In-Class

- Overview of Lesson Plan Final Report
- Overview of Silica Sand Debate
- In Class Exercise on 3D Topography of Minnesota
- Powerpoint lecture on Quaternary Geology of Minnesota
- Homework Exercise on Surficial Geology of Washington and Pope Counties, MN

In-Class/Homework Exercise (12 pts)

Part A: Surficial (and Bedrock) Geology of Washington County, Minnesota

Refer to the Surficial Geology plate of the Washington County Atlas (MGS County Atlas Series C-5, 1990) to answer the following questions.

1) General Glacial History (1.5 pts)
   A) The Superior and Grantsburg lobe deposits are part of what phase (or stage) of Pleistocene glaciation? ________________________________
   B) Which lobe deposit is older? ____________________
   C) What evidence for the age relationships of the lobes is portrayed in the A-A’ and C-C’ cross section?
      __________________________________________________________________________

2) Pre-Wisconsinan Deposits (0.5 pt)
   What is one characteristic that distinguishes Superior till from Keewatin till?
   __________________________________________________________________________

3) Superior Lobe Deposits (3 pts)
   A) What map unit forms the main till deposit of the Superior Lobe? ___________
   B) What is the name of the moraine formed by this till unit? ________________
   C) What map unit forms the main outwash deposit of the Superior Lobe? ___________
   D) Given the relative distribution of these two units, which direction was the meltwater draining away from the Superior Ice Lobe? __________
   E) Unit sl represent deposits formed in what type of depositional environment? __________
   F) Superior Lobe esker landforms are typically associated with what map unit(s)?________

4) Grantsburg Sublobe Deposits (1 pt)
   A) From what larger ice lobe did the Grantsburg sublobe emanate? ________________
   B) Oneka Lake is the last vestige of a larger pro-glacial lake formed as the Grantsburg sublobe retreated. What map unit forms the lake bed of that larger lake? ________________
5) Terrace Deposits (terraces represent floodplain levels of higher stands of a river) (0.5 pt)

   How many terrace levels are associated with the St. Croix River? ____________________

6) Postglacial deposits (0.5 pt)

   Glacial lakes will eventually disappear due to drainage or by infilling with fine sediment
   (lacustrine deposits) and/or vegetation. What map unit represent the infilling of lakes by
   vegetation? __________

Part B: Surficial Geology of Pope County, Minnesota

Refer to the Pope County Atlas (C-15, Part A, Plate 3) to answer the following questions.

1) What are the three main geologic Pleistocene map unit groups in Pope County from oldest to
   youngest? ______________________-_______________________-_____________________(1 pt)

2) The thick blue lines on the map represent the outer margin of the ice lobe at a particular
   stand-still stage (see Fig. 3). Goose River Group sediments tend to be confined inside (SW)
   of what number ice margin? ___________________________________ (0.5 pt)

3) What ice margin position developed an earthen dam (moraine) of till that created Glacial
   Lake Benson as the ice retreated? _________________ (0.5 pt)

4) Note that in the correlation of map units diagram, the units are grouped by the environment
   in which the sediments were deposited – glacial sediments (till), river sediments (outwash),
   and lake sediments. For each of these groups, describe their most common attributes in
   terms of sediment size, sorting, and occurrence of bedding. Understand that the term “loam”
   indicates a mix of sand, silt and clay; if it is very rich in the clay component, it is termed
   clay loam; if it also contains gravel, pebble, and cobble sized particles, the modifiers
   “gravelly”, “pebbly”, and “cobbly” are often used. (3 pts)

Glacial sediments
   Sediment sizes: ______________________
   Sorting: ______________________
   Bedding: ______________________

River sediments
   Sediment sizes: ______________________
   Sorting: ______________________
   Bedding: ______________________

Lake sediments
   Sediment sizes: ______________________
   Sorting: ______________________
   Bedding: ______________________