

Supplementary Information

The figures and tables contained in this file support the Methods section of the main manuscript.

Supplementary Tables (1-3)

Supplementary Table 1 The contour values, areas and volumes used to estimate the 2007-2010 Valley-wide subsidence volume from the Farr et al. (2015) dataset.

Contour value (m)	Enclosed Area (km ²)	Subsidence from contour alone (km ³)	Cumulative total (km ³)
0.05	11900	0.39	0.39
0.13	5800	0.48	0.68
0.25	3100	0.51	0.94
0.38	1640	0.41	1.07
0.51	710	0.24	1.13
0.64	210	0.09	1.15
0.76	10	0.01	1.15

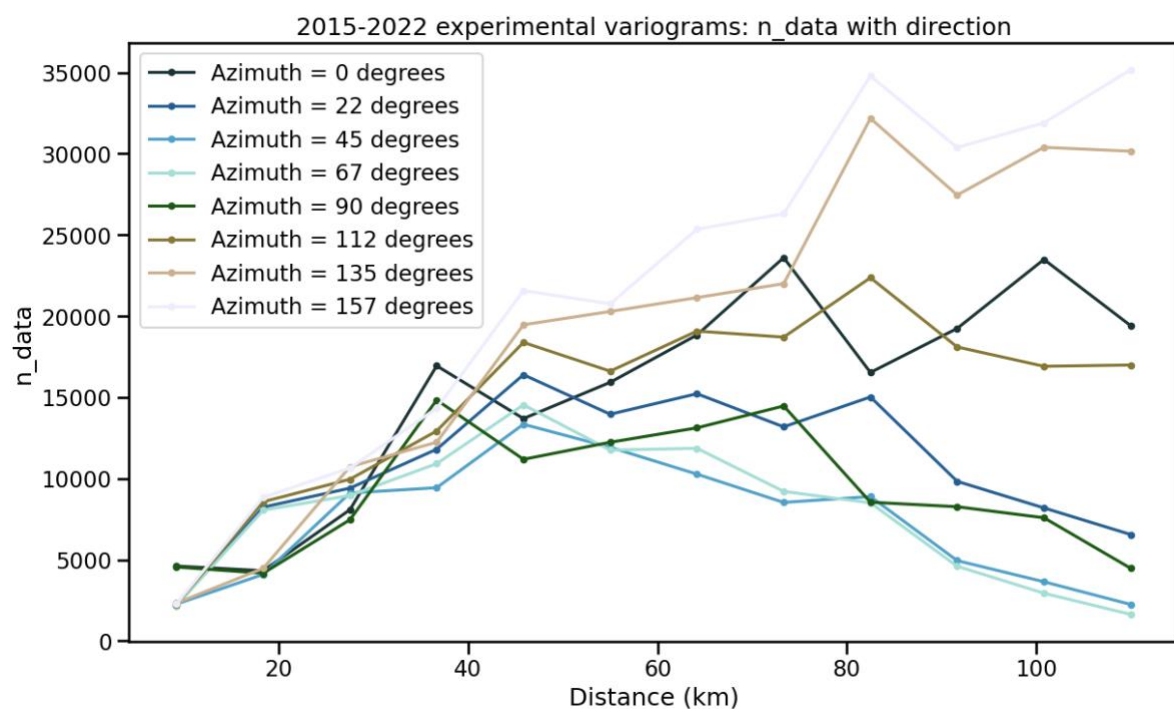
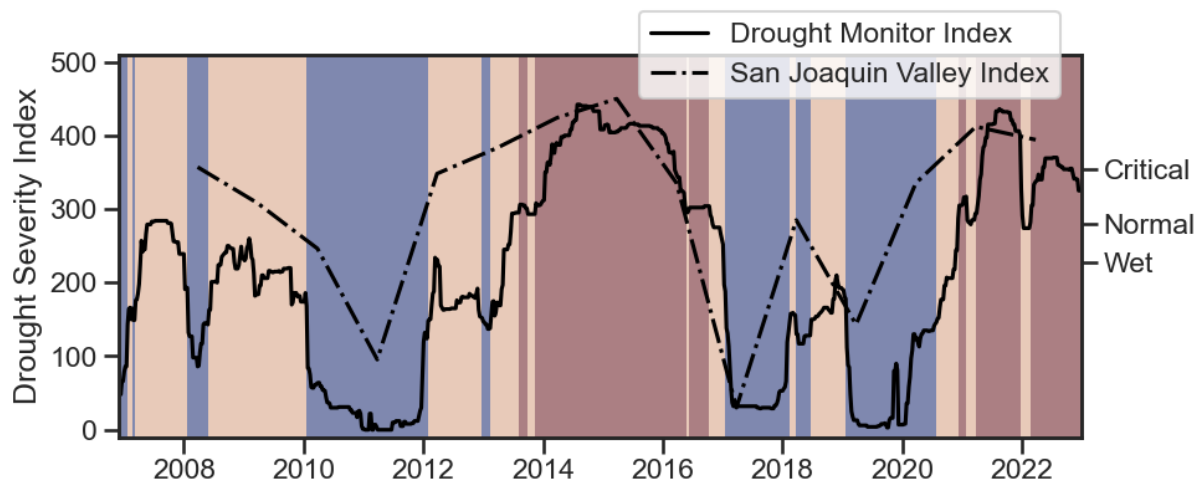
Supplementary Table 2 The contour values, areas and volumes used to estimate the 2007-2010 Valley-wide subsidence volume from the Ojha et al. (2018) dataset.

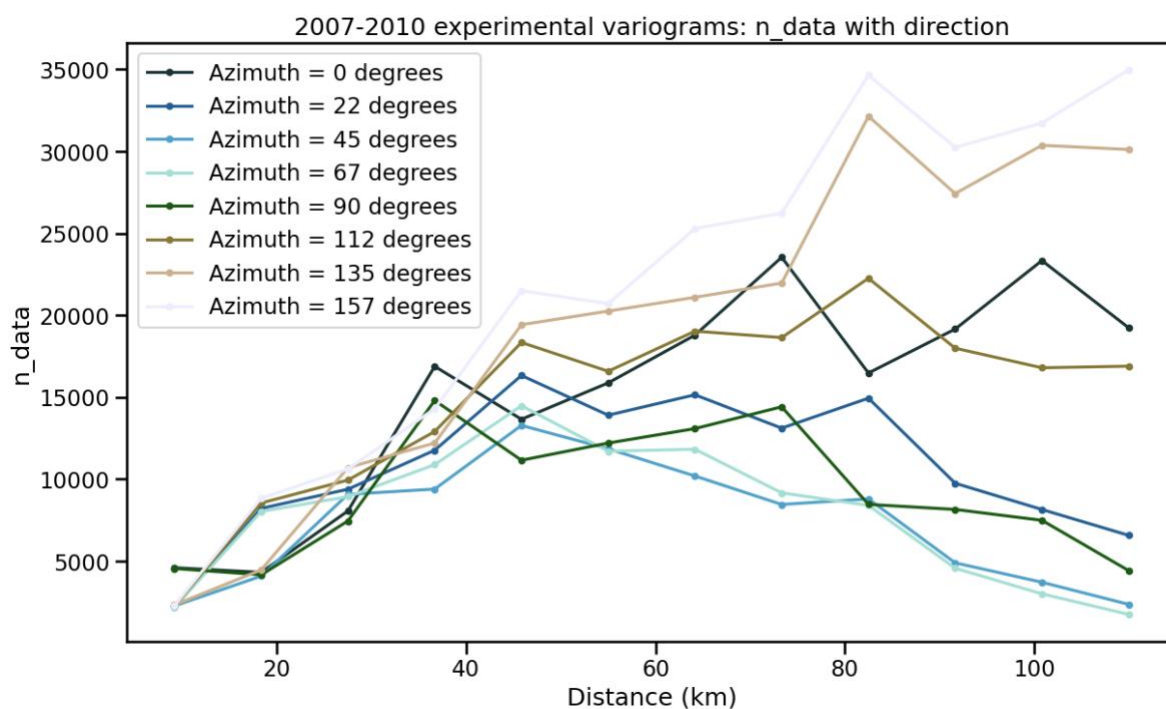
Contour value (m)	Enclosed Area (km ²)	Subsidence from contour alone (km ³)	Cumulative total (km ³)
0.05	6900	0.35	0.35
0.13	2300	0.30	0.53
0.25	900	0.22	0.64
0.38	300	0.12	0.68
0.51	100	0.03	0.69

Supplementary Table 3 The contour values, areas and volumes used to estimate the 2007-2010 Valley-wide subsidence volume from the Sneed et al. (2018) dataset.

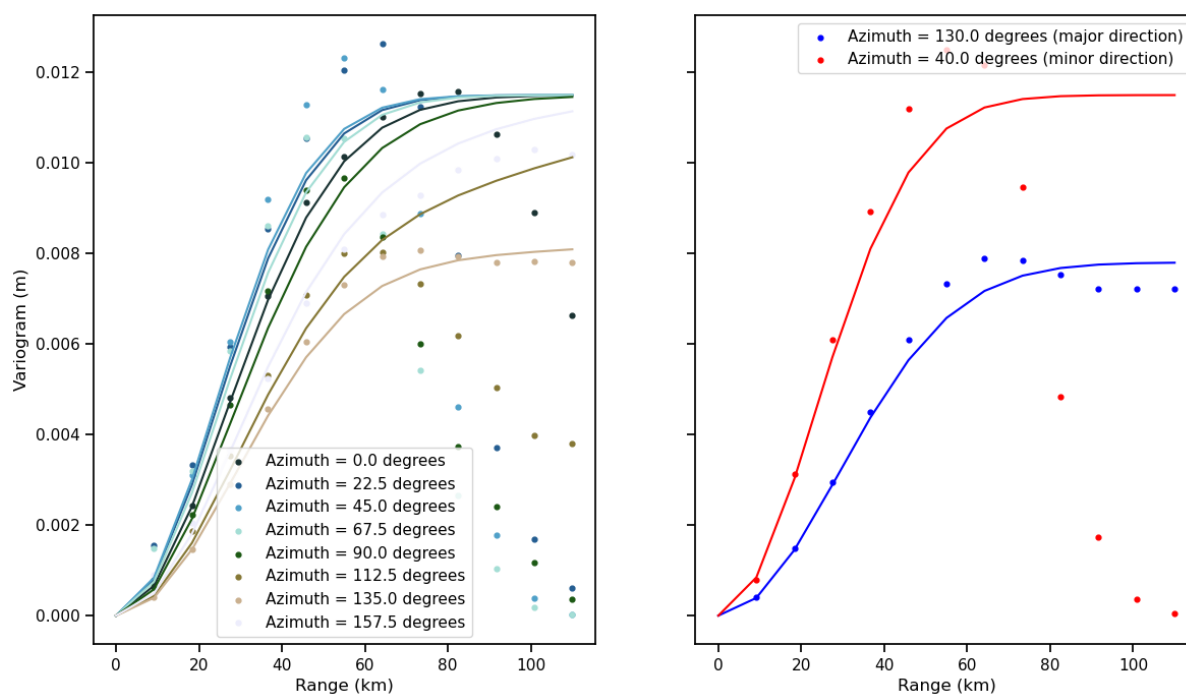
Contour value (m)	Enclosed Area (km ²)	Subsidence from contour alone (km ³)	Cumulative total (km ³)
0.025	11700	0.29	0.29
0.05	7200	0.36	0.47
0.10	3100	0.31	0.63
0.15	1800	0.27	0.72
0.28	100	0.02	0.73
0.41	10	0.004	0.73
0.54	5	0.003	0.73

Supplementary Figures (1-13)

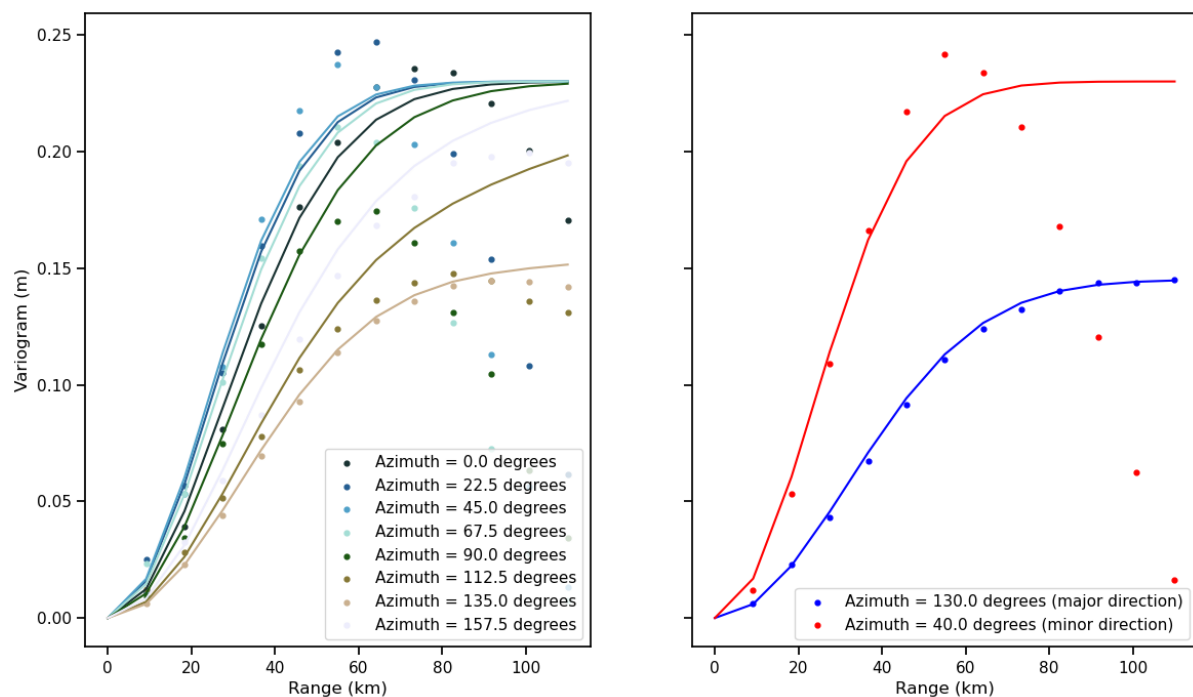




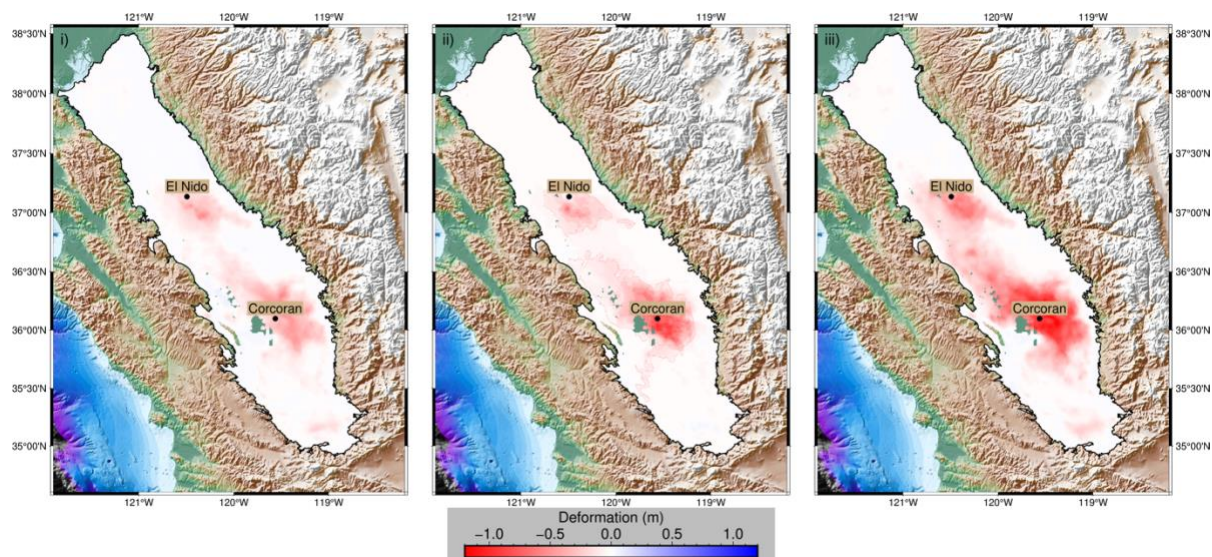
Supplementary Figure 3 Variation in the number of datapoints (n_{data}) per lag for the 2007-2010 data. Distance is displayed on the x-axis and the variation in n_{data} with azimuthal angle is represented by the different coloured lines.



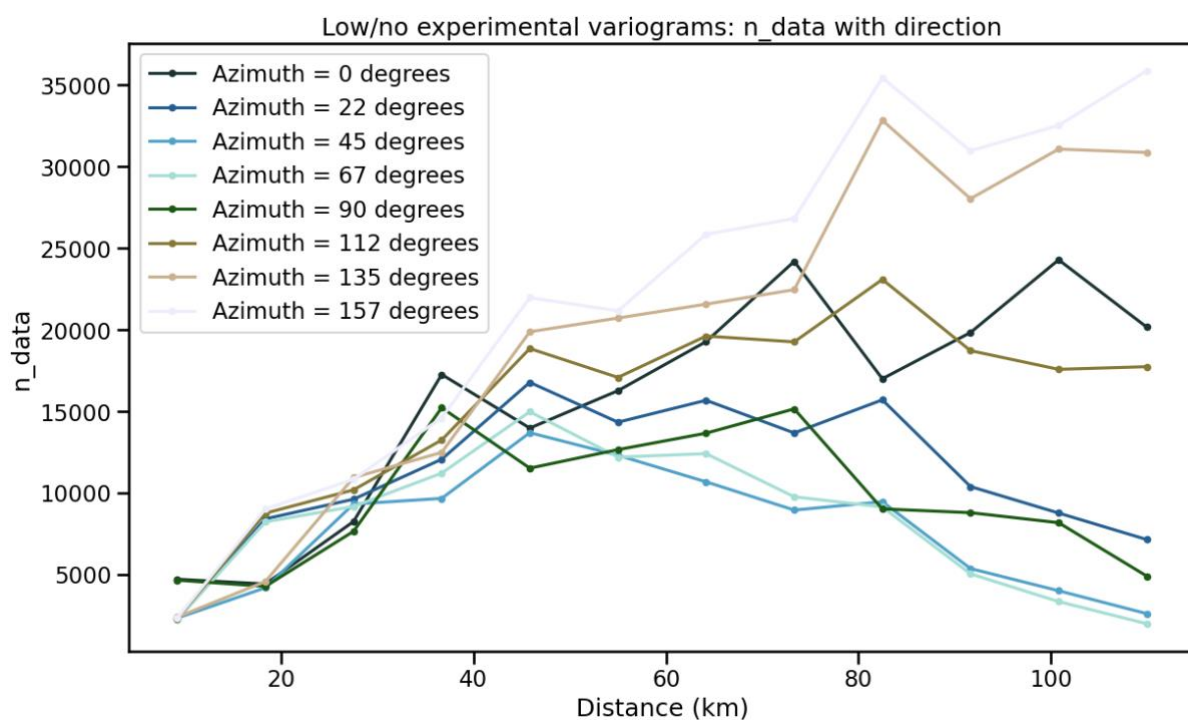
Supplementary Figure 4 Experimental variograms (dots) and variogram models (solid lines) for the 2007-2010 subsidence map. The left panel shows the 8 directional variograms with 22.5 angular spacing, and the right panel shows the directional variograms in the major and minor directions.



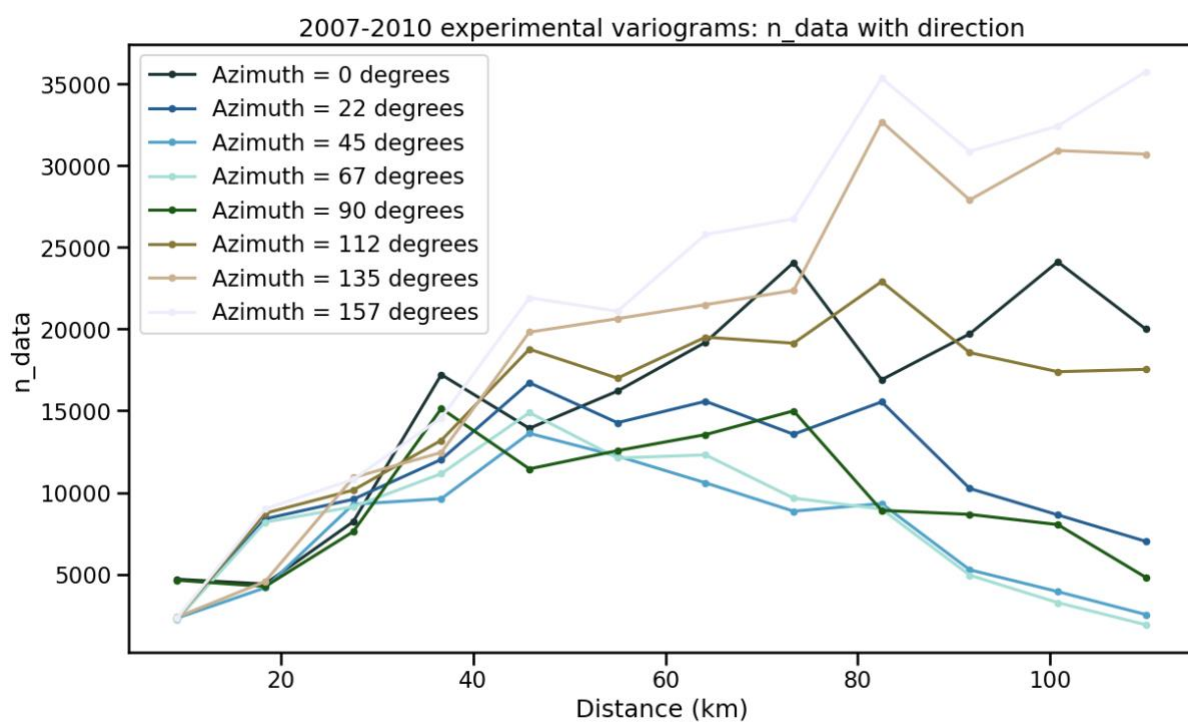
Supplementary Figure 5 Experimental variograms (dots) and variogram models (solid lines) for the 2015-2022 subsidence map. The left panel shows the 8 directional variograms with 22.5 angular spacing, and the right panel shows the directional variograms in the major and minor directions.



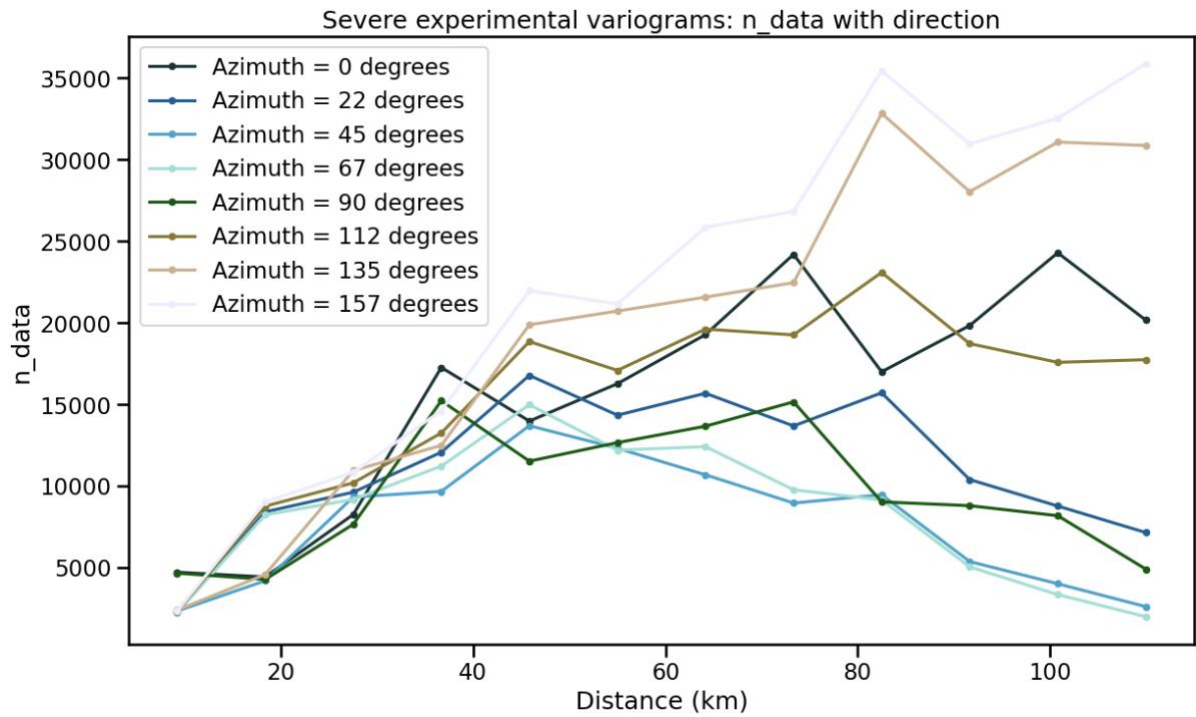
Supplementary Figure 6 Maps of the total subsidence that accumulated during periods of i) low/no drought intensity, b) moderate drought intensity and c) severe drought intensity.



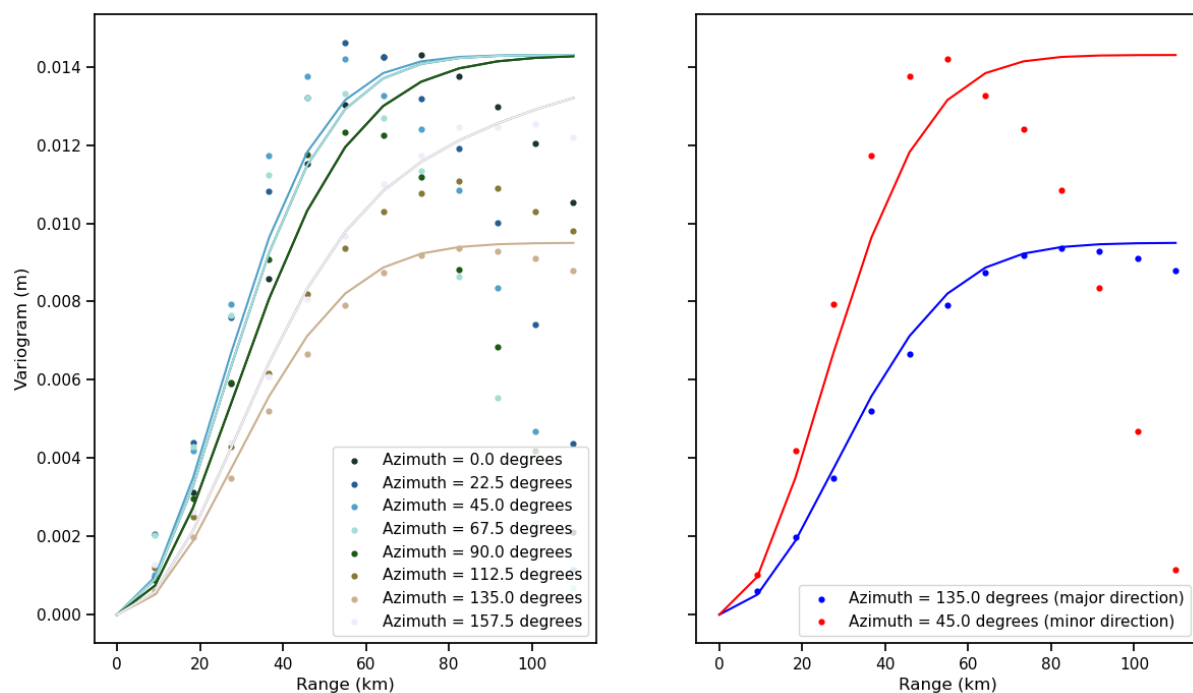
Supplementary Figure 7 Variation in the number of datapoints (n_{data}) per lag for the low/no subsidence data. Distance is displayed on the x-axis and the variation in n_{data} with azimuthal angle is represented by the different coloured lines.



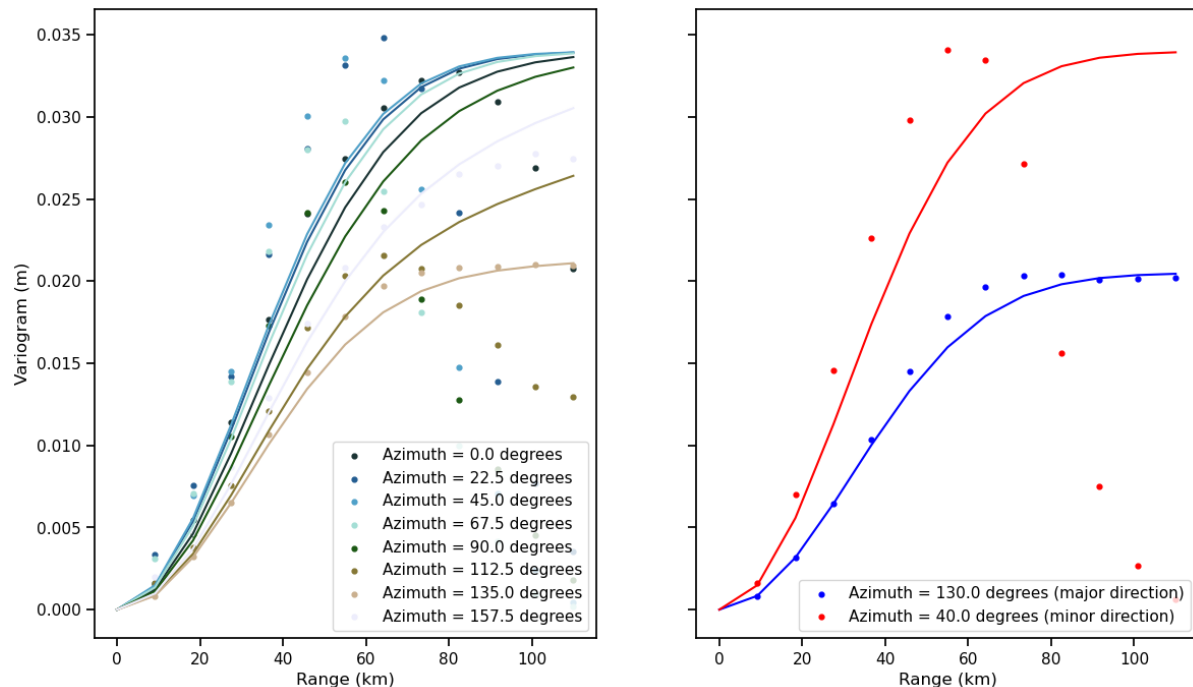
Supplementary Figure 8 Variation in the number of datapoints (n_{data}) per lag for the moderate subsidence data. Distance is displayed on the x-axis and the variation in n_{data} with azimuthal angle is represented by the different coloured lines.



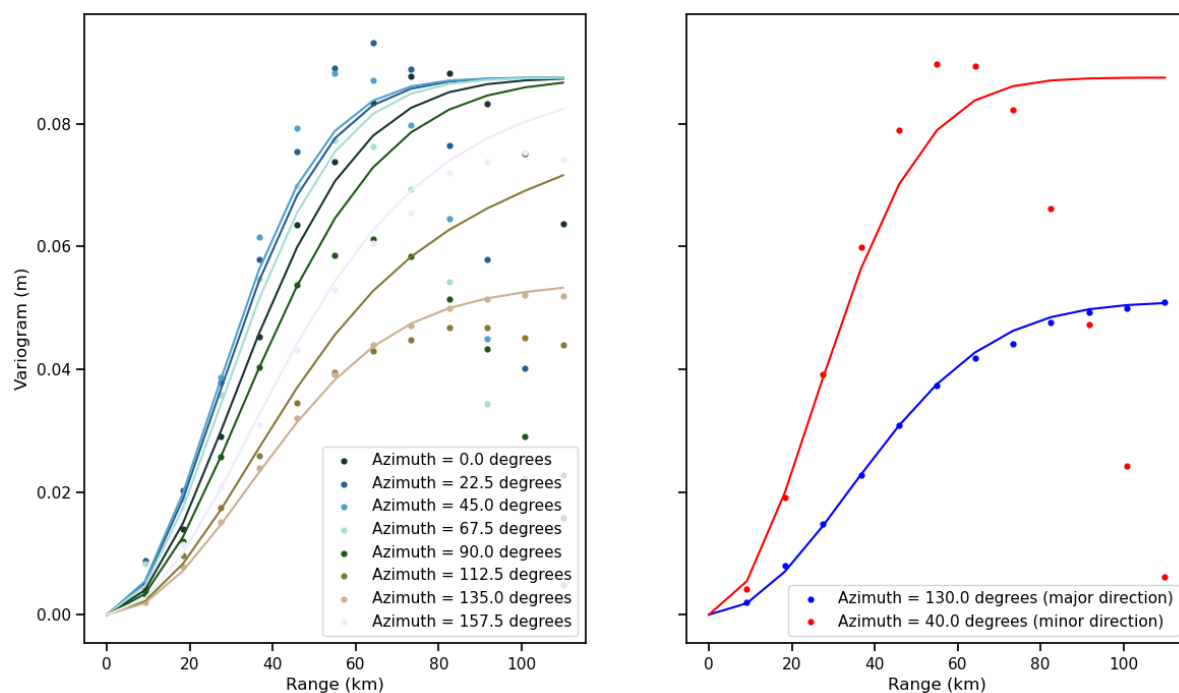
Supplementary Figure 9 Variation in the number of datapoints (n_{data}) per lag for the severe subsidence data. Distance is displayed on the x-axis and the variation in n_{data} with azimuthal angle is represented by the different coloured lines.



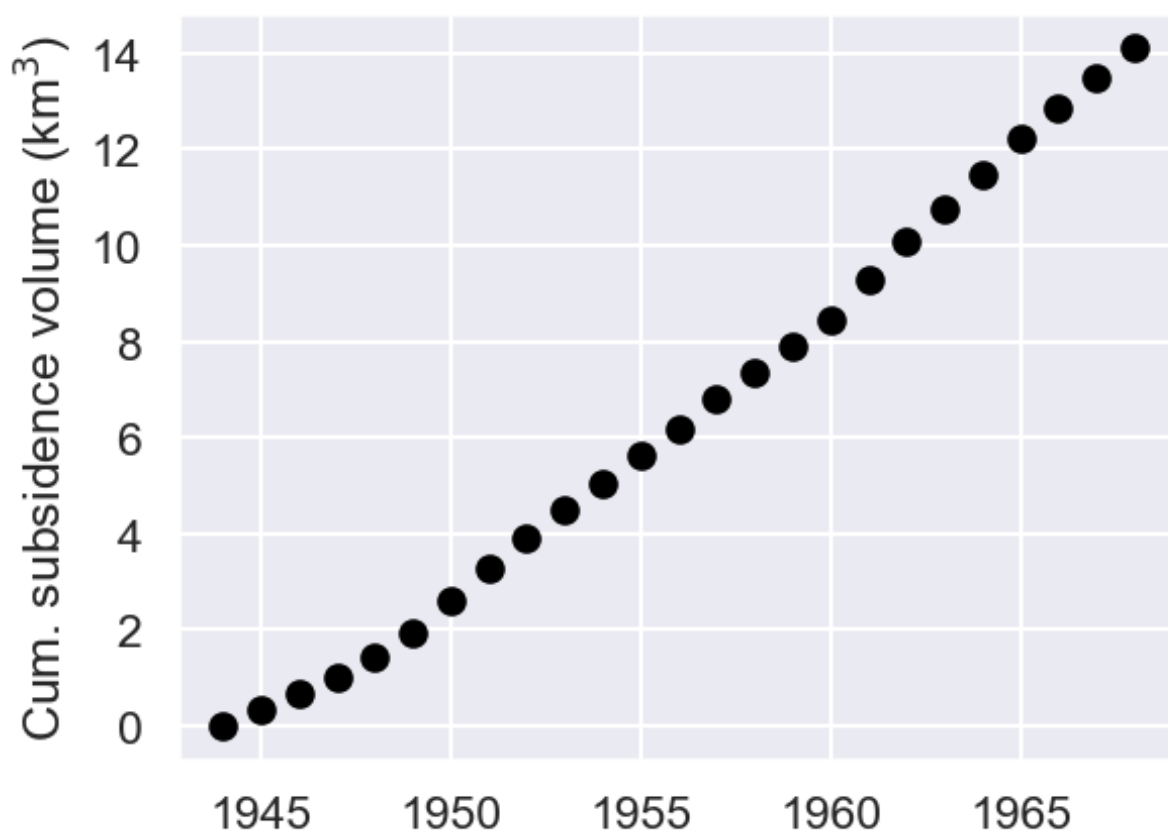
Supplementary Figure 10 Experimental variograms (dots) and variogram models (solid lines) for the low/no subsidence map. The left panel shows the 8 directional variograms with 22.5 angular spacing, and the right panel shows the directional variograms in the major and minor directions.



Supplementary Figure 11 Experimental variograms (dots) and variogram models (solid lines) for various angles for the moderate subsidence map. The left panel shows the 8 directional variograms with 22.5 angular spacing, and the right panel shows the directional variograms in the major and minor directions.



Supplementary Figure 12 Experimental variograms (dots) and variogram models (solid lines) for various angles for the severe subsidence map. The left panel shows the 8 directional variograms with 22.5 angular spacing, and the right panel shows the directional variograms in the major and minor directions.



Supplementary Figure 13 Total cumulative Valley-wide subsidence volume for the historic period, obtained from data in Poland et al. (1975).

Supplementary References

- Farr, T. G., Jones, C. E., & Liu, Z. (2015). *Progress Report: Subsidence in the Central Valley, California*. Retrieved from <https://data.cnra.ca.gov/dataset/nasa-jpl-insar-subsidence/resource/17ad6fd5-918b-4cb2-b682-940ed1c8deb2>
- Poland, J. F., Lofgren, B. E., Ireland, R. L., & Pugh, R. G. (1975). *Land Subsidence in the San Joaquin Valley, California, As of 1972* (U.S. Geological Survey Professional Paper No. 437- H) (p. 87). USGS.