Teaching map interpretation & cross section construction

What I do now:
- Use Google Earth to help students visualize topography & structural features.
- Have students make geologic maps and cross sections using Google Earth before defining online, digital, vector, and paper maps.
- Use Google Earth to visualize dip, strike, and trends.
- Work with folds, sets, and harmonic and vertical contacts lists.
- Have students determine "hinge".
- Give students tips of people in areas of increasing complexity, including folded and faulted rocks.
- Transitions to interpretation of printed maps coupled with use of maps in the field.

Cross sections and elevation profiles

Areas such as this one are great for having students draw geologic cross sections across units with constant dip but very different elevation profiles. They learn to ask if the geology in the cross section is exactly the same, even though the ground surface is quite different - and 2) that the layers are actually continuous in the subsurface and are only thinly mantled by surficial deposits (left and left).

Exploring outcrop patterns and topography

There are many excellent places in Google Earth to show students how to interpret outcrop patterns in cross section and interpret patterns in the field.

Once students have a good visual grasp of dipping units and contacts, they explore the north flank of a spectacular seabed anticline near Decc snor, Iran. Students use the "fly-through" view and then about these as it is opposite the typical color for teaching the box concepts. This week to work with, because dip is actually a very simple concept, the students focus on dips.

Visualizing vertical contacts and their outcrop traces

The anticline is essentially a tilted layer and the cross section is very different from having them describe units that dip to the SE. Students can use "hinge" when something between any two lines below left. For this example, the calculated dip is about 14°, which matches easily the dip-reversed stratigraphy that they see using a protractor in "fly-through" view. At this point, the students use a digitizer to create a map of the outcrop patterns of vertical and horizontal contacts. It is also an opportunity to introduce planar vs. non-planar contacts.

Visualizing strike and dip of dipping contacts

There are some fabulous areas for students to have their first experience with folds, but I start with the Alkali Anticline in Wyoming because they worked with that in another class.

Visualizing folded contacts

There are three excellent "fly-through" views of the Anticline, but the Alkali Anticline is actually lower topographically in the core due to erosion, which helps address misconceptions that students have that anticlines are always topographically higher in the center.

Fold terminology and symbology

The area at the Comb-Ridge monocline and the La Sal are两地 become an easy way to give students the opportunity to explore the change in outcrop pattern as contacts transects from ESE to WSW dipping in the northeasterly to horizontal in the canyons region.

Extensions and applications

One of the great reasons for using the Alkali anticline is to draw connections with mining and petroleum.

Embarrassing errors in Google Earth are instrumental in helping students make sense of more complex fold geometries, and students have little difficulty mapping folds and creating schematic cross sections of areas such as the one in the Anti-Atlas Mountains of Morocco shown here.

The tilt, pan, and rotate features in Google Earth are instrumental in helping students make sense of more complex fold geometries, and students have little difficulty mapping folds and creating schematic cross sections of areas such as the one in the Anti-Atlas Mountains of Morocco shown here.