GEOCHEMISTRY OF A SEDIMENTARY PROCESS, GOLFO SAN MATIAS

Geochemical analyses of marginal basin sediments (Golfo San Matias, Argentina) for Ca, Mg, Sr, Co, Ni, V, Ti, Cr, Fe, Cu, Zn, and Mn in the total sediments and their carbonate fractions have yielded distinct halistases, the areal dispositions of which must be controlled by processes operating within the basin. One of the most important of these processes is derived from hydrodynamic forces moving the sedimentary particles and depositing them in rather distinct (at the 1-phi interval) granulometric zones.

For the total sample analyses, there are covariant relations between the dominant granulometric fractions and certain elements (for example, Zn with clay size, Ti with fine-sand size). For other elements, correlations are less definitive (for example, Fe).

Fragmented biogenic material is ubiquitous in the basin sediments but shows strong accumulations in some zones as a result of localized sources and dominant current activity; there is an expected positive correlation between Ca, Mg, and Sr, and the quantity of carbonate material in the sediments, and the distribution of Co appears to be directly influenced by biogenic components.

In the study basin, the disposition and shape of the plotted halistases are determined by the mode of migration of the elements, in solution, as hydrolysates, as resistates, and as biodates. Although homogenization drives exist, localized conditions have been more influential in controlling detrital and elemental distributions and dispersions. Selected elements are examined for their utility in serving as discriminants better to interpret similar data from the geologic column.

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IMAGING RADAR—TOOL FOR PETROLEUM AND MINERAL EXPLORATION

Remote sensing methods have great potential application in geologic exploration for fuel and mineral resources. Unfortunately, many of the more exotic remote-sensing techniques are still in research and development stages, and most surveys must be conducted in the framework of experimentation rather than routine operation. Sidelooking radar (SLAR) is one of the exceptions to this overall categorization. SLAR systems, originally developed as all-weather military reconnaissance sensors, are providing extremely encouraging results in geologic exploration. Although the success of SLAR surveys has not been widely publicized, more than 6 million sq km of radar mapping has been completed during the past 3 years. Three commercial radar-mapping contractors have conducted geologic-reconnaissance surveys in some of the world's most inaccessible and remote terrain. Radar imagery is providing a first look at many cloud-shrouded regions in Brazil, Venezuela, Colombia, Panama, Nicaragua, Indonesia, and Australia.

The fine resolution of aerial photography is not presently available with imaging radars; however, they do offer the distinct advantage of a large swath of ground coverage (typically at least 20 km). This synoptic presentation allows the interpreter to become quickly familiar with the essential features of structural provinces. Minimal scale distortion allows stereoscopic interpretation on imagery strips that can be enlarged to at least 10 times the acquisition scale. Radar-mosaic construction has provided sufficient base-map information to anticipate and evaluate logistic problems to be encountered during seismic operations or when reconnoitering a territory for favorable drilling sites. Sidelooking radar, like any tool, has limitations as well as capabilities for petroleum and mineral exploration.

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PROBLEMS IN CHEMICAL ANALYSIS OF ENVIRONMENT

Several recent comparative studies of analytical results and procedures cast serious doubt on the validity of many of the pollution data now being reported. These comparative studies indicate that both sampling techniques and analytic procedures are at fault. For analysis of trace metals in seawater and of oil spills, methods of obtaining valid or representative samples from the field and design of "foolproof" procedures for carrying out the subsequent chemical analysis have been developed, as have remote or automated monitoring devices for natural systems.

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GEOLOGY OF EASTERN AND CENTRAL NICARAGUA—INTERPRETATION OF SIDE-LOOKING RADAR IMAGERY

In late 1971, the entire country of Nicaragua was surveyed by side-looking radar for the production of a 47-sheet sequence of 1:100,000-scale mosaics. Interpretation of the imagery of the central highlands and eastward toward the Atlantic Coast has contributed substantially to the elucidation of the geology of this previously little-known region. Although little that is new has been added to the stratigraphic column, the distribution of the main stratigraphic units has been clarified, and the principal structural elements established. The work in Nicaragua is an additional example of the quality of side-looking radar for rapid regional geologic interpretation and consequent guidance of ground programs.

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AGGREGATE PARTICLES IN SEDIMENTS OF YUKON RIVER, ALASKA

A study of the particle size and mineralogic characteristics of bottom and suspended sediment from Kwikluak Pass of the Yukon River revealed that iron oxide and organic material act as binding agents. The binding agents appear to be equally responsible for the presence of aggregate particles which constitute a minimum of 14% of the sediment weight. The mean and standard deviation of the sediment in the aggregate state was $\bar{x}$ = 8.2 phi and σ = 2.0 phi as suspended material and $\bar{x}$ = 5.4 phi and σ = 1.5 phi as bottom material. These distributions are coarser and less variable than those measured after removal of iron oxide and organic binding agents: $\bar{x}$ = 8.6 phi and σ = 2.3 phi as suspended sediment and $\bar{x}$ = 6.4 phi and = 2.6 phi as the bottom sediment. The proportion of aggregates as a function of grain size increases from 10% at 4.0 phi to 50% at 12.0 phi. The size distribution of particles composing an aggregate grain is distinctly bimodal indicating the binding of fine particles to larger grains. However, aggregates also may be composed entirely of fine grains. There was no evidence of mineralogic selectivity within these aggregates. This supports a probabilistic mechanism of formation, whereby the mineralogy of the aggregates is controlled by the frequency of the mineral type in the discrete state. The similarity of aggregates in the bottom and suspended sediments supports the hypothesis that the aggregates were formed in the soil horizon within the Yukon River basin.

The presence of aggregate particles within river sediments can significantly alter conclusions concerning grain-size parameters and resulting mineral-transport characteristics unless proper analytical procedures are utilized.

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BOULDER BEDS IN TESNUS AND DIMPLE FORMA-