President Liz Cottrell called the meeting to order at 20:01EDT.

Attendance
There were 54 attendees.

Minutes
The meeting began with the approval of the minutes from the previous meeting (1563rd). The minutes of the 1563rd meeting had been posted online and a Minute’s Minute was read aloud at the 1564th meeting. No corrections were noted, and the minutes were accepted.

Guests and New Members
Eighteen guests were introduced: Alex Rytel (Ohio State U), Laurel Bauer (NRC), Jane Willenbring (Stanford U), Travis Clow (Stanford U), Adrian Wackett (Stanford U), Bill Dietrich (UC Berkeley), Maryn Sanders (UC Berkeley), Jesse Hahm (Simon Fraser U), David Dralle (US Forest Service), Anna Weniger (UNC Chapel Hill), Kelsey Crutchfield (Eel River Critical Zone Observatory), Jerry Kashatus (AECOM), Hunter Jamison (Eel River Critical Zone Observatory), Irwin Singer (Physicist, retired), Al Handwerger (NASA JPL), Berit Hudson Rasmussen (UMD), Collin Bode (Eel River Critical Zone Observatory) and Kerri Johnson (UC Berkeley).

No new members were announced.

Announcements
1) Liz Cottrell reported that as part of a lively email exchange among GSW Council on the origins of the GSW website an equally seminal event was discovered. The 2001 Council Secretary report by Mark McBride noted that the GSW website was launched and in a cost-cutting measure that also addressed declining consumption, the Society switched from kegs to bottled beer.

2) Callan Bentley announced his upcoming talk via Zoom to the Rockfish Valley Foundation on Appalachian geology. Bentley posted in the Chat a registration link for those interested in this free event.

Obituaries
There were no obituaries.

Informal Communication
1) Prior to the meeting’s call to order, attendees launched a rousing ZOOM rendition of “Happy Birthday” to Bill Burton in two-, three-, or maybe more-part harmony.
2) In honor of Women’s History Month, Liz Cottrell gave an appreciation of geologist Florence Bascom, the first women hired by the USGS, the first women elected to the GSA Council as well as the first women officer and ultimately the GSA vice president. In the first edition of “American Men of Science” she is listed as a four-star geologist which meant that her colleagues regarded her as among the country’s 100 leading geologists. In a nod to GSW history, Cottrell noted that in 1901 Bascom became the first women to present a paper before the Society.

**Formal Program**

The formal program commenced at 20:21 EDT and consisted of three speakers:

Seulgi Moon (University of California, Los Angeles), Daniella Rempe (The University of Texas at Austin) and Margaret Zimmer (University of California, Santa Cruz)

Seulgi Moon presented “Present-day Stress Field Influences Bedrock Fracture Openness Deep into the Subsurface.” Seulgi established that the opening of bedrock fractures and onset of water-rock interaction are crucial to the formation of the critical zone, the life-sustaining part of the Earth that extends from the top of the tree canopy to the bottom of permeable bedrock. Within the bedrock, the intensities of horizontal regional forces and vertical gravitational forces typically increase with depth. These force intensities, or stresses, are modified by surface effects associated with topography, the weight of overlying seawater and sediment, and by groundwater pressure. However, the influence of these surface effects on fractures has been difficult to observe because comprehensive fracture data sets are rare. Key questions that Moon posed were whether, and to what depths, bedrock may fracture under the influence of stress associated with surficial conditions. She explained her research methods that compared bedrock stress calculations with approximately 50,000 fractures from 18 cores reaching depths of 600 meters at Forsmark, Sweden. Moon shared her results and conclusion that present-day stress field influences the opening of fractures to depths of 500 m, contributing to the formation of the critical zone and the preparation of rock for weathering hundreds of meters beneath the surface, much deeper than previously thought. *Talk Length: 21'05"*

Questions were asked by: Liz Cottrell (NMNH), Carl-Henry Geschwind (Independent Researcher), Bill Burton (USGS Emeritus), Alexander Rytel (Ohio State U), Mong-Han Huang (UMD), Ved Lekic (UMD) and Keith Mclaughlin (Leidos).

Daniella Rempe presented “The Hidden Role of Bedrock Fractures in Regulating Water and Carbon Cycling.” Rempe opened her talk by noting that many landscapes are mantled with thin soils that overlie meters to tens of meters of weathered bedrock. This transition zone between soil and bedrock can be a vital water supply to vegetation and can control rates of groundwater recharge. This weathered rock may also regulate carbon cycling through the action of deep roots, which enhance chemical weathering. Relative to the overlying soils and underlying groundwater, the hydrologic and geochemical dynamics of weathered bedrock are challenging to observe and consequently poorly understood. Rempe shared results from intensive efforts to directly quantify
the complex fluid pathways in weathered bedrock and discussed the implications of her team’s monitoring results for Earth system processes. Talk Length: 19’59”

Questions were asked by: Bill Burton (USGS Emeritus), Karen Prestegaard (UMD), Mong-Han Huang (UMD), and Liz Cottrell (NMNH).

Margaret Zimmer presented “Does Aspect Matter? Assessment of Hillslope Structure and Hydrology in Lithologically Complex Landscapes.” Zimmer noted that as researchers try to grapple with how aspect influences hillslope evolution, vegetation patterns, and flow routing it turns out that the direction that hillslopes face has been the focus of a significant number of hydrologic, ecologic, and geomorphic studies. While this body of work has led to advancement in an understanding of these processes, studies are limited to large scale modelling efforts or field studies in thinly mantled landscapes. Zimmer said that her team aims to understand how aspect alters hillslope hydrology in a lithologically complex landscape with deep weathering fronts. In a field-based project at the Blue Oak Ranch Reserve, located in the Diablo Mountain Range in central coastal California her team instrumented an experimental watershed with soil moisture probes, piezometers, weather stations, and a flume to monitor flow routing behavior across north and south facing hillslopes. She shared the results of this research and an associated geophysical survey. Talk Length: 21’01”

Questions were asked by: Bill Dietrich (UC Berkeley), Bill Burton (USGS Emeritus) and Mong-Han Huang (UMD).

President Liz Cottrell announced that the next meeting is on April 21st and adjourned the 1564th meeting at 22:00 EDT.

Respectfully submitted,

Beth Doyle