

# World's oldest weather report could revise Bronze Age chronology

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A new translation of a 6-foot-tall calcite block called the Tempest Stela suggests the Egyptian pharaoh Ahmose ruled at a time 30 to 50 years earlier than previously thought—a finding that could change scholars' understanding of a critical juncture in the Bronze Age. Credit: Metropolitan Museum of Art

(Phys.org) —An inscription on a 3,500-year-old stone block from Egypt may be one of the world's oldest weather reports—and could provide new evidence about the chronology of events in the ancient Middle East.

A new translation of a 40-line inscription on the 6-foot-tall calcite block called the Tempest Stela describes rain, darkness and "the sky being in storm without cessation, louder than the cries of

the masses."

Two scholars at the University of Chicago's Oriental Institute believe the unusual weather patterns described on the slab were the result of a massive volcano explosion at Thera—the present-day island of Santorini in the Mediterranean Sea. Because volcano eruptions can have a widespread impact on weather, the Thera explosion likely would have caused significant disruptions in Egypt.

The new translation suggests the Egyptian pharaoh Ahmose ruled at a time closer to the Thera eruption than previously thought—a finding that could change scholars' understanding of a critical juncture in human history as Bronze Age empires realigned. The research from the Oriental Institute's Nadine Moeller and Robert Ritner appears in the spring issue of the *Journal of Near Eastern Studies*.

The Tempest Stela dates back to the reign of the pharaoh Ahmose, the first pharaoh of the 18th Dynasty. His rule marked the beginning of the New Kingdom, a time when Egypt's power reached its height. The block was found in pieces in Thebes, modern Luxor, where Ahmose ruled.

If the stela does describe the aftermath of the Thera catastrophe, the correct dating of the stela itself and Ahmose's reign, currently thought to be about 1550 B.C., could actually be 30 to 50 years earlier.

"This is important to scholars of the ancient Near East and eastern Mediterranean, generally because the chronology that archaeologists use is based on the lists of Egyptian pharaohs, and this new information could adjust those dates," said Moeller, assistant professor of Egyptian archaeology at the Oriental Institute, who specializes in research on ancient urbanism and chronology.

In 2006, radiocarbon testing of an olive tree buried

under volcanic residue placed the date of the Thera eruption at 1621-1605 B.C. Until now, the archeological evidence for the date of the Thera eruption seemed at odds with the radiocarbon dating, explained Oriental Institute postdoctoral scholar Felix Hoeflmayer, who has studied the chronological implications related to the eruption. However, if the date of Ahmose's reign is earlier than previously believed, the resulting shift in chronology "might solve the whole problem," Hoeflmayer said.

The revised dating of Ahmose's reign could mean the dates of other events in the ancient Near East fit together more logically, scholars said. For example, it realigns the dates of important events such as the fall of the power of the Canaanites and the collapse of the Babylonian Empire, said David Schloen, associate professor in the Oriental Institute and Near Eastern Languages & Civilizations on ancient cultures in the Middle East.

"This new information would provide a better understanding of the role of the environment in the development and destruction of empires in the ancient Middle East," he said.

For example, the new chronology helps to explain how Ahmose rose to power and supplanted the Canaanite rulers of Egypt—the Hyksos—according to Schloen. The Thera eruption and resulting tsunami would have destroyed the Hyksos' ports and significantly weakened their sea power.

In addition, the disruption to trade and agriculture caused by the eruption would have undermined the power of the Babylonian Empire and could explain why the Babylonians were unable to fend off an invasion of the Hittites, another ancient culture that flourished in what is now Turkey.

### 'A TEMPEST OF RAIN'

Some researchers consider the text on the Tempest Stela to be a metaphorical document that described the impact of the Hyksos invasion. However, Ritner's translation shows that the text was more likely a description of weather events consistent with the disruption caused by the massive Thera explosion.

Ritner said the text reports that Ahmose witnessed the disaster—the description of events in the stela text is frightening.

The stela's text describes the "sky being in storm" with "a tempest of rain" for a period of days. The passages also describe bodies floating down the Nile like "skiffs of papyrus."

Importantly, the text refers to events affecting both the delta region and the area of Egypt further south along the Nile. "This was clearly a major storm, and different from the kinds of heavy rains that Egypt periodically receives," Ritner said.

In addition to the Tempest Stela, a text known as the Rhind Mathematical Papyrus from the reign of Ahmose also makes a special point of mentioning thunder and rain, "which is further proof that the scholars under Ahmose paid close and particular attention to matters of weather," Ritner said.

Marina Baldi, a scientist in climatology and meteorology at the Institute of Biometeorology of the National Research Council in Italy, has analyzed the information on the stela along with her colleagues and compared it to known weather patterns in Egypt.

A dominant weather pattern in the area is a system called "the Red Sea Trough," which brings hot, dry air to the area from East Africa. When disrupted, that system can bring severe weather, heavy precipitation and flash flooding, similar to what is reported on the Tempest Stela.

"A modification in the atmospheric circulation after the eruption could have driven a change in the precipitation regime of the region. Therefore the episode in the Tempest Stela could be a consequence of these climatological changes," Baldi explained.

Other work is underway to get a clearer idea of accurate dating around the time of Ahmose, who ruled after the Second Intermediate period when the Hyksos people seized power in Egypt. That work also has pushed back the dates of his reign closer to the explosion on Thera, Moeller explained.

Provided by University of Chicago

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