Colorado Scientific Society

The objective of the Society is to promote the knowledge and understanding of Earth science, and its application to human needs

CSS December Newsletter
CSS Annual Business Meeting, Announcement of New Officers, and Presidential Address

Pleistocene water-table fluctuations in Black Hills aquifers linked to subglacial recharge in southern Canada? Evidence from speleothems in Wind Cave National Park

Thursday, December 17, 2020

Dr. James B. Paces*, United States Geological Survey*

This CSS online Zoom meeting is our annual Business Meeting and a presentation by our outgoing president.

6:45 Join meeting and social time; 7:00 Business Meeting and Presentation

Also at the meeting: Announcement of the recipient of the CSS 2020 Past President's Award for the best paper presented at a CSS meeting, and, election of officers and councilors for 2021.

Click to Join CSS Zoom Meeting
from PC, Mac, Linux, iOS or Android

Meeting ID: 950 7676 3686
Password for meeting, if needed: **838177**

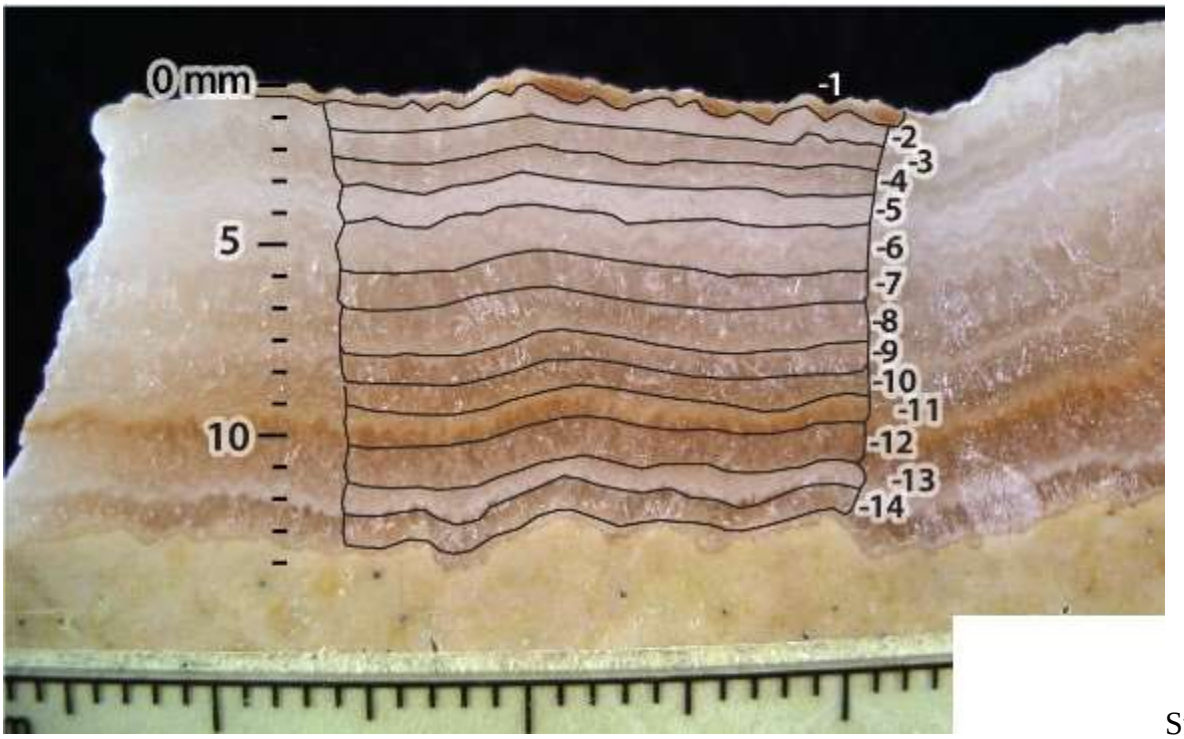
You can also read more posted on our website, **https://coloscisoc.org/ .**

Recent CSS presentations are recorded on Zoom. Follow the links below for each presentation to see abstracts, biographies of the speakers and video recordings of our meetings. [Note: Please ignore the "Transcript". It is wrong too often. Just listen to the video!]

Abstract: Phreatic speleothems in the lower levels of Wind Cave preserve a 300-ka paleohydrologic record of water-table fluctuations along the east flank of the Black Hills in South Dakota. U-series dating of wall coatings and foundered cave rafts indicate that maximum paleo water-table high-stands were less than 45 m and more typically less than 25 m above the modern potentiometric-surface. Periods of non-deposition are interpreted as subaerial conditions that, in some cases, include evidence for vadose flow. Ages of basal layers indicate that subaerial conditions existed between ~1,000,000 and 300,000 years. After that, water-level high stands correlate to interglacial/interstadial periods and low stands correlate to full glacial or stadial periods. Isotopic compositions of $\delta^{18}O$, $^{87}Sr/^{86}Sr$, and $^{234}U/^{238}U$ in speleothems younger than 12 ka are consistent with compositions of modern groundwater in the cave. However, older calcite has $\delta^{18}O$, $^{234}U/^{238}U$, and $^{87}Sr/^{86}Sr$ values similar to modern regional groundwater, suggesting that groundwater during high-stands was more like present-day artesian sources having warmer, deeper flow paths rather than shallower, cooler sources associated with local recharge.

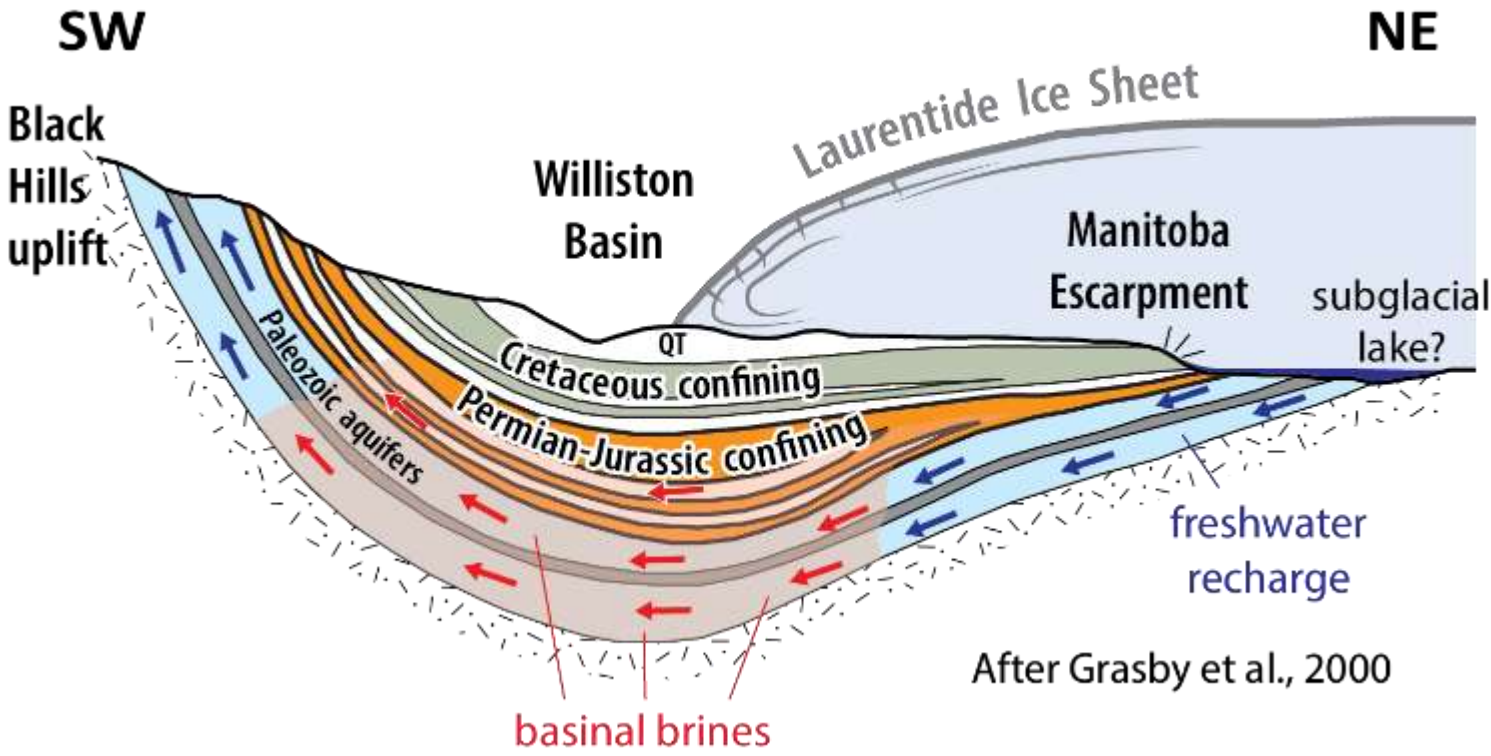
We invite you to pay your dues for 2021 to CSS! You may pay dues online, or print out a pdf of the membership form and mail it to us with a check. Continuing your membership in CSS will enable us to continue all our ongoing programs, including our field trips, virtual meetings, Student Research Grants, and more.

See **https://coloscisoc.org/join-donate/** for the online link to our membership & dues form. Regular CSS dues are $25 (paid after Jan. 31; $20 if paid before the end of January); Corresponding Membership (outside of the Front Range area) $10; Student Membership (any level) $5; Life Membership, $395. Send your membership payment, if not done online through PayPal, to Colorado Scientific Society P.O. Box 150495 Lakewood, CO 80215-0495.
Thank you!



Speleothem layers

Data do not support previous interpretations of a monotonic water-table decline caused by local hydraulic changes. Instead, low stands are interpreted to reflect cold, dry conditions that provided little local recharge to shallow aquifers. High stands likely reflect reorganization of regional flow systems caused by subglacial recharge into the Madison aquifer beneath the Laurentide ice sheet on the northeast side of the Williston Basin (Grasby et al., 2000, Geology 28). Increased hydraulic pressure in a confined aquifer is capable of causing reversed flow into the basin with water-level increases on its south flanks as long as hydraulic connectivity is maintained. Subglacial recharge resulting in overpressuring within the confined Madison aquifer is considered the most likely driving force for increased heads within Paleozoic aquifers of the Black Hills, even though the timing of ice sheet advance and Wind Cave high stands were not synchronous.



Madison aquifer

James Paces *is a research geologist at the U.S. Geological Survey in Denver, CO. He has used radiogenic isotopes to study a wide variety of earth processes including generation and emplacement of Midcontinent Rift magmas; age and origins of Apollo 17 mare basalts; paleohydrology of the potential nuclear-waste repository at Yucca Mountain, NV; identification of hydrologic sources and mixing in arid wetlands; dating of early hominin sites in North America; and studies of karst evolution in several National Parks. Paces received his Bachelor of Science degree in geology from the University of Oregon in 1978, and his Ph.D. in geology from Michigan Technological University in 1988*

President's Message
Dear CSS Members,

As 2020 nears its end, I am happy to announce that the Society has survived its 138th year in spite a multitude of hardships brought on by the COVID-19 pandemic. My heart goes out to those who lost loved ones, jobs, or businesses, and to those who had to figure out new ways to carry on with work, school, and family life. We too, had to figure out a new way to conduct the Society's mission shortly after holding our first two meetings in Berthoud Hall on the Colorado School of Mines campus in January and February. I would like to offer my gratitude to the Society's Officers and Councilors for their wisdom and guidance on how best to proceed in unprecedented times. Consequently, the Society held its first-ever online meeting in July after a 5-month hiatus and co-hosted a seminal online symposium concerning Water and Energy in Colorado in August (a big shout out to Bob Raynolds). We have since held monthly online meetings that included the Past-Presidents event (sans the usual dinner) and the 2020 Samuel F. Emmons Lecture. The pandemic has taught us (and everyone else) that we can now communicate effectively over the internet, and once in-person gatherings again become possible, we will try to include a web-based component for those not able to attend in the flesh. An added bonus is that our webmaster, Chris Morrison, has made recordings of all our online lectures available at our website if you missed one or would like to watch any again. The Society has now survived two global pandemics in its history, though history does not seem to have recorded what responses the Society made to accommodate the 1918 outbreak. Although NO one looks forward to the next pandemic, it's good to know that the membership has remained strong and resilient throughout our history. My thanks to all.

For those of you that attended October's Emmons Lecture presented by Dr. Michael E. Zolensky from NASA's Astromaterials Research & Exploration Science, I wanted to provide an update on the Hayabusa2 sample return mission. Mike described a variety of efforts by the international community to investigate and sample other extraterrestrial objects, including landing the Japanese spacecraft, Hayabusa2, on a ~1 km-diameter asteroid named 162173 Ryugu. After landing on the surface and collecting a multi-gram sample of solid material, Hayabusa2 delivered its payload to the Australian outback on December 6, 2020. Mike is a deputy leader of the preliminary examination team for the returned samples and is excited about studying its precious cargo.

I am honored to have served the Society in 2020 and look forward to upcoming events in 2021 under the guidance of our new President, Dr. Bruce Trudgill from Colorado School of Mines. Best of luck to all in the new year.

Jim Paces, 2020 CSS President