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# Using social media metrics to identify science communicators in Canada

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**Abstract**—As part of a project mapping the new landscape of science communication in Canada, we recognize that social media has allowed non-traditional science communicators to participate as content producers. Yet their practices are not visible to the mainstream science communication community because these social media communicators build networks independently of professional member associations. This project identifies and maps science communicators on Instagram, Twitter, and blogs in Canada using data gathered for creating social media scholarly metrics (Altmetrics) and from social media platforms directly (with the help of the Netlytic tool). Using a combination of automated methods (querying the database of Altmetric LLC and application programming interface of Instagram) and manual searches, we identified hashtags, keywords and users, and then filtered them to those who were geolocated in Canada. We identified 56 science communicators on Instagram, 196 on Twitter and 60 bloggers. Our findings show a rich picture of activity on social media within Canada, mainly in Ontario, Quebec and British Columbia. Identifying these accounts is a first step towards documenting the innovative practices of these communicators so that associations such as the Science Writers and Communicators of Canada (SWCC) and the Association des communicateurs scientifique du Québec (ACS) can provide better professional support and improve policies related to science communication practices.

## I. INTRODUCTION

Social media has changed the way we communicate, including the ways in which we communicate science (Brossard & Scheffele, 2013). This is unsurprising given the broad reach of the largest social media platforms. Worldwide, Facebook has reached more than two billion users, YouTube 1.9 billion, WhatsApp more than 1.5 billion, Instagram one billion, and Twitter 355 million (Statista, 2018a). Of these, Instagram is growing the fastest. Twitter, although having the smallest number of active users, has a lot of visibility. Anyone interested in sharing scientific information with the general public can use social media to freely speak, as well as co-create content with their audiences (Rollwagen et al., 2017). As such, social media has the potential to foster public dialogue. It is rich for direct communication between scientists, experts, universities, NGOs and society, without the need for mediation by journalists.

The broadband connection to the Internet in Canada reaches 86% of homes. The majority of Canadians spend between three to four hours daily on the Internet and around

64% of them enjoy engaging on social media (CIRA, 2018). Facebook is the second main source of news for Canadians, just after television (Abacus Data, 2017), which demonstrates the growing relevance of this social media to Canadians' daily lives. Among Internet users in Canada, 80% use Facebook, 39% Instagram and 35% Twitter (Statista, 2018b).

Social media has drawn the attention of information scientists who have analysed ways of measuring the circulation of research on social media—so called altmetrics (Priem et al., 2010). While altmetrics can be collected and captured by anyone, a British company, Altmetric, is one of the most widely used sources of altmetrics data (Robinson-Garcia et al., 2014). Altmetric tracks how scientific articles and documents are shared online by looking for links and mentions on various platforms, including Twitter. Researchers have proposed using these engagements as alternative indicators to measure the impact of science outside the walls of academia (Bornmann, 2014). Although altmetrics have limitations related to the “heterogeneity of social media acts, users and motivations” (Haustein, 2016, p.4), and the social activity tracked cannot be compared to social impact, it provides rich data to track and analyze publics interested in consuming scientific information. Therefore, we suggest that social media traces of research can be used to study science communication, science communicators and writers, and to produce indicators that might motivate scientists and institutions to track the attention of their public outreach activities.

To begin work on developing social media indicators of public outreach, we first needed to identify the extent to which science communication activities are taking place on social media. As such, in this paper we identify and map science communicators on social media in Canada using altmetrics and social media platforms as a source of data. Our goals are to understand the new landscape of science communication in Canada, provide visibility to social media science communicators, and stimulate networking among them. Moreover, we believe such work may assist Canada's professional science communication organizations, the Science Writers and Communicators of Canada (SWCC) and the Association des communicateurs scientifique du Québec (ACS), in providing better training and support to their members, and to promote and improve policies and practices

related to science communication.

## II. METHODOLOGY

We identified and mapped science communicators on Twitter and Instagram by looking at user self-descriptions (biographies) for mentions of science communication. Twitter, has the highest coverage for scientific papers on Altmetric (Robinson-García et al., 2014) and so we used it to conduct our analysis in two steps. We: 1) identified groups of users whose accounts were geolocated in Canada using a list of relevant keywords and hashtags in their biographies; and 2) looked for keywords in blogs to identify science bloggers.

### 1. Twitter

We searched a local copy of Altmetric data for all research articles shared on Twitter between January 2015 and June 2016. We then used Altmetric's "science communicators" category to filter only those accounts that included any of the following keywords: "news service", "Magazine", "editor-in-chief", "editors-in-chief", "correspondent", "Jornalista", "reporter", "journalist", "journo", "scicomms", "science communicator", "science communication", "editor", "blogueiro", "blogger", "librarian", "Bibliotecari", "journal", "society", "proceedings". Although limited (e.g., does not include any French keywords), it offers a reasonable starting point. From this set of data, we searched for French keywords relevant to science communication including: commsci, communication scientifique, vulgarisation, culture scientifique, journalism scientifique etc. We subsequently filtered these users by those accounts that were geolocated in Canada.

This method identified 855,016 self-identified science communicators in the Altmetric database who shared at least one research article on Twitter from 2015 and the first half of 2016. However, this method had limitations for identifying those from within a given country: only around 56% of all tweets are geolocated (Haustein, 2018). Therefore, we may have missed science communicators who: a) used those keywords in their biographies (self-identified as science communicators) but did not provide geolocation; b) did not use or used different keywords/hashtags to describe their work with science communication. One other important limitation is that Altmetric does not use French keywords under their "science communicators" category. Therefore, we could only track those who used English keywords/hashtags on their Twitter biographies.

To increase the number of French-Canadian science communicators contained in our Canadian dataset, we pulled data from the broader category "Member of Public" from Altmetric.com. This included all Twitter users who did not belong to the other three categories: "science communicators", "practitioners" and "researchers". Since this was a larger sample, we were able to track all the accounts geolocated in Canada and, once again search for the French keywords/hashtags. The results of this work are still under analysis and will not be presented here.

### 2. Instagram

To identify Canadian Instagram science communicators, we used *Netlytic* software, developed by Ryerson University's Social Media Lab. This social network analyser pulls data from different social media, including Instagram. Although the software tool has limitations, we have found it useful for capturing Instagram user accounts by hashtags or geolocation. Geolocation on Instagram is made by picture, not linked to the ID handle. Therefore, we decided to extract different sets of data using four hashtags shared in different posts: #scicomm; #sciart; #commsci and #vulgarisation. While #scicomm appeared on 1,376 unique accounts, sciart was present on 479 unique accounts. Both are used by French-Canadian or English-Canadian science communicators and were the most used hashtags. We also identified 180 unique accounts using the French hashtags #vulgarisation and #commsci. As a way to identify Instagram handles from Canada we then searched the accounts we had identified for keywords related to Canadian geolocation (i.e. using the names of provinces and capitals, #cdn, Canadian). After cleaning the data, we identified 56 Instagram science communicators posting from Canada.

### 3. Blogs

From the samples of science communicators identified on Twitter and Instagram (above), we searched for science bloggers or potential bloggers, by looking for URLs and the keyword "blog" and identified.

We have also pulled Altmetric data of papers with Canadian authors published on Web of Science (WoS) that have been shared on Twitter between 2014-2017. There were a total of 17,514 posts sharing paper link, among which 1,898 blogs worldwide (raw data). We have selected the blogs identified with location in Canada (".ca") or including keywords related to Canada in their description.

We tracked a total of 60 blogs and identified 52 science blogs after excluding the non-active or non-related to science.

## III. RESULTS AND DISCUSSION

Through this approach, we identified and mapped 197 science communicators on Twitter, 56 on Instagram and 52 science blogs (Figure 1). These science communicators are based in nine of Canada's ten provinces and in two of the three territories. There is a significant concentration in Ontario, Quebec and British Columbia, the three most populous provinces and also the ones with a longer record of investment in science communication policy, training and public outreach activities (Schiele, Landry & Schiele, 2011).

Although Twitter is not the most frequently-used social media platform worldwide, nor in Canada, the opportunity for science communicators and publics to engage with researchers on this platform may be on the rise as it becomes more widely used by scholars (Noorden, 2014). Given that science communicators often communicate across multiple platforms, the effectiveness of our approach to locate science communicators on Twitter may prove valuable for identifying them on other platforms.

Instagram is more widely used than Twitter, yet we only identified 56 science communicators on this platform using *Netlytic* software. More than two thirds of these accounts were located in Ontario and Quebec (28 and 11 respectively). Notably none were located in the northern territories.

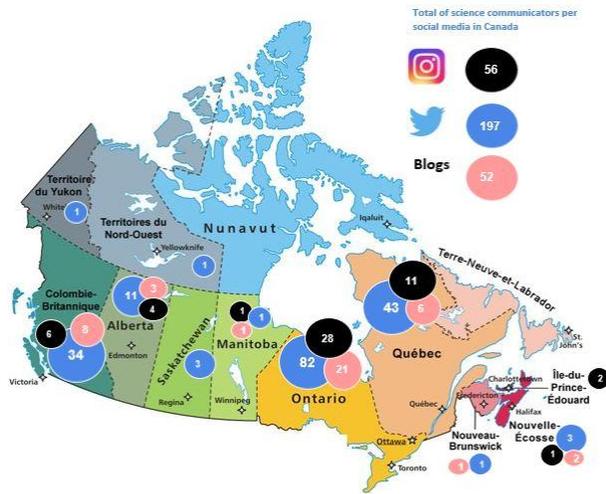


Figure 1 - Map of science communicators on Twitter (blue circles), Instagram (black circles) and science Blogs (pink circles) in Canada among provinces and territories. Some science communicators were geolocated in Canada but not at a province or territory, therefore they are not on the map. The total of science communicators per social media is above on the right

We also identified a similar number of blogs, which were located in fewer provinces and we identified none of the territories. However, we did not include in this procedure the Science Borealis blog hub which contains more than 130 science blogs spread across the country, even though some of its blogs were tracked by our methodology, which means that only the ones sharing a paper link were identified by Altmetric.

The accounts and users included researchers and research groups, members of formal organizations and informal communities, and individuals operating for both commercial and non-commercial purposes. We include four examples of science communicators from each platform:

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### 1. Twitter

- **@AnatomySupply:** Maria Romanova calls herself a medical illustrator and animator and shares #scicomm in her biography. She has more than 1,130 followers and is based in Toronto, ON. She joined Twitter in 2014.
- **@DrummerBoy2112:** Brian Wagner is a Chemistry Professor who works with fluorescent Chemistry in Charlottetown, PE. He joined Twitter in 2011 and has more than 14,000 followers and includes “scicomm” in his biography.

- **@JeremyBouchez:** Jeremy Bouchez is a “communicateur scientifique” in Montreal, QC. He has 1,241 followers. He started tweeting in 2011 and mainly communicates in French, but also in English.
- **@WhySharksMatter:** David Shiffman is a post-doctoral fellow at Simon Fraser University (SFU) in Vancouver, BC. He is a marine biologist expert in sharks with more than 38,000 Twitter followers. He describes himself a science writer. He started his Twitter account in 2009.

### 2. Instagram

- **@oliviarozema:** Olivia Rozema is a full-time science artist. She has 454 followers and is from Regina, SK. She has used #sciart in her bio.
- **@petridishpicasso:** This is a student organization from the University of Calgary using bioart for public outreach and communication in Calgary, AB. They have 2,101 followers and have used #sciart and #scicomm in their bios.
- **@pineappleswhalesci:** Daisy and Chloé are two science artists from Winnipeg, MB, who draw infographics about ecology and evolution. They have used #sciart and #scicomm and have 175 followers.
- **@science.sam:** Samantha Yammine is a neuroscientist PhD candidate at University of Toronto, Toronto, ON. She considers herself a “science storyteller”. Her communication is mainly about neuroscience and STEM. She has more than 31,000 followers.

### 3. Blogs

- <http://www.alternativesjournal.ca>: Alternative journalism focused on environmental issues. Located in Kitchener, ON. This blog was located on Twitter.
- <http://www.drsharma.ca/>: Health expert who writes about obesity in Edmonton, AB. This blog was located on Twitter.
- <https://impactethics.ca/>: Run by a team of researchers from Faculty of Medicine at Dalhousie University in Halifax, NE. It deals with bioethical issues. This blog was located on Twitter.
- <https://www.sciencepresse.qc.ca/blogues>: Hub of science blogs located in Montreal, QC gathers French-Canadian science bloggers from different fields of knowledge. This blog was located on Twitter.

## IV. CONCLUSION

Data gathered from mentions of research on social media from Altmetric LLC and social media data gathered with *Netlytic* have proven to be useful for tracking Canadian science communicators, even in cases where users did not include geolocation information in their accounts. Our

approach involved much manual work and suffers from other limitations already noted. However, we believe our social media mapping work demonstrates that the new Canadian science communication landscape is rich and can serve to promote connections between new and emerging science communicators in Canada. That is, the map has the potential to empower the science communication community, whom we hope see value in contributing to and updating the data map we produce. This map could help inform policies to promote science communication activities on social media and help professionalize and enlarge the community within Canada. It may also promote collaboration among social media science communicators and raise public interest in public outreach activities on social media.

#### ACKNOWLEDGMENTS

This study was supported by the Social Sciences and Humanities Research Council of Canada through Grant (892-2017-2019) to Juan Pablo Alperin and Michelle Riedlinger. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript. We would like to thank the Science Writers and Communicators of Canada (SWCC) for their partnership in this project. In particular, we are grateful for the continued support and assistance of Shelley McIvor, Janice Benthin and Tim Lougheed from SWCC, and Stéphanie Thibault from l'Association des communicateurs scientifiques du Québec (ACS).

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