Geochemical anomalies or Geochemical Prospecting

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Introduction:

Geochemical Prospecting:
The use of chemical properties of naturally occurring substances (including rocks, glacial debris, soils, stream sediments, waters, vegetation, and air) as aids in a search for economic deposits of metallic minerals or hydrocarbons.

Geochemical Anomaly:
Above-average concentration of a chemical element in a sample of rock, soil, vegetation, stream, or sediment; indicative of nearby mineral deposit.

Background Value:
It is the normal concentration of an element in a given material. Threshold: It represents the upper limit of the background value.

Anomalies in Drainage Sediments:
Drainage Sediments include spring and seepage sediments, active stream sediments, flood plain sediments, and lake sediments. These types of sediments differ in character of sediments, processes.

Introducing metal and application:
Many drainage systems start in seepages and springs, where important interchanges between water and sediments may occur.
Sediments in seepage areas and near spring tend to furnish strong anomalies and are useful in surveys.

Spring and Seepage Sediments:
Mode of occurrence of anomalies in seepage and springs sediments depend on precipitation of hydrous oxides and readily soluble components. The immediate source of the anomalous concentration of metal in the soil of seepage area, is the ground water that comes to the surface at these points. The ultimate source of the metal must be along the course of ground water. The location and form of seepage anomalies is controlled by local relationship between the relief and water table and by the flow of water within the seepage area.

Active Stream Sediments:

Active stream sediments include clastic and hydromorphic material from seepages, clastic material eroded from banks of streams and hydromorphic material adsorbed or precipitated from stream water.

Anomalies in active sediments may extend to several kilometers from their source and are widely used for reconnaissance exploration. The metal contained in anomalous stream sediments may have been derived by erosion and transport of metal rich soil, gossans, and hydromorphic anomalies in spring/seepage areas or locally precipitated from stream water.

The principal factors affecting the persistence of these anomalies are:

The contrast at the source.

The input of the metal along the stream course.

Dilution by erosion of the bank material and by confluence with barren tributaries.

Flood Plain Sediments:

The pattern of anomalous metals in flood-plain sediments will reflect their distribution in the abandoned channels previously followed by the stream. Thus the flood plain anomaly is most pronounced towards the base of the alluvium due to detrital minerals.

Flood-plain sediments normally are characterized by a higher proportion of the fine material, and thus may carry a greater content of anomalous metal than active sediments from its equivalent sites. The distribution of anomalous metals across the flood plain varies depending on local conditions.

Lake Sediments:

Lake sediments may furnish a convenient sampling medium for the reconnaissance and detailed stages of exploration.

Metals may reach the lake sediment by a number of routes.

a) In clastic particles washed in by streams or eroded from the margins of the lake.

b) As elements absorbed to or incorporated within colloidal organic or inorganic materials entering through streams.

c) As dissolved material entering through streams or in ground water and later precipitated or adsorbed to suspended particles and finally settling down at the lake bottom sediment.

The character and occurrence of elements are controlled by the climate, vegetation, depth, area, inflow and outflow of the lake and geology. Lake-sediment anomaly.

The major forms of occurrence of elements in lake sediments are as follows:

As substitution for major constituent in minerals of clastic particles.

As element incorporated within colloidal and fine particles of organic material formed by flocculation in lake, tissues of plants and animals growth in the lake.

As element adsorbed to surfaces of particles, including flocculated organic material, Fe-Mn-oxides, clay, and other small grains.

As inorganic precipitates formed in the lake.

Marine Sediments:

In recent years there is an increasing interest in exploration and exploitation of mineral resources from the continental shelf and ocean floor.
These include Mn nodules on the deep sea floor, muds and brines rich in Mn, Fe, Cu, Zn, Ag, and other metals, phosphorites, heavy minerals (cassiterite, Au, diamond, and others), and sand and gravel. The great extent of the deposits is attractive, but the costs of exploration and production of minerals covered by tens to thousands of meters of depth of water is the limiting factor. Inexpensive techniques for locating and outlining the deposits are obviously needed.

Several types of geochemical surveys have been developed to search for marine deposits.

Sediments, waters and suspended particles have proven useful in detection of metalliferous sediments.

Conclusion:

Drainage sediments constitute an important sampling material in various stages of exploration for mineral deposits. The various sources of drainage sediments, viz., spring and seepage, active streams, lakes, flood plains, and marine sediments afford a range of possibilities for exploring a variety of economic mineral deposits.