

What the origins of stone sculptures can tell us about an ancient Andean civilization

ASU research gleans further insight into the political power of the early city of Tiwanaku

By Mara Busch, ASU News
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By studying ancient statues in South America, a group of researchers from Arizona State University have gleaned further insights into the cosmological and political power of an ancient civilization.

The team, from ASU's School of Human Evolution and Social Change, [investigated the origins of volcanic stone](#) that was used to produce sculptures of human-animal hybrids — called chachapumas — and found that the stone was cultivated from sacred locations more than 40 km (nearly 25 miles) away.

These statues were created in the early city of Tiwanaku, a pre-Columbian civilization that flourished from 500–1,000 CE, located in the Lake Titicaca basin of Bolivia.

“The significance lies in the fact that, although the people of Tiwanaku had access to local stone resources, they chose to transport volcanic stone from more distant locations, a process that would have required considerable effort and coordination,” said [Luis Flores-Blanco](#), lead author of the study and postdoctoral scholar with the [School of Human Evolution and Social Change](#).

“This evidence suggests that practical considerations alone cannot explain these decisions. Instead, the symbolic importance of the regions from which these stones were obtained likely influenced the selection of materials used to create these sculptures,” he said.

The findings reveal and open new possibilities for archaeologists to investigate how pilgrimage centers like Tiwanaku emerged and were built in the ancient Andes.

By suggesting that the materials used to construct the sculptures may have carried meanings that extend beyond purely practical function, the findings provide a potential link between sacred places

and broader regional landscapes.

These findings also represent a breakthrough in determining the origins of volcanic rock, like the ones used to make the Tiwanaku sculptures, a question that has historically posed a difficult challenge for archaeologists.

“The Titicaca Basin is geologically diverse, with numerous volcanic formations that can appear very similar to one another,” Flores-Blanco said. “Unlike obsidian, which has been extensively studied and for which well-established sourcing methods exist, determining the provenance of other volcanic rocks has remained much more challenging. As a result, the origins of the stones used to make many Tiwanaku sculptures have remained an open question for decades.”

Researchers were able to achieve this scientific breakthrough through the use of portable X-ray fluorescence equipment and statistical methodologies to conduct a compositional analysis of eight Tiwanaku chachapumas.

“Portable XRF allowed us to analyze the chemical composition of the sculptures in a non-destructive way, which is especially important when working with museum collections and culturally significant artifacts,” Flores-Blanco said. “To strengthen our interpretations, we also reanalyzed geological samples using laboratory-based XRF at [ASU's METAL facilities](#), providing an independent line of instrumental validation. By combining these geochemical data with multivariate statistical analyses, we were able to identify geological sources whose chemical signatures most closely matched those of the chachapuma sculptures.”

Next steps for the researchers include plans to expand this research by analyzing a larger number of sculptures and geological samples from across the Titicaca Basin.

“We are particularly interested in comparing Tiwanaku with earlier centers such as Pucara in the northern Titicaca region to investigate whether the emergence of Andean states was connected to the creation of pilgrimage centers built using materials from sacred landscapes,” Flores-Blanco said.

They also plan to incorporate new analytical techniques that the researchers recently conducted at the Field Museum in Chicago, called laser ablation inductively coupled mass spectrometry analysis, to achieve even higher resolution geochemical characterization in order to continue to uncover deeper insights into the development of ancient civilizations.

“Ultimately, we want to understand whether the movement of stone from sacred mountains and other meaningful places played a role in the development of political authority, religious practice and state formation in the ancient Andes,” Flores-Blanco said.

About the study

The article “[Volcanic stone sculptures of were-animals at Tiwanaku: pXRF and statistical analyses suggest regional geochemical provenance of chachapuma statues](#)” was recently published in the Journal of Archaeological Science: Reports. [Patrick Ryan Williams](#), professor and school director, also served as a co-author of the article.

This story originally appeared on [ASU News](#).

Main image



The archaeological site of Tiwanaku, a pre-Columbian civilization that flourished from 500–1,000 CE, located in the Lake Titicaca basin of Bolivia. Photo courtesy of Luis Flores-Blanco

Text image(s)



Stone sculptures of chachapumas from the Lake Titicaca site. Photo courtesy of Luis-Flores Blanco