

PROBLEM SET: Describing Orientation Data With Fisher Statistics

Name: _____

1. Use the Excel spreadsheet provided to find the average and radius of the 95% confidence interval (CI) for the following surface orientations that are expressed in the quadrant method: N45E 63SE, N43E 60SE, N46E,62SE. As a partial check, the average dip angle is 62°. Express your average using the same method used to express the input data.

average: _____ 95% CI: _____

2. Find the average and radius of the 95% CI for the following surface orientations that are expressed in the azimuth method: 138, 14; 140, 18; 135, 17. Express your average using the same method used to express the input data.

average: _____ 95% CI: _____

3. Find the average and radius of the 95% CI for the following vectors that are expressed as plunge and trend: 32, 210; 35, 213; 33, 215; 38, 218; 34, 214. As a partial check, the average dip angle is 34°. Express your average using the same method used to express the input data.

average: _____ 95% CI: _____

4. Define your own problem similar to the previous three problems, using 3-5 data points. Express the problem below in correct standard English, and provide the answer.

average: _____ 95% CI: _____

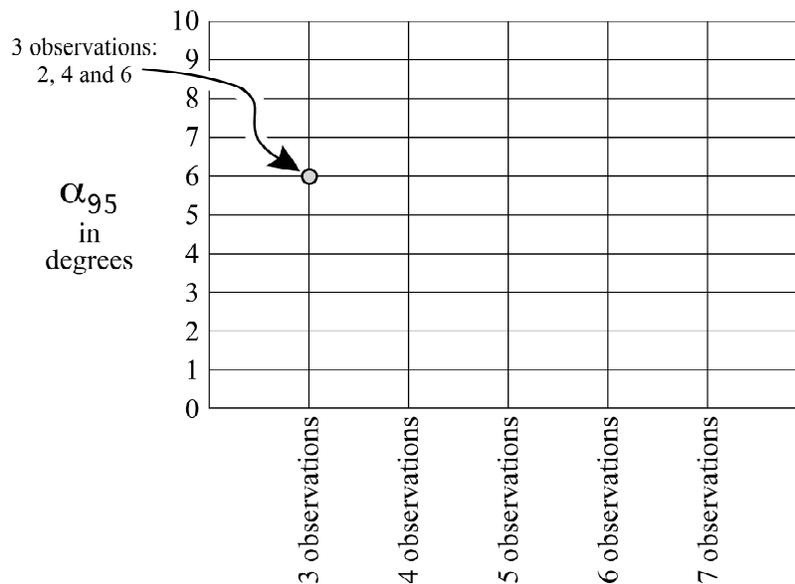
5. Modify the Excel spreadsheet provided so that it can compute the average and 95% CI of the following 7 paleomagnetic vectors for the same site, with orientations expressed as plunge (inclination) and trend (declination): 54, 312; 58, 311; 56, 314; 55, 313; 52, 313; 58, 300; 53, 309. Express your average using the same method used to express the input data. As a partial check on your answer, the plunge of the site average vector is 55°. Provide a copy of your modified spreadsheet.

average: _____ 95% CI: _____

6. Explore the relationship between the number of observations used to compute a site average and the corresponding radius of the 95% CI (α_{95}), given the following dataset.

	plunge	trend
Observation 1:	48°	67°
Observation 2:	46°	69°
Observation 3:	42°	72°
Observation 4:	47°	65°
Observation 5:	41°	68°
Observation 6:	45°	75°
Observation 7:	44°	70°

- Compute the average and α_{95} for any four *different* sets of 3 observations (e.g., observations 1, 3 and 5; observations 2, 4 and 6; observations 2, 5 and 7; observations 3, 4 and 6).
- Compute the average and α_{95} for any four *different* sets of 4 observations.
- Compute the average and α_{95} for any four *different* sets of 5 observations.
- Compute the average and α_{95} for any four *different* sets of 6 observations.
- Compute the average and α_{95} for all 7 observations.
- Using the data you obtained from steps a-e, plot the data relating number of observations to α_{95} below.



- What conclusion do you draw from this exercise regarding how the number of observations affects the average and α_{95} ?