Self Organizing Maps for Targeting within Regional Geochemical Data Sets

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We report on various Self Organizing Maps (SOM) [1] visualization approches that can be used to identify targets, trends and relationships in regional geochemical data sets. These visualizations include, (1) Use of Quantizaton Errors; (2) K-means clustering of SOM-derived nodes; (3) "Cluster-normalized" element anomaly (spatial) maps; (4) Component plots; and, (5) Cross-plots of selected elements based on SOM-node values.

While SOM can be used to assist in the analysis and visualization of regional geochemical data, it is the spatial context and co-herence of the samples that SOM identifies, which are critical for their assessment. Spatial plots of sample-locations colour-coded by either their K-means node cluster colour or by the magnitude of their quantization-error can be used to rapidly asssess the significance of samples identified as anomalous.

Examples will be presented from a study involving the analysis of stream and lake sediment analytical data over part of the Quesnellia Terrane of central British Columbia [2]. The input dataset consists of some 15,000 samples each with 42 elemental values, which were extracted from levelled and imputed elemental grids [3].

[1] Kohonen, T, 2001: Self-Organizing Maps. Third Extended Edition, Springer Series in Information Sciences, Vol. 30, Springer, Berlin, Heidelberg, New York, 2001. [2] Fraser, S.J., and Hodgkinson, J.H., 2009: An Investigation Using SiroSOM for the Analysis of QUEST Stream-Sediment and Lake-Sediment Geochemical Data. Geoscience BC - Report 2009-14. [3] Barnett, C.T., and Williams, P.M., 2009: Using Geochemistry and Neural Networks to Map Geology under Glacial Cover. Final Report for Geoscience Project 2008-003. Geoscience BC Report 2009-003.