

**ELECTROMAGNETIC EXPLORATION OF THE COASTAL AQUIFER, QUINTANA  
ROO, MÉXICO.**

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**ABSTRACT**

Fifty-four electromagnetic soundings, using a Geonics EM34-3 instrument that operates with low induction numbers, were conducted in a small area south of Playa del Carmen, Quintana Roo, in order to obtain the electromagnetic signature of the unsaturated zone, fresh water lens and salt water lens. The Peninsula of Yucatan consists of a mature karstic system in which a thin, fresh water lens is the sole-source aquifer. The saltwater wedge was mapped using conductivity contour maps, where the high values are associated with salt water. The area where the EM surveys were carried out is an active quarry, and good hydrogeologic control exists, including three cenotes (sinkholes) and one well that penetrate through the salt/fresh water interface. These data were used to construct a simple conceptual model for the study area.

The hydrogeological model consists of three layers: the unsaturated zone, the freshwater lens, and the fresh/salt water interface. The first layer has conductivities that fall in the range between 1.02 to 2.8 millimho/m. Physically it is found four to 16 meters above the watertable, and it consists of limestone reef deposits. The second layer has conductivities between 16.6 to 20.8 millimho/m. This layer consists of limestone saturated with freshwater and its thickness varies as a function of distance from the coast. Finally the third layer, is the top of the fresh/salt water interface, with conductivities above 180 milimho/m.

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