INTERPRETING THE LUNAR WATER CYCLE

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Lunar Trailblazer's mission of mapping the abundance, location, and form of water on the lunar surface revolves around our current understanding of the lunar water cycle. Earth and its moon have water cycles that operate in very different ways. We are familiar with how H_2O behaves within the confines of our atmosphere, but the Moon has only a thin exosphere.

The lack of pressure allows for molecular gain and loss from solar and impact processes, and extremes in temperature also play a large part in determining the movement of water in its various forms. Therefore, water moves much differently on the lunar surface compared to terrestrial water. In order to illustrate the water cycle on the Moon, it is necessary to include what forms it takes on the lunar surface, describe how it got there, and delineate paths of migration. That's a lot of information to gather and amass into one infographic! Perhaps this explains why comprehensive diagrams depicting the process are scarce.

As is true with many people, I was unfamiliar with the lunar water cycle. Before getting started on constructing a visual representation, I needed to research in depth. With the guidance of Bethany Ehlmann, the Lunar Trailblazer intern team led by Jasper Miura, and many scientific papers, all the information began to make sense and elements of the process translated to the canvas one by one. I was learning to work within the "exospheric learning curve" since the lack of a substantial lunar atmosphere proved to be the root of the process differences I was discovering. For instance, volcanic eruptions would look very different from those we are familiar with on Earth. Instead of smoke billowing up, the viewer can see it spreads out gradually under the influence of gravity but not buoyancy. Adapting my internal visualization was one of the first adaptations on the path to a successful image.

One logistical challenge in creating this graphic was deciding how to depict ancient versus ongoing deposition. The timeline below the lunar scene provides a reference for what timeframe each process occupies. The use of simple arrows indicates direction of travel for each molecule or object. The components of water can still enter the Moon from beyond the exosphere and then be lost to space once again later on. On Earth, the cycle can mostly be thought of as closed and the gain or loss of water from space does not play a significant role. On the other hand, for the Moon, this openness creates a very interactive relationship between the lunar surface and space.

The Lunar Trailblazer internship program grants students access to the professional geological and planetary science community in such an exciting and unique way. I was able to receive immense support and experience growth as a scientist and designer during this program and am so grateful for the challenge, opportunity, and guidance. I can't wait to watch Lunar Trailblazer take flight and shape the world's knowledge of our Moon!