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| <p>Program: To be announced at meeting</p> | <p>Volume 27, No.05 September 2021</p> |
| <p>Greg Smith – editor.</p> | <p>Meeting: September 15, 2021</p> |

Geology makes Astronomy Possible

How often do we dream of having wide open space to view the stars that we enjoy so much? This past week I had the chance to drive through some of widest open space I have ever been though. I spent a day driving from Leavenworth, WA to Dry Falls State Park, WA. And back. Yes, I know Leavenworth does not have wide open skies, but just 40 minutes east is the open country of central Washington. After driving Highway 2 to Wenatchee and then north a few miles, I followed Highway 2 east towards Coulee City. The small town of Waterville sits in the middle of some of the widest views. It sits on the high point of the rolling hills that are wheatfields. The view is spectacular, for an amateur astronomer. A completely flat North/East/South vista, the western horizon has a view towards the Cascades low on the horizon. So, essentially a 360 degree open sky. Unfortunately, I was there in full daylight, but I could use my imagination to figure out what I might see. This would be a very dark sky as the tiny town of Waterville would not produce much light pollution.

Even if I just dropped down into the bottom of Moses Coulee and had the walls block my view, the overhead sky would be fantastic. Those walls would block out any residual light pollution and give you an incredible dark sky.

I found that as I went to see an incredible geologic site that I had on my bucket list of things

to see; I found that looking for one thing gave me the ability to find something else. Dry Falls has been on my bucket list of geologic things to see (geology was my first love in the sciences). I did not ignore what the geography of a geologic site could reveal to me for my second love in the sciences.

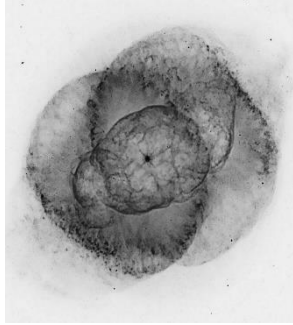
I bring up geology in an astronomical article as they are not mutually exclusive. Geology and the corresponding geography it creates, also makes way for where astronomy is practiced.

Where are the telescopes of the world situated? On top of mountains. Mountains are a product of geology. The Andes, Mauna Loa, the Canary Islands, the deserts of Australia are places of geography and geology.

Even a manmade lake can provide the necessary conditions for Solar observing. Why? The cool water of the lake stabilizes the air so that viewing the sun is not compromised by heat waves produced by solid ground.

It is always wise to not only to be looking up but look around and see what else there is and learn. The coulees of eastern Washington were formed by fire (lava) and Ice (the melt water of an Ice Age ice dam of a massive lake of meltwater). A place of astronomy may be found in a walled canyon caved by water in a land of lava.

*Every Day is a Star Filled Day,
Every Night is a Starry Night*



Cores are
Collected



PERSEVERANCE SUCCESSFULLY GRABS FIRST MARS SAMPLES

BY: DAVID DICKINSON

After a rocky first start, Perseverance hit pay dirt on the second try. The rover collected two samples recording ancient volcanic eruptions and groundwater interaction.

After a tense start to the sample collection campaign for NASA's Perseverance rover on August 5th, researchers finally confirmed on September 6th that the rover has successfully collected two pencil-size cores from Jezero Crater on Mars. The holes were drilled September 1st and 7th, respectively.

"NASA has a history of setting ambitious goals and then accomplishing them, reflecting the nation's commitment to discovery and innovation," says NASA administrator Bill Nelson in a recent press release. "This is a momentous achievement, and I can't wait to see the incredible discoveries produced by Perseverance and our team."

The sampling process began on September 1st, when the rover deployed the rotary-percussive drill on the end of its robotic arm to drill a core sample from the small table-size rock dubbed "Rochette." This boulder is part of a 1-kilometer (half-mile)-long ridgeline named "Artuby."

The Mastcam-Z camera documented the initial collection process, and preliminary success was announced on September 3rd.

However, mission controllers had to wait for a better sun angle to see deep inside the tube to ensure that the sample had really been collected. The team uses a "percuss to ingest" maneuver during collection, vibrating the tube and drill bit several times to clear the outer tube edge of residue in preparation for sealing. This can cause the collected material to slide further into the tube, out of the initial visibility of Mastcam-Z if the lighting isn't favorable.

The process was suspenseful because Perseverance ran into problems on its first sampling attempt in August, when a sampling run came up empty. Team members think that rock fragmented as the drill “rotary-percussed” into it. (The initial sample did, however, collect Martian atmosphere, so not all was lost.) That's why the team really wanted the images to confirm a successful run — and now, new images show the second attempt was indeed successful.

The rover moved the first sample tube, with serial number 266, to the Sampling and Caching System, where it was measured, imaged, and hermetically sealed. A few days later, Perseverance drilled a second hole and stored it as well.

Based on preliminary analysis, scientists believe the rock cores are igneous, originating in ancient volcanic eruptions. The presence of salts in the rock indicate that water percolated through this rock long ago. Once the samples are returned to labs on Earth, scientists will look to see if these salts have trapped liquid bubbles, called inclusions; these could provide a glimpse of Jezero Crater when it was wet and possibly capable of supporting life.

With more than 3,000 moving parts, the caching system is one of the most complex mechanisms ever fielded on a rover or spacecraft. Perseverance has 43 sample tubes and five empty “witness tubes” used to gauge the baseline environment prior to collection. Ultimately, the team wants to collect at least 20 samples from Jezero Crater.

“Getting the first sample under our belt is a huge milestone,” says Ken Farley (JPL-Caltech) in a recent press release. “When we get these samples back on Earth, they are going to tell us a great deal about some of the earliest chapters in the evolution of Mars.”

MARTIAN GEOLOGY

Scientists think the exposed Artuby ridgeline that Perseverance is exploring contains exposed layers of ancient bedrock. The rover's first collection campaign will have it travel between 2.5 and 5 kilometers back to the original Octavia E. Butler landing site. It will collect samples of this ancient rock along the way, filling up to eight tubes.

From there, Perseverance will head to the northwest to another intriguing area: the fan-shaped delta, where an ancient river spilled into Jezero. This region should be rich in clay deposits.

Unlike other landers and rovers, Perseverance is explicitly designed to be an astrobiology mission, and looks to specifically address the question of whether or not life once existed on Mars. Characterizing the past geology and climate of Jezero are key to that exploration.

Perseverance will eventually deposit the collected sample tubes for eventual pickup and Earth return by a future mission. Northrop Grumman is already contracted to build the propulsion system for the Mars ascent vehicle for Earth return, and the European Space Agency will collaborate with NASA for the sample return mission and in-depth analysis back on Earth sometime in the coming decade.

Congrats to the Perseverance team on a first successful sample collection, and many more to come!

Minutes of the August Meeting

General

- Introductions, welcome everybody
- 8 attending via zoom included: Greg Cermac, Steve & Stephanie Foster, Roy Gawlick, Carolyn Hail, Howard Knytych, Bruce Prickett, and Chuck Wallis.
- 9 in-person attendees: Ted, Mike, Steve, Becky, Tom & Mary, Jim Wallace (charter mbr), Greg and Mark.
- Program – Mike Fiest on his collection of meteorites.
- Short break
- Club star party at Mike Feists house with another great demonstration of his new telescope that allows you to see on screen the full colors of the nebulas of the night sky and galaxies.
- Sky report
- Business meeting

Business Meeting Topics

- Treasurer's report - Steve (please include mention of 2020-2021 dues options and AL dues)
- Still need a meeting place for the fall. It looks like we will be able to use a room at R A Long High School

☞ September 2021 Meeting ☞

DATE: Wed September 15, 2021

TIME 7:00pm

PLACE: In person at Mike Fiest home / Zoom - a hybrid meeting. Come if you can, else join us on Zoom from his home.

PROGRAM: "Celestial Mechanics of Soyuz/ISS Orbital Rendezvous". A European Space Agency video.

Drinks :

Snacks :

The Star Report is posted on the clubs website : Friends of Galileo Astronomy Club - Friends of Galileo Astronomy Club

It is listed in the blog portion of the website.

End of twilight - when the stars start to come out.

Wed Sept 15 **7:50 pm** Wed, Sep 29 **7:21 pm** Wed, Oct 20 **6:46 pm**

Friends of Galileo Club Officers

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|----------------------------------|--------------|
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Next Month's Newsletter Deadline

The deadline for items in next month's newsletter is:
Wednesday: seven days before next meeting.

Please feel free to send in your thoughts and experiences about your astronomical adventures.

Submit your material by E-mail to: gryth@msn.com

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 Longview, WA

