

Fracture zones endanger tombs in Valley of Kings

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This is a photograph of a damaged ceiling in tomb KV6 in the Valley of the Kings, Luxor, Egypt. The top portion of the image shows areas damaged by water and repaired cracks. Credit: Katarin Parizek

Ancient choices made by Egyptians digging burial tombs may have led to today's problems with damage and curation of these precious archaeological treasures, but photography and detailed geological mapping should help curators protect the sites, according to a Penn State researcher.

"Previously, I noticed that some tomb entrances in the Valley of Kings, Luxor, [Egypt](#), were aligned on fracture traces and their zones of fracture concentration," said Katarin A. Parizek, instructor in digital photography, department of integrative arts. "From my observations, it seems that tomb builders may have intentionally exploited these avenues

of less resistant limestone when creating [tombs](#)."

Fracture traces are the above-ground indication of underlying zones of rock fracture concentrations. They can be between 5 and 40 feet wide, but average about 20 feet and can be as long as a mile. Lineaments are similar geological features that exceed one mile in length. Geologists suggest that fracture traces are good locations for drilling water wells and probably the highly fractured rock made it easier for the Egyptians to dig tombs.

Working with Richard R. Parizek, professor of geology and geoenvironmental engineering, Parizek has now looked at 33 of the 63 known tombs in the Valley of Kings. She reports her results today (Oct. 18) at the annual meeting of the Geological Society of America in Portland, Or.

"We have now documented nine tombs in detail, photographing and mapping the entire tombs inside and out, and preliminary observations have been made in another ten, which still have to be mapped in detail." said Parizek. "We have recorded 14 more tombs through field observations, but still need to map and photograph these as well."



Katarin Parizek, instructor in digital photography, department of integrative arts, Penn State, photographs the wall of Tia's tomb in the Valley of Kings, Luxor, Egypt. Credit: Katarin Parizek, Penn State

Of the 63 tombs in the Valley of the Kings, so far 30 have been identified by Parizek as lying on fracture traces, two lie diagonal to a trace and one is completely off of this type of geological structure.

The importance of these [geological features](#) is not just that they allow easier tomb creation, but the fracture traces are natural entry points for water, which sometimes damage tombs.

"We have seen evidence of seven separate flood events in four tombs so far," said Parizek.

When it does rain in the area, water enters the fracture traces and runs through the zones of fracture. Because so many of the tombs are located on the traces, the water runs into the tombs destroying wall and ceiling paintings and causing the tomb surfaces to spall or flake off. Even if archaeological curators divert water away from the entrances of known tombs, they may be directing the water to currently undiscovered tombs and flooding them.

"Archaeologists try very hard to mitigate flooding in the tombs, but it becomes even harder if there are tombs flooding that no one knows about," says Parizek.

The geological information the team has been gathering is now allowing archaeologists to plan better ways to stop the flooding of both known and unknown tombs by diverting the water away from traces and exposed

entrances.

Parizek also notes that archaeologists are using this geological information along with archaeological clues to explore for new tombs and other archaeological sites in the Valley of Kings. In February 2006, KV63 was discovered by professor Otto Schaden.

"This tomb is localized along master joints immediately adjacent to a zone of fracture concentration that we mapped in 2002," said Parizek.

This discovery supplied evidence the Parizeks' original hypothesis that tombs were dug on fracture traces and into fracture zones is correct.

For the last two years, Zahi Hawass, Secretary General of the Supreme Council of Antiquities and a renowned Egyptian archaeologist, has been leading an extensive exploration effort within the Valley of Kings.

"He is using our geological information along with archaeological clues to guide excavations," said Parizek.

The researchers hope to investigate and map the geology of more tombs in the future and to combine the photographs and maps to create 3-D images of the tombs.

Source: Pennsylvania State University ([news](#) : [web](#))

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