Draft Minutes for the 1587th meeting of the Geological Society of Washington
March 8, 2023
Cosmos Club and Video Conference via Zoom

President Kori Newman called the meeting to order at 20:06 EST.

Attendance
There were 38 attendees in person and 20 attendees online.

Minutes
The meeting began with the approval of the minutes from the previous meeting (1586th). The minutes of the 1586th meeting had been posted online and a Minute's Minute was read aloud at the 1586th meeting. No corrections were noted, and the minutes were accepted.

Guests and New Members
One new member was introduced, Francesco Civilini (NASA GSFC)

18 guests were introduced: Rachel Maxwell, NASA; Saffat Shahid, UMD; Katherine Udell Lopez, UMD; JoAnna Marlow, USGS/SI; Tyler Spano, Oak Ridge National Lab; Zac Hastings, USGS; Alaina Smith, AGI; Andrea Scroggs, AGI; Austin Neaville, AGI; Jordan Zobel, AGI; Cindy Ebinger , Tulane/State Dept; John Conaty, Agnes Pasco Conaty, NASA; Austin Conaty, Leyla Conaty; Maria Michaela Ninni, U. Penn/Carnegie Institution; John M. Christoph, Smithsonian NMNH; and Michael Keen.

Announcements
Two announcements were made. Kori Newman asked for volunteers for local science fairs. Michael Purucker invited GSW members to participate in a meeting with Astronaut Dr. Watkins of NASA.

Obituaries
An obituary for GSW member Dean Presnall was read.

Informal Communication
No informal communications were read.

Formal Program

The formal program commenced at 20:25 EST and consisted of three speakers: Laura Sammon, MathWorks; Michael Weber, University of Bonn; Francesco Civilini, NASA GSFC.

Laura Sammon presented "A Joint Geochemical-Geophysical Model for the Deep Continental Crust." Studying the composition of the crust is motivated by understanding plate tectonics, elemental abundance, and planetary evolution. Granulite and amphibolite facies metamorphic rock samples were studied because they are thought to represent the composition of the middle and lower continental crust. Earthchem data provided publicly available geochemical data and Perple_X was used to model physical and seismic properties of rocks. Using observed seismic velocities and modeled temperature enabled calculation of crustal composition. Composition was found to be correlated to the relative position within the crustal column (% of crustal depth) rather than absolute depth. Silica decreases with depth but is sensitive to the modeled temperature gradient. Trace elements composition are predicted from seismic velocities based on trace element correlation with silica.

Talk length: 22 minutes.

Questions were asked by: Liz Cottrell, NMNH; Jonathan Tucker, NAS; George Helz, UMD; Yasmina Martos, NASA; and John Christoph, NMNH.

Michael Weber, presented "Antarctic Ice-Sheet Dynamics - past variability and future projections." Sea level rise has been increasing since the industrial revolution, but the rate of sea level increase is not constant. Meltwater pulses and global sea level rise during the last glacial maximum show patterns relating deglaciation in the Northern hemisphere to rapid ice sheet melting in Antarctica. The ice-ocean-atmosphere system is coupled between the northern and southern hemispheres. Dust records in the longest 800 ka record of Antarctic ice are tightly correlated to magnetic susceptibility of the ocean sediment cores. The ocean sediment cores can be used to extend the high-resolution chronology back to 4 Ma.

Talk length: 21 minutes.
Questions were asked by: Michael Purucker, Nasa Goddard; Cindy Ebinger, Tulane/State Dept; and Laura Sammon, MathWorks.

Francesco Civilini, NASA GSFC — How to Train Your Lander: Automated Moonquake Detection Using Machine Learning. Quakes are rare events, which means most seismic records are empty noise. For planetary seismology, telemetry is necessary to transmit seismic data to Earth, but requires power and receiver time, highlighting the need for a algorithm that can distinguish between seismic signals and noise. The experiment presented here attempted to identify moonquakes using a lightweight, general, and adaptive algorithm trained on earthquakes. The difficult problem of detecting seismic events in a seismogram (amplitude vs. time) can be made simpler by converting the data into a spectrogram (frequency vs. time) using a Fourier transform. A convolutional neural network was trained on hundreds of using a three-layer model and yielded up to 98% accuracy. The pilot study demonstrated that the algorithm worked; and also enabled the first systematic catalog of moonquakes from a dataset collected in the 1970s.

Talk length: 20 minutes.
Questions were asked by: Austin Conaty, NASA, Cindy Ebinger, Tulane/State Dept; Gabriella Farfan, NMNH; Jonathan Tucker, NAS; and Janina Czas, Carnegie Institution.

President Newman adjourned the meeting at 22:00 EST.

Respectfully submitted,

Graham Lederer