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Proof**CONTROL ID:** 711835**TITLE:** Crusta: Visualizing High-resolution Global Data**PRESENTATION TYPE:** Poster Requested**SECTION/FOCUS GROUP:** Earth and Space Science Informatics (IN)**SESSION:** Geo-Visualization with Virtual Globes (This Session will be Webcast) (IN04)**AUTHORS (FIRST NAME, LAST NAME):** Tony S Bernardin¹, Oliver Kreylos¹, Christopher J Bowles², Eric Cowgill², Bernd Hamann¹, Louise H Kellogg²**INSTITUTIONS (ALL):** 1. Computer Science, University of California Davis, Davis, CA, USA.
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ABSTRACT BODY: Virtual globes have become indispensable tools for visualizing, understanding and presenting data from Earth and other planetary bodies. The scientific community has invested much effort into exploiting existing globes to their fullest potential by refining and adapting their capabilities to better satisfy specific needs. For example, Google Earth provides users with the ability to view hillshade images derived from airborne LiDAR data such as the 2007 Northern California GeoEarthScope data. However, because most available globes were not designed with the specific needs of geoscientists in mind, shortcomings are becoming increasingly evident in geoscience applications such as terrain visualization. In particular, earth scientists struggle to visualize digital elevation models with both high spatial resolution (0.5 - 1 square meters per sample) and large extent (>2000 square kilometers), such as those obtained with airborne LiDAR. To address the specific earth science need of real-time terrain visualization of LiDAR data, we are developing Crusta as part of a close collaboration involving earth and computer scientists. Crusta is a new virtual globe that differs from widely used globes by both providing accurate global data representation and the ability to easily visualize custom topographic and image data. As a result, Crusta enables real-time, interactive visualization of high resolution digital elevation data spanning thousands of square kilometers, such as the complete 2007 Northern California GeoEarthScope airborne LiDAR data set. To implement an accurate data

representation and avoid distortion of the display at the poles, where other projections have singularities, Crusta represents the globe as a thirty-sided polyhedron. Each side of this polyhedron can be subdivided to an arbitrarily fine grid on the surface of the globe, which allows Crusta to accommodate input data of arbitrary resolution ranging from global (e.g., Blue Marble) to local (e.g., a tripod LiDAR survey). Use of the GDAL library facilitates importing a number of data formats into the Crusta-specific, multi-scale hierarchies that enable interactive visualization on platforms ranging from laptops to immersive geowalls and caves. In addition to the underlying data representation, we also designed Crusta to be dynamic. The shading of the terrain surface is computed in real-time and on the fly when a user manipulates the viewpoint. Likewise, Crusta allows dynamic adjustment of the vertical exaggeration for the display of the globe's surface over an unlimited range of scales. The combination of these two effects greatly improves the perception of shape in high-resolution digital elevation data, critically enhancing the observation of minute details within the context of larger areas

INDEX TERMS: [1992] INFORMATICS / Virtual globes.

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Additional Details

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