



Tracking Santa with open source geospatial software

Hannah Pinkos
Analytical Graphics, Inc.
hpinkos@agi.com



Background



- NORAD began tracking Santa in 1955
- In 1997, AGI took Santa tracking to the web



- + North American Aerospace Defense Command .
- + Monitor system of sensors, control the North American aerospace
- + 1955, Sears ad with a Santa phone number
- + Misprint, reached Colonel Harry Shoup, crew commander at NORAD's headquarters
- + 1997, AGI created Santa tracking website
- + Site crashed when 100 people tracked santa at same time.
- + Problem fixed subsequent years by working with internet providers such as IBM

Background



- Cesium team has developed 3D web map for visualizing Santa's location since 2012
- Volunteer effort



- + Today's site features interactive games and activities
- + 2012, Cesium team created 3D web map
- + With partners such as Microsoft, 20 million unique visitors from 220 countries
- + Volunteer effort
- + Partners volunteering to build website
- + Thousands of volunteers answer phone calls and emails

- Open source Cesium library used for 3D visualization
- Open datasets used to create STK World Terrain
- Open formats
 - glTF for models
 - CZML for updating Santa's location
 - Quantized-mesh terrain

Cesium globe visualization



- Open source JavaScript library for creating 3D globes and 2D maps
- Cross-platform, cross-browser, cross-device with no plugin

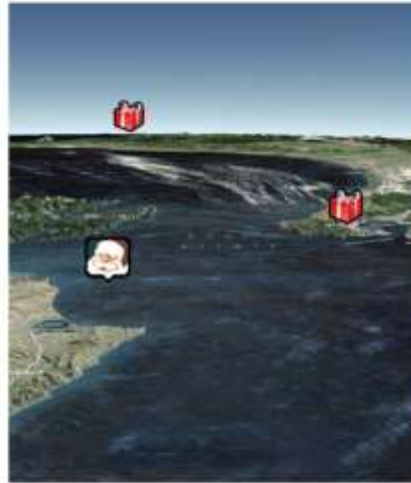


- + WebGL - cross platform including Chrome, Firefox, Internet Explorer and Safari
- + 3D visualization accessible to many people because it can run on many different kinds of devices
- + Increased smart phone usage

Positioning Santa with CZML



- Open format for describing time-dynamic data
- Update Santa's position when data received from NORAD's Santa tracking sensors
- Display billboards at Santa's past locations



+ CZML to update Santa's position

+ Display clickable billboards at locations Santa has already visited

glTF 3D Santa



- Open format for 3D models developed by Khronos
- Runtime format ideal for web
- Animated 3D Santa and Reindeer added in 2013



<http://cesiumjs.org/2013/12/23/Building-A-WebGL-Santa-with-Cesium-and-glTF/>

- + Add an animated 3D model in 2013
- + glTF files are compact and easy to parse. COLLADA is great for model editing applications but too heavy to render efficiently on the web
- + Artist create the model in MODO and export it as a COLLADA model
- + Optimized model by removing extra nodes
- + Open source COLLADA-2-glTF converter to convert the model to glTF

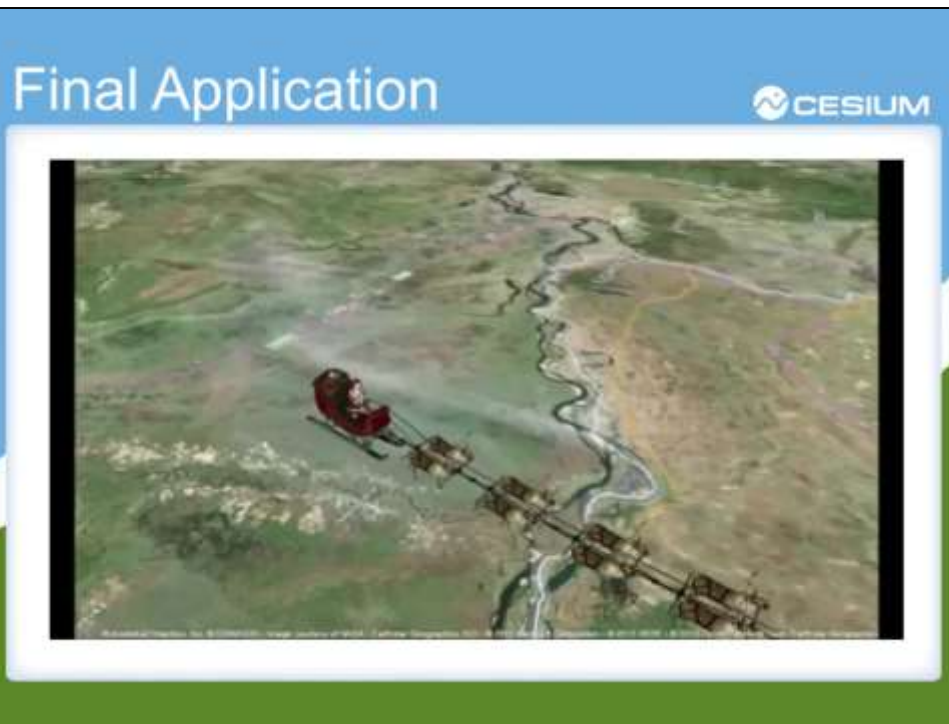
Quantized mesh terrain



- Terrain data compiled from open datasets like SRTM and GTOPO30
- Served as a tileset in open quantized mesh format



- + Quantized mesh was designed to be efficient for streaming on the web
- + Generally seen better performance than with traditional height maps
- + Terrain and imagery tiles are cached



+ Project featured in several different blogs, like Mozilla hacks, NVIDIA's and Internet Explorer

Thank you!



Questions?