Interactive Solarsystem for High-Resolution Planetary Data Exploration

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Abstract

We introduce *Virtual Planet*, an application which enables researchers to interactively explore huge planetary data sets in an intuitive way. The application allows users to navigate seamlessly between planets and provides different tools and interactive visualization to analyze the data.

1 Introduction

Space agencies have collected huge planetary data sets. Researchers want to be able to explore and analyze the data interactively and in realtime. This is a big challenge since the data is often too big to be processed in one step. Another challenge is the heterogeneity of the data. In order to gain new insights, it is important to consider the different data sets in context.

Our Software *Virtual Planet* solves many of these issues and provides researchers with interactive tools to analyze and visualize different kinds of data.

2 Virtual Planet

Our application allows planetary researchers to interactively explore huge planetary data sets interactively. This is a challenge since the data for a planet such as color images and elevation data is simply too big to be processed in real time. To be able to render the planets in realtime, we implemented an LOD-algorithm based on the healpix data structure [3].

Virtual planet is able to render the whole solar system. You can fly seamlessly from helgoland to the gale crater on mars, visit moons and spacecrafts or even zoom out of our solar system. To make this possible, we have developed a new dynamic scene graph which uses SPICE [2]. This allowed us to implement multi-scale navigation which allows us to fly easily through our solar system and land on any planetary surface. With SPICE we get the correct planetary constellation for a given day and time.

In order to analyze the formation and alteration of geological features, we offer planetary scientists various tools as can be seen in figure 3. You can determine the strike and dip of strata, you can measure the size and extend of mountains and canyons by drawing profile lines and you can place annotations anywhere you like.

The flexibility of the system allows it to be used for other applications, such as rover mission planning. For example, we can draw profile lines for a possible route on the terrain. Or we can visualize the slope by mapping it to a color gradient. This allows us to easily see inaccessible terrain.

The system is easily extensible to support new kinds of data. We use the Web Map Service (WMS) protocol for fetching surface data over the Internet. This allows us to use other data sources such as openstreetmaps. We also integrated MRO SHARAD [4] data, atmospheric and climate simulation data [1].

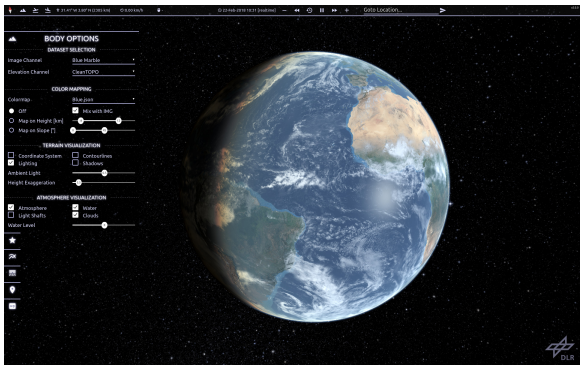

Figure 1: virtual planet in action.

3 Summary and Conclusions

We presented *Virtual Planet*, an application which allows researchers to interactively explore huge plane-

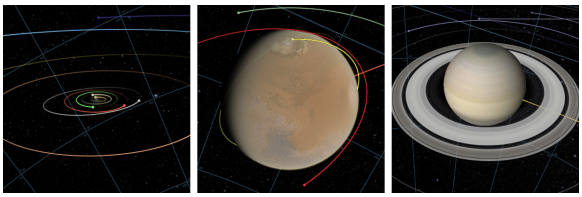

Figure 2: virtual solar system.

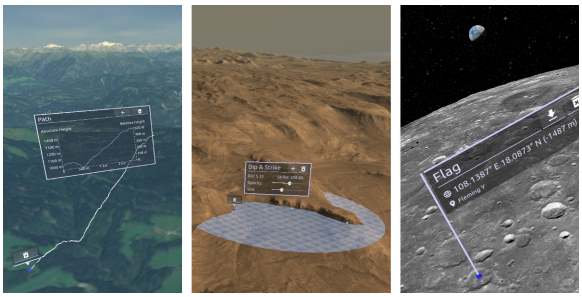

Figure 3: Tools.

tary data sets in an intuitive way. It is easily extendable to support new data sets and provides several tools and visualizations to analyze planetary data.

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