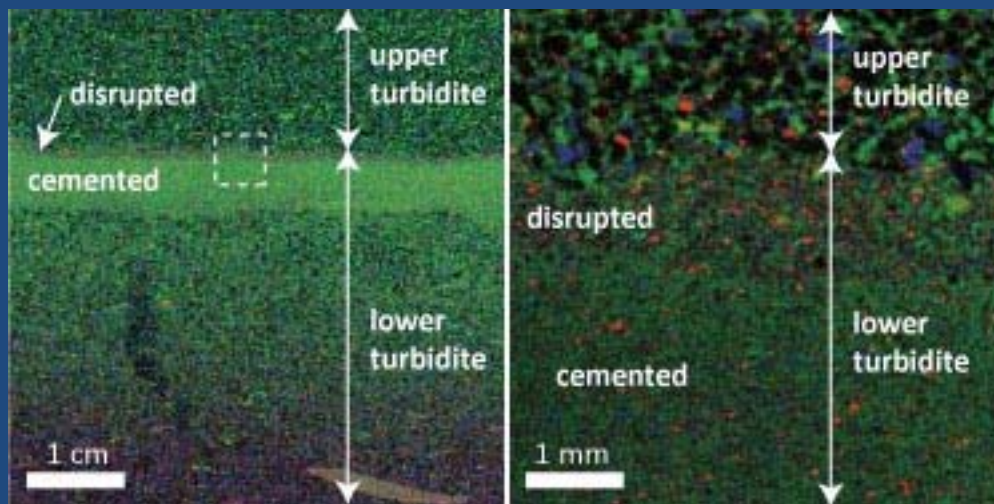


# Heavy Mineral Sorting Processes and Their Geochemical Detection in the Brushy Canyon Formation

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Geochemical image of the top of a sedimentary bed that was converted into rock before deposition of the bed on top of it. Red is iron, green is calcium, and blue is potassium. Image on right is enlarged from dashed box on left. Note bright green cemented layer beneath a 1-2-mm-thick disrupted top and abundance of iron-rich grains in the top, suggesting that cementation took place in the anaerobic zone of the lower bed.

Carbonate cements are common in organic-rich sedimentary rocks and significantly modify rock porosity, permeability, and fracture mechanics in both conventional and unconventional reservoirs. Tops of sandstone beds in our study area were cemented before the next bed was deposited on top of them, implying very early cementation. Our geochemical mapping data suggest that carbonate cements formed in the anaerobic zone, and most likely in the iron reducing zone, of bed tops during intervals when the basin contained only a small amount of oxygen. These cements modified sediment transport and deposition patterns in an area currently functioning as an active hydrocarbon reservoir. If widely developed, similar cements in other settings would play a role in determining rock properties of reservoirs deposited in deep-water settings.