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A long history of paleoenvironmental change in the Lowland Neotropics: Initial results from the Lake Petén Itzá Scientific Drilling Project, Guatemala

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We report initial results from the ICDP-sponsored Petén Itzá Scientific Drilling Project (PISDP), which is expected to recover a long terrestrial record of paleonvironmental change in the lowlands of Central America. During the last glaciation, all shallow lake basins in the northern lowland Neotropics were dry because of increased aridity and/or lowered sea level; consequently, no continuous lacustrine records have yet been recovered from this region. Detailed seismic surveys of Lake Petén Itzá in northern Guatemala revealed that this lake is deep (160 m) and possesses a thick (>100 m) stratigraphic section. Its great depth suggests that the basin held water even during arid glacial periods. In fact, seismic profiles show a basin-wide paleoshoreline at ˜56 m below present lake level that formed during the last glacial lowstand when the lake was reduced to only ˜13 % of its present volume. In piston cores taken landward of the paleoshoreline feature, glacial-age deposits consist of paleosols, indicating subaerial exposure. Basinward of the shoreline, sediments are composed of dense gypsum sands and interbedded silty clays, reflecting authigenic gypsum formation under arid climate conditions. The top of the soil horizon and cessation of gypsum precipitation are represented by a strong seismic reflection that has been dated in several cores at 10.2 cal kyr BP. This transition represents a shift from arid Late Glacial to moist early Holocene conditions that coincided with the end of the Preboreal Period in Europe. From seismic profiles, we infer a similar sediment response to climate variations in the older stratigraphic sequences. We expect to recover these older sedimentary sequences

during a two month drilling campaign to occur in Jan-Mar 2006. Six primary and four alternative drilling sites have been identified that form a depth transect extending from ~30 m below present lake level to near the deepest point (~150 m) in Lake Petén Itzá. A sequence stratigraphic approach will be employed to constrain the vertical range of past lake level variations for glacial, interstadial, and interglacial stages during the late Pleistocene. Deep-water cores should provide continuous records of paleoclimate and paleoenvironmental change that will be compared with marine cores from the nearby Cariaco Basin and Greenland ice cores. In so doing, we will test the hypothesis that changes in precipitation in the lowland Neotropics were largely related to meriodinal displacements in the mean position of the Atlantic ITCZ on orbital and suborbital time scales.