

# From Data Knowledge to Grand Challenge Environmental Science VISualizing Terrestrial–Aquatic Systems (VISTAS)

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## Introduction

The world's digital information is increasing at a prodigious rate, much of it due to long-term environmental monitoring programs. Increasingly, scientists will use this "data deluge" to make and test hypotheses about natural phenomena, but the amount of data is daunting.

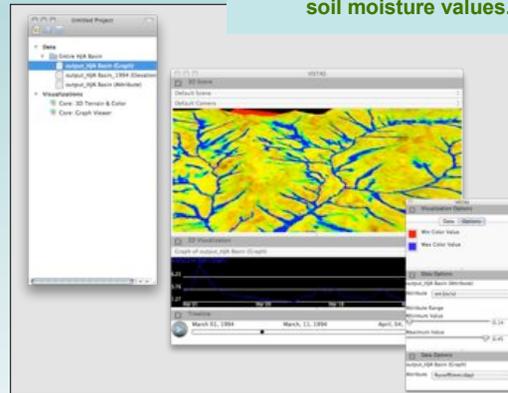
Grand challenge environmental science problems often involve multiple spatial and temporal scales, but analytical methods to transcend scale are not well understood. Visualizing natural phenomena might help scientists manage these reams of data and develop intuition at multiple scales, thus improving their ability to formulate insights and testable hypotheses, and to communicate complex results to collaborators and other stakeholders.

## Objectives

The VISTAS project aims to enable scientists to better understand and communicate grand challenge environmental science through visual analytics that span spatial and temporal scales. It has three main objectives, and starts Summer 2011:

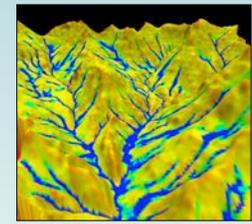
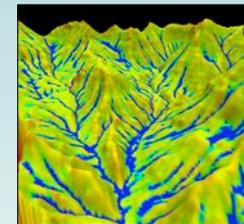
- Conduct Ecology Informatics research to enable the required visual analytics and implement a proof-of-concept software tool: VISualization of Terrestrial–Aquatic Systems.
- Co-develop VISTAS with environmental scientists at the HJ Andrews LTER for use in studies spanning scales from plot to basin.
- Apply social science methods to study the co-development and usability of VISTAS and its visual analytics.

Screen shot of VISTAS displaying soil moisture values.



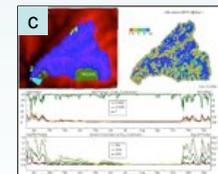
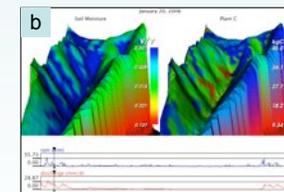
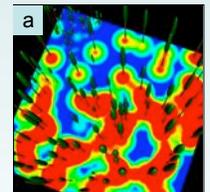
## Preliminary Visualizations

The current VISTAS prototype can be used to create 3–D images and animations of environmental data that display changes over time and spatial scales.

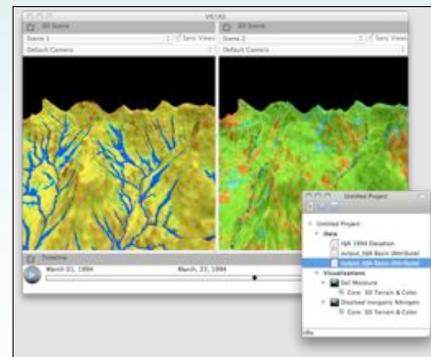


Above: Soil moisture for March 2, 1994 (left), and March 10, 1994 (right). High values are blue, low values are red.

Below and right: Visualizations from (a) forest stand, to (b) catchment, to (c) basin. (b) & (c) can be animated to show change over time.



VISTAS displaying soil moisture and dissolved inorganic nitrogen values side-by-side.



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