Professional Development to Improve the Spatial Thinking of Earth Science Teachers and Students

Agenda – December 3, 2011 – Perspective Taking and Use of 3-D Physical Models

Definition of Perspective Taking: envisioning what an object or system would look like if viewed from different perspectives

1. How did you use spatial thinking in your class this month?
   * Teachers’ reflections (and possibly a special sweet demonstration)

2. Building on last month’s “Representational Correspondence”
   Combining information from two spatial representations which are from different perspectives

3. We do perspective taking when we:
   > draw objects in top view and side view.
   > combine map and profile views of the same segment of the Earth

   Why is perspective taking useful or necessary?
   > because our eyes can only see a 3-D object or system from one position at a time and
   > our brain combines information from multiple perspectives to build up a 3-D understanding of the shape of the object or the motions of the system.
   > because Earth Scientists use 2-D representations to communicate about Earth structures and systems, and count on the viewer to be able to use perspective taking to fill out the 3-Dimensionality of the structure or system.

4. Is perspective taking hard for people?
   > try the Mary Hergerty test of perspective taking/spatial orientation
   > comparing your results with those from RES students

   Note: If you score higher than typical Earth Science students, you might need to be careful about assumptions on how students handle perspective taking

5. Examples from RES Exams

6. Two possible strategies for perspective taking (spatial thinking) in Earth Science classes?

   * Strategy #1: Set up lessons so as to reduce the need for perspective taking, while still achieving essential understandings of Earth processes.

   * Strategy #2: Set up activities to practice and strengthen perspective taking, and develop language to discuss perspective taking

   We recommend a combination of #1 and #2.
7. Using physical models
   Physical models are powerful for topics that involve perspective taking because they are genuinely 3-D and students can view them from different perspectives.

Example: moon phases

Teacher feedback about the two strategies

8. Establishing physical models as a tool for more than just demonstration:
   > physical models to interpret data
   > physical models to create and answer questions