



## **Origin of Chert in Biogenic-Rich Carbonate Sediments from the Eocene Thebes Formation of Egypt**

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Chert and porcelanite samples from the Thebes Formation in southeastern Egypt along the Red Sea coast and in the southwestern Sinai along the Gulf of Suez were examined in this study. The siliceous samples include a spectrum from weakly silicified cherts, dolomites and limestones to mature quartz cherts, and from relatively shallow slope settings to deeper ocean floor environments.

The source of silica for chert formation in the Thebes Formation is most commonly from the accumulation of biogenic silica (opal-A) on the sea floor. Although the evidence for this interpretation is not always abundant in all the samples studied, it is clear in some. Partly preserved parts of shells of diatoms are commonly present in some of the samples studied. Apparently, siliceous microfossils, which were probably abundant in these lithologies at the time of deposition, have dissolved and the silica (opal-A) reprecipitated as opal-CT and/or quartz.

Biogenic opal (opal-A) in the Thebes Formation may have transformed directly to quartz without an intermediate opal-CT stage. This interpretation is documented by the results from the XRD and SEM analyses. Based on these data, two hypotheses can then be made: a) that the opal-CT has completely transformed to (or been replaced by) quartz, or b) that the opal-CT phase did not exist. The second hypothesis is more likely for several reasons: 1) no evidence of an opal-CT precursor stage was recorded from the samples; 2) microfossil cavities and intergrain pores are most commonly filled with microcrystalline or cryptocrystalline quartz; no opal-CT lepispheres or opal-CT crystals were seen in any of these samples; 3) quartz crystals which fill micro-pores in these rocks most commonly have sizes greater than 3 microns; this size exceeds the size of individual opal-CT blades, suggesting that the quartz in these cases is not a replacement of opal-CT blades.