

GY360 Structural Geology  
Stereographic Statistics Problem Set

Problem 1: Below are mineral lineation data. Find the best mean vector orientation using the Eigen vector methods outlined in class. Include in your answer the standard deviation of the fit. Report the best-fit vector orientation in directional angle and bearing-plunge format. Plot the below data on a stereonet as filled circles and the Eigen vectors as filled triangles. Plot the 2 (95%) standard deviation confidence cone around the largest Eigen vector attitude. You may use a spreadsheet or do calculations with a calculator- regardless of which method turn in a table of calculations including all of the summations and all steps in the calculation. The organization of the table will be demonstrated in class. A computer spreadsheet may be printed and turned in instead of the hand written table.

Mineral Lineations

S 14 W 05  
S 05 W 31  
S 12 W 15  
S 11 E 23  
N 32 E 04  
S 10 E 31  
S 17 W 28  
S 14 W 21  
S 19 W 23  
S 04 W 05  
S 20 W 35  
S 00 E 29  
S 27 E 36  
S 16 W 20  
S 05 W 04  
S 02 W 13  
S 10 W 10  
S 17 W 06  
S 14 W 19  
S 00 E 07  
S 00 E 90  
N 05 W 40  
S 09 E 11  
S 18 E 12  
S 05 E 12  
S 07 W 09  
S 08 W 10  
S 08 W 24

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Problem 2: Below are the attitudes of  $S_0$  (bedding) measured from an area believed to be affected by cylindrical folding. Determine the validity of cylindrical folding by statistically fitting a fold girdle through the poles to  $S_0$ . As a measure of the goodness of fit, calculate a standard deviation for the data set. Use the eigen vector method to calculate the least-squares hinge. On the stereonet plot:

- a. Poles to  $S_1$  as filled circles.
- b. Eigen vectors as filled triangles.
- c. Label the minimum eigen vector as the “best-fit hinge”.
- d. Plot the 2-standard deviation confidence cone on either side of the fold girdle great circle.
- e. Plot the girdle 90 degrees from the hinge.

Produce a hard copy of the spreadsheet used to calculate the above.

Bedding data

N 13 W 76 W  
N 17 W 61 W  
N 23 W 31 W  
N 55 W 16 W  
N 27 W 23 W  
N 53 W 22 W  
N 14 E 28 E  
N 32 E 17 E  
N 00 W 36 E  
N 17 E 37 E  
N 09 E 34 E  
N 02 E 23 E  
N 90 E 16 E  
N 15 W 74 W  
N 37 E 07 W  
N 02 E 43 E  
N 15 E 26 E  
N 48 E 20 E