Guest Column: The Making of the 'Moon' Exhibit

University Libraries Special Collections
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The "Moon" exhibit at the University Libraries Special Collections centers around one story—the only place to begin a journey into the history of the Lunar and Planetary Laboratory and its prominent role in lunar science. The place to start is exactly the way Melissa Sevigny begins her book "Under Desert Skies: How Tucson Mapped the Way to the Moon and Planets":

"In late August 1955 at the Ninth General Assembly of the International Astronomical Union (IAU) in Dublin, Ireland, the Dutch-born astronomer Gerard P. Kuiper circulated an unusual memo: would anyone help him create an atlas of the moon?"

The Whitaker Collection

In the exhibit, if you can manage to walk past the 1610 copy of Galileo's "Sidereus Nuncius," one of the first artifacts you'll see is the letter written by LPL astronomer Ewen A. Whitaker to Kuiper, the founding director of LPL, expressing his eager desire to work on the atlas project. Directly next to it you will find Kuiper's equally enthusiastic reply. Special Collections is fortunate to have extensive manuscript collections from both scientists and about a dozen more prominent scientists from LPL, a lab that Kuiper founded in 1960. Whitaker's collection is the heart of the exhibit.

Whitaker's passion was selenography, the study of the surface and physical features of the moon; the name comes from the Greek Selene, goddess of the moon. You will find Whitaker's moon maps covering the walls, his collection of photographs peppering most display cases, and his original lunar drawings and other graphics. One of my favorite pieces is a presentation slide Whitaker made of Kuiper debating his rival Harold Urey, a Nobel Prize-winning chemist, on the origins of the moon.

It has portraits of both men with speech bubbles, arguing back and forth, and shows Whitaker's sense of humor. In the middle of the moon maps you'll also find a cartoon about "luna-sea" that he included in his 1999 book "Mapping and Naming the Moon."

Whitaker's scientific work resulted in the first compositional maps of lava flows on the moon and played a critical role in early lunar exploration programs including Ranger, Surveyor and Lunar Orbiter. Whitaker famously pinpointed the location of the Surveyor III landing site and chose the Apollo 12 landing site adjacent so that the astronauts could retrieve the equipment.

Centuries-old texts

The exhibit also draws upon an important collection of early texts authored by giants such as Galileo and Copernicus and printed around the time modern science was being born. The books were purchased by the University of Arizona Foundation in the early 1970s. This is the first time they have been on display since 2000, when Special Collections held the exhibit.
"Heavenly Manuscripts: The Renaissance of Astronomy." Galileo's "Sidereus Nuncius," or "Starry Messenger," is the text that announced his discoveries in 1609 and 1610, made with the newly invented telescope, which discovered mountains and valleys on the face of the moon, the four satellites of Jupiter and the stars of the Milky Way. The book is displayed alongside a telescope from the early 1700s borrowed from the Museum of Optics at the College of Optical Sciences.

Copernicus' 1543 book, "De Revolutionibus Orbium Coelestium," or "On the Revolutions of the Heavenly Spheres," contains the earliest representation showing the sun as the center of the solar system and represented a major shift in human thought – heliocentrism. The general response from visitors is a dumbfounded "Is that thing real?" It is a real pleasure to then say it isn't even the oldest book in the exhibit.

Carl Burkhout, professor emeritus of English, brought it to my attention that we have an extraordinary incunable – a book produced in the earliest years of printing, before 1500 – that is a revised Ptolemy text printed in 1496. "Epitoma in Almagestum Ptolemaei," or "Epitome of Ptolemy's Almagest," is a treatise begun by the Austrian astronomer and mathematician Georg von Peuerbach and completed by his student Johannes Regiomontanus. This is a Latin abridgment, with important corrections, from the original Greek "Almagest" by renowned astronomical authority Claudius Ptolemy of Alexandria, who lived from about A.D. 100-170. Most notably, the book calls Ptolemy's position that the moon sometimes appears up to four times larger than its usual size a fantasy. Copernicus later used his own copy of this edition in rejecting Ptolemy's lunar and geocentric theories. The book is open to a gorgeous woodblock print featuring portraits of both authors, a sun and a moon. Two of the moon's impact craters, named Purbach and Regiomontanus, commemorate this book's authors. When not on display, these books live in a climate-controlled vault.

Curating 'Moon'

As the curator for the History of Science collections, it is my great privilege to work with these materials and the personal and professional papers of important modern scientists. The strong relationship Special Collections has with the Lunar and Planetary Laboratory is built upon a legacy of accomplishments processing collections and making them available to researchers thanks to former archivists Crystal Carpenter and Maurita Baldock and retired library information associate Deborah Weller.

The relationships also go straight back to Kuiper and Whitaker. When Kuiper passed away suddenly in 1973, he left a great archive containing unpublished scientific research and a wealth of correspondence, audiovisual materials, reports and notes dating back to his work at Yerkes Observatory, a University of Chicago observatory in Wisconsin, where, among other things, he was Ph.D. adviser to renowned science communicator Carl Sagan.

Whitaker rose to the challenge to steward this collection. He became an amateur archivist, joined archival organizations and did his best to organize, describe and provide access to the collection. Whitaker invested a good deal of his time, even in retirement, to this endeavor. He was also the unofficial LPL historian. His lengthy and detailed definitive history "LPL: Its Founding and Early Years," written in 1985, is still linked prominently on the LPL website.

After his passing, Whitaker's daughter, Fiona, arranged for us to gather the rest of his professional materials. I was part of a four-person team that loaded three full loads into an 18-passenger cargo van. When it was time to organize the materials and write the collection
guide, it was nice being able to visualize how they were previously stored.

Processing the collection took the better part of a year and led to some valuable collaborations. When associate professor of English and science writer Christopher Cokinos \[8\] got wind that Special Collections had the Whitaker papers, he came over to help me out with the organization. It was nice having an expert help bring the collection to life. Every once in a while he'd get excited about something he'd found and bring it to my attention?like a folder titled "Crank Science," which includes a lengthy article about termites on the moon. Cokinos agreed to help curate the exhibit and contributed the powerful text that introduces the exhibit and the detailed lunar timeline that masterfully weaves together cultural and scientific milestones.

Unfortunately, I didn't get to meet Whitaker. He was known for his delightful personality and as a skillful hobbyist in historic clock repair. His last public appearance was April 25, 2016, on a panel talk in Special Collections titled "How Tucson Mapped the Way to the Moon and Planets \[9\]," alongside a group of scientists that included William Hartmann, co-founder of the Tucson-based Planetary Science Institute, a nonprofit corporation and the largest nongovernmental employer of planetary scientists in the world. Hartmann was a graduate student under Kuiper who worked with Whitaker and others at LPL on the lunar atlases in the 1960s. He co-authored a groundbreaking paper on the giant impact origin theory of the moon based on features discovered during the creation of the Rectified Lunar Atlas \[10\].

**The 'strange egg' that mapped the moon**

The precision hemisphere, located at the center of the "Moon" exhibit, is the original artifact, on loan from LPL, used to create the Rectified Lunar Atlas at LPL in the 1960s. It looks like a strange egg until you turn on the projector and watch it transform into the surface of the near side of the moon. The projected image is a ground-based telescope photograph from 1946 taken at the Lick Observatory on Mount Hamilton in California.

Part of Kuiper's moon-mapping program of the late 1950s and 1960s, the Rectified Lunar Atlas was created in collaboration with Whitaker, Hartmann and Harold Spradley, another LPL astronomer. This large-format, bound atlas showed each lunar limb area as seen from directly overhead. Since this was made before lunar orbiters flew, it was necessary to create it by projecting telescopic images of the moon onto a large white sphere and then re-photographing the sphere from directly over the area of interest.

In doing this, Hartmann discovered the multi-ring structure of Mare Orientale and other basins, which shaped his theories around the origins of the Earth's moon. In 1974, Hartmann and UA alumnus Don Davis proposed that the moon formed when a Mars-sized planet struck Earth and flung the top layer of the Earth into space, where the debris recombined to form the moon. The Giant Impact Theory \[11\] withstood 45 years of scientific scrutiny and is currently in flux with several modified scenarios.

The exhibit also features a treasure trove of moon-themed video game ephemera including "Moon Tycoon," "Lunar Pool," "Lunar Lander," "Moon Patrol," "Lunar Golf" and "Lunar Rescue." Also on display is a miniature replica arcade game and two Nintendo controllers cast in cement.

The icing on the cake of the exhibit is a fantastical painting by renowned space artist Robert McCall. On loan from the UA Museum of Art \[12\], "Visitation" is at first glance a futuristic
Tucson replete with saguaros and floating space stations under the embrace of a giant moon. Looking closer, you'll find that you're standing on the future state of Mars with Earth looming large and Earth's moon tucked neatly at the left like a small ear.

The "Moon" exhibit runs through Dec. 20.

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[5] https://www.optics.arizona.edu/outreach/museum
[6] https://english.arizona.edu/users/carl-t-berkhout
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