

Student Experience LESSON: Labeling Facies

When

Prior to, during, and after the expedition

Disciplines

Earth Systems Science

Description

As a vehicle for learning the facies model and the components of the system, students will match physical and chemical characteristics to cartoon drawings of the facies model.

Learner outcomes

The student will:

- Be able to identify the five facies in the hot springs facies model
- Understand that each of the different facies is characterized by different water chemistry (as demonstrated by pH) and different physical characteristics (as manifested in the morphology (shape) of the travertine and the range in water temperature).
- Understand that the basic trends for the facies model are: flow rate and temperature decrease and pH increases as the water moves away from the vent.

Materials

- Facies Background document (for the teacher) including cartoon of facies model and accompanying table with pH and temperature information
- Figures 1-6 (photographs) of Facies (printed out or displayed on a Smartboard® or ELMO®)
- Facies Model Student Sheets. The same student sheets can be used for this lesson or the video lesson.)

Background

This can be used either as it is written, as an introduction of the facies model in a lecture or whole-group discussion with notes session, or it could be used as a review session after students have seen the facies model video. If it is being used as a review session, be sure to have students volunteer their ideas and brainstorm their thoughts on the model as you work through it. This will give you an idea of their grasp of the model, and a chance to help students make the connection between the two-dimensional cartoon and the three dimensional photos of the facies.

If you have not yet discussed carbon dioxide (CO₂) degassing, when you go to label the pH of each of the facies would be a good time to do it. See the background information on the Facies Model of Hot Springs Systems for more information.

The easiest example to use to explain how CO₂ affects water is to have a discussion about Coke or sparkling water. The “burn” one feels in their mouth is both the CO₂ and the acid caused by the presence of the CO₂. Additionally, Students will be able to identify from past experience that Coke is fizzier when it is cold. You can use this example to lead students to understand that warmer temperatures decreases the ability of the CO₂ to stay in solution, thus the reason for the rapid degassing at the vent, where the water is quite warm.



Suggested procedure

The teacher will:

- 1.** Sketch the profile of the hot springs model on the chalkboard/whiteboard. Indicate the primary flow path of the spring water from the vent. Discuss with the students possible differences in flow rate in the various areas of the hot springs. (Refer to Facies Model Background Information for discussion points on flow, temperature, pH, and facies names.)
- 2.** Label each section's temperature range, simultaneously discussing reasons for temperature ranges and changes with the students.
- 3.** Label each section's pH range. While labeling, discuss reasons for pH change with the students.
- 4.** Divide the sketch into the five facies of a hot springs: vent, apron channel, pond, proximal slope, and distal slope. Have the students make general statements about each of the facies, including flow rate, temperature, and pH. It is important to discuss with the students the variations possible in each of the facies, including the likelihood that a hot springs will not contain all five facies. See the discussion in the Background document on this topic for more information.
- 5.** Using pictures of real hot springs (refer to figures* at the end of the Facies Video lesson and current photo point images especially 5, 7, 10) have the students identify each facies and predict the temperature and pH of each facies.

*Recall that the student sheets for this lesson are contained in Lesson 6 - Background Lesson Facies Video.

Extensions:

- 1.** Have students create their own model of a hot springs using modeling clay or other materials.
- 2.** Have students draw/paint a version of a hot springs containing all five facies. Students can embellish the drawing with appropriate flora and fauna.