

Maya Civilization Done In By Brightening Of The Sun

The Maya were talented astronomers, religiously intense in their observations of the sun, moon and planets. Now, new research shows something in the heavens may have influenced their culture and ultimately helped bring about their demise.

In an article in today's issue of the journal *Science*, a team of researchers led by a University of Florida geologist reports finding that the Yucatan Peninsula, seat of the ancient Maya civilization, was buffeted by recurrent droughts.

More importantly, the research shows, the droughts -- one of which is thought to have contributed to the collapse of the Maya civilization -- appear to have been caused by a cyclical brightening of the sun.

"It looks like changes in the sun's energy output are having a direct effect on the climate of the Yucatan and causing the recurrence of drought, which is in turn influencing the Maya evolution," said David Hodell, a UF professor of geology and the paper's lead author.

In 1995, Hodell and two colleagues at UF published results in the journal *Nature* suggesting that the ninth-century collapse of the Maya civilization may have been influenced by a severe drought that lasted for more than 150 years.

The paper, co-authored by Mark Brenner, a UF assistant professor of geology and director of UF's Land Use and Environmental Change Institute, and Jason Curtis, a UF geology researcher, was based on analysis of a sediment "core" from Lake Chichancanab on the north central Yucatan Peninsula in Mexico.

Cores are samples of lake sediment retrieved by driving a hollow tube into the lake bottom. The sediments are deposited layer by layer, like a wedding cake, with the oldest layer at the bottom. Such cores provide a timeline that allows researchers to obtain a continuous record of changes in climate, vegetation and land use.

For the latest research, Hodell, Brenner and Curtis returned to the lake and collected a new series of cores. The researchers discovered layers of calcium sulfate, or gypsum, concentrated at certain levels in the cores.

Lake Chichancanab's water is nearly saturated with gypsum. During dry periods, lake water evaporates and the gypsum falls to the lake bottom. The layers therefore represent drought episodes. The researchers found the recurrence of the deposits is remarkably cyclical, occurring every 208 years, although they varied in intensity.

The 208-year cycle caught the researchers' attention because it is nearly identical to a known 206-year cycle in solar intensity, Hodell said. As part of that cycle, the sun is most intense every 206 years, something that can be tracked through measuring the production of certain radioactive substances such as carbon-14.

The researchers found the drought episodes occurred during the most intense part of the sun's cycle. Not only that, the researchers found the droughts occurred at times when archeological evidence reflects downturns in the Maya culture, including the 900 A.D. collapse.

Such evidence includes abandonment of cities or slowing of building and carving activity.

As Hodell said, the energy received by the Earth at the peak of the solar cycle increases less than one-tenth of 1 percent, so it's likely that some mechanism in the climate is amplifying the impact in the Yucatan.

Archaeologists know the Maya were capable of precisely measuring the movements of the sun, moon and planets, including Venus. Hodell said he is unaware, however, of any evidence the Maya knew about the bicentenary cycle that ultimately may have played a role in their downfall.

"It's ironic that a culture so obsessed with keeping track of celestial movements may have met their demise because of a 206-year cycle," he said.

The cycle continues to the present, which happens to fall into about the middle of the 206-year period, Hodell said. Even a severe drought today, however, isn't likely to have the same impact on the culture as in ancient times. Brenner noted North Korea currently is suffering an extreme drought, but the country has the benefit of international aid.

"Nobody stepped in to help the Maya out," he said, "and as conditions worsened, it probably created a lot of stress among various Maya cities competing for resources."

Thomas Guilderson of the Lawrence Livermore National Laboratory assisted the UF scientists in the research, which was funded by the National Science

Foundation Paleoclimate Program. The cores were collected for a BBC program on climate and Maya culture collapse. - By Aaron Hoover

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