Discussion of the Occurrence and Origin of Sedimentary Palygorskite-Sepiolite Deposits

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Abstract: Marine and non-marine palygorskite-sepiolite deposits are found throughout the world and occur interbedded with chert, dolomite, limestone, phosphates and other non-detrital sedimentary rocks. The origin of these high-magnesium clays has long been attributed to either alteration of volcanic ash or the structural transformation of smectite clays. More recently, others have argued origin by direct crystallization (neo-formation). Recent laboratory studies support this latter concept, particularly in environments where the concentration of alumina is low, the silica concentration high, and the pH alkaline. Such an origin is proposed for the Georgia-Florida deposits in southeastern United States, since major obstacles exist against formation by alteration of volcanic ash or by transformation of smectites. Lateritic weathering during the Miocene would have favored direct precipitation of these clays in the shallow, marginal seas. The basinward increase in the MgO: Al_2O_3 ratio is further support.

Deep weathering of crystalline rocks in northern British Honduras and Guatemala would have produced similar high silica, low alumina conditions on the adjacent submerged Yucatan Platform during the late Tertiary. The seaward increase in the $MgO:Al_2O_3$ ratio, the lack of associated detrital constituents, and the absence of associated smectites strongly indicate a similar origin by direct crystallization of these Yucatan palygorskite-sepiolite clays.

Some occurrences of palygorskite and sepiolite may well be related to the alteration of smectite clays or volcanic ash. However, many of the large sedimentary deposits are more probably the result of direct crystallization adjacent to areas undergoing tropical or subtropical weathering.

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