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Press release

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World Congress on Mummy Studies in Cusco, Peru: High-resolution 3D Documentation of the Iceman Mummy and Associated Finds Presented

Technical milestone and important contribution to preventive conservation

Cusco/Peru - An innovative project on documentation conducted by the South Tyrol Museum of Archaeology was presented at the 11th World Mummy Congress in Cusco, Peru on Thursday, 14 August 2025. It is a novel, preventive conservation measure which uses photogrammetry technology and artificial intelligence. The project sets new standards in the digital preservation of prehistoric finds – most notably of the world-renowned, 5,300-year-old glacier mummy Ötzi.

The Iceman's health was also a topic of discussion in Cusco. At the congress Patrizia Pernter, radiologist from the South Tyrolean Health Service and member of the South Tyrol Museum of Archaeology's advisory board, presented findings that demonstrate the mummy's atherosclerosis.

Experts from the company Arc-Team (Cles/Sexten-Sesto), led by archaeologist and 3D expert Luca Bezzi, combined high-resolution photo technologies with AI to create digital models of the mummy and his fragile artifacts, including objects made of wood, leather, and fur. The photogrammetry technique "structure from motion (SfM)," AI-assisted neural radiance fields (NeRF), and polarization photography were used to overcome the challenges of capturing reflective and sensitive surfaces.

Additionally, the resulting 3D image of the mummy was linked to computed tomography scans, offering a detailed three-dimensional anatomical view. Every step of the process was done using free

and open-source software (FLOSS) with the aim of ensuring accessibility and reproducibility in the long term.

“This type of high-end documentation allows us, on the one hand, to examine and research the mummy while he is safely kept in the refrigerated storage cell. On the other hand, high-resolution images of surfaces document the state of preservation of both the mummy and the associated finds with the utmost precision, far more precisely than regular images or the human eye could,” **Elisabeth Vallazza**, director of the South Tyrol Museum of Archaeology said of the project. “Our colleagues from the world of mummy research were very interested in our presentation here in Cusco. Other museums could also use this technology to bring the documentation and accessibility of their objects to a whole new level,” commented Vallazza.

Luca Bezzi added, “the project shows what the future of conservation and research on sensitive objects could look like: non-invasive, extremely precise, and freely accessible. It sets new standards for documenting and monitoring our cultural heritage and ensures that future research projects can access large amounts of valuable data.”

Ötzi’s health was the focus of another lecture at the Mummy Congress: A research team led by radiologist **Patrizia Pernter** examined the state of the Iceman’s blood vessels and compared them to the health situation of modern patients. Pathological changes in the blood vessels are clearly visible in the mummy’s CT scans. Atherosclerosis was already detected in Egyptian mummies as a part of the “Horus” research project led by the American scientist Gregory Thomas. This showed it is a disease which has been part of human history for a long time. Ötzi is, however, the oldest known patient to have suffered from this vascular disease.

For further information:

Luca Bezzi, Alessandro Bezzi, Rupert Gietl, Cicero Moraes, Giuseppe Naponiello, Sara Airò, Andreas Putzer, Elena Silvestri: Digital twins of archaeological finds: open-source technologies applied to 3D scanning. In: *Archeologia e Calcolatori* 35.2 (2024) 203-214. Link: **doi 10.19282/ac.35.2.2024.22**

Patrizia Pernter, Beatrice Pedrinolla, Paul Gostner: Das Herz des Mannes aus dem Eis. Ein paleoradiologischer Fall. In: *RöFo* (2018) 190(01). Link: doi: [10.1055/s-0043-119890](https://doi.org/10.1055/s-0043-119890)

Photos:

- Work on the photogrammetry project and 3D results © Arc-Team
- Elisabeth Vallazza and Luca Bezzi at the 11th World Congress on Mummy Studies in Cusco, Peru, August 14, 2025 © South Tyrol Museum of Archaeology / Arc-Team
- Vascular disease at the Iceman © Bolzano Hospital

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