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DANCING ON THE VULCANO: LUXOR SEM COATER ON THE FAGRADALSFJALL IN ICELAND

In May 2023, LUXOR was invited by Thermo Scientific to join their expedition to the Fagradalsfjall vulcano in Iceland for a first-of-its-kind expedition to study microbial life and metastable minerals in lava tubes formed by volcanic eruption.

WHAT IS IT ALL ABOUT?

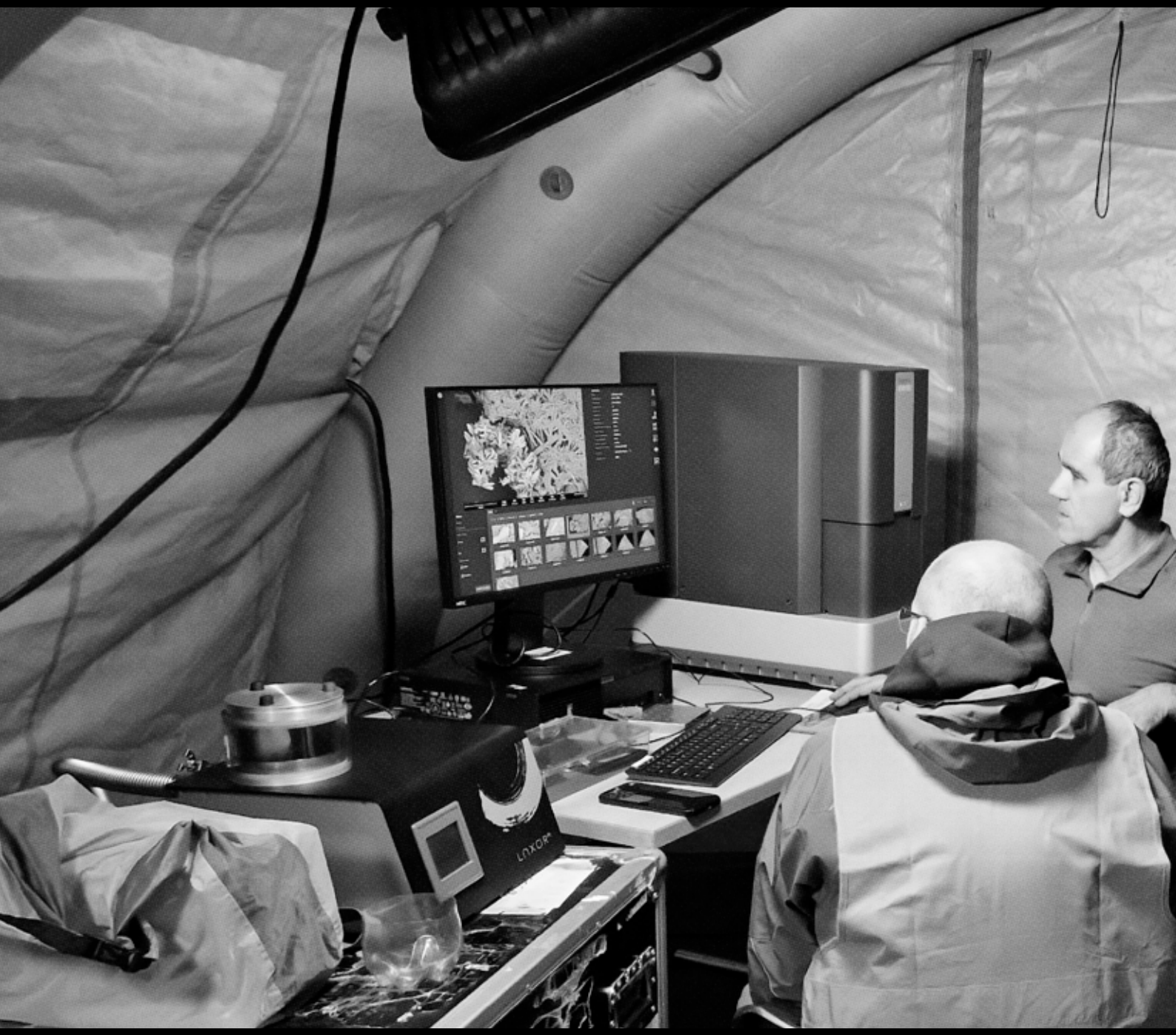
In a prior expedition during 2021, Thermo Scientific introduced a Phenom desktop SEM to the Selvagens Islands.This time, their ambitions took a more explosive turn: setting up a Phenom XL G2 desktop SEM and a LUXOR^{Pt} SEM coater across the expansive plains encircling the Fagradalsfjall volcano in southwest Iceland. Their objective was to meticulously examine microbial and mineral samples, observing their transformations during the cooling process. The focus was on identifying the metastable minerals that emerge while the lava tube remains hot, as well as investigating the colonization of these environments by microbial life. These valuable insights could potentially shed light on the origin of our planet or even offer insights into the formation of planetary lava tubes on Mars.

Together with the Italian organization La Venta Esplorazioni Geografiche, that organizes and runs geographical and environmental exploration projects in remote areas with difficult access, they pulled off a successful expedition where many new minerals and microbes were analyzed with SEM on-site. It is exciting to see that SEM technology can have a place as a scientific tool in exploration and field work, even in harsh environments.

WHY USE SEM COATING FOR MICROBIOLOGICAL AND MINERAL SAMPLES?

In an article in Labcompare: Geologist Francesco Sauro and microbiologist Ana Zélia Miller explain why they took the Thermo Scientific Phenom XL G2 desktop SEM to Iceland.

"It is important to note that SEMs are not typically portable and require a controlled laboratory environment due to their size, delicate nature, and power requirements. Therefore, they are not used directly within caves. Instead, cave samples are usually collected and transported to a laboratory for high-resolution imaging and elemental analysis using a SEM. In 2021, we transported the Phenom XL desktop SEM to the remote Selvagens Islands in the North Atlantic Ocean, where we explored for the first-time cave samples directly in the field. These findings allowed us to select the best sampling points to collect mineralogical and microbiological samples without the need to transport them to a laboratory setting. In the Fagradalsfjall volcano, from a geomicrobiology point of view, the same instrument was used to examine the potential presence of pioneer microorganisms in the newly formed lava tubes and their possible interactions with the cave minerals."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“UNDERSTANDING THE ORIGIN OF OUR PLANET...”

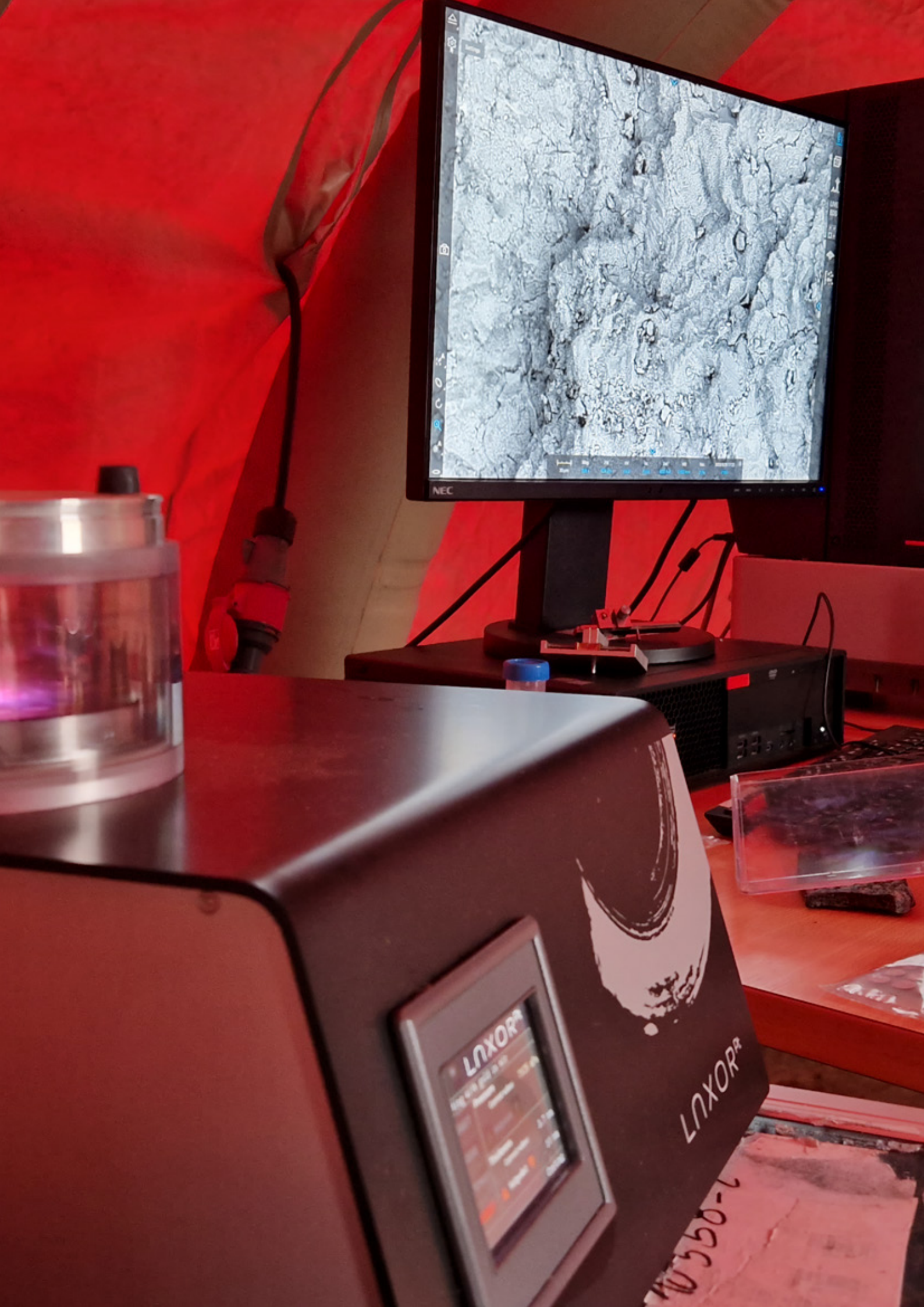
For Rogier Miltenburg, applications and product specialist at Thermo Fisher Scientific, the compact LUXOR^{Pt} SEM coater was the logical solution to complement the equipment as a coating tool for the SEM samples:

“From the start it was clear that the mineralogical and microbiological samples we were going to analyze have a strong tendency to charge in an electron microscope. Charging can be avoided by gold or platinum coating, or by applying lower acceleration voltages or reduced vacuum in the Phenom XL SEM.

The main reason however for using a metal coater was to better identify if there was any biological material among the minerals, while the additional resolution of the coating also allowed us to identify the type of bacteria.

Our choice for the LUXOR^{Pt} SEM coater was a logical one. We have extensive experience using it in our application lab in Eindhoven, the Netherlands, and its compact size, easy installation and operation were necessary prerequisites for use in the harsh conditions and cramped housing on the plains around the Fagradalsfjall volcano. The upside-down technology protected the SEM column from contamination, and the coatings were of the same high quality we are familiar with from our daily work in the application lab. Basically it is about entering the coating thickness, pushing start, and then take a few minutes to warm ourselves at the small heater in the tent.”

Rogier Miltenburg - applications and product specialist at Thermo Fisher Scientific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Would you also like to learn more about how LUXOR SEM coaters can help make sample preparation in your lab easier, faster, more precise and more reproducible during your next volcanic expedition?
Then contact us at www.luxor-tech.com.

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