

Author: Ronald Moore

Title: 3DTiles via GDAL

Our presentation introduces a set of extensions to the Open Geospatial Consortium (OGC) 3D Tiles standard that enable direct interoperability with Geospatial Data Abstraction Library (GDAL) tools and workflows, while preserving the native advantages of 3D Tiles for Modelling and Simulation (M&S) applications. The work addresses a key barrier to broader adoption of 3D Tiles within the M&S community: the continued dependence on traditional terrain generation pipelines and legacy geospatial formats. Rather than exporting source data into multiple well-known formats, the proposed approach retains all content natively in 3D Tiles and exposes the data directly through GDAL-compatible access mechanisms, eliminating redundant conversions and reducing data duplication.

The presentation describes how 3D Tiles provides a hierarchical, metadata-rich structure capable of storing heterogeneous geospatial content, including polygon terrain meshes, imagery, land cover classifications, vectors, and 3D object models. The implementation uses S2 Geometry tiling to improve global spatial organization and runtime traversal efficiency. Extensions to the standard include orthographic imagery textures, land cover classification textures, GeoJSON vector payloads, and specialized M&S metadata encoded through glTF and 3D Tiles metadata schemas. To support scalable storage and distribution, the content is packaged within a customized ZIP-based archive format using the .3tz extension, which enables indexed access without full extraction.

The primary contribution of the presentation is the introduction of GDAL-oriented enhancements that allow standard geospatial tools such as QGIS to access 3D Tiles content directly from .3tz archives. Raster imagery, land cover classification, and elevation data are stored externally to glTF binary payloads as standard image or floating-point raster assets and are accompanied by optional virtual raster files that provide GDAL-readable metadata. This allows GDAL-based applications to open and process imagery, terrain elevation, and classification layers directly from the archive without requiring intermediate export or decompression steps. Similarly, curated vector data stored as GeoJSON payloads can be exposed through file definitions for direct vector access and conversion into user-preferred formats.

The approach preserves full compliance with the OGC 3D Tiles specification because conformant 3D Tiles clients simply ignore the GDAL-specific extensions. As a result, a single authoritative dataset can simultaneously support native 3D Tiles visualization systems and established GDAL-based geospatial workflows. The presentation concludes that this strategy significantly reduces redundant data management, improves interoperability, and provides a practical migration path for organizations seeking to adopt

3D Tiles while maintaining compatibility with existing GIS and M&S production environments.