



Research students are diverse, while those in salaried positions are not: results from a survey of Canadian academic geoscience

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Abstract: Despite recognition that academic geoscience lacks diversity to an extent beyond that of other disciplines, demographic data from academic geoscience departments is not routinely collected. This inhibits the ability to address disparities and make improvements. We aim to address this gap by establishing the demographic make-up of academic geoscience in Canada and identify communities that may be underrepresented. A 22-question survey was disseminated to all geoscience departments at Canadian universities ($N=35$) between September and December 2022 asking specific questions related to identity. Research students, faculty, staff and instructors in these departments were eligible to respond. Responses were analysed for proportions and compared with relevant national data. In total, 482 respondents completed the survey, representing approximately 21% of the academic geoscience population in Canada. Responses indicate marked reductions in diversity between research students and salaried researchers for gender, race and LGBTQ+ representation. Men outnumber women in all tenured faculty positions (64.9%) and tenured positions were overwhelmingly held by white respondents (84.6%). Indigenous identities are poorly represented in this population, with only 2.3% identifying as First Nations, Inuit or Métis. A higher proportion of students than faculty identified as disabled, with the greatest representation among PhD students (12%). These data support previous studies finding low diversity among those in academic geoscience. The drop in diversity between students and faculty suggest barriers for those not historically represented, and the dominance of white men in tenured positions indicates further barriers for those who do pursue careers in geoscience. Addressing these barriers will require broad-scale efforts and engagement with communities that continue to be excluded from academic environments.

Keywords: geoscience education; history of geology; outreach and public engagement

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Many universities openly pledge commitments to improving diversity, with science, technology, engineering and math (STEM) disciplines continually receiving significant attention (Palid *et al.* 2023). Despite these efforts, geoscience still remains one of the least diverse STEM fields in the Global North (Wilson 2016; Bernard and Cooperdock 2018; Dutt 2020; Dowey *et al.* 2021). This recognition has prompted an increase in studies stressing the systemic lack of representation across the field and the barriers that exist for those within (Bernard and Cooperdock 2018; Marin-Spiotta *et al.* 2020; Beane *et al.* 2021). These works have been foundational in raising awareness of the lack of diversity prevalent across numerous countries, and presenting strategies that can help to foster a more inclusive and diverse field. However, much of this work has been limited by the use of demographic datasets that have been either passively collected or derived from restricted government sources (Bernard and Cooperdock 2018; Handley *et al.* 2020; Marin-Spiotta *et al.* 2020; Beane *et al.* 2021; Ranganathan *et al.* 2021). Constraints generally include country-specific data collection policies, failures to collect field-specific data and the absence of additional information necessary for intersectional analysis. Advancing diversity, equity and inclusion (DEI) in our field requires meaningful datasets that clearly identify social inequalities. Limited, incomplete or anecdotal data are too easily dismissed by those in power, stalling constructive efforts.

In Canada, demographic data are not regularly collected at academic institutions, and are seldom field-specific. This absence of data undermines efforts to identify the current state of diversity in the field and design initiatives for improvement. Canada has a reputation as a country that celebrates diversity despite a history of cruel exclusionary policies and practices that have limited many groups from accessing higher education. Historical and persistent mistreatment and discrimination against women, racialized populations and those with disabilities, and the cultural genocide of Indigenous peoples remain critical to any discussions regarding diversity in Canada (Satzewich 2010; Truth and Reconciliation Commission 2015; Godley 2018). Increased attention to the importance of diversity and inclusivity has led to the development of mandates at international, national and institutional levels (Canada Research Chairs 2012; Mundial *et al.* 2016; Universities Canada 2017; Treasury Board of Canada Secretariat 2021). While these initiatives are often criticized as superficial (Tamtik and Guenter 2019), engagement from multiple tiers of government combined with DEI requirements for research funding has cemented these principles as a priority at Canadian universities (NSERC 2022). Collecting comprehensive demographic data is a crucial step in determining whether progress is evident. It can also help to highlight areas of concern, especially in fields lacking in diversity, such as geoscience.

To address this absence of data, we disseminated a 22-question demographic survey to all 35 academic geoscience departments across Canada in late 2022. The results from this survey highlight disparities in representation across gender, sexual orientation, race, First Nations, Inuit and Métis (FNIM) identity and disability.

Background

Addressing the underrepresentation of minority groups in geoscience requires some understanding of the current representation of these groups. Anecdotal data, derived from a person's lived experience, are vital for designing initiatives that support and improve environments for minority individuals. Unfortunately, these data can be disregarded by those in power, with many choosing to either question these lived experiences or to ignore them completely. Demographic data provide foundational information that can support and encourage those in power to act (Rossiter and Ndekez 2001). Alone, demographic data cannot capture the same insight into lived experience that anecdotal data can provide. However, when combined, these two tools may drive much needed and meaningful change.

Many studies that have highlighted disparities in student and faculty representation use either passively collected datasets or those from government sources. Unfortunately, these types of data are limited by the limited variables collected and typically fail to provide intersectional insight as they focus on one element of a person's identity. Passively collecting data has typically involved using university faculty websites to infer individuals' gender from their name or visible appearance (Handley *et al.* 2020; Ranganathan *et al.* 2021). This approach fails to account for gender diverse persons and can be inherently informed by the bias of the observer (Strauss *et al.* 2020). Other studies have attempted to incorporate the pronouns related to individuals (Ranganathan *et al.* 2021), although these pronouns may also be presumed by the institution and not reflect the individual's identity as they are not self-reported. Demographic data from government sources are typically limited by country-specific data collection policies. For example, demographic data from the United States National Science Foundation only includes racial data from those who are United States citizens or permanent residents, ignoring one-third of the graduate student population and probably dramatically underestimating its diversity. Moreover, most Organisation for Economic Co-operation and Development countries, including Australia, France, Italy and Germany, do not collect racial data owing to stated concerns about privacy and discrimination, or claims of 'colour-blindness' (Bleich 2016; Boytchev 2023; Renzaho 2023). Although a noble goal, data regarding racial inequality are essentially absent from these countries, making it very difficult to identify at-risk groups and challenge patriarchal norms. Importantly, we do not wish to discredit or critique these previous works; they simply highlight some of the significant challenges present in establishing trends in demographics.

Methods

Survey invitations were sent by email out to 35 academic geoscience departments across Canada between September and December

2022. Emails were sent to all 35 departments, while an additional three emails were sent directly to 628 faculty members in each department in September, October and December 2024, including requests to pass the survey to any eligible graduate students. The invitation was available to all faculty, staff, instructors and graduate students (master's and PhD) in each department. The survey contained 22 questions pertaining to individual demographics, including gender identity, sexual orientation, Indigenous identity, racial identity, disability, educational attainment and employment. Definitions of relevant terms were provided to survey respondents. Each question in the survey was voluntary and respondents could choose 'Prefer not to answer' or skip to the next question. The survey was approved by the Social Sciences, Humanities, and Education Research Ethics Board at the University of Toronto (Protocol no. 00043104).

All responses were closed-ended and analysed for frequency using Microsoft Excel. All percentages are rounded to the nearest one decimal place, unless the percentage is less than 1% in which case it is reported as <1%. Results are then compared with those from two existing databases: (i) the non-field specific 2019 Survey of Postsecondary Faculty and Researchers (Statistics Canada 2019; SPFR); and (ii) the 2021 Canadian census (Statistics Canada 2022). The SPFR was a Statistics Canada survey tasked with filling data gaps on equity, diversity and inclusion among those who teach or conduct research across all of Canada's postsecondary system, asking questions regarding a wide range of topics (e.g. demographics, funding history, professional development and discrimination) (Statistics Canada 2019). The Canadian census is a completed every five years and seeks to gain information about the Canadian population concerning a range of social variables (e.g. demographics, education, housing, income and language).

Results

In total, 482 respondents completed the survey: 50% of participants were college or university faculty/staff, 6% were post-doctoral fellows, 23.7% were PhD students and 89 18.5% were master's students. The remaining participants either did not indicate their research position or held another position that was not listed. This sample is approximately 21% of the total research population of academic geoscience in Canada. A summary of response data is presented in Figure 1, with comparisons with results from the 2019 SPFR and the 2021 Canadian census.

Research students v. 'salaried' researchers

Gender, race and LGBTQ+ representation decline significantly between 'research students' (MSc/PhD students) and 'salaried' researchers (postdoctoral fellows/faculty/research staff/instructors). Representation of women and non-binary persons drop by 34 and 65%, respectively, racialized persons by 39%, and FNIM by 46% (Fig. 2a). An even greater decrease between students and salaried researchers is seen in LGBTQ+ representation (78%) (Fig. 2a).

When compared with the SPFR (Statistics Canada 2019), our results for gender representation of PhD students and postdoctoral

Table 1. Percentages of representation for respondents with tenure or on tenure-track from our survey results

	Men	Women	Non-binary	Racialized	FNIM	Disabled	LGBTQ +
Tenured	65.7	32.0	2.3	13.9	<1	6.4	7.1
Tenured assistant professor	78.6	21.4	0	28.6	0	7.1	0
Tenured associate professor	39.1	56.5	4.3	15.2	0	10.4	15.2
Tenured full professor	75	23.2	1.8	8.9	2.7	4.5	4.6
Leading to tenure	60	37.8	2.2	22.2	4.4	8.9	6.7

FNIM, First Nations, Inuit and Métis.

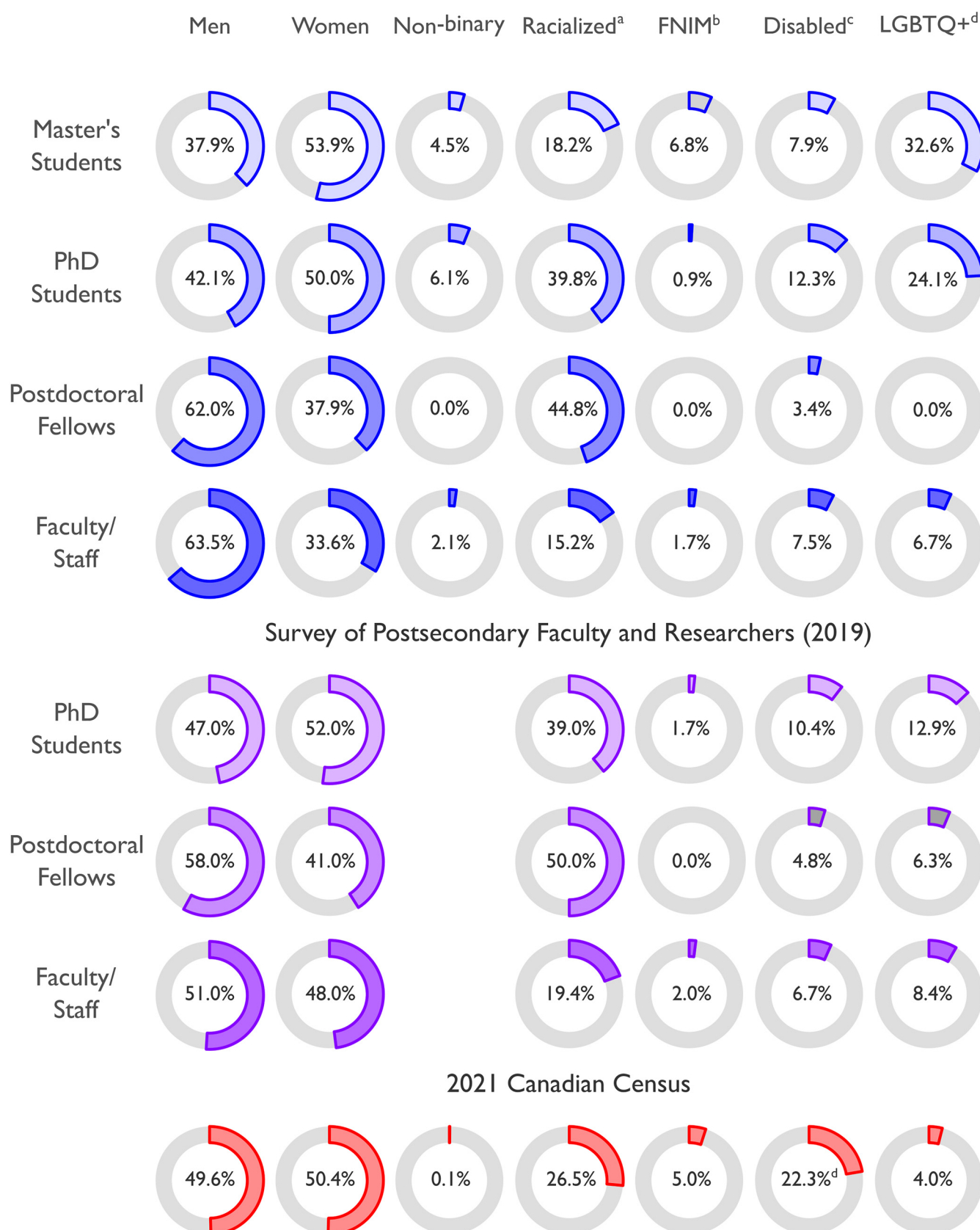


Fig. 1. Percentages of representation from our survey results, the Survey of Postsecondary Faculty and Researchers and the 2021 Canadian Census. (a) Those participants who are not First Nations, Inuk (Inuit), Métis or White, based on the 'visible minority' classification of the Canadian Census. (b) Participants who are First Nations, Inuk (Inuit) or Métis. (c) Based on the 2017 Canadian Survey on Disability. (d) Participants who identified as lesbian, gay, bisexual, trans, queer or other identities that are not heterosexual or cisgender.

fellows in geoscience appears consistent with broader Canadian academia. However, the proportion of women faculty/staff/instructors is 35% lower in geoscience than across Canadian

academia (Fig. 1). The representation of racialized persons is 22% lower among faculty/staff/instructors and 10% lower among postdoctoral fellows (Fig. 2a). Results from the SPFR (Statistics

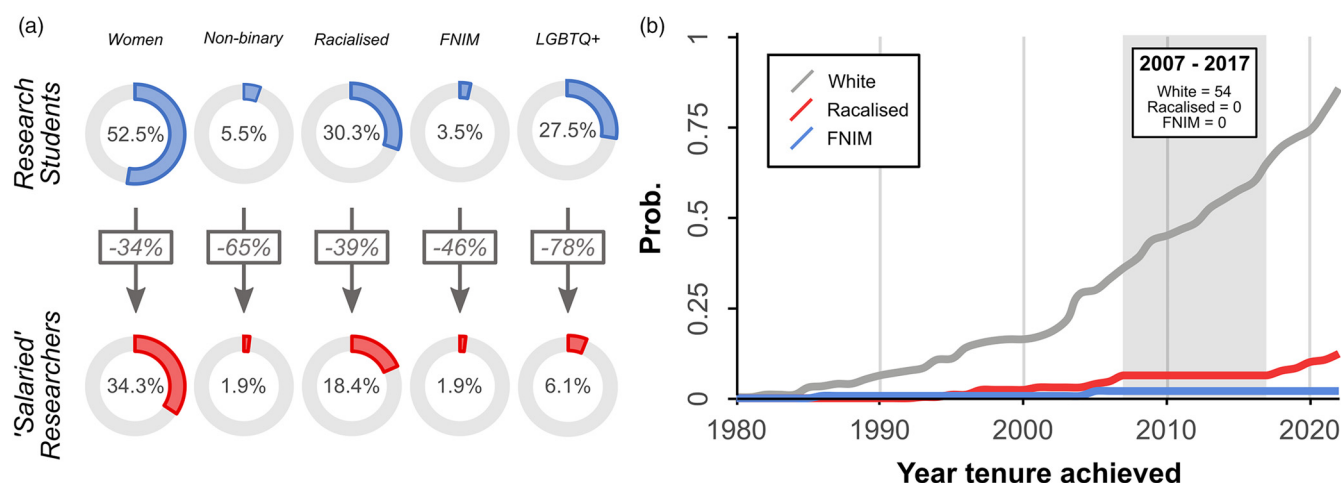


Fig. 2. (a) Changes in representation for women, non-binary racialized, FNIM and LGBTQ+ persons between research students (master's and PhD students) and 'salaried' researchers (postdoctoral fellows, faculty, research staff & instructors). (b) Cumulative density plot of when tenured participants received tenure by race and First Nations, Inuk (Inuit) and Métis identity.

Canada 2019) also show that diversity appears to decrease between student and salaried positions across Canadian academia; however, without access to the number of participants from each group, we cannot determine the percentage decrease for comparison.

Tenure

Data from tenured participants also highlight issues of gender, racialized and FNIM representation. Of all tenured respondents, 32% are women. While tenured associate professors are majority women (56.5%), they are underrepresented among tenured assistant professors (21.4%) and full professors (23.2%) (Table 1). Non-binary representation in tenured positions follows a similar trend to women; however, the overall number of respondents is too small for detailed analysis. Racialized and FNIM representation in these positions is consistently low with only marginal improvement in recent years. Faculty with a tenured position are 84.6% white and the proportion of tenured racialized respondents decreases with rank: 33.3% of tenured assistant professors, 14.5% of associate professors and 11.6% of full professors are identified as racialized. We are unable to report on tenure status by Indigenous identity owing to the low number of Indigenous individuals in tenured or tenure-track positions.

FNIM

Survey respondents could self-identify as one of three distinct Indigenous identities in Canada (First Nations, Inuit or Métis) or another Indigenous identity. In total, 19 respondents identified as Indigenous, with 10 identifying as First Nations, one as Métis, and eight as another Indigenous identity; no respondents identified as Inuit. Master's students had the highest proportion of Indigenous respondents (6.7%), followed by university or college professors (4.6%) and PhD students (3.5%).

Disability

We asked participants to indicate whether they had a disability of any type, whether visible or invisible and regardless of whether they had been diagnosed with a particular disability. In total, 39 participants indicated that they had a disability, with dramatic differences by gender identity: 9.4% of women identified as having a disability, 4.7% of men and 50% of non-binary participants. PhD students had the highest proportion of disabled respondents out of

all positions (12.3%), followed by master's students (7.9%) and university professors (7.5%).

Discussion

The results from this first-ever survey on the demographics of geoscience research students, faculty and staff across Canada illuminate stark disparities in representation. While both master's and PhD students appear to have relatively high diversity across all categories measured, these identities quickly disappear among tenured faculty and instructors. Additionally, Indigenous and disabled individuals are poorly represented across all positions when compared with Canadian data and deserve dedicated attention.

Research students and v. salaried researchers

In all metrics of identity, diversity is poorer among salaried researchers than students, with the most notable decrease for LGBTQ+ populations and gender diversity (Fig. 2a). This suggests that the pathway for students to transition to salaried positions is less supportive for those who are not traditionally represented in academia.

This issue is well documented in academic geoscience. This loss of underrepresented groups has been described as a 'hostile obstacle course', where women, non-binary, LGBTQ+ and racialized populations are presented with numerous barriers to a successful research career (Berhe *et al.* 2022). Sexism, racism, transphobia and homophobia continue to be perpetuated on university campuses despite steps to address discrimination and improve support for at-risk groups. Without significant and overt efforts to improve university, discipline and departmental cultures, these hostile obstacles will remain in place and drive underrepresented populations out of academia. Future efforts should focus on tackling the mechanisms that have created the disparity between salaried researchers and students to ensure that women, non-binary, LGBTQ+ and racialized researchers are retained in their respective departments.

Tenure

The results from this survey indicate that gender and racial disparities persist between those with and without tenure. Of those on the tenure track or who have obtained tenure, one-third are women. Out of all professors, only associate professors are

predominantly women, while all remaining categories are <40% women. These data suggest that, while women are obtaining tenure, they do not achieve it at the same rate as men and even fewer progress to full professorships; in our results, only 23.2% of full professors were women. A lower proportion of women in tenured positions has been observed across academic disciplines in Canada, where 41% of all tenured faculty were women (Uppal and Hango 2022). This disparity is often attributed to the effects of pregnancy and parenthood, which can make meeting the demands of a successful tenure application more difficult (Careless 2012); however, barriers to tenure exist regardless of whether a woman has children. Some of these include biases in student evaluations and obtaining grant funding, and a disproportionate burden of committee service, barriers that are even more significant for racialized women in academia (Krebsbach 2022).

Racialized individuals make up only 14% of tenure/tenure-track positions in geoscience and fewer than 10% of full professorships are held by racialized individuals. This suggests that racialized individuals may leave academia before starting a tenure application or rarely obtain tenure, while even fewer achieve full professorships. This is underlined by our results finding that zero racialized respondents achieved tenure between 2007 and 2017, compared with 54 white respondents (Fig. 2b). This disparity has been attributed to systemic racism inherent in academia (Omhand 2023), which leads to a variety of barriers such as poor mentorship (Davis *et al.* 2022), insufficient institutional support (Davis *et al.* 2022), disproportionate service loads (Carter and Craig 2022) and lower incomes (Li 2012).

FNIM

First Nations, Inuit and Métis persons make up 5% of the Canadian population but are poorly represented in our survey (2.2%). Out of all categories, only master's students came near the national proportion (6.8%), while all other categories were well below. Notably, only 1.8% of tenure-track or tenured participants identified as FNIM. Across Canada, FNIM representation in academia is low (Statistics Canada 2019; Uppal and Hango 2022), which only provides more evidence that greater effort should be taken to reduce barriers to academic participation for this population. Greater engagement with Indigenous communities and an acknowledgement of the colonial nature of geoscience are necessary steps to ensure that Indigenous researchers can see a clear path to a successful career or degree.

Canadian universities are intrinsically tied to the violence of residential schools that systematically erased Indigenous culture across the country. To date, only three universities have apologized for the harm caused by training the policy makers and administrators who operated these schools and for remaining silent during their operation (*U of M President Apologizes for Residential Schools* 2011; Ono 2018; Lumpkin 2021). These apologies demonstrate that universities accepting responsibility for their previous actions can be a step towards improving trust with Indigenous communities. The role of higher education in colonial activities was recognized in the 2015 Truth and Reconciliation report and, in response, many Canadian universities have developed strategy documents aimed at improving Indigenous representation and awareness on campus. While these strategies can be helpful, most fall short by providing minimal capacity or resources.

As a discipline with a large field-based component, geoscience studies often take place on Indigenous land and care must be taken to respect the land and its stewards. Part of this process could be incorporating Indigenous teachings into geoscience curricula, collaborating with communities regarding data collection and ensuring that any tangible outcomes are beneficial for all parties (Lin *et al.* 2020).

Disability

In our sample, the proportion of geoscience researchers who indicated that they had a disability was lower than the proportions identified in both surveys of comparison (i.e. SPFR and 2021 Canadian census). As in previous categories, individuals with disabilities were better represented among students than faculty, indicating that those with a disability may struggle to continue their careers in geoscience.

The field-based components that are often mandatory in geoscience create a perceived requirement that individuals must possess certain physical, sensory and cognitive abilities to participate. This perception is so cemented that, when professional geoscientists were surveyed, they stated that they felt that individuals with physical or visual disabilities would be unable to have a successful geoscience career (Atchison and Libarkin 2016). In recent years, efforts have been made to improve fieldwork accessibility, including using tactile maps for those with visual disabilities, providing interpreters and using various technologies (Carabajal *et al.* 2017; Chiarella and Vurro 2020; Cramer *et al.* 2020; Kingsbury *et al.* 2020).

These improvements demonstrate that accommodations are available and can improve the quality of education for all students; however, students in many universities often have difficulty accessing the accommodations they require. The process to have an accommodation implemented is generally onerous and uncomfortable, and the documentation required can take months to acquire (University of Calgary 2015; University of British Columbia 2018; University of Guelph 2021). Instructor perception of disability accommodations can be an additional barrier to students. Some instructors feel that accommodations provide students with an unfair advantage (Pardy 2017) or may be unempathetic to the challenges of seeking accommodations, feeling that students should be grateful to the university for adapting to their disability (Carabajal *et al.* 2017). Alternatively, instructors who are supportive of accommodations acknowledge that disabled and neurodivergent students can be beneficial to the classroom environment, and teaching methods and activities. Without taking the steps to challenge current stereotypes and instructional methods of geoscience, 'faculty are merely replacing themselves with future scientists who act, think, and perform as they do' (Atchison 2021).

International context

Country-specific data on demographics in geoscience are sparse and inconsistent, making it difficult to contextualize our data among the international geoscience community. In the US, data only collected from citizens and permanent residents by the National Science Foundation indicate that Earth/atmospheric/ocean sciences PhD recipients in 2022 were 44% female, 15% racialized and 0.3% Indigenous American or Alaska Natives (NCSES 2022), and 11% reported a disability. To our knowledge, representation of women faculty in US geoscience is limited to passive data collection (i.e. gender determination through pronouns in faculty directories). In one such study, 27% of faculty across 62 geoscience departments were women and the proportion of women decreased as rank increased (Ranganathan *et al.* 2021). In the UK, the Higher Education Statistics Agency reported in 2022 that 53% of graduate researchers in geography, Earth and environmental studies were female, 8% were racialized and 16% reported a disability (HESA 2023). Data regarding faculty members in the field are not publicly accessible. Additional work from Australasia found low representation of women in geoscience departmental or school staff, although these data were also collected passively using only name and appearance from university websites (Handley *et al.* 2020).

The disjointed nature of the data from outside Canada makes it impossible to derive meaningful comparisons with our results. That

Table 2. Issues highlighted by our survey results with a selection of approaches taken from the literature

Issue	Suggested approaches
Drop in representation from student to ‘salaried’ researcher	Review and improve faculty hiring policies (Smith <i>et al.</i> 2015). Provide focused support and mentorship for students from underrepresented groups (Packard 2015). Improve departmental cultures to be more inclusive (Moss-Racusin <i>et al.</i> 2014; Marin-Spiotta <i>et al.</i> 2020). Regulate the hiring of postdoctoral fellows (Patt <i>et al.</i> 2022). Offer livable graduate student stipends and postdoctoral fellow salaries (Acres 2022; Postdocs are pushing back against low pay and conditions – more institutions must take heed 2023).
Poor gender and racial representation in tenured positions	Implement tenure systems that account for family planning (Careless 2012). Examine internal review tenure processes (Abdul-Raheem 2016). Require anti-oppression training for all faculty involved in the tenure process. Provide tailored mentorship for underrepresented tenure-track faculty (Zambrana <i>et al.</i> 2015; Davis <i>et al.</i> 2022; Murry <i>et al.</i> 2022). Include a diversity, equity and inclusion component in the tenure application.
Poor FNIM representation	Support Indigenous students through mentorship and funding opportunities (Pidgeon <i>et al.</i> 2014; Murry <i>et al.</i> 2022). Develop active and authentic efforts to work with local Indigenous communities in research (Klymiuk 2021). Integrate Indigenous land use into research while ensuring data sovereignty is maintained (Walter <i>et al.</i> 2021). Integrate Indigenous science into geoscience education and research (Zamparo 1996; Johnson <i>et al.</i> 2014; Todd <i>et al.</i> 2022). Use Indigenous terms and language in naming of geological features (Maloney <i>et al.</i> 2023).
Poor representation of disabled persons	Embrace principles of Universal Design for Learning (Benton Kearney <i>et al.</i> 2022). Provide adequate funding and resources for accommodations (Benton Kearney <i>et al.</i> 2022). Reduce the burden on students to disclose and self-advocate (Carabajal <i>et al.</i> 2017; Bruce and Aylward 2021). Invite students to participate in planning for lab and fieldwork (Carabajal <i>et al.</i> 2017; Kingsbury <i>et al.</i> 2020). Provide alternative approaches to fieldwork (e.g. virtual fieldwork or remote access to live fieldwork) (Adams <i>et al.</i> 2010; Stokes <i>et al.</i> 2019).

This list is simply a selection of some prominent work and many more exist but could not be mentioned. FNIM: First Nations, Inuit and Métis.

being said, broad consistencies are apparent with the data from the US, UK and Australasia, each showing a lack of gender and racial representation. Moreover, comparison with the US shows that representation of Indigenous persons in geoscience is consistently low across North America, while disability representation in Canada, the US and UK remains low against respective census statistics. Despite an incomplete and piecemeal collection of global statistics, the data that do exist point to a simple reality of the field: research students in geoscience are diverse, while those in salaried positions are largely straight, white, able-bodied men.

Improving diversity in Canadian academic geoscience

It is clear the demographics of geoscience in Canada remain overwhelmingly homogenous, particularly for those at the highest levels of academia. The field’s inherent colonial origins, especially in Canada (Zeller 2000), coupled with a culture of misogyny and racism, have created a field dominated by white men. For those interested in working to create a more inclusive and diverse field, a wide range of solutions presented in the literature are summarized in Table 2. The following recommendations are based on the excellent work done by others who are driven to improve geoscience and academia more broadly.

Diversity within academic fields is a worthy goal in and of itself. Diverse groups are often more innovative and productive than uniform groups and can foster an enriched campus experience for students (Powell 2018; Science Benefits from Diversity 2018; Lin *et al.* 2019). Demographic data collection can be the foundation upon which these improvements are built and, as such, we advocate for the continued collection of comprehensive demographic data through self-reported surveys. We recognize that such data collection methods are time consuming, require institutional ethics approval and may be unfamiliar to many geoscientists, but

they allow us to gather vital demographic information and characterize the modern landscape. However, data collection and analysis cannot be the only product of DEI efforts. Those involved must also plan to develop and monitor evidence-informed strategies to prioritize and address diversity gaps. Continued demographic data collection by the geoscience community is a necessary step in making the field more inclusive and diverse.

Limitations

The results of this study are limited by the inherent challenges involved with survey design and dissemination. First, while we made several attempts to recruit participants for the survey, the response rate (~20%) is lower than we would prefer to achieve a representative sample. Repeated surveys will be disseminated every three years, and it is hoped that participation will increase. Second, selection bias is a potential concern for any survey of this nature. Individuals from underrepresented groups may not participate in the survey because of fear of identification or lack of trust in the institution to use their data appropriately. Conversely, individuals in privileged groups may not participate because they may feel that they do not benefit from diversity work, or that their responses are not relevant. In our results, LGBTQ+ individuals are over-represented compared with the Canadian population, which may suggest bias in favour of underrepresented groups; however, no other categories showed significant over- or under-representation. We do not have data on non-respondents to adequately characterize the extent of selection bias in our responses. Third, while we used established surveys from the literature to develop the demographic questions here, we recognize that some identities may have been overlooked. In each subsequent iteration of this survey, we intend to consult the literature and adjust the questions as required. Finally, while we highlight the importance of intersectional analysis in this

kind of work, our sample size was not large enough to do this sufficiently. In the future and with additional data, we hope to elaborate on the distinct needs of those with multiple marginalized identities.

Conclusions

This first survey of Canadian academic geoscience provides considerable insight into the demographic makeup of the field. Trends in the data suggest that the transition from research student to a salaried researcher presents a major barrier to women, non-binary persons, racialized persons and those who identify as LGBTQ+. Additionally, it is clear that women and racialized persons are poorly represented in tenured positions. Finally, FNIM persons and those with self-identified disabilities are poorly represented in all positions against national averages (except FNIM MSc students), highlighting significant barriers to these groups in entering geoscience and Canadian higher education.

Glossary of terms

Gender	gender refers to current gender identity, which may be different from sex assigned at birth and may be different from what is indicated on legal documents.
Racialized person(s)	this term is used to describe all participants that racially identify as anything other than ‘white’ or Indigenous. This aligns with the federal government’s definition of a ‘visible minority’ and is necessary to compare our results with federal statistics.
FNIM	this term is used to describe participants who identify as First Nations, Inuk (Inuit) or Métis.
LGBTQ+	this includes participants who identified as lesbian, gay, bisexual, trans, queer or any other identities that are not heterosexual or cisgender (e.g. pansexual, asexual, gender queer).
Disabled	a person with a disability is a person who has a long-term or recurring impairment that could be categorized into one of 10 types (vision, hearing, mobility, flexibility, dexterity, pain, learning, developmental, memory and mental health-related) and considers themselves to be disadvantaged in employment by reason of that impairment, or believes that an employer or potential employer is likely to consider them to be disadvantaged in employment by reason of that impairment. Persons with disabilities are also those whose functional limitations owing to their impairment have been accommodated in their current job or workplace.
Prefer not to say	all questions in the survey were optional to ensure those who did not wish to answer specific questions did not feel pressured. This term is used to define those participants who did not provide an answer for a given question.

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Data availability The datasets generated during and/or analysed during the current study are not publicly available due to the conditions of our ethics approval but are available from the corresponding author on reasonable request.

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