Problem Statement:

Create a basic version of Google Earth that is interactive. It should contain the following features:

1. A texture of earth mapped on a sphere.

2. User can rotate, zoom-in and zoom-out.

3. If a user clicks on a location. It shows the longitude, latitude and altitude of that location.

4. If user enables exploration mode and then clicks on a location, your system shows the highest point, lowest point, average altitude in a specified area around the click position.

5. Add a “radar watch” that tells the user what is the best placement position for a radar in a given area. User can specify a rectangle and your program shows the best location for installing the radar.

6. Add a globe narration. User inputs a list of locations with a description for each location. Your program then goes from one location to another and zooms-in into each location and display the description before moving on to the next position on a user event. Imagine showing the locations where the world cups took place since 1900, with brief description, or creating an educational video to teach continents to children.

<u>INSTALLATION GUIDE:</u>

This assignment requires the use of NPM (JavaScript package manager) to run. This is because the code runs on a self-hosted HTTP server in order to properly serve static files without CORS and browser security errors. The required static dependencies have been downloaded and copied over to the application directory beforehand. However, the Node.js dependencies have to be re-downloaded since they are too large (> 80MB). This can be done using Yarn. After installing Yarn, please run the command “yarn” in the root code folder to re-install them. If you do not wish to use Yarn, you can use “npm install” instead. To run the application, please use the command “npm start”. This will automatically run the server and open the application.

If the console gives the error like: npm ERR! code Z_BUF_ERROR

try cleaning the cache using : npm cache clean –force

then use the following commands again:

```
npm install
npm start
```

SITES USED:

CesiumJS Sandcastle The Sandcastle environment contains demos which were helpful to us in implementing features

CesiumJS STK High resolution terrain The high-resolution terrain was required to calculate height of coordinates on Earth in meters

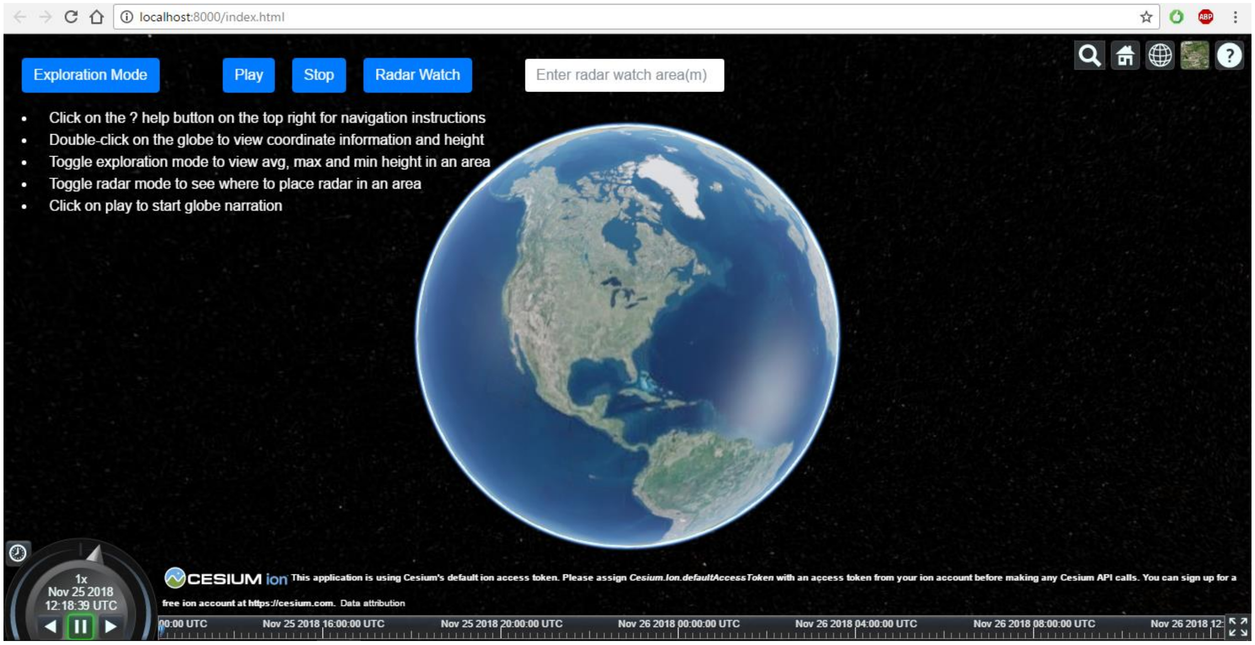
KML Reference The KML file required for the globe narration meant that we had to research how the file is structured and what elements are required

CHALLENGES FACED:

1. Getting the height of coordinates required us to search for a terrain which had the required information. We could not move forward in the assignment until we found one since height was necessary for the next task as well.
2. Calculating average, min, max height in an area. These calculations required interpolation to be used. Four coordinates needed to be calculated from original point which were calculated using Google Maps Library offset function. Then these four points were used to create a grid of coordinates using interpolation formulas from the Google Maps Library. For each grid point, the Cesium STK high resolution texture was queried in parallel and JavaScript mapping and reduction functions were used to calculate minimum, maximum and average altitude for that area.

SCREENSHOTS:

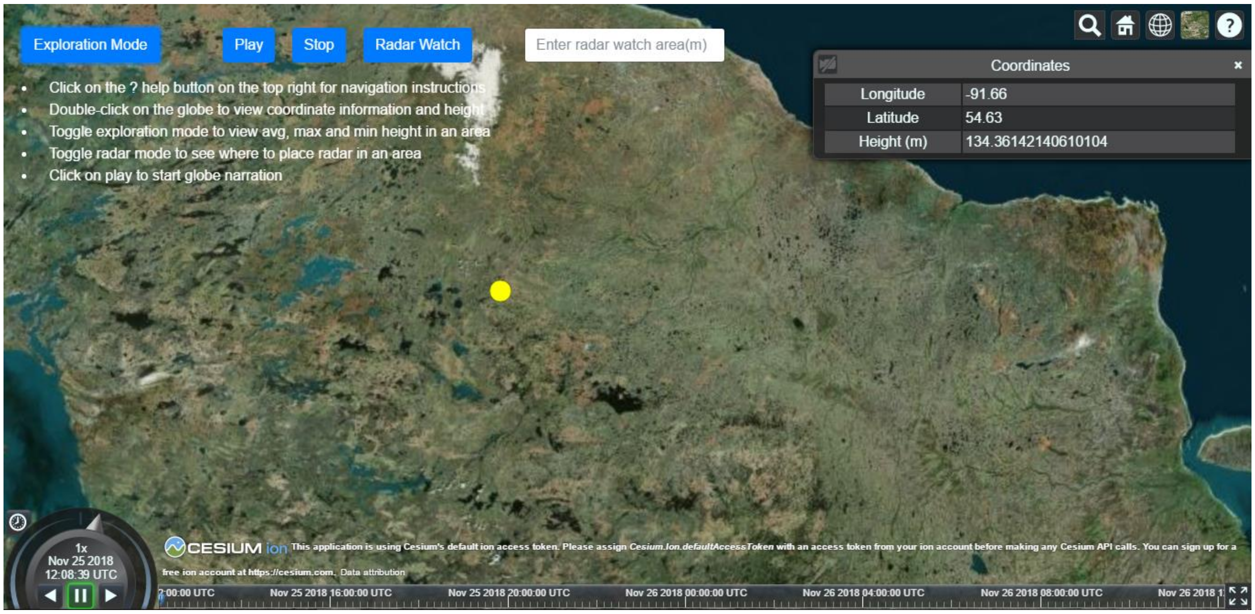
1. Zoomed-out view



- Click on the ? help button on the top right for navigation instructions
- Double-click on the globe to view coordinate information and height
- Toggle exploration mode to view avg, max and min height in an area
- Toggle radar mode to see where to place radar in an area
- Click on play to start globe narration

This application is using Cesium's default ion access token. Please assign *Cesium.Ion.defaultAccessToken* with an access token from your ion account before making any Cesium API calls. You can sign up for a free ion account at https://cesium.com. Data attribution

2. Longitude, latitude and altitude of a location



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Longitude	-91.66
Latitude	54.63
Height (m)	134.36142140610104

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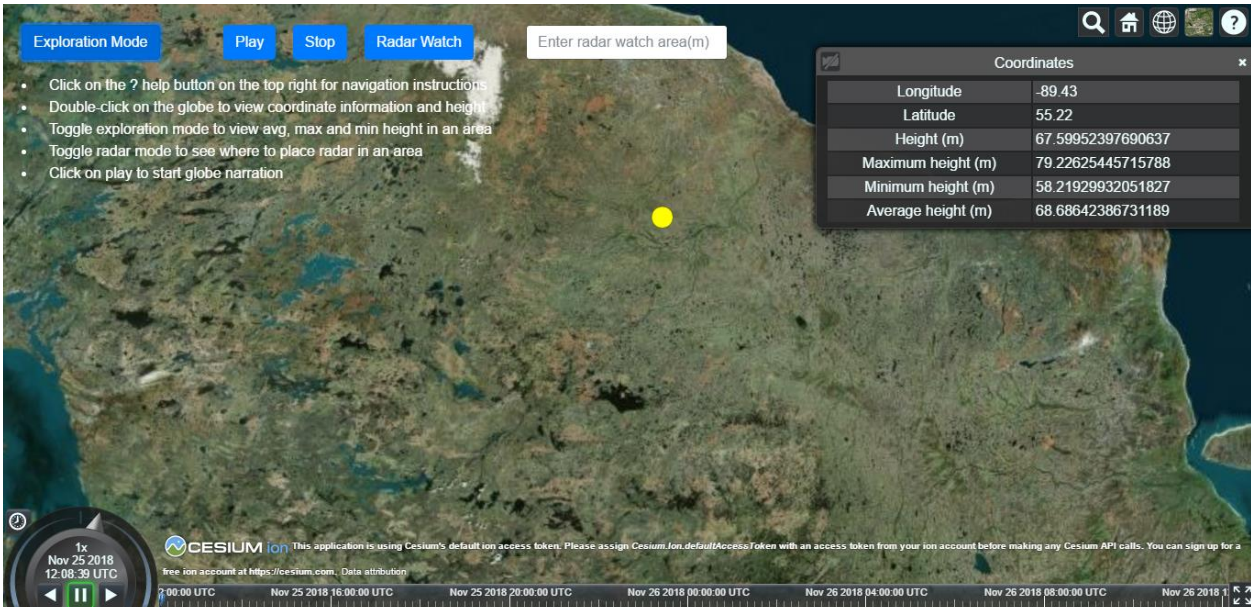
3. Exploration mode



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Coordinates

Longitude	-89.43
Latitude	55.22
Height (m)	67.59952397690637
Maximum height (m)	79.22625445715788
Minimum height (m)	58.21929932051827
Average height (m)	68.68642386731189

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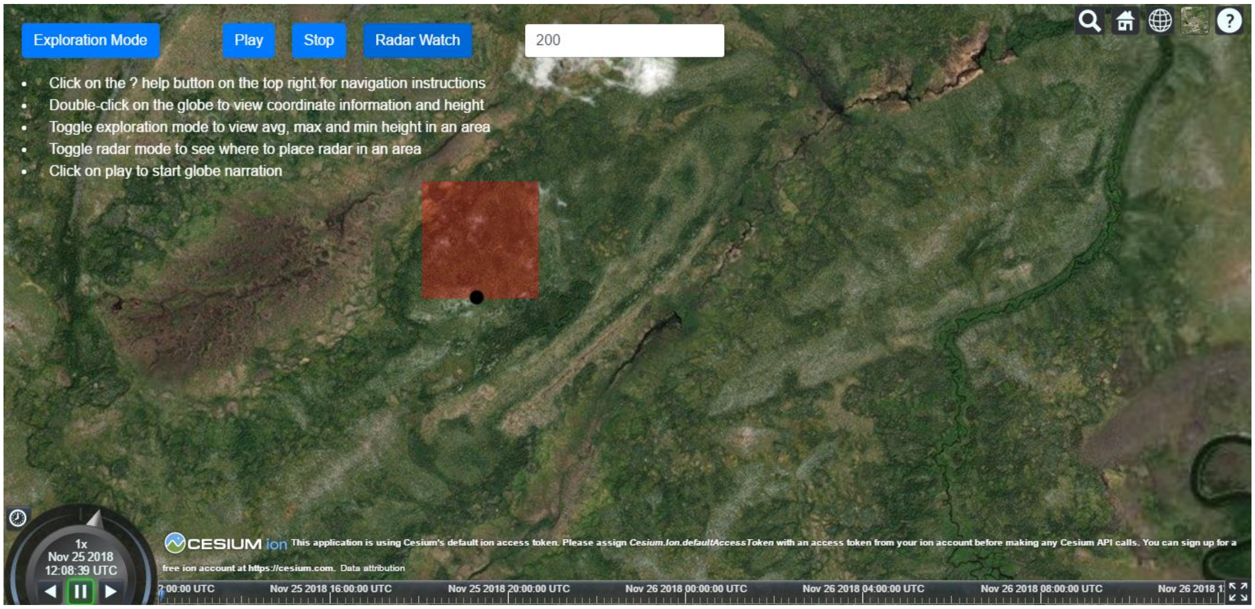
4. Radar watch



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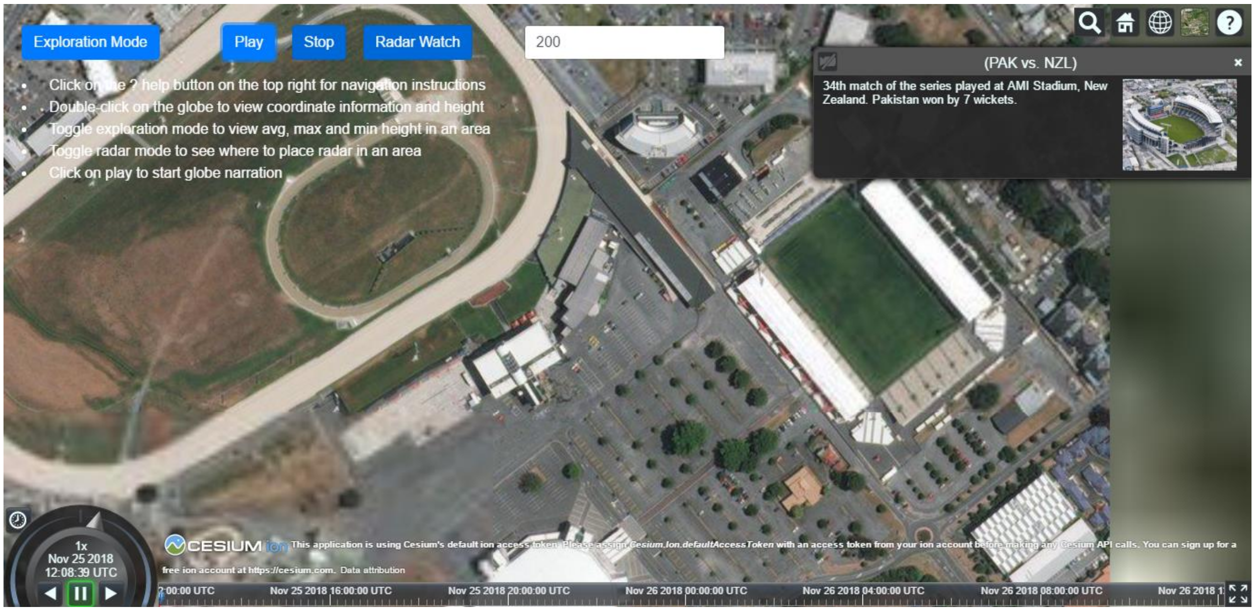
5. Globe narration



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(PAK vs. NZL)

34th match of the series played at AMI Stadium, New Zealand. Pakistan won by 7 wickets.

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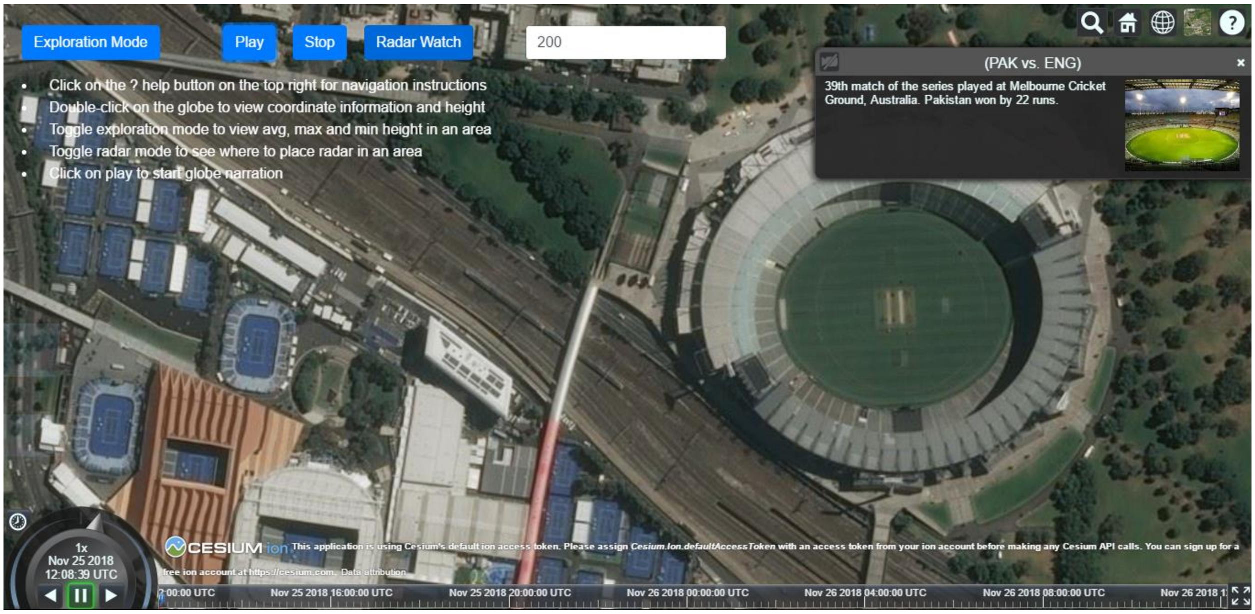

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(PAK vs. ENG)

39th match of the series played at Melbourne Cricket Ground, Australia. Pakistan won by 22 runs.

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