Alluvial Fans

Reports will be typed (font 11 pt and larger) and each answer will follow the numbering system of the questions and be in consecutive order. Neatness counts and all pages need to be stapled. Graphs need to be adequately labeled including axis labels with units. All features in a graph or drawing must be identified.

On page 25 of Aerial Stereo Photographs (Wanless), Stovepipe Wells, note the two main alluvial fans.

1. (5pts) Carefully draw and trace the two main fans on the central photo and indicate the location of modern washes, abandoned washes, and desert pavement. Use different colors to identify the features on the fans. Pay attention to detail. Neatness and clarity of the drawings are important. [Reading: Hooke may help interpretation]

2. (5pts) Observe the smaller fan on the left if book is held up with the spine on the left. Where do you anticipate the modern wash moving next and why? A careful drawing will help.

3. (5pts) Is the smaller fan growing, shrinking, and or stable? Please explain your answer based on the observations from the photograph.

On the Furnace Creek, CA topographic map, note that the mountains to the west are the Panamint Range, the same as those as in the stereo aerial photograph. Lets examine the geometry of the fan that heads into Trail Canyon.

4. (5pts) Plot the longitudinal (radial) slope of the fan from benchmark 260 up to where the road crosses the 1520 ft contour line. Along the line defined by these two points, use the intersection of the contours with the line as your elevation data (z), and for the distance to each contour (x) use the distance from benchmark 260 along the line. Therefore, your origin will be BM 260. Make your vertical equal to the horizontal scale. For example, if 1 inch on your vertical scale equals 1000 feet on the map, then 1 inch on your horizontal scale will be 1000 feet.

   Is the geometry the same as we discussed in class? Ritter (page 250) is also a reference for this. Can you observe segments in the fan? If so, draw them in as dashed lines.

5. (5pts) Redraw the plot in (4) at a 4:1 vertical exaggeration and reexamine the geometry. Are the segments any more visible? Please draw them in with dashed lines if present. Given the number of segments you observe and knowledge of the segmentation process, briefly discuss the development of this alluvial fan? What processes are responsible?

6. (5pts) Plot the transverse elevation of the alluvial fan. The starting point is located where the intermittent stream that crosses the valley road between BM254 and BM257 intersecting the sea level contour. The end point is located where the same contour almost touches the hat of the "T" in NATIONAL. The point is located at the bend in the contour line next to the "T". Along the line defined by these two points, use the contours as your elevation data (z), and for the distance to each contour (y) use the distance from the junction of the intermittent stream and the sea level contour. Make your vertical axis twice the scale of the horizontal axis (2:1). For example, make your scale in the y-axis in the graph, say 50' equal to 1", and the x-axis with 100' to 1".

   Is the transverse cross-section of the alluvial fan about what you might expect? If not, why not?

One of the fundamental papers on alluvial fans is,

> Hooke, R., LeB., 1967. Processes on arid-region alluvial fans. Journal of Geology, 75, 438-460.

Please answer the following questions about the paper.

7. (2pts) What was the object of the paper?

8. (3 pts) What are the colors of the three kinds of channel deposits and the cause for each color?

9. (3 pts) What are the 3 characteristics that distinguish the uppermost segment as the youngest?

10. (2 pts) The Trolheim Fan and the Shadow Rock Fan are within a mile of each other yet they do not have similar patterns of segmentation. Why?

11. (4 pts) Hooke uses basic geomorphological techniques to distinguish relative ages. What are they?

12. (5 pts) Briefly describe the results of the Series B laboratory events that provided insight into natural processes.

13. (5 pts) How are the mechanics of debris transport like glacier flow, and differ from water flow? Include the second equation on pg 451 in your answer to help describe your answer.

14. (5pts) Coarse material is often located in levees and lobes and is sorted. Please describe the processes that cause this occurrence.

15. (5pts) Please describe why deposition near the toe of alluvial fans is not caused by debris flows but rather running water.