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## Comment on gc-2021-35

Anonymous Referee #1

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Referee comment on "Geology uprooted! Decolonising the curriculum for geologists" by Steven L. Rogers et al., Geosci. Commun. Discuss.,  
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My perspective on this ms is informed by my training in human geography, and most recently by my extensive work to write about decolonizing geography, including on physical geography. In this respect, I read the ms as an interested academic in a cognate discipline who has extensive knowledge of the decolonising debates generally.

Overall, the paper raises many important points about the presence of colonial legacies in geology's teaching, interpretive frameworks, and its canonisation of particular (western-endorsed) forms of knowledge. The ms is written in an accessible style in order to create a broad conversation, and without assuming any prior knowledge of decolonial issues. My main response is positive, although the ms could, I suggest, do more to draw out specific dimensions of the discipline's "colonial present" in more detail, as the discussion was at points rather general.

p.1 "early modern" - be careful with this label which generally refers to the period 1492 to around 1700; so this ms's focus on the post-1700 period could more usefully be labelled as such. On the same page, "our civilization" is for many people a loaded term, both because it assumes a common heritage and the term has such strong associations with western societies. Perhaps "diverse world societies" would work?

p.2, line 46: exploitation of mineral resources was undertaken by Spanish and Portuguese state-led colonisation and colonialism, from the early 16th century. line 50: these forms of knowledge may not have been 'academic' in the sense today, but they did establish a mindset that Europeans had the right to identify, extract and trade minerals, which were the foundations at a deeper level for later 'academic' study. Line 56: North European Empires (versus earlier southern European empires, including Spain and Portugal) - clarification required here. And it would be useful to explain to non-specialist readers what is meant here by "dominance of knowledge production" - what is described here is epistemology [note spelling; incorrectly spelled at end of ms] which then informs pedagogy (students tend to be inducted into the dominant epistemology, through a particular mode of teaching and learning ie pedagogy). Decolonising the curriculum entails

questioning and reforming both epistemology (the interpretive frameworks, and domains of what is considered important knowledge) and pedagogy.

p.3 line 69: provide a page number for Peake and Kobayashi. lines 73-75: in decolonising debates today, the emphasis has been on the colonial geopolitics (ie which world powers, which world scientific networks and associations) of knowledge production as a whole. It is this pattern of power and domination that then shapes which types of knowledge are deemed valuable enough to 'extract' or destroy. So I wondered if more could be said here about the norms, 'standards' (established in geology) and control of journals, and who decides what is valuable 'new' knowledge. Line 81: students 'learn' or 'engage with' (the term 'undertakes' is awkward). In this paragraph, the crucial point is that the curriculum is endorsed as the knowledge most worth passing on - if there is a very common set of truths found across all geology courses, then that can be termed the 'canon'. Deciding what goes in/stays out of the canon relates back to the power dynamics mentioned above. Could the ms give an example or two of geology's canon? Line 93: decolonising the curriculum is not solely concerned with repositioning theory then, but also crucially the content and - key, although underexamined in the ms currently - the interpretive frameworks used to explain and understand the content.

p.4 line 100 the phrase "acknowledge colonial debts to knowledge creation" is awkward - arguably, it is a question of colonial legacies in knowledge creation.

p.5 line 140 One aspect requiring some more discussion is the unacknowledged influence of particular types of geologists relative to others in setting norms and criteria for excellence in a discipline - so it is a mindset and an awareness of the issues that need to change. The ms in this respect could perhaps delve more into the reasons why STEM subjects present their knowledge as 'neutral' and unaffected by social relations (again it's not a question of individuals but of society-wide 'commonsense'). This is important as decolonizing is not about just adding in Indigenous peoples and stirring; not least as the dividing line between Indigenous and STEM knowledges are context specific, blurred, contested and very difficult to fix. Lines 150-55: it would be very useful here to give an extended example to illustrate how an interpretation could be repositioned in a decolonising way - eg. from a first year undergraduate lecture, or topic that everyone learns in university; this would offer a specific set of resources as well as a sustained argument about how to decolonise [the paper does end with a list of recommendations, but these are not particularly engaged with the specifics of geology, which is what readers will presumably want to find here.] Since this page contains a considerable amount of repetition, a specific example would move the paper along strongly here.

p.6 'colonised geology' : this subsection could usefully start with a line or two about the purpose of the historic overview - is this not taught in geology courses? Also, the discussion is very Anglo focused, and underplays the global nature of geology's history. I recommend looking at J A Secord 2018 chapter 'Global geology and the tectonics of empire', in Curry et al (eds) *Worlds of Natural History*. And A Bobbette and A Donovan (eds.) 2020 *Political Geology*. Springer. And Nicola Miller 2020 Chapter 7: Land and Territory, in her book *Republics of Knowledge*, Princeton University Press. These give a more international sense of how colonialism and geological knowledges interacted, drawing out German, Spanish and other trajectories.

pp.6-7: this account tends to reinforce the idea that white European men are the problem (with a few notable exceptions); rather than this, how about talking about the type of exploration, the systems of validation, and institutional standards and circuits of knowledge production, by which core chronologies, typologies, international systems for verification etc etc were set up and - likely - continue to have a resounding influence today. In other words, structures not people.

p.8 line 230: what are the global norms at play today? Could this discussion be more specific? Again, it's not just a question of random Indigenous peoples currently outside western institutions; decolonising implies a mindset in which a variety of knowledges - from farmers, women, Black, non-dominant religious groups etc etc - could pluralise and diversify what geology means. Another way to come at this question is to ask what is it that seems to make Indigenous knowledges so incompatible with 'global' geology?

line 236/38: on culture and science distinction: decolonial analysis highlights how non-western societies are said to have 'culture' while western societies have 'science'.

line 260-4: underscore the power of geologists relative to the legal provision for specific people and places; this reflects unequal power, not just geopolitics over national legislation, but crucially the role of political and economic elites and powerful groups, who ally themselves with western geologists (especially if it means foreign earnings from mineral wealth). Line 266: surely this is geology's "colonial present" (Gregory 2004) not its past?

p.10 line 306 the word is "willingness"

p.10-.11 - see Bryn Mawr college website for an extensive list of resources on the relationship between colonialism and geology, including links to Indigenous policy to establish ethical entry into and prospecting on Indigenous lands and territories.

<http://mineralogy.digital.brynmawr.edu/blog/geology-colonialism-reading-list/>

p.11 line 355: what does "more impactful" mean in this context? Could this be unpacked more.

line 361: on the Anthropocene, there is an emerging decolonising debate: see Davis H and Todd Z 2017 On the importance of a date, or decolonizing the Anthropocene. ACME 16(4): 761-80. And Slaymaker, O, Mulrennan, M and Catto N. 2020 Implications of the

Anthropocene epoch in geomorphology, In Landscapes and Landforms in Eastern Canada. Springer.

p.13 spelling: epistemology, and epistemicide - you may be interested in Boaventura de Sousa Santos who has written extensively about epistemicide from a critical social science perspective.

It is great to see a glossary of terms given here! Another resource, in due course, will be S Radcliffe Decolonizing Geography: an introduction, Polity Press, Cambridge UK (published April 2022 in UK, May 2022 in North America).