

Draft Minutes for the 1592nd meeting of the Geological Society of Washington
October 4th, 2023
Cosmos Club

President Kori Newman called the meeting to order at 20:00 EDT.

Attendance

There were 53 attendees in person.

Minutes

The meeting began with the approval of the minutes from the previous meeting (1591st). The minutes of the 1591st meeting had been posted online and a Minute's Minute was read aloud at the 1592nd meeting. No corrections were noted, and the minutes were accepted as read.

Guests and New Members

No new members were announced.

Ten guests were introduced: Robert Whitten; Julien Rojas, Carnegie Institution, Oded Elazar, Carnegie Institution; Anna Bidgood, Carnegie Institution; Karin Lehnigk, Georgia Tech; John Christoph, NMNH; Ashley Gonzales, GWU; Elisabeth Herndler, Luxembourg Embassy; Sourabh Shubham, UMD; Jeremy Warner, NASA Goddard

Announcements

One announcement was made.

The GSW will also be having a daylong field trip on Saturday, Nov. 4, which will include a stop along the falls of the James River in downtown Richmond, VA.

Obituaries

No obituaries were read.

Informal Communication

An informal communication by Gregory A Neumann (GSFC, retired) was presented about the Osiris-REx mission to the Nightingale landing site on the carbonaceous asteroid Bennu. A sample containing 250 g of material was recovered and successfully returned to Earth in 2023.

Formal Program

The formal program commenced at 20:20 EDT and consisted of three speakers: Yarieska Collado-Vega, NASA Goddard; Megan Mouser, Carnegie Institution; and Shoshana Weider, NASA.

Dr. Collado-Vega presented "Moon to Mars Space Weather Analysis Office: Support for NASA missions and the Artemis program."

Space weather, predominantly influenced by the sun, involves factors such as solar flares and coronal mass ejections. Solar flares, which take 8 minutes to reach Earth, impact our magnetosphere, while coronal mass ejections result in geomagnetic storms, auroras, and disruptions like GPS signal loss and satellite interference. To observe and understand these phenomena, the Solar and Heliospheric Observatory (SOHO) is positioned at the L1 point, shielding the sun's glare. Solar energetic particles pose challenges for instruments and astronauts by affecting Earth's magnetosphere. The M2M Space Weather

Analysis Office provides support for missions and collaborates with agencies like NOAA, operating around the clock for lunar missions under Artemis. They employ human-in-the-loop analysis to validate predictions. NASA's Space Radiation Analysis Group (SRAG) initiated a scoreboard for space weather analysis. Models utilize observations, some fully automated, while ISEP, a web tool with customizable layouts, aids in monitoring. The M2M office ensures model functionality and handles anomaly assessments. Solar activity varies, with periods of calm during solar minimum and turbulence during solar maxima. The R2O2R pipeline is responsible for developing tools and models to enhance space weather analysis and prediction.

Talk length: 21 minutes.

Questions were asked by John Christoph, Smithsonian; Mong-Han Huang, UMD; Brooks Hanson, AGU; Greg Neumann, NASA; and Jonathon Tucker, National Academies.

Dr. Mouser presented “Exploring early planetary formation processes using high-pressure, high-temperature experimental techniques.”

The magma ocean hypothesis suggests that rocky bodies like Mercury were either partially or fully molten due to the heat generated by the decay of ^{26}Al and ^{60}Fe , as well as impacts. Cooling led to differentiation, resulting in compositional variations. Compositional information is obtained through magnetic field observations, indicating a liquid outer core, and seismic data revealing details about the mantle. Experimental petrology can investigate the effects of high pressure and high temperature on samples, such as Mercury's composition with or without sulfur. The Moon possesses a flotation crust of plagioclase, and Mercury may have had a graphite crust. Meteorites provide evidence of differentiation in non-planetary-sized bodies. Experiments involving silicate and iron metal show that at lower temperatures, metal remains immobile, while at higher temperatures, it becomes mobile.

Talk length: 18 minutes.

Questions were asked by: Mike Ackerson, Smithsonian; Larry Meinert, USGS retired; John Christoph, Smithsonian; and Jonathan Tucker, National Academies.

Dr. Weider presented “Mercury Exploration: Past, Present, and Future.”

Mercury, challenging to observe due to its proximity to the Sun, was initially dismissed as uninteresting, with early missions viewing only 45% of its surface. The Messenger mission (2011-2015) changed this, equipped with various instruments like magnetometers and spectrometers. It revealed Mercury's substantial core and high metal-to-silicate ratio, which conflicted with the giant impact hypothesis, and utilized XRF for planetary mapping. This uncovered geochemical terranes independent of geomorphologic ones, whose significance remains uncertain. The upcoming BepiColombo mission (arriving in 2025) is equipped with a diverse instrument payload, aiming to address these mysteries and take surface images, record mineralogy, topography, and magnetism. The low reflectance of Mercury's surface may be due to graphite.

Talk length: 20 minutes.

Questions were asked by Larry Meinert, USGS retired; George Helz, UMD; and Victor Zabielski, NVCC

President Newman adjourned the meeting at 21:36 EDT.

Respectfully submitted,

Graham Lederer