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# Clustering of volcanic ash arising from different fragmentation mechanisms using Kohonen self-organizing maps

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In this study, we present the visualization and clustering capabilities of self-organizing maps (SOM) for analyzing high-dimensional data. SOM were used because they implement the orderly mapping of a high-dimensional distribution onto a regular low-dimensional grid and are thereby able to convert complex nonlinear statistical relationships between high-dimensional data items into simple geometric relationships on a low-dimensional display. The SOM solves difficult high-dimensional and nonlinear problems such as feature extraction and classification of images and acoustic patterns, adaptive control of robots, and the equalization, demodulation, and error-tolerant transmission of signals in telecommunications. A new area of application is the organization of very large document collections (Kohonen, 2001).
We used surface texture parameters of volcanic ash that arose from different fragmentation mechanisms as input data. The component planes constructed by SOM were more successful than statistical tests in determining parameters for distinguishing the different fragmentation mechanisms. Component planes helped to determine the discriminate performance of each variable. Based on these planes, we modified the parameters to attain the absolute discrimination.