

A Self-Contained Spherical Display System

Thomas Ligon^{*}
President
ARC Science Simulations

Christopher Fedde[†]
Senior Software Engineer
ARC Science Simulations

Jonathan Lang[‡]
Sales Manager
ARC Science Simulations

Abstract

The OmniGlobe is a large acrylic globe (up to 80 inches in diameter) with a self-contained high intensity projector built into its supporting base. Essentially a “spherical monitor,” the OmniGlobe may be used to display any type of data that fits well into a spherical format, such as whole-Earth satellite data sets. A true 360-degree display system, the only obscured spot on the sphere is a small area at the top that is generally out of sight of the viewer.

1 Introduction

The spherical format of the OmniGlobe is perfectly suited for viewing global imagery of Earth as well as other planets. A large “library” of images may be loaded, instantaneously flipping between scenes with a button click or dial turn. The displayed image is fully interactive, able to be rotated, tilted and zoomed in realtime. For the visualization of more complex datasets, pre-rendered movies can be created and streamed to the globe.

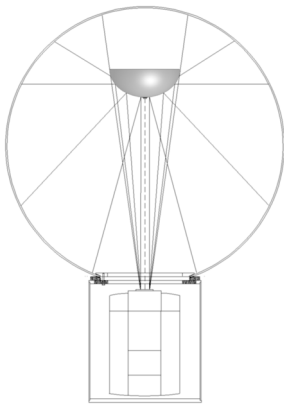


Figure 1. Schematic View

The first OmniGlobe installation was at the Indiana State Museum in Indianapolis, Indiana (See Figure 2). As part of the museum’s exhibit on the roadside geology of Indiana, an 80” OmniGlobe was included to show the last 600 million years of the Earth’s plate tectonics. This four-minute animation (created by ARC in collaboration with Dr. Ron Blakey, Geologist at the University of Northern Arizona) shows primal continents breaking up and reforming, vegetation patterns changing, and the building up and wearing away of major mountain chains.

2 Technology

The OmniGlobe is based upon an ARC patented convex reflecting element (Figure 1). Projector light, after being reflected off this disperser, is brought to focus on the spherical screen. The screen is constructed of an acrylic shell to which is bonded a “rear projection” type vinyl film. ARC optics and screen development took over three years. This effort, as well as content creation, has relied heavily upon in-house software. For over seven years ARC has provided technology and imagery for Earth-from-space visualizations for many diverse applications.

^{*}e-mail: tligon@arcscience.com

[†]e-mail: cofedde@arcscience.com

[‡]e-mail: jlang@arcscience.com

3 Applications and Usage

Up to this point, the OmniGlobe has primarily found application in museums and science centers. The display technology, however, is adaptable to a wide range of fields. The remote sensing, GIS, and weather forecasting fields are all natural users of the OmniGlobe for the display of geospatial data. School teachers have shown a strong interest in the OmniGlobe as a teaching tool for the classroom. An instructor could instantaneously call up and interact with:

- A world political map for any period of history extending all the way back to Ancient Egypt.
- An interactive animation showing the paths taken around the world by the great explorers.
- A geology map showing the major tectonic plate boundaries and the directions the plates are moving.
- A realtime display of the current Internet backbone activity among major network hubs all around the world.
- The continuously updated track of a large hurricane heading towards landfall.



Figure 2. OmniGlobe in a museum environment.

4 Conclusion

Two-dimensional projections of spherical data have always represented a bad compromise, stretching some areas and compressing others to try to “squash” the curved data down onto a flat surface. Too many people have grown up believing that Greenland is the same size as South America. The OmniGlobe, however, presents spherical information in its natural geometry, in a way instantly comprehensible to children and adults alike.

Contact Information

ARC Science Simulations
306 N. Washington Street
Loveland, Colorado USA 80537
(970) 667-1168
<http://www.arcscience.com>