

Geology 334: HOMEWORK 4

Interpreting Depositional Environments

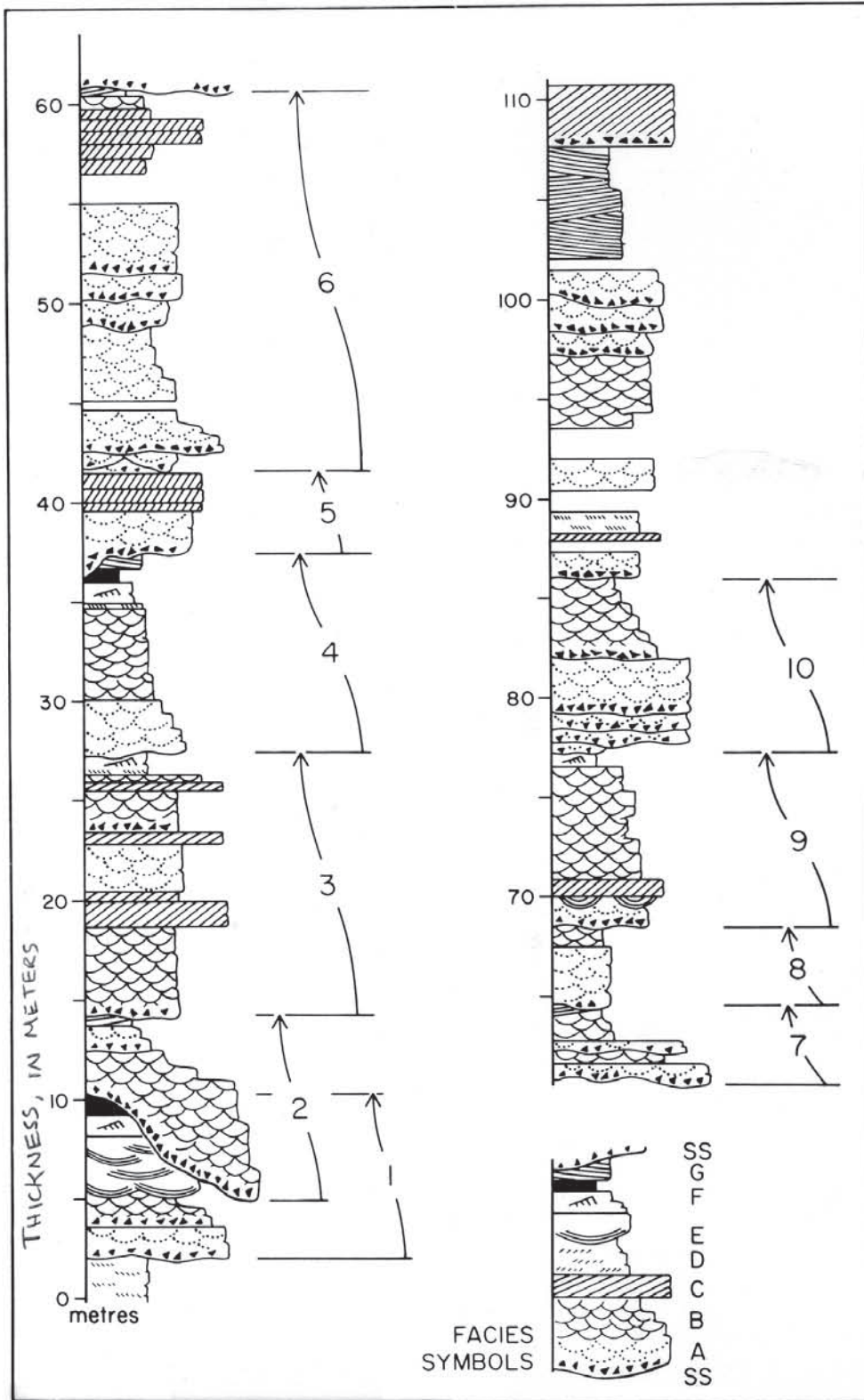
Due Date: Thursday May 16, 2019

This homework gives you a little experience interpreting depositional environments from the stratigraphic record. In stratigraphic analysis we often measure a vertical section through an exposed interval of sedimentary rocks, describing grain size, sedimentary structures and textures, especially noting vertical transitions and lateral relationships of different lithofacies to each other. The term “lithofacies” means a type of deposit that has a distinctive set of characteristics, usually including grain size, textures, sedimentary structures, etc. Some common examples of lithofacies include “cross-bedded sandstone”, “laminated black shale”, “massive conglomerate”, “thin-bedded sandstone and mudstone”, etc. Read the Intro to Part IV in the text for an overview of facies models, which use principles of sedimentary environments, processes, and depositional products. You will want to focus on the class notes and handouts that outline the three types of continental environments we discussed last week: alluvial fans, braided rivers, and meandering rivers.

The measured section on the opposite side of this page shows variations in lithofacies and sedimentary structures that allow us to interpret the environment of deposition. Study this measured section, review your class notes and related handouts, and answer the following questions on a separate sheet(s) of paper. If you notice any differences between information in the text versus class notes or handouts, be sure to *use the class notes and handouts*.

Please *type your answers*. Be sure to answer the questions in the order that they are asked, using the indicated numbers and topics (this is also an exercise in structured technical writing).

1. What are the dominant grain size and sedimentary structures in the section? What processes (*not environment, that comes later*) do the sedimentary structures record? This can be brief.
2. What is the *range of thickness* and approximate *average thickness* of the numbered fining-upward intervals? What is the likely origin of these fining-upward packages: how did they form?
3. What depositional environment is represented in this measured section? Be sure to use class notes and handouts given in class to help you answer this question. Tell me what observations and logic your interpretation is based on. Be sure to explain the links between depositional products (facies and structures) observed in the section, depositional processes they represent, and thus the depositional conditions and environment where these processes are most likely to occur. Write as if you are trying to convince me of your interpretation, and I'm skeptical. Feel free to refer to figures in the handouts to support your interpretation.
4. Explain and illustrate how the sedimentary deposits observed in this measured section differ from deposits that are likely to form in the *two other* types of continental environments that we discussed in class. How to do this: for the two kinds of nonmarine (continental) environments we discussed that are *not* represented in this section, draw a hypothetical measured section at a vertical scale similar to the one used here, showing features such as grain size and grain-size variations, sorting, sedimentary structures, and vertical sequences that are characteristic and diagnostic for recognizing those types of environments in the stratigraphic record. One section for each is sufficient. Label your sketches with notes that indicate the key sedimentary products and processes that they represent, and indicate which depositional environment is represented by which section. Also, provide a short written summary with an explanation of how your two schematic sections differ from the one that I've given you. This will help you synthesize the material that we covered last week, and will allow you to develop a convincing set of arguments that support your interpretation of this measured section.



white (unfilled) areas = sandstone (coarser on the right, finer on the left)
 black filled areas = siltstone and mudstone
 black triangles above "SS" = minor conglomerate and rip-up clasts

SS = scoured surface; A = poorly-defined trough cross bedding; B = well-defined trough cross bedding; C = large planar tabular cross beds; D = small planar tabular cross beds; E = isolated scour fills; F = ripple cross laminated silts and muds; and G = low angle inclined stratification.

Note: "F" may also include mudcracks, root traces and paleosols :)