COMPOSITION OF DEEP-SEA SANDS OF THE PRESENT CONTINENTAL MARGINS: STATE OF THE ART °

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Up to a few years ago very little was known about the composition of recent deep-sea sands (turbidites). Considerable data is now available concerning detrital modes as a result of drilling on the present continental margins. The first attempts at a synthesis of the compositional characteristics of recent turbidites [3,5] were limited, however, by the fact that the various samples and analyses were only partially comparable.

Today the authors have at their disposition 140 optical microscope analyses of deep-sea sands collected around the world in equal geological conditions so that their composition is strictly comparable. The samples are of Plio-Pleistocene turbidites and were supplied by the Lamont-Doherty Geol.Obs.(one half) and by the D.S.D.P.(the other half). The detrital modes were expressed using Dickinson's parameters,divided into Primary (Q;F;L = quartzose;feldspathic;fine-grained lithic) and Secondary(C/Q;P/F;V/L = policrystalline/total quartzose grains; plagioclase/total feldspar grains; volcanic/total lithic fragments).

The framework grain types,expressed by the plot of the essential grains population (Q,F,L) and by their internal ratios (C/Q,P/F, V/L), can be easily determined and duplicated by different workers and present three fundamental compositional groups:

A.QUARTZOFELDSPATHIC SANDS - Characterized by a Q content >50%, F largely exceeding L (at least 3:1) and a P/F ratio <0.5 .

B.LITHOFELDSPATHIC SANDS - Characterized by a Q content >25% , a Lithics content >10%, a particularly high C/Q ratio (0.2-0.3) and a rather variable P/F and V/L ratio (up to 0.8).

C.VOLCANOLITHIC SANDS - Characterized by a Q content <50%, a P/F ratio >0.5 and a very high V/L ratio (0.9-1.0).

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As can be seen, although the three compositional groups occupy relatively distinct areas, the primary parameters do not discriminate fully between them and one has to use secondary parameters. The two most visible cases of overlap are as follows: firstly of the Quartzo feldspathic and Lithofeldspathic sands for values approximately equal to Q 50, F 30-40, L 20-10; secondly,of the Lithofeldspathic and Volcano lithic sands for values approximately equal to Q 40, F 30-40, L 30-20.

In summary then, analysis based on the primary parameters does not lead to very clear clusters and it is evident that in nature the essential framework constituents occur over a large area of the theoretically possible "mixtures". With the help of the secondary parameters it is possible to define three fundamental compositional groups and, what is more,find indications of at least two distinct sub-populations in each of them [2 , 3 , 5] .

Previous studies[1,2,3,4,5] showed that each major sand compositional type occur in a preferential structural setting.This is also proved by the new data here introduced. Nevertheless the comparison of the above data with previous studies having a global approach raises important questions. The results obtained by [2] are similar since comparable compositional groups were detected. However,the primary parameters of modern sands having a distinct provenance can easily overlap and Q F L values may not be indicative of provenance. Data in [1] on ancient graywackes and in [4] on big river sands can be seen to be substantially different. This suggest that the depositional facies and the basin type are also important controlling factors for sand compositions.

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