19 Virtual reality for scientific data visualisation

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Abstract

This paper presents a survey study intended to describe the perceived usefulness of virtual reality (VR) for scientific data visualisation tasks. Experienced scientific data analysts were queried as to their opinions on dynamic 3-D data visualisations versus 2-D displays. They evaluated an existing virtual environment visualisation by performing basic visualisation tasks. A follow-up interview was used to assess perceived usability of the VR system and to solicit recommendations for improvements. In general, the study revealed VR to be considered a viable and potentially beneficial tool for scientific data visualisation. Suggestions for existing system improvements focused on customisability of interfaces for novice and expert users, integrating multi-modal displays, and simplifying navigation control.

Introduction

Researchers have stated that scientific data visualisation is a task paradigm that may benefit from virtual reality (VR) applications (Mann and Mon-Williams, 1996). Scientific data visualisation involves the representation of the behaviour of natural environmental events such as meteorological and oceanographic (METOC) phenomena through graphics and 2-D and 3-D displays. METOC visualisation usually requires extraction of features from large, complex data sets, for example identifying the presence of eddies and whirlpools in ocean models. In addition, METOC data analysts often need to develop an understanding of how this information is related to broader task goals (McCormick et al., 1998). In military operations, analysts are sometimes responsible for using visualisation tools to provide strategic advice for enhancing warfighter performance and safety.