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Amazon Fan sands: implications for provenance

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Abstract

The Amazon Fan is the third largest modern 'mud-rich' submarine fan system in the world, located on the equatorial Atlantic margin and abyssal plain. The Fan is believed to have originated as a result of the Andean orogeny in the early Miocene and has continued to build through to the present day. Sedimentation rates across the Fan vary in time and space, and can be as high as 10–25 m/k.y., especially during periods around and during low sea-level stands. These large-scale fan systems offer a unique opportunity to study earth history, in particular, the comparison between ancient and modern systems in terms of reservoir potential, sedimentation processes, fan models and provenance studies. It is the latter that forms the basis of this contribution. In 1994, Leg 155 of the Ocean Drilling Program recovered over 4 km of core material from 17 sites on the Amazon Fan. We report on the provenance (heavy mineral, quartz grain morphology, geochemistry and grain size) of sands recovered from the Fan. Initial findings indicate that sand compositions vary through a glacial cycle. The older units in the Upper Levee Complex (U.L.C.) have a pyroxene-dominated heavy mineral suite, and a relatively low proportion of glacially derived quartz grains, whilst the younger units in the U.L.C. have an amphibole-epidote-dominated heavy mineral suite, and a larger proportion of glacially-derived quartz grains. These results suggest either a change in provenance or climate, or a combination of both over a glacial cycle. Core samples studied appear to be unaffected by diagenesis, whilst abrasion during transport has had little effect on individual grains.

Keywords: Amazon Fan; Sand; Provenance

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