July 9, 2002
Ways of knowing session, Wingspread Conference Center
A. Observation is theory and experience laden
> Form and function
> Lack of scale
> No color
> Initial focus was on form rather than material.
> Geologists would also classify rocks, would have said granite earlier than wood—
> make the material more important if mineral…..
> Bowl not connected to prior knowledge than rock.
> Some folks tried to draw in the material —
> Drew more like students

Geological observation is often guided implicitly by the instructor.
Geologists look for changes over time;
> Substitute place for space
> Infer changes over time such as uplift
> Describe a narrative of dynamic change from a static observation.

B. Research programs in Geo-sciences are needed to explore role of spatial reasoning in interpreting geological processes. Current emergent research suggests important questions for future study. Existing psychology measures of spatial reasoning are incomplete—they tap only part of the knowledge and remain inadequate for interpreting knowledge required for Geo-sciences
Interpret in light of work in psychology & cognition [Tversky, Hegerty, Liben, Uttal].
Connect to work in cognitive neuroscience
C. Assessment opportunities
1, Performance based assessment—assess in the context of use.
2. Complex sustained projects capture the complexity of Geo-sciences knowledge but are difficult to assess.
Coherence of the student report or presentation.
Argument construction as an outcome.
Debate as an outcome.
3. Typical spatial reasoning assessments such as paper folding and block design align poorly with goals of teaching students to use Geo-sciences ways of knowing.
We need to create ways to assess Geo-science ways of knowing in the context of exploration.
The description task for this session illustrates this phenomena—it resulted in many descriptions that resembled those characteristic of students rather than experts. Lack of color, use of form and function [bowl, banana], start with outer shape. Methods from Geo-sciences used to infer incomplete information such as symmetry, canonical views, dashed lines to show symmetry, dashed lines for inferences, three axes, cross sections, etc. Drawings based on architecture or engineering, elevations, axes, engineering canonical views.