



The GPlates Portal: Cloud-based interactive 3D and 4D visualization of global geological and geophysical data and models in a browser

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The pace of scientific discovery is being transformed by the availability of ‘big data’ and open access, open source software tools. These innovations open up new avenues for how scientists communicate and share data and ideas with each other, and with the general public. Here, we describe our efforts to bring to life our studies of the Earth system, both at present day and through deep geological time. The GPlates Portal (portal.gplates.org) is a gateway to a series of virtual globes based on the Cesium Javascript library. The portal allows fast interactive visualization of global geophysical and geological data sets, draped over digital terrain models. The globes use WebGL for hardware-accelerated graphics and are cross-platform and cross-browser compatible with complete camera control. The globes include a visualization of a high-resolution global digital elevation model and the vertical gradient of the global gravity field, highlighting small-scale seafloor fabric such as abyssal hills, fracture zones and seamounts in unprecedented detail. The portal also features globes portraying seafloor geology and a global data set of marine magnetic anomaly identifications. The portal is specifically designed to visualize models of the Earth through geological time. These space-time globes include tectonic reconstructions of the Earth’s gravity and magnetic fields, and several models of long-wavelength surface dynamic topography through time, including the interactive plotting of vertical motion histories at selected locations. The portal has been visited over half a million times since its inception in October 2015, as tracked by google analytics, and the globes have been featured in numerous media articles around the world. This demonstrates the high demand for fast visualization of global spatial big data, both for the present-day as well as through geological time. The globes put the on-the-fly visualization of massive data sets at the fingertips of end-users to stimulate teaching and learning and novel avenues of inquiry. This technology offers many future opportunities for providing additional functionality, especially on-the-fly big data analytics.

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