

Scientists: Earthquakes, El Ninos fatal to earliest civilization in Americas

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First came the earthquakes, then the torrential rains. But the relentless march of sand across once fertile fields and bays, a process set in motion by the quakes and flooding, is probably what did in America's earliest civilization.

So concludes a group of anthropologists in a new assessment of the demise of the coastal Peruvian people who built the earliest, largest structures in North or South America before disappearing in the space of a few generations more than 3,600 years ago.

"This maritime farming community had been successful for over 2,000 years, they had no incentive to change, and then all of a sudden, 'boom,'" said Mike Moseley, a distinguished professor of anthropology at the University of Florida. "They just got the props knocked out from under them."

Moseley is one of five authors of a paper set to appear next week in the online edition of the *Proceedings of the National Academy of Sciences*.

The people of the Supe Valley along the central Peruvian coast did not use pottery or weave cloth in the settlements they founded as far back as 5,800 years ago. But they flourished in the arid desert plain adjacent to productive bays and estuaries. They fished with nets, irrigated fruit orchards, and grew cotton and a variety of vegetables, according to evidence in the region unearthed by Ruth Shady, a Peruvian archaeologist and co-author of the paper. As director of the Caral-Supe

Special Archaeological Project, Shady currently has seven sites in the region under excavation.

Most impressively, the Supe built extremely large, elaborate, stone pyramid temples -- thousands of years before the better-known pyramids crafted by the Maya.

"They're impressive, enormous monuments," Moseley said.

The largest so far excavated, the Pirámide Mayor at inland settlement Caral, measured more than 550 feet long, nearly 500 feet wide and rose in a series of steps nearly 100 feet high. Walled courts, rooms and corridors covered the flat summit.

The Supe seemed to thrive in the valley for about 2,000 years. But around 3,600 years ago, an enormous earthquake -- Moseley estimates its magnitude at 8 or higher -- or series of earthquakes struck Caral and a nearby coastal settlement, Aspero, the archaeologist found. With two major plates scraping together not far offshore, the region remains one of the most seismically active in the world.

The earthquake collapsed walls and floors atop the Pirámide Mayor and caused part of it to crumble into a landslide of rocks, mud and construction materials. Smaller temples at Aspero were also heavily damaged, and there was also significant flooding there, an event recorded in thin layers of silt unearthed by the archaeologists.

But the flooding and temples' physical destruction was just the dramatic opening scene in what proved to be a much more devastating series of events, Moseley said.

The earthquake destabilized the barren mountain ranges surrounding the

valley, sending massive amounts of debris crashing into the foothills. Subsequent El Niños brought huge rains, washing the debris into the ocean. There, a strong current flowing parallel to the shore re-deposited the sand and silt in the form of a large ridge known today as the Medio Mundo. The ridge sealed off the formerly rich coastal bays, which rapidly filled with sand.

Strong ever-present onshore winds resulted in "massive sand sheets that blew inland on the constant, strong, onshore breeze and swamped the irrigation systems and agricultural fields," the paper says. Not only that, but the windblown sand had a blasting effect that would have made daily life all but impossible, Moseley said.

The bottom line: What had for centuries been a productive, if arid, region became all but uninhabitable in the span of just a handful of generations. The Supe society withered and eventually collapsed, replaced only gradually later on -- by societies that relied on the much more modern arts of pottery and weaving, Moseley said.

With much of the world's population centers built in environmentally vulnerable areas, the Supe's demise may hold a cautionary tale for modern times, the researchers said. El Niño events, in particular, may become more common as global climate change continues.

"These are processes that continue into the present," said Dan Sandweiss, the paper's lead author and an anthropology professor and graduate dean at the University of Maine.

Affirmed Moseley, "You would like to say that people learn from their mistakes, but that's not the case."

The other authors of the paper are David Keefer, a geologist and geoarchaeologist with the University of Maine's Climate Change

Institute, and Charles Ortloff, a consulting engineer who has spent the past three decades working in the Andes.

Source: University of Florida

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