lines in the image (along track)	Int	2328
interleave	Band interleave method	String	bsq
band names	Standard HSI band names	List	["Band1", "Band2", ... "BandN"]
along scan gsd	Along track ground sample distance in meters	Float	7.917959036

angle to north	the angle of the image segment with respect to True North, measured clockwise from the first row vector	Float	99.19888011
az of obliquity	the azimuthal angle of the SV-to-target LOS vector projected in the target local horizontal plane, measured clockwise from True North computed at acquisition time	Float	137.0450581
boresight track	Center of the scene as calculated along the boresight vector	List	[39.24094930797 594,-96.4219517 4660458]
center frame number	Center frame number	Int	388
center time j2k	Time of image center imaging in J2000 reference frame	Float	806490750.5
cross scan gsd	Across track ground sample distance in meters	Float	8.733577782
max gsd	Best ground sample distance in meters. This is the smaller of along_scan_gsd and cross_scan_gsd	Float	8.733577782
obliquity angle	the angle between the satellite vehicle (SV) nadir pointing vector and SV-to-target line-of-sight (LOS) vector at acquisition time	Float	19.79375408
off nadir angle	Imaging angle measured from nadir in degrees	Float	19.00335235
sat lla position	Satellite position [latitude, longitude, altitude] at the center imaging time	List	[40.25304400525 91,-97.84030506 131585,481738.1 966509307]
sensor azimuth	Sensor azimuth angle from north, measured in degrees	Float	132.6734805
sun azimuth	Azimuth of sun, measured from true north in degrees	Float	250.1388749
sun elevation	Elevation of sun, measured from horizontal in degrees	Float	51.41521191
bands	Number of imaging bands in the HSI product	Float	472

acquisition time	Acquisition time of the image center, provided in ISO format	ISO	2025-07-22T21:12:28Z
asset name	Satellite name	String	GHOST-5
capture id	Capture number	Int	214090
cloud cover	Calculated cloud cover, measured as a float from 0.0 to 100.0	Float	9.30125443
dem centroid	Centroid value of elevation over the imaging area	Float	362.1529236
dem centroid unit	Unit of dem values	String	m
dem max elevation	Maximum elevation value	Float	384.4853821
dem mean elevation	Mean elevation value	Float	346.498142
dem median elevation	Median elevation value	Float	348.5642395
dem min elevation	Minimum elevation value	Float	308.0043335
dem stdev elevation	Standard deviation of elevation values	Float	13.58124256
detector size	Imaging detector size, often referred to as IFOV	Float	15
detector size units	Units of detector size	String	µm
file id	Unique image id	String	43d78823-294e-5a28-bc98-a969923a3d6a
fpa col end	Ending FPA column	Int	571
fpa col start	Starting FPA column	Int	100
fpa row end	Ending FPA row	Int	511
fpa row start	Starting FPA row	Int	0
frame rate	Frame collection rate	Float	155.0459855

frame rate units	Rate units	String	hz
fwhm	Full width half max of hsi bands, measured in nanometers	List	[8.7,8.7,8.7,...]
image radiance units	Unit for calibrated radiance in L1B product	String	Watts/(steradian* meters^2*micron)
imaging mode	Image collection mode, one of [linescan, wide, narrow, unknown]	String	unknown
integration time	Imaging integration time	Float	4992.916
integration time source	Source of integration time	String	commanded
integration time units	Integration time units	String	µs
processed datetime	Date of processing in the OSK pipeline	ISO	2025-07-22T23:07:14.542173Z
sensor firmware version	Firmware of the sensor during collection	String	6acfb7d7ceee7887166fe28a25aff46f6f4c198f7
sensor type	Type of imaging sensor	String	hyperspectral
system sn	Serial number of system	Int	11
task id	Unique id for the task that belongs to this image	String	47197fe3-b35c-47f4-bbdc-334357c1cc95
wavelength	Center wavelengths of hsi bands	List	[396.8, 401.3, 405.8, 410.3, ... 2507.2]
wavelength units	Units of wavelength, used for both wavelength and fwhm values	String	nm