

## Did Columbus contribute to a Little Ice Age?

Christopher Columbus and his crew set sail in 1492, enduring a five-week journey that launched the European conquest of the Americas. Historians have documented how Columbus and the wave of explorers that followed him across the Atlantic forever altered the landscape and population of the Americas.

Now research shows that the explorers' influence might have reached to the skies. Richard Nevle, a geochemist from Stanford University, reported this new impact at a recent meeting of geologists in Minneapolis. Geologists study Earth, and geochemists study the chemicals and molecules in soil, rock and water.

By connecting different studies like puzzle pieces, Nevle and his colleagues have linked the explorers' arrival to a period of cold temperatures called the Little Ice Age. Scientists say that during the Little Ice Age, which lasted from the 16<sup>th</sup> century until the 19<sup>th</sup> century, temperatures dropped and large, slow-moving rivers of ice, called glaciers, formed in northern Europe. Researchers often study glaciers to understand how Earth's climate changes.

After Columbus and other explorers arrived in the Americas, some native Americans fled, but most died from new diseases, like smallpox, introduced by the Europeans. The native people left behind large patches of land cleared to create fields. Over time, trees grew back.

Trees "breathe," but not like people, who inhale oxygen and exhale carbon dioxide. For trees, breathing works the opposite way: They absorb carbon dioxide from the air and release oxygen. Nevle and his team found that the trees that grew on the previously cleared land covered an area at least the size of California. The team says the trees could have removed between two billion and 17 billion tons of carbon dioxide gas from the air.

Carbon dioxide traps heat and helps the atmosphere stay warm, so a massive withdrawal of carbon dioxide could cause a drop in temperature. Nevle and his team found that the carbon dioxide taken in by North America's new trees could have lowered the temperature.

"We have a massive reforestation event that's [withdrawing] carbon ... coincident with the European arrival," Nevle told *Science News*.

Scientists learned that atmospheric carbon dioxide levels dropped during the Little Ice Age by studying ice that's been frozen for hundreds of years in Antarctica. Bubbles trapped in the ice contain the conditions of the atmosphere at the time the ice formed, and scientists have found that bubbles from the Little Ice Age contained lower levels of carbon dioxide than bubbles from older or newer ice.

Not all scientists agree that the regrown forests in North America played such a key role in the change in temperature. More volcanoes and colder oceans, as well as a quieter sun cycle, might have helped cool the atmosphere. Michael Mann, a climate researcher at Pennsylvania State University in State College, told *Science News* that these kinds of natural events better explain why some places got colder than others during this period.

Others point to Nevle's study as showing an early example of how human activity changes the climate. Earth scientist Jed Kaplan studies climate change at the Federal Polytechnic School of Lausanne in Switzerland. He told *Science News* that more research is needed to back up Nevle's study, but the connection deserves investigation. "There's nothing else happening in the rest of the world at this time, in terms of human land use, that could explain this rapid carbon uptake," he said.



These are replicas of the Pinta (left) and the Niña (right), two of the three ships that accompanied Columbus and his crew in 1492. Recent research finds that the explorers' arrival in the Americas may have contributed to a cooling of temperatures known as the Little Ice Age. Credit: NASA Marshall Space Flight Center

**climate** The weather conditions in an area over a long period of time.

**Little Ice Age** A cold period that lasted from the 16<sup>th</sup> to the 19<sup>th</sup> century and reached its peak during the 17<sup>th</sup> century.

**glacier** A slowly moving mass or river of ice formed by the accumulation and compaction of snow on mountains or near the poles.

**carbon dioxide** A colorless, odorless gas produced by burning carbon and organic compounds and by respiration. It is naturally present in air and is absorbed by plants in photosynthesis.