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EDITORIAL

Geoscience in the Time of Covid

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SUMMARY

If one thing is beyond discussion in June of 2020, it is that we are living in unique times, even if pandemics are far from unique in longer Human history. A short article in this issue on the topical concept of the Anthropocene closes with a quote that (in part) reads that “....some humility is in order about our, thus far, infinitesimal part in the history of the planet”. Our high-technology society has certainly received a stark reminder of the power of the natural world, as it struggles to prevail over one of the most primitive of life forms. Few previous analyses of the pandemic threat that I have read fully captured the economic impacts and ethical dilemmas that confront us in this time of Covid. Many in the Canadian Geoscience Community suffered these impacts and some are now directly touched by illness or bereavement. On behalf of those involved in *Geoscience Canada*, I extend sympathies and condolences, and the hope that the time of Covid will be brief.

The American Geological Institute (AGI) recently initiated a study on the impacts of Covid-19 on the Geosciences and invited contributions from member organizations (see www.americangeosciences.org/workforce/covid19). No great insight is needed to see how the prohibition of large gatherings and the need for physical distancing could have far-reaching implications for many of the things that we typically do. We will need to think about how to conduct important field work, especially in remote and isolated areas, how to mount our vital professional conferences, and how to educate the next generation of Geoscientists. We should expect that the global pandemic will wreak changes to many other things that we have not yet considered. AGI's initiative is a good step, and one that will hopefully provide some direction and context as we move into next year. There are of course much wider questions to consider, such as whether this global crisis might force society to better confront the threat of climate change or even to rethink the relationship between the Human and Natural worlds. These

are not really subjects suited to an editorial, but issues surrounding professional development and education are definitely relevant to *Geoscience Canada*. Even if the time of Covid turns out to be transient, impacts we now see may reverberate through the coming decades.

Geoscience Canada has to date seen only minor impacts from the pandemic. Our small editorial and production team rarely ever meets in person, so our work could continue, but important in-kind support from Universities and Geological Surveys was disrupted by closures in March and April. Suddenly, it seemed as if every process was suddenly two or three times slower than usual, likely reflecting the distraction that accompanies a loss of a sense of certainty. Our decision to defer the first issue of Volume 47 was easy because there really was no other option. We are now happy to present a combined summer issue, even though we would have liked for it to also include some other papers that are still impacted by delays. The various lockdowns around the world might even have some positive side effects – for example, two weeks of mandatory self-isolation in late March finally forced me to finally complete an article that was in some danger of becoming lost. Nobody I know actually likes the idea of being told to stay home, but such circumstances *might* encourage writing, so perhaps we might yet be deluged with high-quality submissions. If nothing else, the preceding sentence illustrates that optimism is a necessary attribute for all editors of small journals. In almost every editorial over the last few years, I point out somewhere that journals like ours simply cannot exist unless readers are also writers and so I will reiterate it, yet again. This is our most important requirement if we are to survive and hopefully grow in the years to come. *Geoscience Canada* needs to maintain and grow the subscriptions that help to sustain us and expand our readership – to do so we must provide high-quality material that is relevant to a wide audience. We cannot do that without our most important contributors – *the authors*.

The Geological Association of Canada (GAC) has taken some direct steps to assist the Geoscience Community in these challenging times. The pandemic has closed libraries around the world, and we have all now discovered that some literature still does not exist online, or is not accessible. In April, many GAC publications were granted interim open-access status to assist users and this includes recent issues of *Geoscience Canada*. Currently, all material published in the journal since its foundation 46 years ago is available without restriction. Recent issues are most easily accessed at www.geosciencecanada.ca, and

older material can be searched and accessed through the more comprehensive site at <https://journals.lib.unb.ca/index.php/GC>. Judging by a recent communication that I received concerning bandwidth issues for our website, this initiative has been welcomed, and it will continue for the foreseeable future. This is perhaps a good time to point out that we are *already* an open-access journal to a large extent, because all content more than 12 months old is freely available under normal policy. For those of you who receive external research funding that requires open-access considerations, this is another good reason to publish with us.

Geoscience Canada is an important part of GAC's Professional Development and Educational agendas, as we encourage the preparation of review-type papers that have long-term value in the training and enlightenment of Geoscientists. We encourage authors to keep non-specialist or undergraduate student audiences in mind as they write, to make their papers clear, and not to inundate readers with unnecessary jargon and acronyms. We also have a role in terms of outreach, to try and inform readers with limited formal training in our science. This is a very wide mandate, and it is perhaps worth thinking about how the time of Covid will affect these key areas, and how we might be better able to assist in adaptation.

As a part-time educator, I am coming to terms with the fact that the entire teaching experience will be very different, at least for a while. I am now considering how to adapt existing materials for online and remote delivery and, like many others, I am struck by the challenges of delivering a 'hands-on' subject in a 'hands-off' environment. So much of what we do in Geoscience, especially in our field work and in observational lab work, is not readily amenable to distance learning strategies. Knowledge of field geology skills is accumulated from direct experience over multiple years and simply cannot be gained from theory alone. A considerable portion of my knowledge was acquired by getting things wrong more than once and learning from mistakes, rather than learning from books. If learning comes largely from computer screens and texts for more than a few years, a coming generation of Geoscientists will be disadvantaged. There is already concern over the limited acquisition of field-related skills such as mapping in our educational systems, and these will be exacerbated by a lack of hands-on learning. We do not want to be a discipline learned largely from computer screens and innovative thinking is required to avoid this fate. Some University Departments are shipping out rock and mineral kits to students enrolled in introductory courses, and some have sent upper-year and graduate students home with petrographic microscopes or other equipment. Other approaches include adjusting schedules for field schools and finding ways to accommodate smaller groups in face-to-face laboratory sessions. Health and community well-being are obviously the first priority, but there may be ways to work within these constraints.

I am less than enthusiastic about the prospect of swapping a real classroom for the computer in my own basement, and probably not meeting or getting to know any students in the coming semester, but online and remote instruction do offer some advantages. I have heard some claims that it might

reduce instructor workload, but I do not believe those for a minute. However, it does make it possible for more students to enroll in a course, especially if material can be delivered in an asynchronous manner, allowing them to work at their own pace from elsewhere. It can also remove some of the high associated costs of attending University in person. However, remote instruction is not necessarily more efficient or less expensive than in-person teaching. The challenges of building 'connections' between instructors and students in large classes are greater, and not all students will have the same access to technology or broadband internet. If we are not careful, we might design online instruction that magnifies existing inequities. As I think about how to approach this challenge, I realize that material for online course delivery needs to be more self-contained and comprehensive than material that I typically have used in person. I suspect that many others are coming to the very same conclusion and recognizing the need to prepare in this way. Thus, there may be opportunities in this transition for the development of material that might serve as a starting point for topical review papers – which, naturally, could and should be submitted to *Geoscience Canada*. There is nothing novel about this, as our previous thematic series such as *Facies Models* and *Ore Deposit Models* are well known as educational resources. There is now an opportunity for us to revisit and expand this role, and I encourage those engaged in preparation for online and remote teaching to consider eventually adapting such materials for publication. This might be one positive outcome from a set of circumstances that might presently seem unwelcome to some of us. To convey aspects of field geology without 'being there' is a more significant challenge, but some informative field areas could be framed as self-guided excursions that students might be able to undertake alone, or in smaller groups. *Geoscience Canada's* 'Classic Rock Tours' series, initiated in 2018, is an ideal vehicle for doing just this, although it was not an application that we had in mind at the time. If you have a favourite area that really should be shared more widely with others for any purpose, please consider the idea of contributing to this series.

Conferences and related activities are a vital part of professional development in Geoscience, and they are an important part of GAC's annual agenda. They also contribute vital revenue that provides a foundation for a wide range of activities, including publishing journals like ours. Conferences in all professions have effectively disappeared in the time of Covid, as large gatherings of international delegates propagate viruses as much as they do knowledge. There will be no major on-site Geoscience conferences in 2020 and there is understandable concern about the outlook for 2021. Our annual conference for 2020, integrated with the *Geoconvention 2020* initiative, did not occur in Calgary, and is now reframed as an 'online conference' in late summer. The large European Geoscience Union (EGU) conference in May met a similar fate, becoming a free online event, and the Geological Society of America (GSA) conference originally planned for Montreal this October will also be a 'virtual conference'. This small selection of examples is probably a taste of what is to come. The next GAC-MAC in 2021 (London, Ontario), may be a 'hybrid' con-



ference involving both on-site gatherings and wider online participation, but details have yet to be decided. It is not exactly clear how such a hybrid model will work in practice, but this is likely the way of the future. If an in-person conference can successfully and seamlessly incorporate virtual components it may enjoy wider participation. There will be potential to attract those who may not be able to attend in-person, bring in more students, and perhaps connect scientists whose paths would not otherwise cross.

Scientific conferences serve many roles beyond the science that is presented in lectures and poster sessions. The administrative business of Geoscience societies is conducted there, they serve as vehicles for technical courses, and – most importantly – they serve to connect people from around the world in person. Unfortunately, the latter attribute is exactly what we are now required to avoid at all costs. Field trips at Geoscience conferences provide unparalleled opportunities for discussion and collaboration. They are often where important geological correlations are made, as well as important personal contacts. The long-distance friendships that start at conferences or field trips lead to collaborative research, opportunities for students and to many other outcomes. Students often first meet the professionals who influence their career paths at conferences, and this is where many students get their first jobs. For *Geoscience Canada*, the symposia and special sessions at conferences are where many of the thematic papers that we eventually publish are first formulated. Many of these contributions may be gone, at least for a while. National and regional initiatives that present and disseminate research and ideas across Canada may also be impacted. Depending on the situation in the coming winter, GAC medallist lectures may have to be facilitated by online conferencing tools, at least in part. Similar approaches will be needed for all the technical aspects of Geoscience conferences, and there is a wide range of opinion about the chances of success for virtual conferencing. There is likely some correlation between these opinions and age, so it is probable that the organization of conferences will increasingly be the responsibility of a younger demographic group in our Community. This is probably a good thing in the long run, and the time of Covid may in the end open opportunities and lead to much-needed renewal.

Participation in science is a motivation to attend a conference, but any honest analysis would admit that it is not the *only* reason to attend. The ability to physically travel to a different location, to reunite with friends and colleagues and make new contacts is equally important for many delegates. Not to mention going on field trips. The idea of ‘virtual’ field trips has been suggested, but it is hard to summon enthusiasm for that prospect, even if it might preclude getting soaked or multiple insect bites. Would potential delegates be prepared to part with registration fees in order to sit in front of their own computers in their own offices? If conferences are designed as synchronous events, i.e. in which online presentations are accessed in specific time slots, will this complicate international participation? If conferences are designed as asynchronous events that you take in at whatever time is convenient (like an online course, perhaps), would they actually qualify as conferences at

all? We will not know the answers to these and other questions until we start to work through the process. In the end, conferences and travel are not linked by simple necessity – realistically, many delegates attend because they want to travel, and want to visit and explore a new place. The restrictions and challenges to travel that the time of Covid has imposed will not prove easy for Geoscientists to accept or adapt to, because we tend to be enthusiastic travellers and explorers. I am probably biased, but ours is surely one of the most international of professions.

The above is perhaps a rather pessimistic view and for those of you who do not know me, it likely betrays my age. In the end, we need to put away misgivings and objections and try to find out how to make old things work as best they can in new ways, at least for a while. Just as there is a new normal of mostly online and remote teaching, there will be a new normal for conferences and professional development. Everyone understands that we will all miss many aspects of in-person conferences, and may find it difficult to replace some things. But some things are quite literally out of our hands, and we have no choice but to adapt and embrace changes that may at first seem radical, but will in time feel routine. When the time of Covid comes to an end, we will perhaps return to the old ways of doing things (or at least, I hope we will) but we will hopefully keep many useful and valuable things that come from involuntary adaptations. Above all, we must always remember that we are not making a choice between an idealized “in-person conference” or a “virtual conference”, as these are false equivalents. The third option of not holding conferences at all is obviously unpalatable, and the risks presently involved in traditional in-person conferences are simply unacceptable. To paraphrase a well-known axiom, we must hope that necessity turns out to be the mother of innovation, and rely on our well-known reputation for adaptability and resourcefulness.

We can find some good examples of innovation and adaptation in the first few months of this year, which have done much to keep our community connected. The lockdowns imposed in the spring of 2020 led to many online seminars and lectures, delivered via Zoom, Webex and similar tools. Of particular note in Canada are the excellent talks organized by GAC’s Volcanology and Igneous Petrology (VIP) division. An international example is the “Ore Deposits Hub” that facilitates topical online seminars related to economic geology (www.oredepositsclub.com). At the other end of the spectrum is a more local initiative by the Atlantic Geoscience Society and the Newfoundland-Labrador Section of GAC. These are just three examples of initiatives that have served us well in a time when workplaces were closed and social gatherings were impossible. Many similar initiatives have emerged across the world, and in disciplines that I am less familiar with. There is generally little or no cost to participate, but software licenses commonly impose restrictions on the numbers of participants in each session. In some cases, presentations are available as recordings, to reach people who cannot participate directly. If the practical considerations can be resolved, there is potential to involve large numbers of participants, who could never



meet in person under normal circumstances. The information about such online professional development ventures is presently circulating to a large extent through informal channels. *Geoscience Canada* might be able to provide a resource centre for information about such initiatives, through our website. Obviously, we are more than happy to encourage more visits, so that more of our papers can be read and downloaded. The seminar series noted above also include many excellent broad-interest lectures that would make excellent topics for thematic series papers. So we certainly have a vested interest, and encourage support for such ventures. Even if physical lectures do eventually resume, virtual equivalents or simultaneous online sessions should probably be an expected requirement in the future.

If there is a statutory limit on the length of an editorial, I have undoubtedly exceeded it, but I must add a few lines to thank those whose efforts make *Geoscience Canada* happen. As scientific editor, I truly depend on contributions from others. My greatest debt is to managing editor Cindy Murphy, who coordinates the long pipeline that leads us from first drafts to the final formatted product. This requires organization, self-discipline, insight and more than a touch of diplomacy, and I greatly value her advice. We also benefit from work by associate editors, who coordinate thematic series papers. I would particularly like to thank Jarda Dostal, Brendan Murphy and David Lentz for their efforts in 2019. We are always interested in recruiting new associate editors – so if you have an idea for a thematic series and are interested in coordinating such an effort, please get in touch. I must also thank tireless volunteer copy editors, who patrol for grammar infractions and do much tedious work to get papers into shape for production. Robert Raeside, Lawson Dickson, Stephen Amor and Janice Allen have all made important contributions. Beverly Strickland and Joanne Rooney are responsible for the attractive layout of the articles in this issue and many previous contributions, and Evelise Bourlon provides our thoughtful French translations. Peter Russell provides the graphic icons that accompany many of our papers, and it is remiss on our part not to acknowledge him each time that they appear. We are very grateful for his time and creative energy. I must also thank Karen Dawe at GAC headquarters in St. John's for support with the administrative aspects of our work. Cindy and I receive institutional support from St. Francis Xavier University and Memorial University, respectively, and the journal also receives institutional support from the University of New Brunswick.

The forty-seventh volume of *Geoscience Canada* did not get off to the best start in 2020, but we hope that these frustrations and delays are now behind us, and that we will be able to bring you diverse and interesting content through the remainder of the year. We also fervently hope that by the time we publish the first issue of volume 48 in March of 2021, the time of Covid will be behind us. In the meantime, we hope that all our readers will stay safe and healthy, adapt to an increasingly online Geoscience world, but also find the time to write a paper for us. We exist to help you share your ideas as well as to help you share in the ideas of others.

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