BROCHURE

Octave Alto Lightspeed

Advanced geospatial analytics for desktop and onboard applications



Octave Alto Lightspeed (formerly LuciadLightspeed) is a modular and extensible desktop and onboard solution for geospatial situational awareness. Users can bring in a multitude of data sources together in a common operating picture (COP).

Alto Lightspeed provides the foundations for advanced geospatial analysis applications. Developers can create high-performance C2 and location intelligence applications thanks to the clean, modular structure and powerful visual analytics capabilities. Using its configurable SDK, you can add support for custom data sources or databases, add your own symbology or match user interaction and look and feel to your company's unique needs and style.

Alto's desktop and onboard solution comes with Octave Lucy, a ready-to-use application framework. Lucy allows users to drag and drop or connect to more than 200 data formats and databases with unparalleled performance, all while preserving data precision. Data can be explored in a 2D or 3D map view, table view or vertical intersection view. Annotate maps and print or export the result to report your findings.

Who needs the Alto Lightspeed desktop and onboard solution?

These are just a few examples of why users turn to Alto Lightspeed for their geospatial data challenges:

- Provide your operational staff with a COP
- Stay informed via shared tactical plans in NVG format, visualized with military symbology
- Analyze complex airspaces delivered as AIXM data using 3D visualization
- Create a certified recognized air picture
- Correctly represent data for the polar region
- Explore X (formerly Twitter) feeds for trend analysis and security at big events
- Detect patterns in traffic and get alerts about unexpected behavior
- Explore data in 4D, represented geographically as time series as well as plot views
- Share vector data as a web service without rasterizing it before publishing

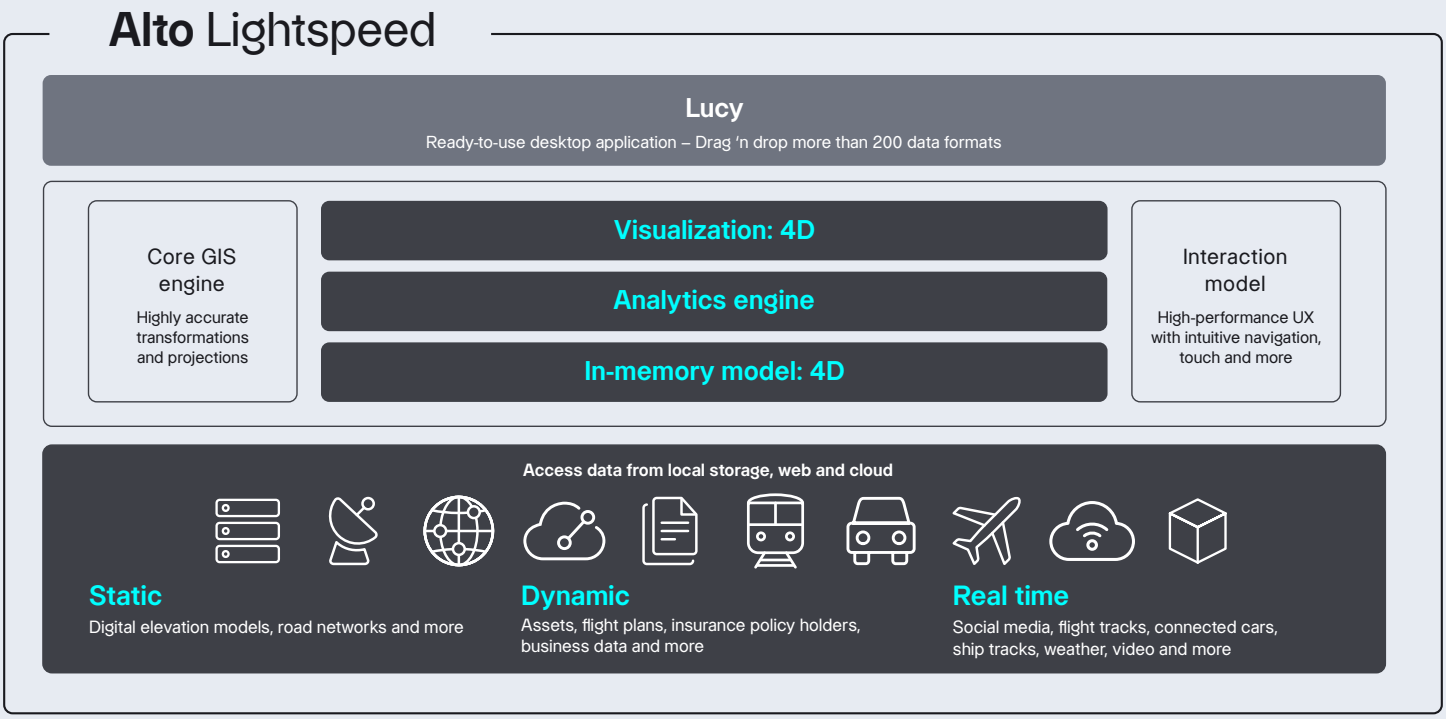


Figure 1: Alto's desktop and onboard solution connects to more than 200 data sources with an intuitive, drag-and-drop user interface. Its core GIS engine and visual analytics capabilities offer beautiful visualization and powerful data analysis.



Figure 2: Starting in Alto Lightspeed's application template Lucy, you can drag and drop your geospatial data, visualize it, add additional data layers and run analyses.

Key benefits

Best-in-class performance	Allows an unprecedented user experience with hundreds of thousands of track updates per second, on-the-fly line of sight (LOS) calculations and real-time data access without pre-processing
Retained geospatial positioning accuracy	Ensures precision on a worldwide scale for visualization, transformation and calculation of any data
Platform independence	Runs on all platforms (with or without GPU — desktop, tablet, embedded, high-end or low-end) that support Java, including Windows, Mac and Linux
Flexibility	Designed to integrate into any architecture and has fine-grained customization options
Ease of use and lowest total cost of ownership	Enables rapid development and customization, ensuring source code and backward binary compatibility and eliminating the need for data pre-processing

Overview

The Alto Lightspeed components have been organized into product tiers. Depending on the needs of your organization, you can opt for Alto Lightspeed Essential, Advanced or Pro. From the Advanced and Pro tiers, you can extend the functionality available to you with extra options.

Legend

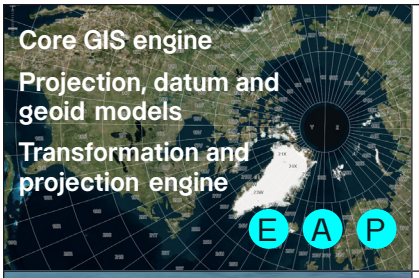
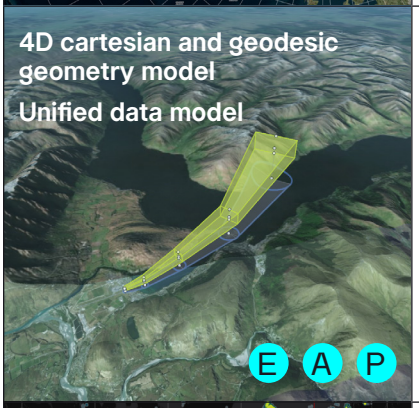
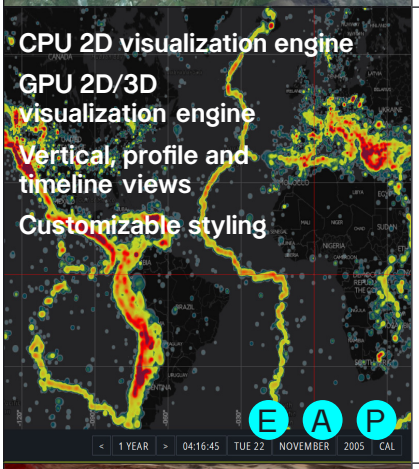
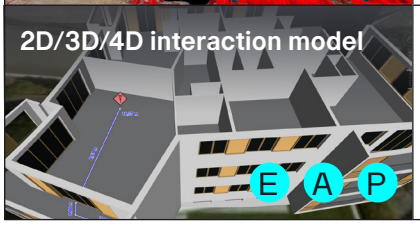
✓ Feature included

◯ Optional feature

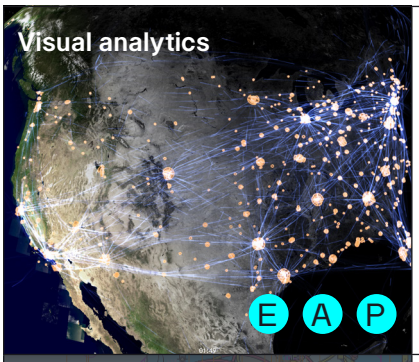
Functionality	Essential	Advanced	Pro
Core GIS engine	✓	✓	✓
Projection, datum and geoid models	✓	✓	✓
Transformation and projection engine	✓	✓	✓
4D cartesian and geodesic geometry model	✓	✓	✓
Unified data model	✓	✓	✓
CPU 2D visualization engine	✓	✓	✓
GPU 2D/3D visualization engine	✓	✓	✓
Vertical, profile and timeline views	✓	✓	✓
Customizable symbology	✓	✓	✓
CPU, GPU image processing image	✓	✓	✓
2D/3D/4D interaction model	✓	✓	✓
Visual analytics	✓	✓	✓
High-quality, large-format printing	✓	✓	✓
Raster connectors	✓	✓	✓
Vector connectors	✓	✓	✓
Point clouds and reality meshes	✓	✓	✓
OGC standards	✓	✓	✓
Advanced raster connectors		✓	✓
Advanced GIS engine		✓	✓
Real-time engine		✓	✓
Tiling engine			✓
Database connectors		◯	✓
Terrain analysis engine		◯	◯
Weather and environment standards		◯	◯
Graph and routing engine		◯	◯
Infrastructure standards			◯
Radar connectors			◯
Aviation standards			◯
Defense standards			◯
Defense symbology			◯
Maritime standards			◯
S-63			◯

Functional specification

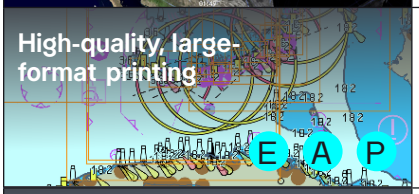
Below is a high-level, non-exhaustive overview of the functionality available in Alto Lightspeed. You can use the functionality it offers out of the box or extend it to meet user-specific requirements.

	• Access and represent data in any coordinate reference system (geodetic, geocentric, topocentric and grid) and in any projection • Get support for vertical datums • Perform advanced geodetic calculations, transformations and ortho-rectification
	• Model any data format, represent all object geometries and their metadata (standard or specific for your application domain) and apply any data filter • Integrates with all calculations from the GIS Engine • Get support for complex geometries like geo-buffers, arcs and arc bands, radar coverage volumes and more • Accurately represent radar coverage beams and other sensor detection ranges as 3D volumes and set up geo-fencing for those volumes • Boost performance with support for concurrent data access and asynchronous loading • Retrieve data from local, network attached or cloud storage
	• Visualize data in an accelerated 2D/3D view or a non-accelerated 2D view • Visualize data with height information in a vertical view or a profile view and dynamic data in a timeline view • Apply flexible styling (layers, icons, line styles, fill styles, transparency and more) to your data and customize it using OGC-defined styled layer descriptor/ symbology encoding (SLD/SE) standards; use hardware-accelerated styling expressions to update your dynamic data at runtime • Use high-performance terrain rendering that is integrated in the view; if elevation data is present, all data can be draped automatically over the terrain • Benefit from advanced labeling and decluttering of vector data • Integrate with the UI toolkit of your choice; a dedicated view implementation is available for JavaFX/OpenJFX
	• Benefit from advanced, fully interactive graphical processing and visualization of raster data, including high dynamic range (HDR) and multispectral imagery and multidimensional data
	• Benefit from many ready-to-use controllers for map interaction: standard map controls (zoom, pan and select), editing/creating geometries, rotating, distance measurements, multitouch and more • Easily create other controllers for custom interaction • Fine-tune navigation using the configurable 3D camera

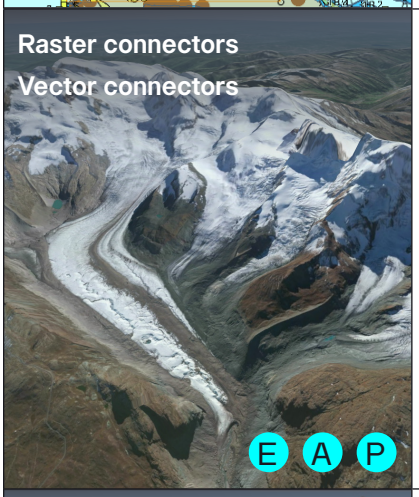
E Included in Essential A Included in Advanced P Included in Pro



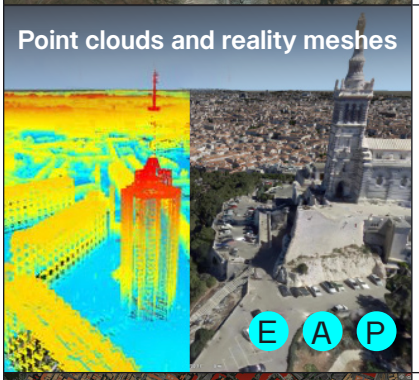
- Rapidly gain a thorough understanding of your geospatial data using advanced visual analytics tools
- Configure clustering algorithms to aggregate a multitude of data objects into easily distinguishable clusters based on their properties
- Slice and filter data dimensions for analysis
- Use swipe, flicker and porthole controllers to uncover similarities and change between images
- Perform density calculations and display the resulting heat maps based on static, as well as dynamic data



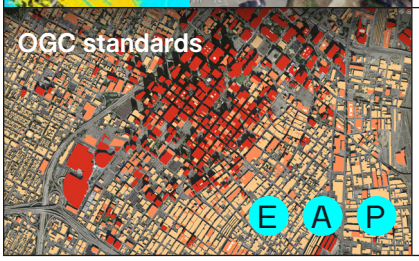
- Configure, preview and print snapshots of Alto Lightspeed views in high quality, including custom layers
- Print in large formats or use multipage support to stitch together a large print



- Access data in many vector and raster formats
- Exploits multileveling and tiling
- Benefit from Alto Lightspeed's data-agnostic visualization and analysis capabilities, which work with any data format
- Get out-of-the-box native support for:
  - Raster data: BIL, Azure Maps, BMP, DTED, ESRI TFW and JGW, ETOPO, GeoTIFF and BigTIFF, GIF, JPEG, JPEG2000, MapInfo TAB, PNG, PPM, USGS DEM, MBTiles and Open Street Map
  - Vector data: CGM, Collada, ESRI Shape, GeoJSON, MapInfo MIF and MAP, LiDAR LASer and LASZip (LAZ), OpenFlight (3D), OSGB 3D meshes, SVG, MBTiles (including support for MapBox style files) and Wavefront OBJ (3D)
- Add support for new, custom formats through a straightforward, well-documented process

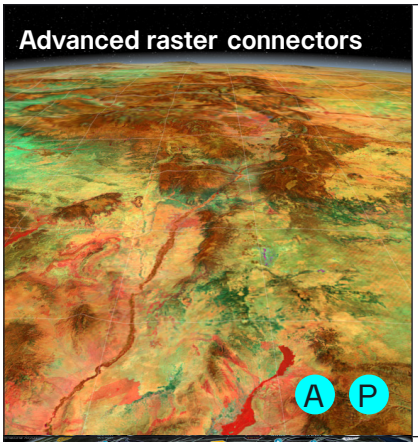


- Connect to and visualize unlimited point clouds and reality meshes
- Load 3D tiles smartly
- Style and filter point clouds and reality meshes based on expressions
- Combine 3D data with terrain, other geodata, annotations and measurements
- Gain support for OSGB, LAS, LAZ, OGC 3D Tiles, supporting Draco compression
- Get out-of-the-box native support for:
  - OSGB, LAS, LAZ, E57 and OGC 3D Tiles
  - *.slpk files, i3s services

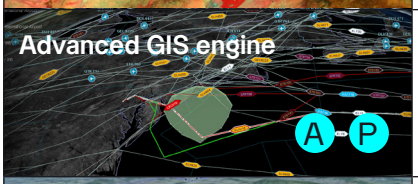


- Connect to several OGC web services and read data in a variety of OGC formats
- Get support for these standards:
  - OGC GeoPackage, GML, KML, WCS, WFS(-T), WMS, WMTS, OGC Filter 2.0 (spatial filter capabilities can be enabled from the Advanced GIS engine listed under Advanced and Pro options), OGC Symbology Encoding (SE), ISO 19115 metadata and OGC 3D Tiles

E Included in Essential A Included in Advanced P Included in Pro



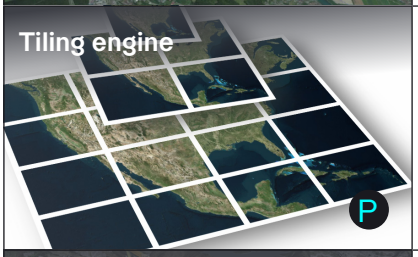
- Connect to and visualize specialized raster formats, and access a GDAL connector for several other raster formats
- Gain direct support for these formats:
  - ECW, GeoPDF, GeoSPOT, JPEG2000 (encoding), MrSID, Spot DIMAP and Swiss DHM
- Get GDAL support for these formats:
  - ARC/Info Binary Grid (AIG), BSB Nautical Chart Format, ARC/Info Export E00 GRID, ENVI HDR Labelled Raster, Octave Imagine (formerly ERDAS IMAGINE), ERDAS Imagine Raw, ILWIS Raster Map, Intergraph Raster, PCI Geomatics database File, PCRaster, Sentinel 1 SAR SAFE, Sentinel 2, SAR CEOS, SRTM HGT, GDAL Virtual, ASCII Gridded XYZ and more



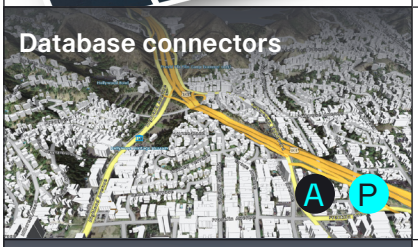
- Calculate binary topological relations (for example, overlaps and contains) and perform constructive geometry on shapes (for example, union or intersection)
- Benefit from support for geodetic shapes and rhumb shapes



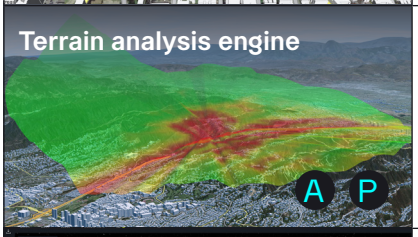
- Optimally handle and visualize dynamic data, including live radar video feeds
- Play back simulations in fast or real time; take advantage of playback controls and continuous label decluttering



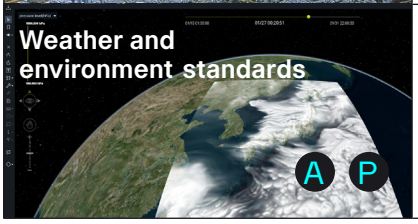
- Fuse, tile and multilevel large amounts of raster and imagery data using the tiling engine
- Build globes with detailed and accurate point-sampled terrain data, centimeter-accurate, area-sampled (multispectral) imagery and multidimensional weather data and imagery
- Optimize point cloud data for direct access or streaming as OGC 3D Tiles



- Gain support for spatial databases
- Get support for these database formats:
  - IBM DB2, Informix Geodetic and Spatial Datablade, OGC GeoPackage, Oracle Locator and Oracle Spatial, PostGIS (PostgreSQL spatial database extension), SAP HANA (Beta), Microsoft SQLServer and SQLite



- Perform calculations on terrain data, such as LOS or hypsometric calculations, and get an alternative view on the terrain data
- Reach unparalleled calculation and visualization performance with hardware acceleration (OpenGL and OpenCL)
- Calculate shape-to-shape intervisibility based on terrain

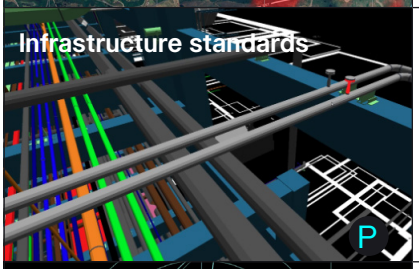


- Integrate environmental data, and preserve dimensional information for further visual analysis
- Get support for these formats:
  - NetCDF ISC, GRIB V1/V2 weather data (WMO/ICAO Bulletin) and SIGWX (BUFR)

A Included in Advanced P Included in Pro A Optional in Advanced P Optional in Pro



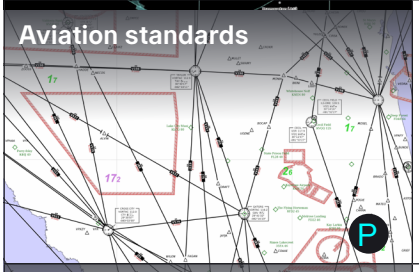
- Exploit the network structure of your geospatial data and make use of algorithms to construct graphs and solve your routing challenges
- Leverage the graph engine and get support for all kinds of network-related processing, such as shortest path or cross-country movement calculation; also enables the creation of flexible cost functions



- Import and visualize your computer-aided designs to see them in context
- Prepare your 3D models and cities for streaming via conversion of OBJ, Binz and IFC to OGC 3D Tiles; optimize the tiles via compression and preserve material properties
- Get support for these formats:
  - Autocad DWG/DXF, Microstation DGN, Binz, OBJ, IFC, Revit and Navisworks



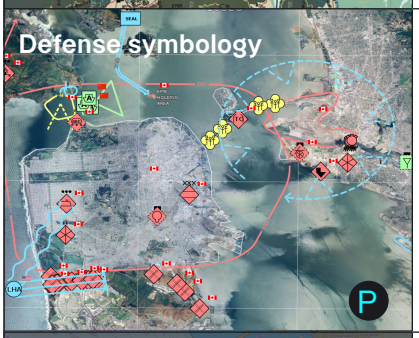
- Visualize radar data captured in the ASTERIX format; combined with the real-time engine, the radar connector offers fast and flexible handling of ASTERIX data, including radar video (ASTERIX Cat 240)
- Get support for these formats:
  - Eurocontrol ASTERIX categories 1, 8, 10, 11, 21, 30, 34, 48, 62, 240 and 244



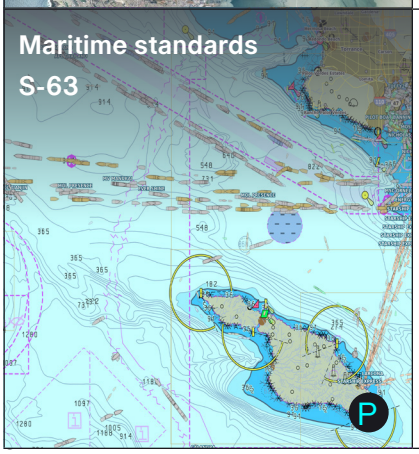
- Model and visualize aeronautical data such as airspaces, navaids, procedures and minimum off route altitudes (MORAs) in accelerated 2D and 3D views; integrate with operations from the Advanced GIS Engine
- Gain visualization support, including options for custom styling
- Get support for these formats:
  - AIXM (3.3, 4.0, 4.5, 5.0 and 5.1), ARINC 424 and DAFIF(T)



- Integrate various military data formats for full situational awareness
- Get support for these formats:
  - ADRG, ASRP, BCI, CADRG, CIB, ECRG, NITF, NSIF, USRP, VPF products (VMAP0, VMAP1, VMAP2(i), DNC, DCW) including Geosym symbology and MGCP



- Full support for symbols and tactical graphics of the latest military symbology standards in 2D and 3D; NATO Vector Graphics support increases interoperability; this support encompasses the lookup, creation, visualization and editing of military symbols and tactical graphics
- Get support for these formats:
  - APP-6A, APP-6B, APP-6C, APP-6D, APP-6E (cyber domain), MS2525b, MS2525c, MS2525d and NVG (visualize, create, edit, update)
  - Military grids: MGRS, CGRS and GARS



- Accurately visualize electronic navigational charts in 2D and 3D; complies with standards defined by the International Maritime Organization (IMO) and the International Hydrographic Organization (IHO)
- Decode data in the IHO S-57 format and visualize charts in compliance with the IHO S-52 visualization standard
- Decode and visualize electronic navigational charts in the encrypted IHO S-63 format
- Decode and visualize electronic navigational charts in S-101 format, including encrypted S-101 data.
- Get support for these formats:
  - IHO S-57, IHO S-52, IHO S-101 and UKHO AML (STANAG 7170)

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Use cases

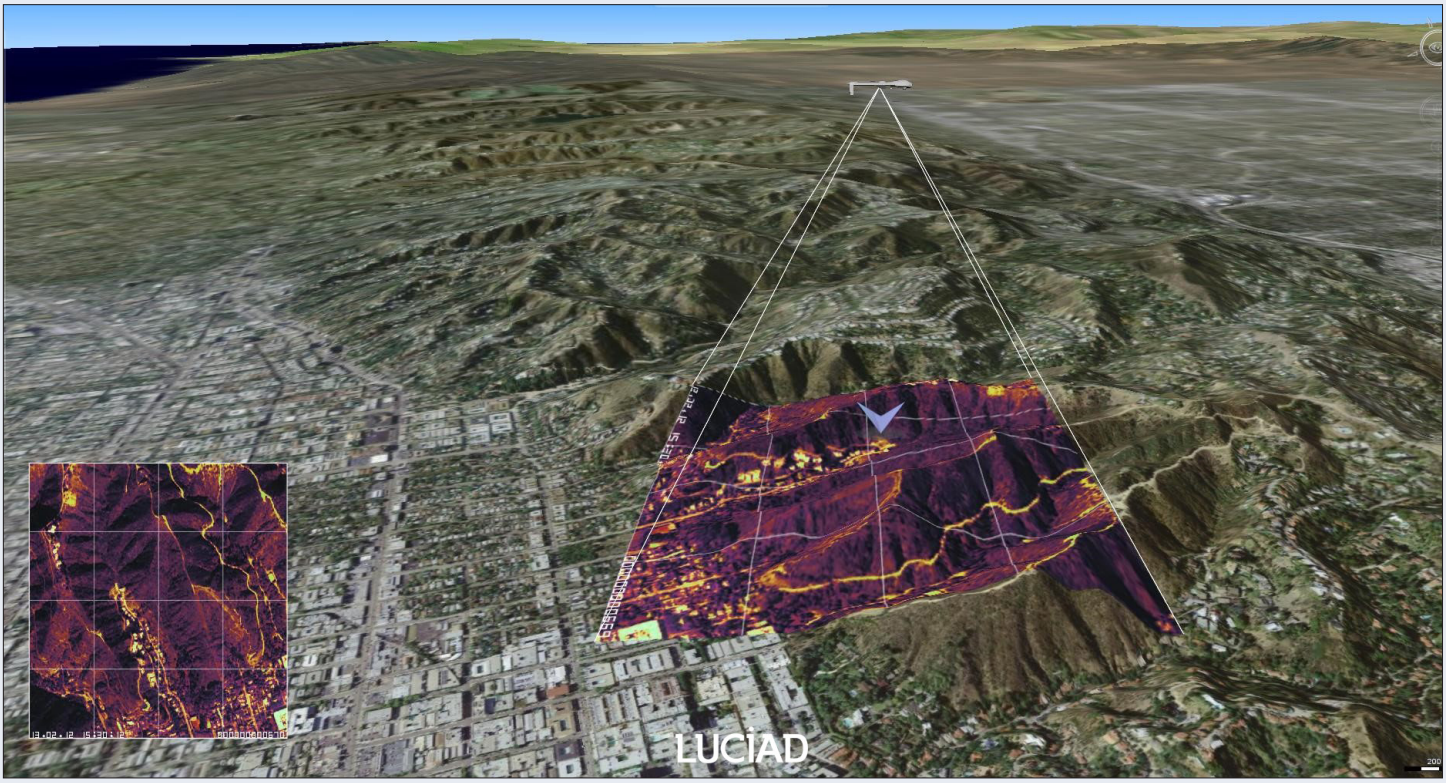

Figure 3: Real-time video draping

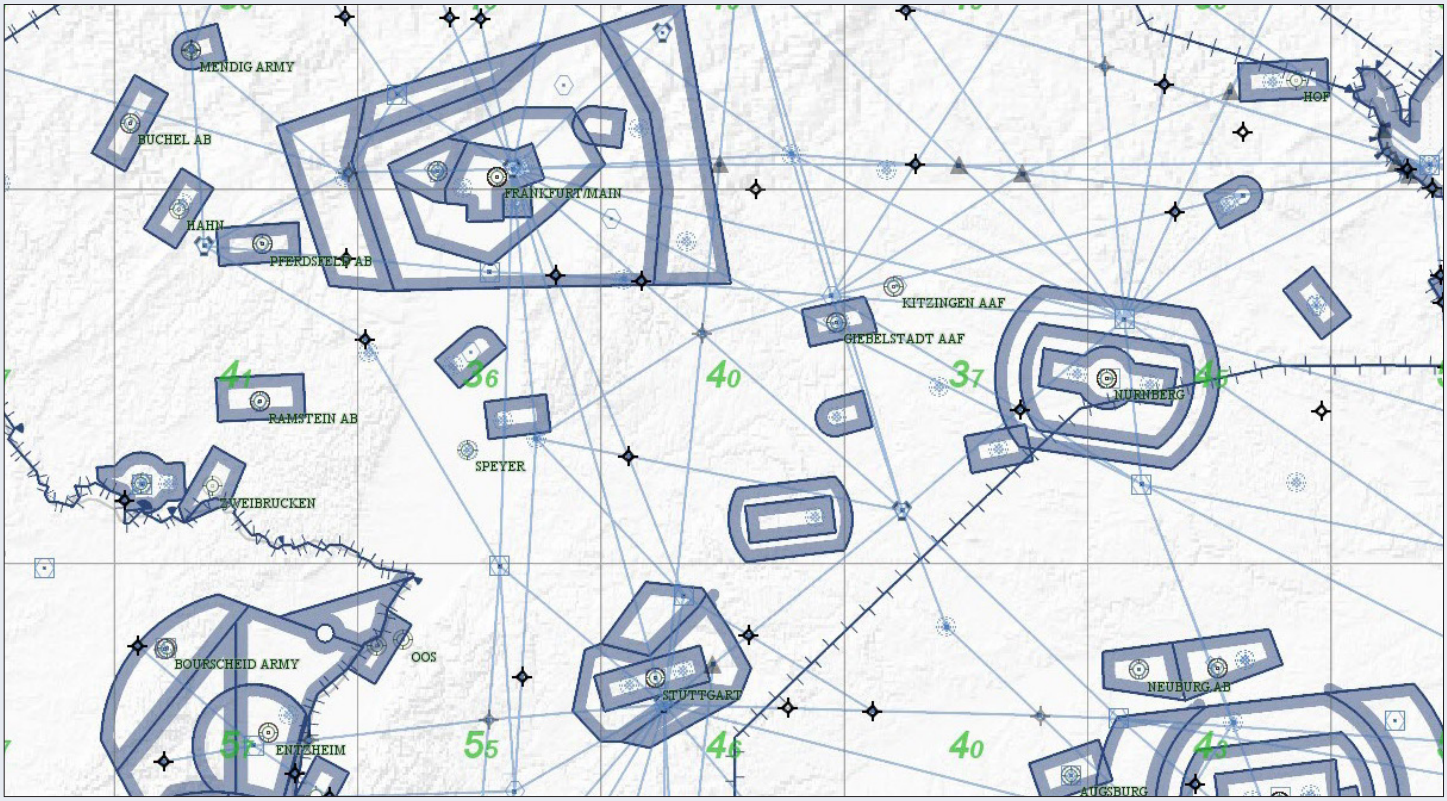

Figure 4: 2D aeronautical chart data

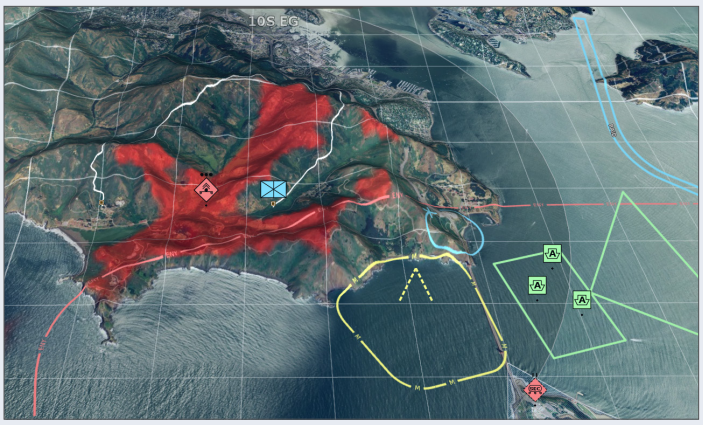

Figure 5: LOS analysis and dynamic routing on 3D terrain

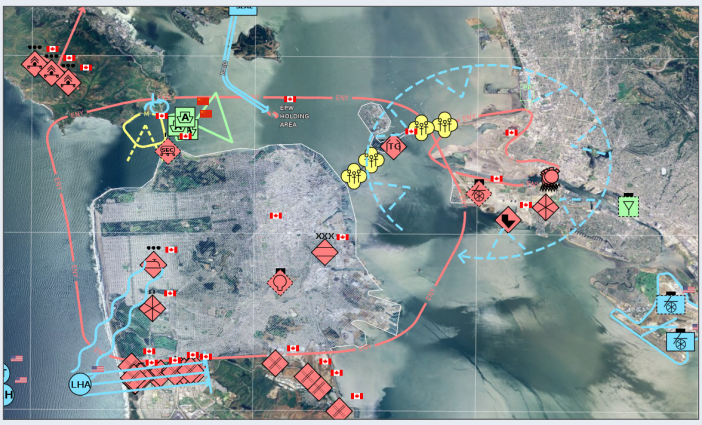

Figure 6: A tactical scenario visualized using APP6symbology shows Alto Lightspeed's military symbology capabilities

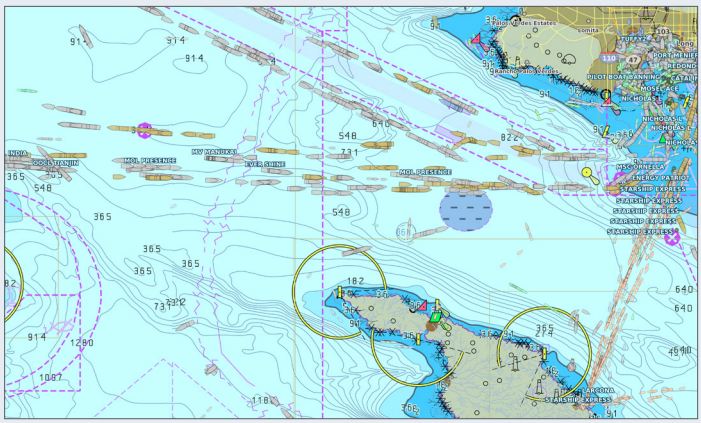

Figure 7: Vessel plots combined with electronic navigational charts

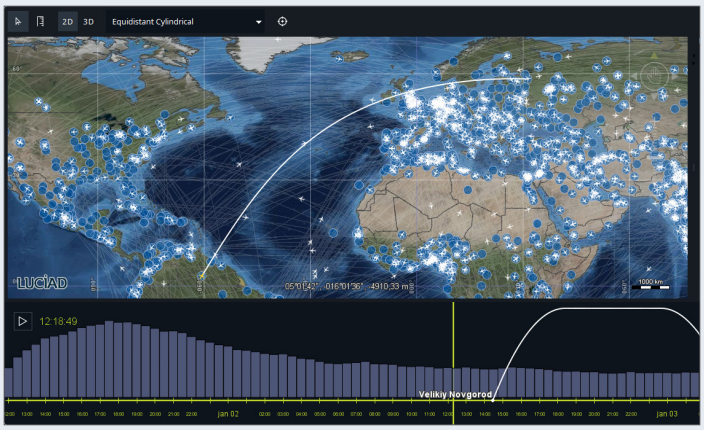

Figure 8: Dynamic aircraft tracks and trajectories combined with a timeline view Alto Lightspeed map

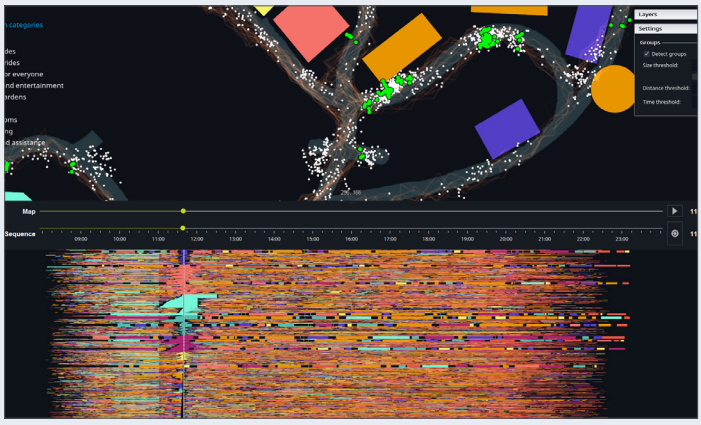

Figure 9: Visual analytics of people movement datasets using spatial and nonspatial views

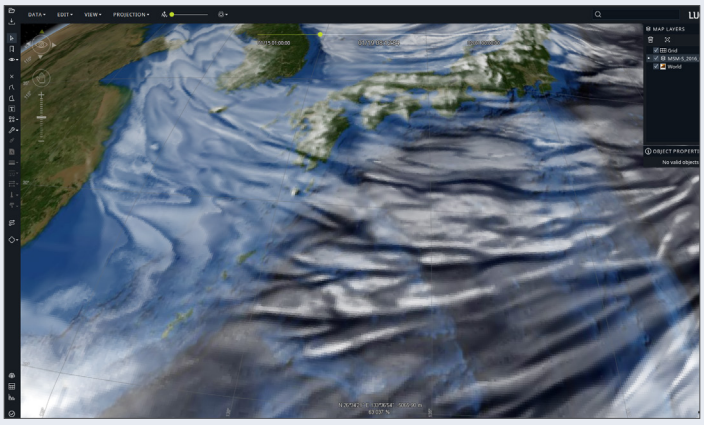

Figure 10: 4D analysis of a NetCDF weather cube

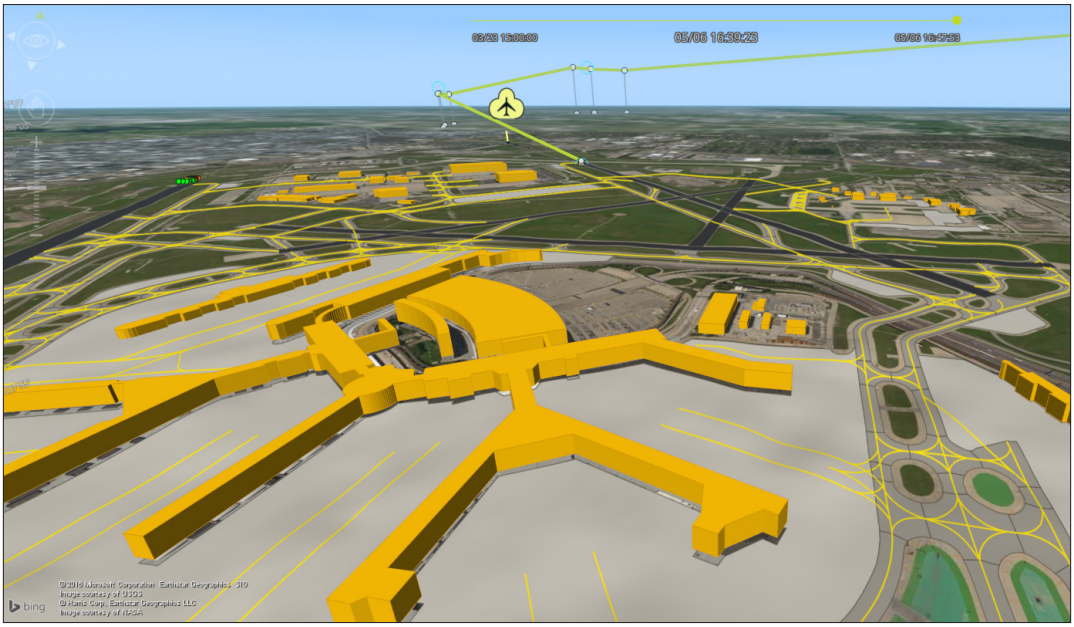

Figure 11: AIXM 5 data and flight plan preview in 3D and a vertical view

More information

Alto Lightspeed comes with:

- An automated installer and a launcher for applications, samples and documentation
- A dedicated AI skill package that helps leading AI coding tools understand the Alto Lightspeed architecture, APIs, samples and platform-specific development patterns
- Build scripts and Maven POM files for all libraries
- Code samples for all components
- Developer's guide with clear explanations and an overview of best practices
- API reference offering detailed descriptions of all interfaces and classes
- Release notes to see what's new
- Technical notes to support technical requirements

To learn more or schedule a demo, contact us at www.octave.com/general-inquiry

For developer guides, code snippets, technical articles, videos and more, visit the Alto Developer Platform.

About Octave

Octave is a leader in enterprise software, turning data into decisive action and intelligence into your edge. Our software solves for and simplifies complexity, from the design and build to operations and protection of people, property and assets – for any scope, at any scale. For decades, we've partnered with customers to sharpen performance, elevate efficiency and amplify results. From factory floors to entire cities, our solutions are tuned to scale up what's possible from day one onward.

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