Sources and transport routes for Cretaceous turbidite sands from the Newfoundland Basin, ODP site 1276

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ODP Site 1276 is located east of the Grand Banks and south of Flemish Cap, at a water depth of 4 560 m. Cores were collected from 800–1 739 m below the seafloor in lower Oligocene to lowest Albian rocks. The hole was not logged because of engineering problems. Sedimentation rate was <5–7 m/m.y. from the earliest Oligocene to the Cenomanian, but was ~20–100 m/m.y. during the Albian. The Cretaceous deposits are ~65% hemipelagic, bioturbated mudrocks, and ~33% turbidites (and their kin). Many of the turbidites are mud-dominated. Minor rock types are Coniacian-Turonian sandy contourites and Albian black shales containing mostly terrestrial organic carbon.

Deeper cores show bedding dips of ~10° in a borehole with a measured deviation of 7.4° from the vertical. Seismic reflections dip much less: ~2.5° toward an azimuth of 130º. These results strongly suggest that the borehole is deviated downdip. If true, the dip line in cores provides a geographic reference direction for paleocurrent measurements. Eleven current-ripple foreset dips and five sand-grain fabric determinations from the basal divisions of turbidites indicate paleoflow toward the NNE. These data and regional paleogeography implicate the Avalon Uplift and/or a broader area of eastern Newfoundland as the source of the Cretaceous detritus.

The average sandstone composition ($Q_{57}F_{23}L_{20}$) and the variety of metamorphic (including metasedimentary) and sedimentary lithic fragments are consistent with a source on the Grand Banks. The relatively low average K-feldspar content ($Qm_{71}K_{8}P_{21}$) is unlike that of time-equivalent Iberian sandstones, and appears to preclude a primary Iberian source for the Cretaceous sand fraction. At first sight, this conclusion seems to be at odds with results from Ar/Ar dating of detrital white micas. Fifty-seven detrital white micas were separated from five sandstone beds; 42% have Hercynian ages of 270–340 Ma, and only 9% have older ages (~400–600 Ma). An Appalachian provenance should have provided mostly >400 Ma detritus, whereas an Iberian provenance can more easily account for the Hercynian mica ages. The width and bottom morphology of the Albian ocean basin and our own paleocurrent data rule against direct sediment-supply from Iberia. Instead, we advocate recycling of the white micas from Hercynian foreland-basin deposits that likely covered the Grand Banks. The Hercynian Front is typically placed close to the line of continental breakup in this area, so the associated foreland basin should have extended westward onto the Grand Banks. The Site 1276 sandstones and other studied Grand Banks sandstones are quartzolithic and fall within the *Recycled Orogen* compositional field of W.R. Dickinson. In Iberia, by Jurassic and Cretaceous times, erosion had unroofed granite batholiths so that they became a major source of quartzofeldspathic sands deposited on the adjacent margin - the batholiths would not have been unroofed at the time the Hercynian foreland basin was being filled.