Lab 8B) Surficial (and Bedrock) Geology of Washington County, Minnesota

Refer to the Surficial Geology and Bedrock Geology plates of the Washington County Atlas (MGS County Atlas Series C-5, 1990) to answer the following questions. Each question is worth 0.5 pts.

1. General Glacial History
   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
   A) What might be one of the attributes distinguishing Superior till from Keewatin till?
   B) What unit’s age is inconsistently portrayed on this map when comparing the Description of Map Units, Cross Section C-C’ and the Correlation of Map units?

3. Superior Lobe Deposits
   A) What 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 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
   A) From what larger ice lobe did the Grantsburg sublobe emanate?
   B) As one progresses to the SE across the Grantsburg sublobe deposits, what is the general progression of surficial materials?
   C) Oneka Lake is the last vestige of a larger pro-glacial lake. What unit forms the lake bed of that larger lake?
5. Terrace Deposits
   A) What is the relationship between the different terraces and their proximity to the current floodplain?
   B) What is the significance of the blue stippled areas of the terraces?
   C) Note that the St. Croix River is noted as Lake St. Croix upstream from Point Douglas (where it merges with the Mississippi River) to about Stillwater. Can you think of why the lower St. Croix is backed up as a lake?

6. Postglacial deposits
   A) Organic deposits (o) commonly flank what type of units in both the Grantsburg and Superior lobe deposits?
   B) In glacial times, what type of botanical entity do the organic deposits represent?
   C) Note that some elongate organic deposits are hosted within terrace deposits. In what specific type of lacustrine environment might these organic deposits have formed?

7. Bedrock geology
   A) The long ribbon of unit Cj in the southern part of the county represents what type of topographic feature?
   B) Is there anything in the overlying glacial geology that hints at the presence of this feature?
   C) Some lakes in the area are remnants of proglacial lakes (e.g. Oneka Lake), formed by damming behind a moraine, and many others are kettle lakes, formed by the melting of large ice blocks embedded in till or outwash. There is a third type of lake represented by Lake Elmo in the south and a string of lakes in the northeastern part of the county (Big Cameron Lake, Square Lake, Mays Lake, Terrapin Lake, Long Lake, and Big Marine Lake). Looking at the locations of these lakes relative to the underlying bedrock, how might these types of lakes have formed?

8. Note that the map units are defined by the origin of the sediment and (the interpretation of each unit is shown in italics at the end of each map unit description). This is very different from the Washington County map. Which way of classifying map units, genetic or non-genetic, do you think is preferable and why?