Figure 1. Questions to Guide Students' Thinking

Getting Started – Observations of Photos of Permafrost

What components do you see and how do they connect to Earth systems?

Is this system stable or changing? How?

Do we have ice like this in our soil?

As this ice melts what problems might it cause?

How might ice melting in the Arctic influence your community?

Interpreting the Results of the Model

Did the two sides of the model experience the same thermal history? No.

Describe the pattern for the control (no added heat) side of the model.

Describe the pattern for the heated side of the model.

Does the model suggest that changes will be observed in permafrost as the surface is warmed?

Explain your answer.

Describe the physical changes were observed in the model?

How did this change with temperature over time?

How do you explain the cooling of the soil on the heated side of the model as the experimented progressed?

Would you expect this in a natural system?

How is the experiment good at modeling the real world?

How is it different or a poor model for the real permafrost system?

What's happening in the Arctic?

Describe the pattern for temperature change over time for permafrost in Alaska.

Calculate rates of change.

Do the data suggest that heat is being added from the top, bottom, both?

Was the permafrost melting from 1985 to 2003? If yes, how fast? If no, when will it start?

Estimate when the base of the permafrost at this location will melt. Identify and evaluate your assumption(s).

Based on your calculations will much of the carbon stored in permafrost be released into the atmosphere during your lifetime?

Was this a good model?

How do you explain the cooling of the soil on the heated side of the model as the experiment progressed? Would you expect this in a natural system?

How was the experiment good at modeling the real world? How was it different or a poor model for the real permafrost system?