

## Heterogeneous-Resolution and Multi-Source Terrain Builder for CesiumJS WebGL Virtual Globe

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**Abstract :** The increasing availability of information about earth surface elevation (Digital Elevation Models DEM) generated from different sources (remote sensing, Aerial Images, Lidar) poses the question about how to integrate and make available to the most than possible audience this huge amount of data. In order to exploit the potential of 3D elevation representation the quality of data management plays a fundamental role. Due to the high acquisition costs and the huge amount of generated data, highresolution terrain surveys tend to be small or medium sized and available on limited portion of earth. Here comes the need to merge large-scale height maps that typically are made available for free at worldwide level, with very specific high resolute datasets. One the other hand, the third dimension increases the user experience and the data representation quality, unlocking new possibilities in data analysis for civil protection, real estate, urban planning, environment monitoring, etc. The open-source 3D virtual globes, which are trending topics in Geovisual Analytics, aim at improving the visualization of geographical data provided by standard web services or with proprietary formats. Typically, 3D Virtual globes like do not offer an open-source tool that allows the generation of a terrain elevation data structure starting from heterogeneous-resolution terrain datasets. This paper describes a technological solution aimed to set up a so-called &ldquo;Terrain Builder&rdquo;. This tool is able to merge heterogeneous-resolution datasets, and to provide a multi-resolution worldwide terrain services fully compatible with CesiumJS and therefore accessible via web using traditional browser without any additional plug-in.

**Keywords :** Terrain Builder, WebGL, Virtual Globe, CesiumJS, Tiled Map Service, TMS, Height-Map, Regular Grid, Geovisual Analytics, DTM

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