Oceanographers Explain the Origins of Tampa Bay

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What made Tampa Bay Tampa Bay? Geological oceanographer Al Hine and colleagues Beau Suthard and Stan Locker of the University of South Florida's College of Marine Science explain the origins of Tampa Bay's bottom, which dates back many million years, in a paper soon to be included in a special symposium issue of the journal *Sedimentology*.

In the journal, published by the International Association of Sedimentologists, the USF scientists describe Tampa Bay's geological features and unravel geological messages related to its creation.

"Millions of people live around Tampa Bay. We travel over it on bridges and swim and fish in it," says Hine. "It's part of our daily life, but we know very little about how it came to be."

According to Hine and the article's co-authors, the bottom of the bay was birthed beginning about 15 million years ago, through a combination of ancient sink holes, folds, sags and warps, occurring over many millions of years.

"The basin that is now Tampa Bay formed between 15 and 7 million years ago, when the underlying limestone was deformed by collapses," explained Hine. "The basement of Tampa Bay consists of ancient sub-basins deformed into sinks, folds, sags and warps, later filled in by the by the sand sediments."

About four to six million years ago, the wrinkled, shallow bottom was

topped off by a massive transport of quartz sand that originated 1000 miles north.

“Ever since the first geologist walked local beaches in the early part of the last century, it was obvious to him that what we call the Florida Platform received a shipment of sand in the region’s deep, geologic past,” explains Hine.

How the sand got here is still not very well understood. But millions of years after it arrived, the ancient sand shipment was remobilized locally, probably in very wet years by river flow, and it flowed into and filled in the bottom of Tampa Bay.

According to the USF researchers, the foreign sand originated in silicate-rich bedrock in the Appalachian Mountains and Piedmont area in what is now the eastern U.S. mid-Atlantic region. The rocks that weathered to produce the sand were already hundreds of millions of years old.

“It appears that exposed silicate-rich bedrock, chemically weathered, arrived from the north through multiple sources, most likely through runoff into streams and rivers running from the mountains to the coast,” Hine speculates.

The sediment flow was deposited in the Georgia channel system and, eventually, during times when sea levels were high, the sand eventually arrived in Tampa, adding to the geological features of Tampa Bay’s basin, already millions of years old.

This combination of geological occurrences, says Hine, formed what geologist call the Florida Platform along the West Coast of Florida where geologists also observe many ancient shorelines, the record of many fluctuations in sea levels over many millions of years.

“By the late Pliocene and early Pleistocene eras - some one to two million years ago - there was a great reduction in the silicate transport system and a similar reduction in rainfall, runoff and sand transport from local rivers,” says Hine. “Tampa Bay as we know it was then geologically complete.”

The research team used a seismic reflection profiler to carry out their research. The technology, like sonar, throws out a sound beam that bounces off layers of rock and sediment and returns to the surface where the impulses are picked up by hydrophones. The data, analyzed by computer, reveals geological features as images.

The authors point out that Charlotte Harbor, 100 miles to the south, was formed by the same geological processes – basin collapse, fold, sag and warp – and capped by an overlay of transported silicate.

So, how can we use this knowledge?

“The research can help us understand fresh groundwater flow and how nutrients or pollutants get into the bay,” says Hine. “Knowing the thickness of the sediment and where the bedrock is important to dredging and pipeline burying.”

Source: University of South Florida