Practical 3-D Visualization for Understanding Maps

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Visualizations are extremely important tools for most aspects of earth sciences, particularly for investigating the solid earth. Although I have been involved in a variety of types of visualizations, I have always been somewhat concerned about what students learn from them. In particular, computer graphics are great tools, but sometimes are not as effective at communicating results as they could (should?) be. Our experience with advanced technology to demonstrate visualizations, students tend to fall into one of three groups: 1) Students who do not need the technology to grasp the basic concepts; 2) Students who are much more interested in the technology, and therefore often miss the point of the visualization; and 3) Students who do not understand the basic concept, but who often do not choose to use the technology. Although this may seem to portray a negative image of visualization, it merely intends to point out that technology is not going to solve all the problems. Students have other interests besides academics and the major problem is often just getting their attention (the why-you-should-care factor).

I have started to take an Achem's razor approach to visualization. I worry first about resolving the conceptual difficulties that students are having with spatial data. The poster shows a very simple type of technology – called an anaglyph - that appears to work because it is so simple. It renders a standard USGS topographic map in three dimensions. The use of this technology combined with more tactile experiences – making one's own topographic map and clay models – seems to work quite well, and also addresses the different types of learning styles. I am increasingly convinced of the effectiveness of multiple methods of teaching the same material, although it often seems redundant.

The poster also presents some preliminary results from an ongoing classroom assessment designed to address students' visualization difficulties. The assessment consists of frequent, anonymous, ungraded one minute quizzes, each designed to gauge the students' understanding of the most relevent material. The goal is that these quizzes will improve.