Identifying biogenic silica: Mudrock micro-fabric explored through charge contrast imaging

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ABSTRACT

Visual inspection (optical microscope point counting) and silica abundance show that laminated shale from the Late Cretaceous of Colombia contains high levels of detrital quartz silt and sand particles. Closer examination using the charge contrast imaging (CCI) technique, however, illustrates that much of the quartz is authigenic micro-quartz, and thus not exclusively of detrital origin. In addition, many "sand" grains that otherwise appear to represent simple detrital quartz particles are actually of biogenic origin, representing the tests of agglutinated foraminifera, formed from cemented silt-sized quartz particles. Finally, CCI shows that original detrital grains have undergone authigenic modification, with both syntaxial overgrowths and micro-quartz. Without recognition of these features, the relative proportion of detrital quartz (sand) would otherwise be greatly overestimated, with important implications for environmental interpretation. Furthermore, the recognition of biogenic structures, including agglutinated foraminifera, provides additional environmental information that otherwise could be easily overlooked.

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