6.1 Geostatistical Analysis in Gold Prospecting: a Case Study in El Firga Area, North Kordofan State, Western Sudan

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The application of GIS was found to be a quick and inexpensive technique in order to obtain the desired output efficiently. This article proposed to explain the mineralization trends bearing gold in El-Firga Area by geological controls using geostatistical analysis in Geographical information system environment. Spatial point pattern analysis and orientation analysis (directional ellipse) have been accomplished in ArcMap using ArcGIS 10 for gold analysis point data to compare stream samples with the drainage system and chip samples with structures. For the first time the use of directional ellipse was given persuasive results in identifying mineralization trends. Results revealed that the overall gold mineralization trend in soil and stream samples is following the main drainage system direction. Also mineralization trend in chip samples in El-Firga, North Kordofan State was interpreted to be totally controlled by the structure of Sudari Shear Zone, Umm badir Shear Zone and associated fault sets. The changes in mineralization trends might propose a Z-shape structure which corners might be suitable for gold bearing mineralization zones. Mineralization zones are defined as mesothermal, structurally controlled deposits, which are typical of the Greenstone Belt and abundant in other Archean greenstone belts around the world. The gold bearing quartz-tourmaline veins are young in geologic age and cut all rock-types including irregular intrusive (diorite) bodies, which are affected by regional deformation and green schist grade metamorphism.