Release guide

LuciadFusion 2024.0

28 June 2024

Contents

About this release

The 2024.0 release of LuciadFusion strengthens support for BIM data. You can now stream Autodesk Revit data in addition to the exchange format Industry Foundation Classes (IFC).

This release also combines many specifically requested features. Developers will benefit from the raised minimal Java version and many security upgrades. A new MBTiles service type has been added to stream vector and raster tiles directly from MBTiles files.

The existing OGC 3D Tiles and WCS service types have been upgraded:

- OGC 3D Tiles service now supports publishing OGC 3D Tiles 1.1 data
- WCS service now supports version 2.0.1of the OGC WCS protocol
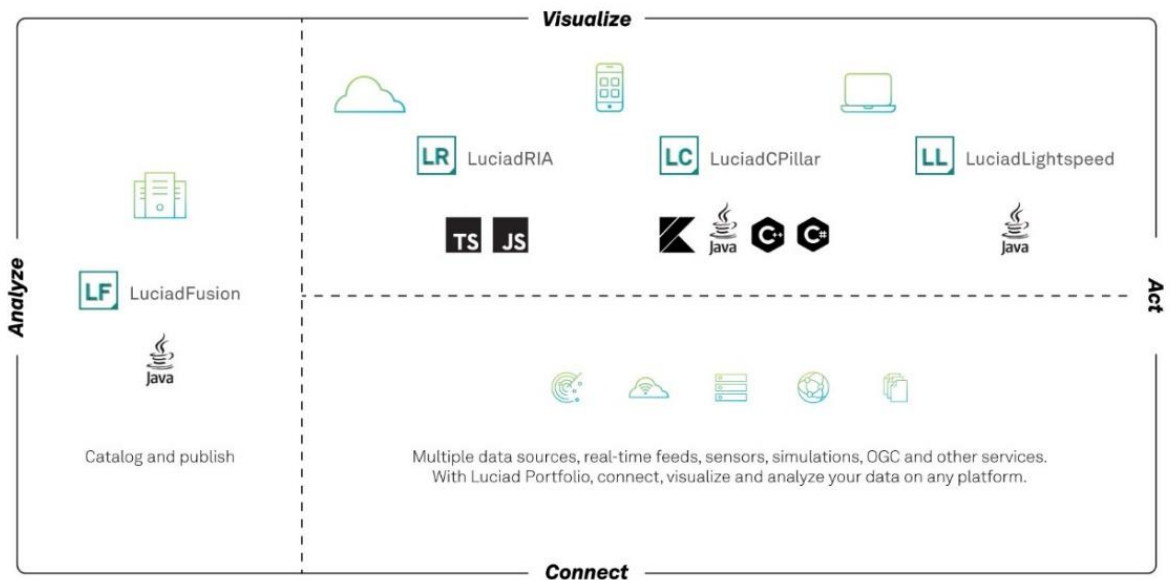
This document lists the most noteworthy improvements.

Figure 1: The Luciad portfolio

Benefits of new features

Support for Autodesk Revit data

Revit[1] is a BIM software tool for architects, engineers and construction professionals to model shapes, structures and systems in 3D. It stores these 3D models in a proprietary RVT file format with the .rvt file extension.

These RVT files contain:

- A **geometry model** of a building or facility, including spatial elements, materials and shapes

- A **feature data model** describing typical BIM properties of that data, such as layer, material and more

LuciadFusion now decodes both the geometry and the attribute data, handling the two data types in a distinct way: Revit data can be served by LuciadFusion using the OGC 3D Tiles protocol. The attributes can be served by LuciadFusion through a WFS service.

Note: Revit data doesn't have a tiling structure. Therefore, the data is organized into a new tile structure during conversion. This further extends LuciadFusion's renowned 3D tiling capability.

Sample code/documentation to get you started
A new section "Data formats: Autodesk Revit" was added to the documentation. It bundles a collection of relevant articles. For specific guidance to get started with Revit data quickly, refer to "Serving BIM data from LuciadFusion Studio."

The LuciadRIA IFC sample has been renamed to IFC / Revit Viewer and now also showcases Revit data, processed and served using LuciadFusion's OGC 3D Tiles service.

Java and security upgrades

Java support
In every version, including LuciadFusion 2023, the minimal required Java version was 8. This was based on customer demand. With all the changes introduced by Oracle in recent years, we received explicit demands to continue supporting Java 8. In the meantime, priorities have shifted, for us and for our customers. One factor is that many third-party libraries have raised their minimal required Java versions. The LTS versions after Java 8 are 11 and 17. This past September, premier support for Java 11 ended[2], so we decided to raise the minimal supported Java version on our side to Java 17. At the same time, we also made sure that LuciadFusion supports Java 21. The supported Java versions are documented within "Hardware and software requirements" in the product documentation. See Figure 2.

The article "Integrate LuciadFusion into your IDE" has also been updated.

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[1] www.autodesk.com/products/revit
[2] www.oracle.com/be/java/technologies/java-se-support-roadmap.html

Luciad aims to support the latest Java LTS version in its latest releases. The minimum JDK/JRE requirements never change with a minor upgrade (an upgrade from 2022.0 to 2022.1, for instance) or a patch release of LuciadFusion.

Table 1. Supported Java versions

	OracleJDK	OpenJDK
LuciadFusion 2017 and earlier	8	not supported
LuciadFusion 2018 [1]	8, 11	11
LuciadFusion 2019	8, 11	11
LuciadFusion 2020	8, 11	11
LuciadFusion 2021 [2]	8, 11, 17	11, 17
LuciadFusion 2022	8, 11, 17	11, 17
LuciadFusion 2023	8, 11, 17	11, 17
LuciadFusion 2024	17, 21	17, 21

Figure 2: The supported Java versions are documented within the "Hardware and software requirements" section in the product documentation.

Security updates

The 2024.0 release of LuciadFusion includes several security updates. The release notes provide full details on the updated, removed and added dependencies. Please look for "Security updates" under the upgrade considerations in the release notes.

It is now easier to use HTTP/2 with LuciadFusion. To assist you, the new article "How to use HTTP/2 with LuciadFusion" has been introduced. See Figure. Also, HTTP/2 is now enabled by default in the LuciadFusion Platform configuration. Finally, sample dependencies have been updated to enable HTTP/2 with the sample Jetty server shipped with LuciadFusion.

Please read the following articles for more information:

- "How to configure access to services in LuciadFusion"
- "Configuring access to your endpoint handlers"

Alternatively, you can consult the chapter "LuciadFusion Studio: Security" in the documentation. It bundles many articles, several of which have been updated.

Various updates resulted in some upgrade considerations:

- The third-party library GDAL was updated to version 3.8.3. With this update, the TLcdGDALModelDecoder can no longer decode Arc/Info Export E00 GRID files. The GDAL library no longer offers supports for this format.
- The minimum supported glibc (GNU C Library) for Linux has been raised to 2.28. This means that Ubuntu 18 is no longer supported.
- This version of LuciadFusion no longer supports 32-bit Linux for the GXY view. For the full list, please consult the release notes.

LuciadFusion / Getting Started / Installation / How to use HTTP/2 with LuciadFusion

How to use HTTP/2 with LuciadFusion

HTTP/2 is a major revision of the HTTP/1.1 protocol. It improves performance and efficiency. The LuciadFusion server is fully compatible with HTTP/2.

To use HTTP/2 with the LuciadFusion server, these conditions must be met:

- HTTP/2 must be enabled in Spring Boot. This is the case by default: you can find the corresponding `server.http2.enabled=true` property in the `fusion.common.yml` configuration file.
- HTTPS must be enabled. The HTTP/2 standard doesn't require encryption, but all major browsers, such as Chrome, Firefox, Safari and Edge, only support HTTP/2 in combination with HTTPS. As a result, encryption becomes mandatory. You can enable HTTPS in LuciadFusion through Spring Security, as explained in How to enable HTTPS in LuciadFusion.
- LuciadFusion must be deployed in a servlet container or application server that includes support for HTTP/2. The Jetty servlet container included with LuciadFusion and used by the stand-alone LuciadFusion server comes with out-of-the-box HTTP/2 support.

Figure 3: It is now easier to use HTTP/2 with LuciadFusion. The new article "How to use HTTP/2 with LuciadFusion" has been introduced to assist you.

Improved vertical datum and reference support

The default behavior of many model decoders, used to decode elevation data, has been changed. We now enable support for vertical datums by default. Supporting vertical datums will cause the appropriate geoid elevation to be applied to data. This provides more accurate elevation values.

The affected elevation data formats are DEM, DMED/DTED, ETOPO, GeoTIFF, LAS/LAZ and SwissDHM.

After this change, the geoid elevation will be applied to your elevation data. Your elevation layers may be painted at a different height, which can cause the data on your other layers to be misaligned with your terrain layer. You should check that your terrain layer is still properly aligned with your other layers, especially if you are using the Terrain Analysis (TEA) module.

If your data is misaligned after this change you can try to resolve it in the following ways:

- Update your other layers to use the same vertical datum reference as your elevation data
- Disable geoid support for a specific model decoder by calling the method #setSupportGeoidDatums(boolean)
- Disable geoid support for all model decoders by setting the system property com.luciad.geodesy.geoidSupport.LEGACY to true

In other situations, you want to influence the order in which reference sources are checked to determine the model reference. You can now set a model reference decoder priority for model decoders supporting this feature. The priority decides whether an embedded or external reference source is used first to determine the model reference before falling back to the other source in case of an error.

- The following model decoders support this feature: TLcdGeoTIFFModelDecoder, TLcdLASModelDecoder and tLcdE57ModelDecoder

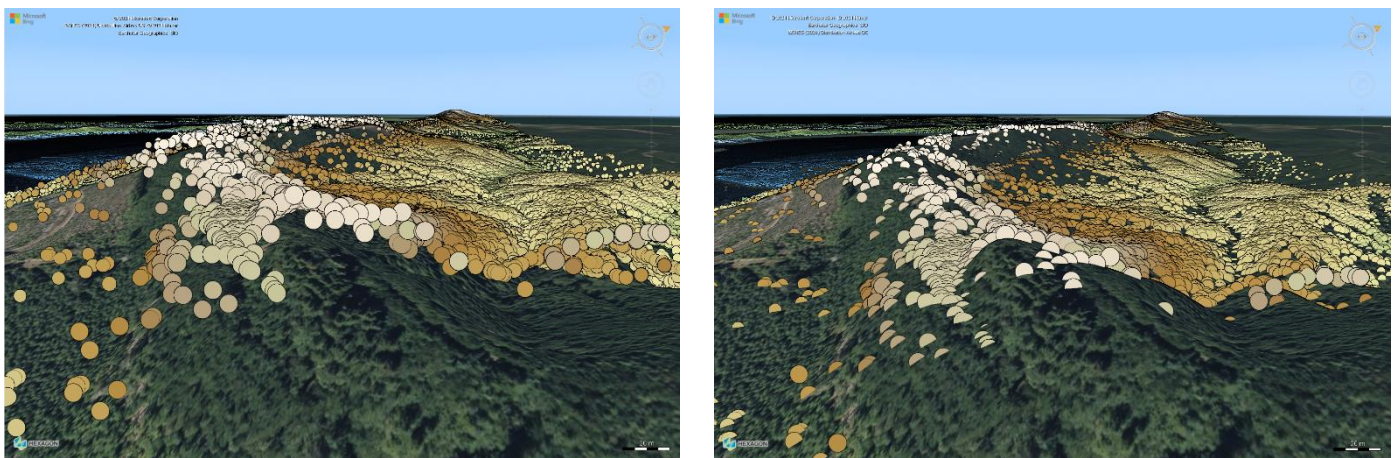The article "Setting model reference decoder priority" summarizes this topic.

Figure 4: Visualization of LAS data with orthometric heights. The left screenshot shows the result without geoid support, resulting in a misalignment between the point cloud heights and the underlying terrain. The right screenshot shows the correct result with geoid support.

MBTiles service

You can now serve data in MBTiles raster or vector format. The endpoint of a MBTiles service complies to the TileJSON version 3[3] spec.

Using an MBTiles service, you can serve MBTiles data to MBTiles clients, such as LuciadCPillar and LuciadLightspeed. See Figure 25.

Currently, LuciadFusion does not offer management of styles for MBTiles services. There is, in fact, no standard handling of styles in the TileJSON spec. The two Luciad clients for MBTiles services currently offered within the Luciad portfolio, LuciadLightspeed and LuciadCPillar, offer client-side styling of the MBTiles data.

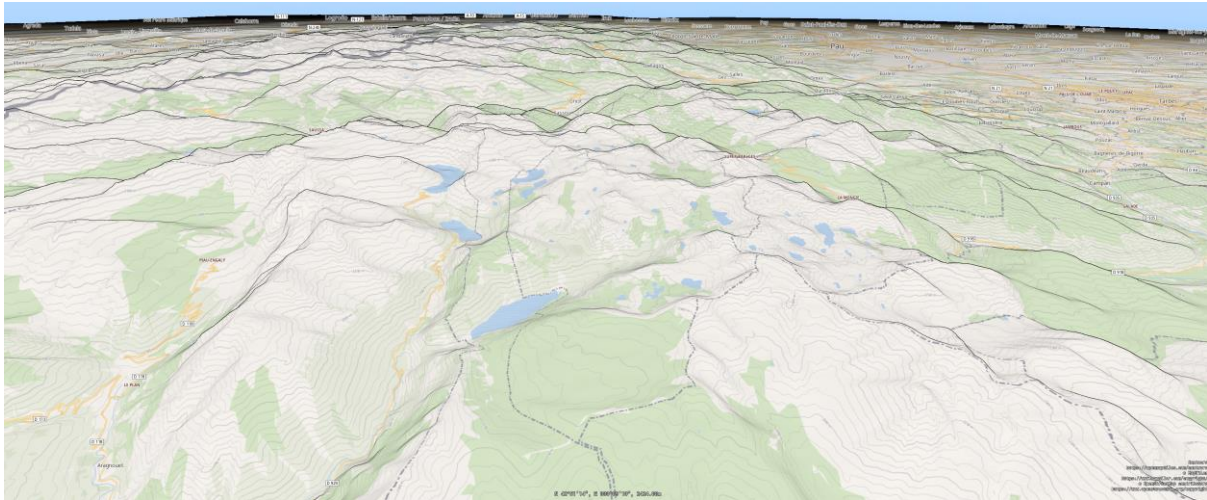[3] https://github.com/mapbox/tilejson-spec

Figure 2: This picture depicts a combination of Open Street Map data and contour lines that were visualized as vector tiles using LuciadCPillar 2024.0.

Sample code/documentation to get you started

You can find more information in the article "[How to configure the MBTiles service type](#)."

OGC 3D Tiles 1.1 service

We support OGC 3D Tiles since version 2018 and started with support for version 1.0. In the meantime, the new version of OGC 3D Tiles has been adopted as OGC community standard. Previously referred to as "3D Tiles Next," version 1.1 of the OGC 3D Tiles Community Standard is designed for streaming high-resolution, semantically rich 3D geospatial data to the metaverse. OGC 3D Tiles 1.1 promotes several OGC 3D Tiles 1.0 extensions to "core" and introduces new glTF extensions for fine-grained metadata storage.

LuciadFusion can now serve datasets that are encoded as OGC 3D Tiles 1.1.

This is the first phase of full OGC 3D Tiles 1.1 support. In later releases, data encoding into OGC 3D Tiles 1.1 will be planned.

Improved ECW support

LuciadFusion users can now visualize ECW images with any number of bands and any bit depth. To support this, the previous libraries have been replaced by the native libraries provided as part of ERDAS ECW JP2 SDK[4] version 6.1.0.

As a result, you can now use image processing on ECW data. The LuciadFusion image processing framework allows you to access images built from raster data and enhance or highlight certain aspects of the raster data for display. You can make use of various image manipulation operations, including the typical image operations to work with multiband images, high dynamic range (HDR) images and low-quality images.

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[4] https://bynder.hexagon.com/m/3dab4b4268e27bd6/original/Hexagon_GSP_ECW_JP2_SDK_Product_Sheet.pdf

Note: This improvement resulted in a few upgrade considerations. Please check the release notes for more details.

Sample code/documentation to get you started

For information about handling raster data within LuciadFusion, refer to the documentation entry "Models: Handling raster data."
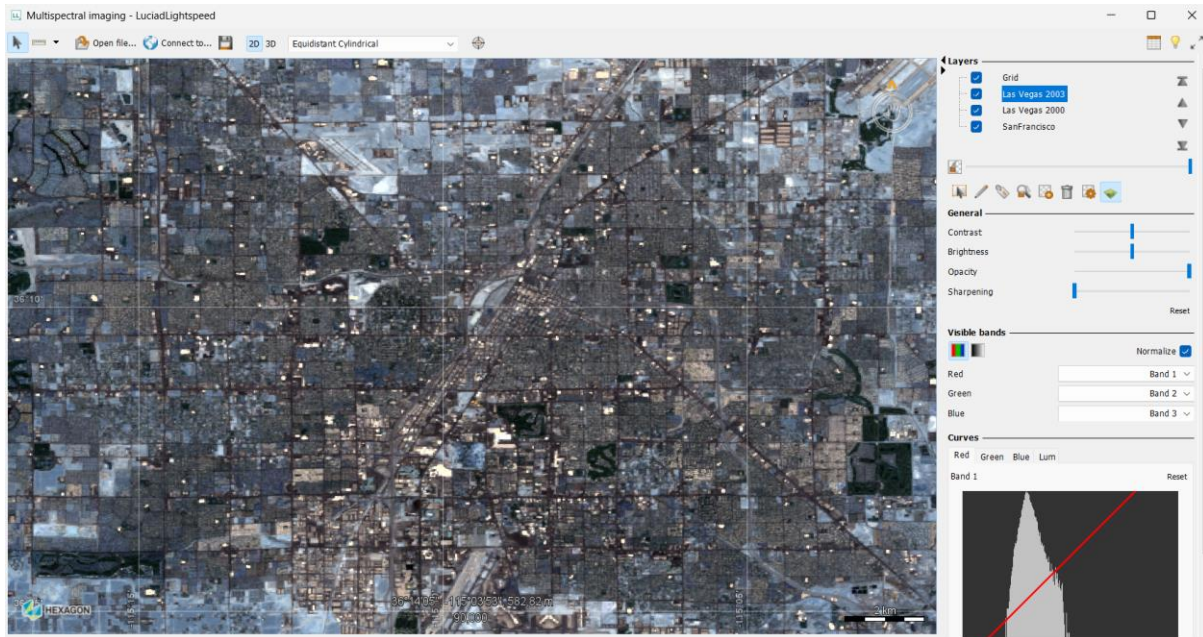

Figure 3: The "multispectral" sample illustrates how to work with multiband or HDR imagery.

Upgrade considerations

This section lists some noteworthy other upgrade considerations:

- **Oracle** versions 8, 9i, 10g, 11g, 12c and 18c are no longer supported as a database by the TLcdOracleSpatialModelDecoder, TLcdOracleSpatialModelEncoder and TLcdOracleGeoRasterModelDecoder. Also, Oracle versions 11g, 12c and 18c are no longer supported as a database for LuciadFusion Studio. These versions are no longer supported by Oracle; see the Oracle Lifetime Support Policy document. It's advisable to upgrade to a newer version of Oracle database if you are still using any of these versions.
- **PostgreSQL** versions 8.x, 9.x, 10 and 11 are no longer supported as a database by the TLcdPostGISModelDecoder and TLcdPostGISModelEncoder. Also, PostgreSQL versions 9.4, 9.5, 9.6, 10 and 11 are no longer supported as a database for LuciadFusion Studio. These versions are no longer supported by the PostgreSQL Global Development Group, see the PostgreSQL Versioning Policy page. It's advisable to upgrade to a newer version of PostgreSQL if you are still using any of these versions.
- **SQL Server** versions 2008 and 2012 are no longer supported by the TLcdMSSQLModelDecoder and TLcdMSSQLModelEncoder. Also, SQL Server version 2012 is no longer supported as a database for LuciadFusion Studio. It's

advisable to upgrade to a newer version of SQL Server if you are still using version 2008 or 2012.

Other improvements

- **WCS service support for version 2.0.1:** The LuciadFusion WCS service now supports version 2.0.1 of the OGC WCS protocol, next to the existing supported versions 1.0.0, 1.1.0 and 1.1.1.

- **WMS service support for a FILTER parameter:** The LuciadFusion WMS service now supports a vendor-specific FILTER parameter, allowing users to filter data in vector layers using OGC Filter. For more information, please consult the new article "How to filter vector data served via a WMS service."

- **The TLcdBinzModelDecoder is now more robust when encountering objects with an unknown type:** The unknown objects will be logged and skipped; the conversion will continue without them.

- **The LuciadFusion Studio REST API endpoint GET/api/data/filter now allows filtering data resources by data categories and keywords:** These properties are also listed by the GET/api/data/queryable-properties endpoint. More information on how you can use the GET/api/data/filter endpoint can be found in the article "Querying data resources based on queryable metadata properties."

- **A LuciadFusion Studio REST API developer can now define custom properties with a limited set of allowed values for the "Long" data type** in addition to the already supported String type. As a result of this: addLongProperty(String, Set) and addLongProperty(String, String, Set, boolean) methods have been added to the class TLfnCustomPropertyDefinitions.

- **Replace a color**: LuciadFusion now supports replacing one or more colors within an image. A common example is a satellite image that comes with black or white borders. You can use this new capability via the image processing API ("TLcdPixelReplaceOp" operator) or using OGC SE/SLD, via a Luciad-specific option. For more information, please consult the new article "How to replace a color."

- **Apply a color map on 2-band measurement data using OGC SE/SLD**: You can now use SLD styles with color maps to render dual-band raster data, such as wind or water velocity data decoded from OGC NetCDF files. Such data consists of a U and a V band that respectively represent a magnitude value parallel to the X and Y axis. The SLD rendering pipeline calculates the magnitude for a vector that combines the U and V bands, on which the color map is applied. See Figure 7.
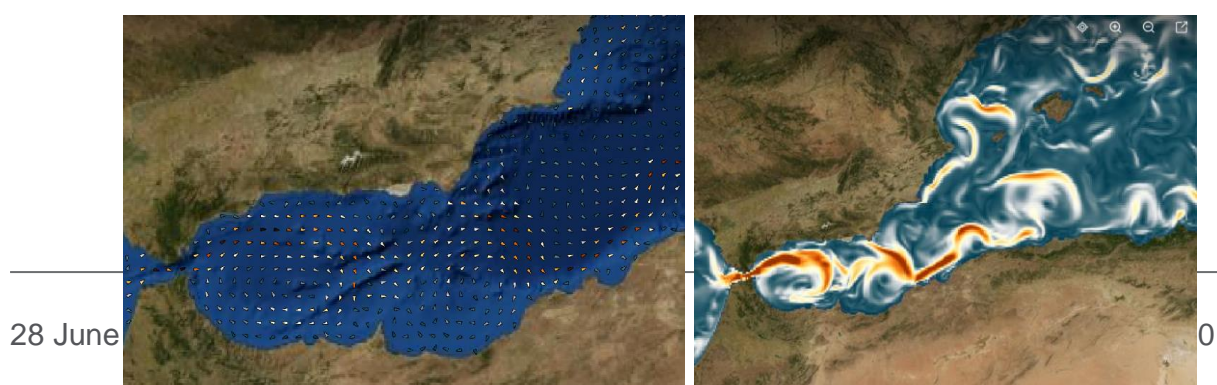

Figure 4: You can now apply a color map to dual band raster, like water current. The picture on the left

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