Advancing 3D Geospatial Data Visualization

Shehzan Mohammed
Director of Product Management, Cesium

shehzan@cesium.com
@shehzanm
About me

Leading Product Management and outward-facing engineering and building partnerships

Connecting with developers, users, and customers along with standards organizations like the OGC

Software Engineer in 3D computer graphics and high-performance GPU computing for 6+ years

Lecturer at University of Pennsylvania
Teaching **GPU Programming**

Note: Not representing Penn at this event
Cesium is the open-core platform for building massive 3D maps.

**3D content pipelines**
The best available tiling tools to optimize a variety of data for streaming

**Visualization**
Open source web-based runtime engine

**Analysis**
GPU-accelerated 3D geospatial analysis

**Curated 3D content**
Ready-to-stream 3D assets

**Streamable formats**
Web-friendly open standards for 3D streaming
We’ve created the optimal web-based 3D workflow; from the 3D engine, to the streaming format, to the 3D content pipelines.

- Bring your own data
- High performance
- Data fusion
- Analytic precision
- Time dynamic
- Visualize anywhere
- Open & interoperable
Let's talk 3D
And why it is different from 2D + Height
Video games

2.5D

3D

Wolfenstein 3D and Wolfenstein: The Old Blood, both © id Software
Is this 3D?
Data versus Engine

• Data
  • XY values that map to a single height (Z)

• Engine
  • How the data is actually interpreted and visualized
  • How the world around the data is modeled
  • Camera controls (and limitations thereof)
  • Accuracy and precision
2.5D Data (Raster terrain)

Data courtesy USGS:
https://lta.cr.usgs.gov/GTOPO30
2.5D Data (Extruded footprints)

Data courtesy https://www.opendataphilly.org/dataset/buildings
3D Data (3D models)
3D Data (Photogrammetry)

Data courtesy Bentley Systems
3D Data (Point clouds, yes really)
3D Data (Buildings)
3D Data (Weather data)

http://cesiumjs.org/demos/HWRF.html
2.5D vs 3D Engines

• 2.5D and 3D engines are fundamentally different
• You can’t “upgrade” a 2.5D engine to 3D.
Camera controls

2.5D

3D

Data courtesy NYC DoITT
Camera controls

Data courtesy NYC DoITT
Caves and overhangs

Data courtesy Bentley Systems
Visibility and distance
Visibility and distance

http://apps.agi.com/SatelliteViewer/
Medium for telling compelling stories
BYO-Data

• Upload, optimize, and host your 3D (and 2D) geospatial data using one fast, effective pipeline.
• **Combine** your data with high-resolution terrain and imagery for global coverage and show where your data fits in the world.
Geospatial Data is Heterogenous

To tell compelling stories, we need the right data.

Data fusion brings various data types and sources into a single realistic experience.
Time as a first-class citizen

Cesium goes beyond static 3D maps, with best-in-class support for visualizing time-dynamic data with pinpoint accuracy.

2009 satellite collision between the Iridium and COSMOS 2251 satellites.
Introducing Cesium Stories

• Create and share visualizations and stories for your data
• Without writing any code!
• Add your own data, or use our 3D world terrain basemap
• Fuse multiple datasets together to share richer and more complex stories.
• Share it with a link or embed it into your website.

Launched Today!
Demo Time!

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