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Two white-haired guys, Charles Dimmick and David Abbott, serving as gadflys for the ExCom meeting.

Wall Mountain Tuff outcrop in Florissant National Monument; field trip, September 8th.
The Board normally meets the first Tuesday of each month at 7:00 AM; all members are invited to attend. Please contact a Board Member to confirm time and location.

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Call for Articles

The Colorado Section of AIPG newsletter welcomes submission of technical or informational articles for publication. Articles may be submitted via e-mail to the editor at: dmageol@msn.com (Microsoft Word format is preferred.)

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Contact David at 303-394-0321 for additional information.

Change of email:
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Letters, articles, announcements, ads, etc. must be received by the Editor by the end of the fourth full week of the month preceding publication. Letters, articles, ads, announcements, etc. accepted on a space available basis. Submission of articles, etc. via e-mail is the preferred method; copy can be accepted in most PC formats, but DOC or DOCX are preferred. Call or e-mail David Abbott for details on submission of copy or advertising at 303-394-0321, dmageol@msn.com.

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Back issues: available in PDF at www.dropbox.com/home/CO AIPG/Colorado Professional Geologist
By now, all of you have received the e-mailed link for the ballot for the elected members of the Colorado Section 2019 Executive Committee (ExCom). I respectfully request that everyone sign in to this link and vote in this election if you haven’t already done so. Ron Pritchett, our current President-elect, did a good job on lining up members willing to serve, or re-serve, for the various elected positions for 2019. Write-ins also are allowed, so if you are not happy with the current selection of candidates, please feel free to include someone else in this way.

If you have seen the ballot, you no doubt saw that most offices have just one named candidate running for election. This is because, as with most organizations nowadays, it is difficult to find multiple volunteer candidates for any open position. Many members who might have some desire to serve AIPG as a section officer feel that the time commitment or duties are likely to be beyond their abilities in terms of time or expertise. That is rarely true for the Colorado Section at least because most of the time commitment for most positions involves participating in monthly meetings (except for July) and dealing with any special volunteer needs that arise and that officers can handle if available. For example, serving as President primarily involves 1) bringing issues to the attention of the ExCom, such as items needing a vote for approval or disapproval, or responding to issues raised by other ExCom members or AIPG members in general, 2) assembling the monthly agenda and presiding at the meetings, 3) writing these quarterly missives for the newsletter, and 4) handling any other matters that may arise during the year. This year was a bit more effort than most for me as President (having served twice before in this capacity) because we hosted the AIPG Annual Meeting and I served as Technical Program Chair at the same time to contribute directly to the meeting planning effort.

Perhaps the most intensive position is the Legislative-Regulatory Committee (“Leg.-Reg.”) Chair because the Committee has to keep on top of legislation and rulemaking by the State that needs the Section’s attention either by direct action of the ExCom or information distribution to the membership. The Editor, Secretary, and Treasurer positions also have periodic hard-deadline duties (monthly or quarterly), but these duties generally are not major time sinks other than when reports or the newsletter are due to be produced. Having the full set of positions filled and actively served by dedicated volunteers keeps the load spread out and everything running as smoothly as possible.

So, I encourage all members to consider serving the Section in the future so that we can both have multiple candidates for the ExCom positions and other volunteer needs each year. You are welcome to contact any ExCom member to discuss your interests or desire to run for office next year in the 2020 election.

Speaking of elections, all 2018 state, city, county, and special district election ballots have been mailed to citizens of our state. Please participate by voting in the election regardless of your party affiliation and views on ballot topics. There certainly is no lack of the latter this year requiring your input! Although the ballot item language is not always straightforward, many of these items have long-lasting and potentially serious consequences for our state. Please consider your vote carefully, but DO vote!!

Elsewhere in this newsletter issue, you will see a save-the-date announcement for our January 2019 Section Annual Meeting. As we did in 2017, we are hosting another student mentoring session at the meeting. These will be done on odd-numbered years in the future as well. This is a great way to meet many of the geoscience students from Colorado universities, especially from along the Front Range, and give them input on the profession and future job opportunities. We encourage you to participate in the meeting and mentoring for those who are pursuing degrees and who will one day be part of our profession in Colorado and elsewhere.
Editor’s Remarks
David M. Abbott, Jr.

Vote!

The election is fast approaching. I hope you’ve voted already. If not, the good news, all the hideous TV ads will stop running. The less good news is that there are a lot of issues and candidates on the ballot. Denver’s both sides of 3 pages of ballot is apparently the largest ballot, which is part due to the requirement that it be in both English and Spanish. Take the time to consider the candidates and issues. The nice thing about mail-in ballots is that you know who and what your voting on and can search the web, the Blue Book (state) and “Not-blue” county “blue books, and other sources. Take the time and vote. Voting sooner should stop the phone calls urging you to vote for or against some candidate or measure.

The two measures affecting geologic practice are Proposition 112 that mandates 2,500-foot setbacks for drilling sites and Amendment 74 that requires payment to property owners whose land values are impacted by government action.

Opposition to Proposition 112 is the one thing Walter Stapleton and Jared Polis agree on, and John Hickenlooper agrees as well. According to my Blue Book the arguments for Proposition 112 involve perceived health and safety issues; mostly the greater the setback the better. I’ve seen nothing demonstrating that current setbacks are inadequate. One gets the feeling that proponents of Proposition 112 just don’t like oil and gas development. The one argument in favor of Proposition 112 that I haven’t heard but which has a sound moral justification is that significantly reducing oil and gas development in Colorado is a dramatic and demonstrable effort to end reliance on the use of fossil fuels and their contribution to global warming and climate change. I’m not advocating this position, just recognizing it as a justified position, unlike the named arguments for Proposition 112.

Amendment 74 has generated doomsday ads of state and local government bankruptcy. These ads presume the passage of Proposition 112. If 112 doesn’t pass, then the justification for Amendment 74 can be considered on a less emotional basis. Let’s take geohazards zoning as a basis for an action that could impair the value of a tract of land.

Many of you have taken the Consequences of living with geology field trip that I and Dave Noe have led several times for GSA annual meetings and for the Colorado Section. One of the stops on that trip examines rock fall from North Table Mountain in the Golden area. Within the City of Golden, there are no restrictions on building homes in areas where rockfall has demonstrably occurred. In unincorporated Jefferson County, there are such restrictions. For the person who owns farmed or ranched property that is becoming urbanized, selling to a developer may be the means of sending children or grandchildren to college. But if development is restricted, the development value is lost. Amendment 74 provides a means for compensation. Other examples come to mind, but you get the point.

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Girl Scout Day at Dino Ridge

By Tom Van Arsdale

October 13th was an excellent opportunity for AIPG’s Colorado Section to present itself to the public, and through the efforts of Metro State University, Denver’s Student Chapter and other volunteers, AIPG presented itself extremely well at the “2018 Girl Scout Day” at Dinosaur Ridge.

Three Metro State students provided exceptional help: Danielle McDowell, Kaite Burger, and Jeneane Barber. These three students committed their time, energy, knowledge, and appreciation of geology to the effort, and were well received by the Girl Scouts and their parents. AIPG can be proud of these college students, and we are a better organization because of their commitment to the Institute, and their vitality in representing our Institute. Also volunteering were Ron Pritchett, who provided a number of epidote specimens as “giveaways,” Jessica Davey, and Tom Van Arsdale. In addition, Fred Barnard provided numerous giveaways, such as magnetite specimens, pumice samples, and even some clear topaz samples.

Dinosaur Ridge estimated the turn-out at 639 Girl Scouts, with 1,099 total visitors (both record attendances), and all were treated to a wide range of science-oriented exhibits and specialists. The enthusiasm of the visitors was refreshing, and their interest in the various booths was exceptional. No one seemed to be in a hurry—they were there to observe, listen and learn, and the themes of the various booths were fascinating. For instance, a booth near to AIPG’s was, “Women in Mining,” an organization founded in Denver during the 1970s, and not far away the Denver Astronomical Society had fascinating materials. And, of course, Mr. Bones was there to munch on heads (and, if you do not know who Mr. Bones is, well then, you’ll have to show up next year to find out!).

Dinosaur Ridge is a Colorado treasure, and an excellent venue for AIPG’s outreach efforts. The visitors, especially the younger students, are a target audience not only for geological education, but for the sciences across-the-board. AIPG’s outreach effort can always use volunteers to help “man-the-booth,” to contribute mineral specimens, rocks, and fossils, and to share their love of a truly enjoyable and challenging profession.

Hope to see you all next year, which kicks-off with Boy Scout Day, typically held on the second Saturday in May.
A good crowd and great Girl Scout day at Dinosaur Ridge.

Girl Scouts with various rock types and obsidian.

Scouts and mothers looking at minerals and rocks.

Dani McDowell describing different rock types to a scout.

Katie Burger with kyanite sample.

Ron Pritchett explaining the Colorado Section’s exhibit.
Climate Change: Are We Changing or Not?

David M. Abbott, Jr., CPG-4570

The geologic record demonstrates continual climate change over time. More specifically, we are coming out of an ice age (or are we?) and are getting warmer. This is something geoscientists have accepted for many years. Recognition of human-caused impact on climate change and resulting global warming is more recent and increasingly compelling. Although not everyone agrees, An Earth Scientist’s Perspective on Climate Change by Ray Leonard in the October 2018 issue of the AAPG Explorer suggests that even the petroleum industry is coming to accept human-caused global warming. The measurements of sea level rise are unambiguous data demonstrating climate change.

Honesty—Avoiding the Misuse of Models is the title of one of the lectures I’ve been giving at various universities this fall. The key summary of the lecture is, “All models are wrong. Some are useful.” One of the key points on honesty is Richard Feynman’s admonition from his Cargo Cult Science lecture at Cal Tech (1974, available on the web), “...you should report everything that you think might make it invalid—not only what you think is right about it: other causes that could possibly explain your results; and things you thought of that you’ve eliminated by some other experiment, and how they worked—to make sure the other fellow can tell they have been eliminated.” Uncertainty is a very important aspect of geoscience that is not emphasized the way that it should be. Our estimates (of whatever) are all wrong; they are too high or too low. We should disclose our assumptions and uncertainties and provide error ranges, even if only qualitatively. Unfortunately, I recall only one paper in over 40 years of professional practice that included a description of a methodology that didn’t work. Any paper that lacks a discussion of the uncertainties of the conclusions reached is missing a very important section—this means most papers regardless of topic.

One of the attorneys I worked with at the Securities and Exchange Commission observed one day that, “The weather bureau is deserving of great public commendation for daily issuing weather forecasts that were distributed to all and sundry by the news media and which serve as daily reminders that prognostications in general and those of the government in particular are subject to error.” Weather forecasting remains uncertain and subject to error. Hurricane forecasters are to be commended for issuing both the American and European models that differ and that are shown on TV along with ever-expanding circles of uncertainty around the predicted path. The models give neither unique or precise forecasts. The hurricane forecasters at the University of Wisconsin-Milwaukee collect numerous hurricane prediction models and publish them on the web. Figure 1, for Tropical Storm Bonnie, is an example.

Figure 1. Estimated tracks from 18 different hurricane models for Tropical Storm Bonnie at 0600 UTC, 5/29/16; http://derecho.math.uwm.edu/models/.

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Most of the estimated tracks had Bonnie either tracking just offshore to somewhat inland before turning to the Atlantic off the Delmarva Peninsula. However, one track proceeds to northern Quebec and another heads northwest to Lake Huron. Those familiar with the models could comment on which best estimated Bonnie’s track. But the point is the uncertainty and diversity of tracks as of 0600 UTC on 5/29/19.

Climate change modelling has even greater uncertainties because they model the whole earth’s weather systems, not just relatively localized hurricanes. I’ve been looking for climate change models that depict these uncertainties and found a good collection thereof in Wuebbles, D.J., et al., 2017, Climate Science Special Report: Fourth National Climate Assessment, Volume I: U.S. Global Change Research Program, Washington, DC, USA, pp. 12-34, doi: 10.7930/J0DJ5CTG. https://science2017.globalchange.gov/chapter/executive-summary/ (accessed 10/17/18) (NCA4 report). Figure 2 shows estimated global mean temperature anomalies in °F and °C for 1976–2005 for various runs of four Representative Concentration Pathways (RPC).

While all the RPC estimates increase from 2010 onwards, the amount of increase varies considerably. For some of the estimates, the rate of increase grows over time and declines for others. Is climate change happening? Yes. But how much and how fast depends on the particulars of the estimate.

Figure 3 is a chart of 2016 US greenhouse gas emissions. Transportation’s contribution is over 90% from gasoline and diesel for cars, trucks, ships, trains, and planes. About 68% of electricity production comes from fossil fuels, mostly coal and natural gas. Industry’s contribution comes from burning fossil fuels for energy, but some come from manufacturing chemical reactions (for example, making cement and flue gas desulfurization that release CO₂ from the CaCO₃ used in these processes). The commercial and residential contribution comes mostly from heating primarily natural gas or fuel oil. Agriculture’s contribution comes from livestock (cows), soil amendments, and rice production; methane is the main greenhouse gas generated. Land use and forestry act as an absorbent of CO₂ and offsets about 11% of the 2016 greenhouse gas emissions.

The NCA4 report notes that CO₂ is the greenhouse gas causing the greatest concern for climate change. While other greenhouse gases such as methane and black carbon aerosols exert stronger warming effects on a per ton basis, they do not persist as long in the atmosphere. CO₂ is generated by the burning of fossil fuels, coal, oil, and natural gas.

While Figure 3 is interesting, the underlying data (and the NCA4 report as a whole) lumps all greenhouse gases together. This lumping is for me a major failing of the NCA4 report as a basis for moving towards a solution because the amount of CO₂ generated by burning coal, oil, and natural gas differs. There are
(Continued from page 8)
even differences attributable to the quality (BTU and trace element content) of coals and to the type of oil used (gasoline, bunker oil, etc.). Natural gas, being essentially methane (CH₄) lacks the variability of coal or oils. Moving towards increased use of natural gas for transportation fuel and electricity generation and reduction of in the use of coal in particular could be a positive step.

Let’s turn to the second part of this article’s title, “Are we changing or not?” “We” (the general public) is the important word in this question and the answer to the question is generally “not.” Coal use may be down to some extent in the US but is increasing elsewhere in the world. The number of vehicles on the road and jets in the air is increasing. Despite recognition of sea level rises, people are not moving away from the sinking Texas and Louisiana coasts or areas of frequent hurricane impact such as the Gulf Coast and Florida. The root cause of almost all environmental problems is too many people. Yet little is being done to reduce the world’s population. A repeat of the so-called Spanish flu pandemic of 1918–19 that infected 1/3rd of the world’s population and killed at least 50 million worldwide would result in only a temporary reduction in population (www.cdc.gov/features/1918-flu-pandemic/index.html). People generally don’t like change of any type, particularly changes that are viewed as making life more difficult. Such changes are resisted.

A radical proposal: instead of having a 2,500-foot setback from buildings for new oil and gas wells, let’s have a 2,500-foot setback for all new development from existing and planned oil and gas wells. This would force increased population density in existing urban areas along the Front Range. Increased population density could stimulate the use of public transportation (and maybe reduce the need for subsidizing public transit) and it would retain agricultural areas with plants that offset greenhouse gas emissions. Other consequences may occur to you. Is this proposal likely to be adopted? No. Should we all become vegans to reduce the resource consumption required to raise animals for food? I don’t think this will happen. So, are we (the general public) changing or not; we are not.

MSU Student Chapter Autumn Corn Maze Fun

Jeneane Barber

On October 21st, the MSU Denver AIPG Student Chapter organized a small trip to Rock Creek Farm to venture through their corn mazes. Evidently, it’s one of the largest in Colorado! The theme for this academic year’s Student Chapter is “Community”. As MSU Denver is a large commuter campus, it can be difficult to feel a sense of belonging. To remedy this, our Chapter has planned a few social events. When we get together to mingle, geology sneaks in. In the hours before we assembled at Rock Creek Farm, several geology students gathered for a few hours at the I-70 road cut to measure and study the exposed strata. It was then time to discuss our findings, and time for some fun!

We were handed maps of the intricate corn maze as we arrived, and chuckled a bit because after all, we’re “professionals” and don’t need maps. Right? … Wrong. There were several checkpoints within the mazes and it was surprisingly troublesome at times trying to find them all. Consider us humbled. We discussed how amazing it was that humans seem to be able to orient themselves after a while in different environments. We noticed the heights of corn stalks differed depending on location. So geology snuck in, as it always should.
Participants in the 2018 Annual Meeting in Colorado Springs really enjoyed the meeting. A good number of students participated, included a group from Central Michigan University. Participants learned things and had some fun. The picture on the front page of this issue of the two white-haired guys prompted the observation resulting in creation of the picture.

The Student forum on Saturday was a great success. It ended with a “speed dating format” chance for students to meet with experienced geoscientists representing all types of geoscience practice. And Aaron Johnson closed out the forum with a fascinating geotrivia contest. Do you know which US President’s wife was a geologist and where she went to school? Can you name the polymorphs of Al₂O₃? Why are these polymorphs important? Teams at different tables had variable success. The two white-haired guys won going away.

Dr. Uwe Kackstaetter and students at the “speed dating format” meeting with experienced geoscientists.

Barbara Murphy modeling the latest in geologic footwear—a volcano on the right foot and a subduction zone on the left. Different cross sections on the sides not shown.

Doug Peters with Matt Rhoades.

Jeneane Barber was top bidder for a banded iron formation specimen at the Silent Auction.
My Last TPG issue

This is my last issue as Editor of The Colorado Professional Geologist. I served as editor in 1993 to 1996 when we had 10-12 issues per year and part of the job was putting the mailing labels on the printed copies. The current term as Editor began in 2015.

Jim Russell, also a former Editor, is taking over in 2019 and I wish him well. I’ll try to remember to send in the odd letter to the Editor or article. I hope the rest of you do likewise.

The thing any Editor really appreciates receiving are articles, letters to the Editor, and pictures. Jeneane Barber’s article on page 9 about the MSU trip to the corn maze is a good example of what is needed to both add content and make a record of what the Section members have done. Likewise the article on Girl Scout Day by Tom Van Arsdale and the pictures taken by different folks are a big help.

If you Don’t Like How Things Are Going in the Section

The Colorado Section’s membership is pretty diverse group in terms of age, geoscience specialty, interests, etc. As a consequence, some member is going to say or write something you strongly disagree with or believe is wrong.

When this happens do something about it. Write a letter to the Editor. Confront the person if that is possible. Let folks know what you think. As long as we are respectful (polite) to each other, we can agree to disagree on some very fundamental issues. Don’t go off in a huff. That doesn’t change anything. Present the other side of an issue. That can be one of the things that makes The Colorado Professional Geologist particularly useful.

The time has come for those in my age cohort to pass the leadership torch on to younger members. Step up and volunteer. You’ll change things, but that’s okay and probably better.

2018 Annual Meeting Plenary Session

![David Abbott, General Chairman for the Annual Meeting, greeting participants at the plenary session on Monday.](image)

![Matt Rhoades presenting his and David Abbott’s paper, Intraplate Tectonics—a geopoetic introduction to a new tectonic paradigm at the plenary session.](image)