



The origin of the fluid mud layer in Lake Apopka, Florida

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ABSTRACT: Since it switched from a macrophyte-dominated state to a turbid, algal-dominated state in 1947, Lake Apopka has developed a layer of flocculent sediments with characteristics of fluid mud covering most of the lakebed and averaging 47 cm in thickness in 1996. Waves in this large, shallow lake frequently resuspend the upper portion of the fluid mud and frustrate programs designed to decrease the trophic state. We tested two hypotheses for its origin, one that the fluid mud layer represents the buildup of organic materials that had accumulated since 1947, the other that it was derived primarily by the liquefaction of the underlying macrophyte-derived consolidated sediments. We examined (1) changes in the mean depth of the lake relative to changes in fluid mud thickness; (2) ^{210}Pb dating of the sediments; (3) organic matter budget for the lake; (4) inorganic particle budget for the lake; and (5) chemical markers of sediments produced during the macrophyte stage (biogenic silica from sponges, long-chain n-alkanes from macrophytes, and ^{13}C) in the fluid mud. The evidence indicates that a major portion of the fluid mud can be attributed to the liquefaction of underlying consolidated sediments that were produced during the macrophyte stage of the lake. It follows that the fluid mud layer is less a direct consequence of eutrophication than a consequence of enhanced wave action on the lakebed following the loss of macrophyte dominance in this lake.

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