Principia College Sedimentary Geology GEOL 330

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Lab – Drawing Structural and Isopachous Maps – **KEY**

**Purpose:**

1. To become familiar with drawing contour maps, both structural and isopachous (thickness)
2. To learn to interpret structural contour maps
3. To learn to interpret changes in thickness relative to the structure of an area

**Methods and Questions:**

1. Three maps with drill holes and associated stratigraphic data are provided.
   1. *Note: I usually have the students plot some points and stratigraphic data on a map first so that they know how to go from tabular data to map data; they quickly realize how a computer can do this for them more quickly and accurately, provided the data are good. We talk about looking for bad data, anomalies.*
   2. *I do not use all 3 of these maps; I might start them with the Lawrence County map that only has structural data, no isopachous data; this gives them practice in contouring*
   3. *Two Excel files with the data in tabular form are provided for creating your own maps if you wish.*
2. On the Lawrence County map, the elevation of the top of the Herrin #6 Coal (middle Pennsylvanian Carbondale Formation) is given for each drill hole.
   1. Contour all of the data points. Use the simplest interpretations. Keep your lines as smooth and uniform (from one contour line to the next) as possible while still honoring the data.
   2. Interpret your map. Is there a pattern? *(wraparound indicates plunging folds)*
   3. Label any structural features you recognize. *(anticline, syncline)*
3. On the Fayette County map, for each drill hole there are 3 pieces of data recorded: elevation on the top of the Herrin Coal, thickness of the Herrin Coal, and thickness of the interval between the top of Herrin Coal and the top of the somewhat older Springfield #5 Coal.
   1. First color-code your data for easier recognition. For example, highlight in yellow the thickness of the Herrin Coal and underline the thickness of the interval between the coals for each data point.
   2. Draw a structure map on top of the Herrin Coal (contour the elevation of the top of the Herrin Coal), using the guidelines given above in 2a.
   3. Interpret your map. Is there a pattern? *(wraparound indicates plunging folds)*
   4. Label any structural features you recognize. *(anticline, syncline)*
   5. Now look at the trend in thickness of the Herrin Coal relative to the structural features.
   6. Do the same for the thickness of the interval between the coals.
   7. What trends do you see? *(they should see that in general the coal and the interval is thinner over the anticlines)*
   8. What do these trends suggest? *(the change in thickness suggests that tectonic activity was occurring while the coals and units in between were being deposited – middle Pennsylvanian Desmoinesian time when the Appalachian Mountains were beginning to form for the 3rd time [the Alleghanian Orogeny]; the structurally high areas were receiving less deposition and certainly the coal swamps would be drier resulting in thinner coal)*
4. *The Marion County map is similar to the Fayette County map, but the thickness trends are not clear. If you want the students to have more practice in contouring a structure map, this provides that opportunity.*