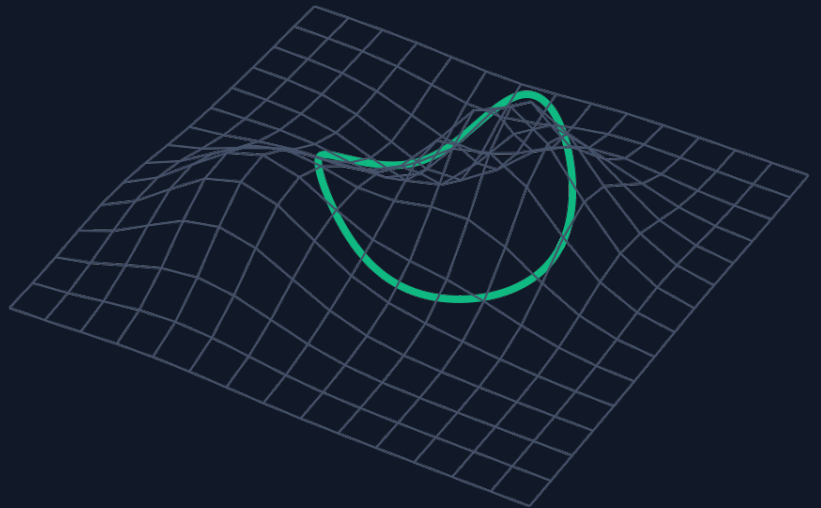


TECHNICAL CAPABILITY DOCUMENT · JULY 2026

Satellite imagery, delivered analysis-ready

Constellation access, the Legato processing pipeline, standard deliverables, and derived products: bathymetry and water quality.



Overview

Geopera provides tasking and archive access across 100+ satellites, automated processing through the Legato pipeline, and delivery as analysis-ready data. Orders are placed per area of interest; feasibility and price are returned before commitment, and full processing is included on every order.

Rates are published at geopera.com/pricing and are charged per AOI, per epoch: if several captures are needed to cover an AOI on a single date, the price does not change. Each additional acquisition date is priced as its own epoch.

100+

SATELLITES TASKABLE

1M+KM² PROCESSED**<24 hrs**

TYPICAL DELIVERY

0

MANUAL STEPS

ORDER WORKFLOW

Define an AOI in Pera Portal or via the API → feasibility and pricing returned → task a capture or pull archive → Legato processing → delivery by download or WMTS.

ACCESS & INTEGRATION

- ✓ REST API with SDKs, webhooks, STAC and WMTS
- ✓ Pera Portal for interactive search, pricing and ordering
- ✓ Role-based team workspaces with spend limits and approvals
- ✓ NET-30 invoicing with PO numbers; contracted rates available
- ✓ Raster hosting with WMTS endpoints created on upload
- ✓ One account and one invoice across archive and tasking

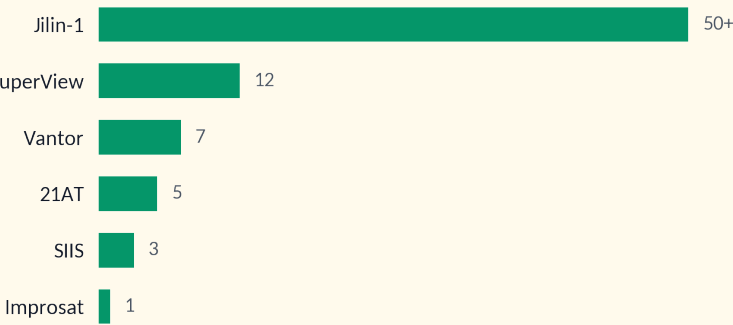
DATA TYPES

Optical • SAR • Hyperspectral • Stereo

Tasking access by constellation

Through its operator partnerships, Geopera holds the highest 30 cm and 50 cm tasking capacity of any provider. Each request is matched across the fleet on resolution, revisit, availability and urgency, with trade-offs set out before an order is placed.

SATELLITES AT 50 CM, BY CONSTELLATION



CONSTELLATION	30CM	50CM
Jilin-1	16	50+
Vantor	7	7
SuperView	4	12
21AT	1	5
SIIS	—	3
Improsats	—	1
Total	28	78+

Jilin-1 shown at 50; tasking access exceeds 50 satellites. Archive from more than 100 sensors supports historical baselines, through one account and one invoice.

DATA PARTNERS

MAXAR	VANTOR	JILIN
SIIS	IMPROSAT	SPACEWILL
WYVERN	ESA	NASA

VANTOR HUB PARTNER

WorldView tasking, archive imagery, 3D data and AI analytics, paired with Legato processing and local support in Oceania.

Licensing terms and tasking restrictions for sensitive regions are published before you order.

How we Process

Legato is the single automated pipeline behind every order, refined across more than one million square kilometres. Inputs are Level-1 products as they come off the downlink: 11-bit pixels in sensor geometry, with RPCs, ephemeris and calibration coefficients intact. Every stage runs without manual intervention, and most orders deliver within 24 hours.

1

Orthorectification

Terrain and sensor-geometry correction from DEM + RPCs; map-projected.

2

Alignment & co-registration

Tie-point alignment across scenes and to ground control.

3

Atmospheric correction

Scene radiance converted to surface reflectance.

4

Pansharpening

Visual (8-bit, balanced) and analytic (16-bit, reflectance-preserving) products.

5

Seamline optimisation

Seamlines routed to minimise visible transitions across the block.

6

Cloud & shadow masking

Per-scene masks, delivered as GeoJSON with the order.

7

Mosaicking

One continuous surface along optimised seamlines.

8

Harmonisation, QC & delivery

Block-wide radiometric normalisation; automated QC; cloud-native delivery.

THE QC GATE

A delivery ships only when automated QC passes: seam colour difference of $0.5 \Delta E$ or less across the block, geometry and radiometry checks passed, and 100% clean coverage. Anything that fails routes to manual review instead of shipping quietly.

The standard package

Every imagery order ships the full processing chain, from raw vendor scenes to final mosaics. Standard contents:

RAW	Raw source data	Original vendor scenes as captured (PAN + MSS), including RPCs and sensor metadata.
L2	Orthorectified scenes	16-bit per-scene imagery, terrain- and sensor-geometry corrected (DEM + RPC), map-projected and tie-point aligned. Delivered as separate Pan and Multi products.
SR	Surface reflectance scenes	16-bit atmospherically corrected surface reflectance (scaled ×20,000), per scene. Delivered as separate Pan and Multi products.
L3	Pansharpened, visual	8-bit natural-colour pansharpened scenes, tone- and colour-balanced and sharpened for visual analysis.
L3	Pansharpened, analytic	16-bit radiometrically faithful pansharpened scenes retaining surface reflectance (scaled ×20,000).
L4	Mosaics	Seamless, colour-balanced, cloud-masked mosaics of the full AOI along optimised seamlines: pansharpened visual (8-bit); pansharpened analytic (16-bit); Pan surface reflectance (16-bit); Multi surface reflectance (16-bit).
QA	Metadata & QA (00_Metadata)	Imagery Processing Report (PDF): sensor, capture, coverage and per-level processing summary. Mosaic seamlines (GeoJSON). Cloud masks (GeoJSON).

Delivered cloud-native; download or WMTS streaming.

CUSTOM DEVELOPMENT

Beyond the standard package, Geopera develops custom ML models and analytics to client requirements. Delivered examples include a sun-glint detection and classification model, aquatic atmospheric correction tuned for shallow-water conditions, and a LiDAR co-registration model producing clean, ML-ready training data automatically.

Satellite-derived bathymetry

Nearshore depth maps from optical imagery, with no vessel or aircraft mobilisation and no in-situ calibration campaign. Multi-date Sentinel-2 composites are atmospherically corrected, water-masked and regressed against ICESat-2 ATL24 bathymetric laser photons, with tide levelling, refraction correction, confidence tiering and outlier rejection applied to the reference before use. Every pixel carries an uncertainty estimate, and depth is withheld wherever the seabed signal is not physically present. The same method runs on commercial sensors with four or more bands, at the sensor's multispectral resolution.

DEMONSTRATED ACCURACY

SETTING	VALIDATION	RESULT
Clear shallow (Bahamas reef)	Held-out ICESat-2	RMSE 0.24 m at 0–5 m; 0.27–0.29 m overall; R ² 0.97–0.99
Turbid temperate (Jervis Bay, NSW)	Independent airborne LiDAR	1.35 m mean RMSE across 0–25 m; 0.55 m at 0–2 m

Best achievable classification is IHO S-44 Order 2 / CATZOC B in clear shallow water and CATZOC C in turbid temperate water — the physical ceiling for 10 m passive optics. Validation published at geopera.com/blog/satellite-derived-bathymetry-validated.

Depth retrieval

To roughly 20–25 m in favourable water, with site-adaptive limits derived from each scene's own optics.

Physics-informed ML

CatBoost regression over depth-invariant indices, Stumpf and Lyzenga transforms, per-pixel Kd490, coastal-aerosol band and multiscale spatial context.

Per-pixel uncertainty

Predictive variance decomposed into data and knowledge components; conformal prediction intervals calibrated per depth bin.

IHO S-44 / CATZOC layer

Per-pixel TVU at 95%, survey order and CATZOC category; the classified surface is gated on empirical coverage against independent control before any order is claimed.

Coverage handling

A bottom-visibility index censors pixels where the seabed spectrum is indistinguishable from deep water; censored pixels ship as a floor value, with measured and inferred zones flagged band-by-band.

Multi-scene ensemble

Per-scene prediction with outlier-clipped fusion across orbits, available for multi-scene orders.

DELIVERABLES

Cloud-optimized GeoTIFF depth surfaces (raw analytical, smoothed cartographic, full-coverage and IHO-classified), water mask, uncertainty bands, training-point tables, model artifacts and processing lineage.

Validated against independent airborne LiDAR, not only the altimetry used for training. Where the seabed is not optically visible the product says so: 97% of censored pixels verified genuinely deeper than 18 m. SDB complements a hydrographic survey; it does not replace one.

Satellite water quality monitoring

A production service converting optical imagery into quantitative water-quality products for coastal, estuarine and inland waters. Scenes are atmospherically corrected to remotely sensed reflectance using Acolite dark spectrum fitting, screened for cloud, sun glint, land adjacency and optically shallow bottom contamination, then processed through published retrieval algorithms. A machine-readable QC record accompanies every scene.

PARAMETERS RETRIEVED

PARAMETER	ALGORITHMS
Chlorophyll-a	NDCI, OC3, MPH, 2BDA / 3BDA / MCI
Turbidity	Dogliotti, Nechad
Total suspended matter	Novoa multi-regime, Nechad
CDOM	QAA v6
Water clarity / Secchi depth	Lee ZSD, Kd490
Water colour	Forel-Ule
Harmful algal bloom risk	NDCI / FAI / MCI ensemble
Phycocyanin	Sentinel-3 OLCI
Net primary production	VGPM

SENSORS Sentinel-2 MSI (10 m) · Sentinel-3 OLCI (300 m) · Landsat 8/9 OLI (30 m); sensor abstraction accommodates additional multispectral platforms.

Plume analytics

Threshold-based plume polygonization: area, centroid, principal axis, dispersion distance, intensity class, multi-date persistence.

Zonal reporting

Per-AOI statistics (mean, median, percentiles, valid-pixel fraction) on an equal-area projection; Parquet or CSV.

Time series & baselines

Monthly and seasonal composites, multi-year baselines, z-score anomaly rasters, STL decomposition, Mann-Kendall trend testing, before/after comparison.

Recurring programmes

Daily, weekly or monthly cadence with automatic scene discovery and dispatch, cloud-cover SLA tiers, and manual trigger for event response.

Alerting

Configurable rules on parameter exceedance, plume area and data quality; webhook delivery with an acknowledge/resolve workflow.

QC as a deliverable

Each scene ships a QC sidecar: masking source, valid-pixel fractions, physical range violations and processing lineage.

DELIVERABLES

Cloud-optimized GeoTIFF rasters with per-pixel QA bitmask; GeoPackage, Shapefile and File Geodatabase vector layers; Parquet/CSV tables; JSON processing lineage; schema-validated QC report per job. Physics-based throughout: every parameter traces to a peer-reviewed algorithm with a citation. Imagery is charged on the acquisition footprint; analytics on the sum of client AOI areas.

Delivered at scale

133,000 km²

Bahamas · national 50 cm mosaic

Captured with the Jilin-1 constellation over the 2025 summer window and processed through Legato. Custom aquatic products (bathymetry, glint classification, aquatic atmospheric correction) built on the mosaic. The client has since committed to a five-year agreement.

100,000+ km² / yr

Australia · recurring forestry supply

The satellite imagery layer for a leading Australian forestry database company, on a recurring schedule, including a custom LiDAR co-registration model producing ML-ready training data.

FUTURE DIRECTIONS

In development. The items below are roadmap and are not part of the current deliverable set.

- Automated reporting templates (monthly, quarterly, incident) for monitoring programmes
- STAC catalog and WFS endpoints for water-quality products
- Site-specific calibration against in-situ data
- Extension to SAR and other sensors
- Habitat classification

COMMERCIALS

Pricing and terms

Imagery pricing starts from \$3 per square kilometre and is published at geopera.com/pricing. Prices are per area of interest, per epoch: several captures covering an AOI on one date are priced once, and each additional acquisition date is priced separately. Full Legato processing is included on every archive and tasking order, and a project can be scoped and budgeted from the website without requesting a quote. Organisations can operate on NET-30 invoicing with PO numbers and contracted rates.

CONTACT

WEB	geopera.com	PORTAL	portal.geopera.com
ENQUIRIES	geopera.com/contact	COMPANY	Geopera Pty Ltd, Australia



SATELLITE IMAGERY · ANALYTICS · MONITORING