

## Peer Review Report

# Review Report on Anthropogenic geology and the role of public sector organisations

Review, Earth Sci. Syst. Soc.

Reviewer: Simon Price

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### EVALUATION

#### Q 1 Please summarize the main theme of the review.

The review considers the role of public sector organisations, including geological surveys, in studying and characterising anthropogenic geology. The authors identify unique elements of anthropogenic geology compared to other non-anthropogenic processes. These include social and economic drivers for land use change and potential use of anthropogenic deposits in the circular economy.

#### Q 2 Please highlight the limitations and strengths.

The strength of the manuscript is in the recognition of anthropogenic geology as a component part of the earth system and therefore geoscience as a discipline. Recognising that factors driving anthropogenic geology in terms of products that result from anthropogenic processes include social and economic drivers is a strength.

One limitation is that the authors don't yet consider the potential role for the private sector. Secondly, the research presented isn't particularly new, but considers other research in a new context.

#### Q 3 Does the review include a balanced, comprehensive and critical view of the research area?

I believe so, yes.

#### Q 4 Check List

Is the English language of sufficient quality?

Yes.

Is the quality of the figures and/or tables satisfactory?

Yes.

Does this manuscript refer predominantly to published research? (unpublished or original research is non-standard for a review article, and should be properly contextualised by the author)

No.

Does the manuscript cover the topic in an objective and analytical manner

Yes.

Does the reference list cover the relevant literature adequately and in an unbiased manner?

Yes.

Does the manuscript include recent developments?

Yes.

Does the review add new insights to the scholarly literature with respect to previously published reviews?

No.

Thank you to the authors for submitting their manuscript.

The authors describe the concept of Anthropogenic Geology (AG) and its significance for resource use. They define anthropogenic geology and describe the factors that drive AG including social and economic drivers. They argue that AG should be understood in the context of 'geoservices' and the benefits that AG might have for materials re-use and recycling.

I believe the manuscript will be of interest to readers of ES3. I have made some minor suggestions including how the authors consider the role of the private sector who might be better placed to characterise AG.

I have made some comments and typos and have advised the authors on reference to the proposed 'Anthropocene' of which anthropogenic geology would form a part (as would any other geology created during this Epoch if it were to be accepted). I have made specific review comments below. Numbers refer to manuscript page and line number noting that line numbers reset on each page. I believe the manuscript would benefit from the addition of a discussion and conclusions section to help structure the evidence presented and reasoning for why the paper considers only public sector organisations. .

#### Page/Line Comment

Title I suggest slightly changing the title to reflect the significance of the role of public sector organisations, like national geological surveys, rather than 'the public' in general. For example: Anthropogenic geology and the role of public sector organisations'

1/25 Suggest changing the word 'geophysical' with 'geological and geomorphological'.

1/33 Suggest changing 'this period with: a stratigraphical Epoch called the 'Anthropocene'

1/35 Here and throughout, please add the word 'proposed' before the Anthropocene

2/12 Please define UNFC

2/13 I think it would be beneficial to here to explain briefly, why the authors consider that public sector organisations can contribute to the challenges, compared to the private sector. For example, the private ground engineering sector often has first-hand experience of investigating, describing and designing in AG. What might their role be?

2/18 Suggest adding the word 'generally' before 'Geologist have'. Some, including R L Sherlock (a public sector survey geologist) in the UK wrote sections on type of artificial ground found in London in around 1922! This was very unusual for the time but shows that some geoscientists thought about the significance of the ground made by humans.

[https://www.researchgate.net/publication/326419542\\_Man\\_as\\_a\\_Geological\\_Agent\\_An\\_Account\\_of\\_His\\_Actions\\_on\\_Inanimate\\_Nature\\_by\\_Robert\\_Lionel\\_Sherlock\\_1922](https://www.researchgate.net/publication/326419542_Man_as_a_Geological_Agent_An_Account_of_His_Actions_on_Inanimate_Nature_by_Robert_Lionel_Sherlock_1922)

(Note the title of his paper is very gender-specific - using the term man - and of its time)

2/33 Typo. Please change (artificially ground) to (artificial ground)

2/44 and 45 I agree this needed and thank the authors for considering this. But I feel that the processes created by humans are an important part of the definition.

The anthropogenic processes result in the deposits and geomorphology. Please consider this in the definition. Or is this implied in the term 'human activity'? I feel the term process or processes is directly analogous to natural ones (erosion, transport and deposition).

Figure 1 Thank you to the authors for preparing this figure. It is definitely beneficial to link the products of anthropogenic activity to their processes which are not typically geological. I see this as analogous to 'erosion-transport-deposition'.

In examples, please can I suggest removing 'The Anthropocene'. The Anthropocene is a proposed Epoch of geological time and not the products of anthropogenic activity. For example, if the Anthropocene was ever accepted, glacial and fluvial sediments would be still be produced and be classed as 'Anthropocene' even though they are not anthropogenic.

I'd suggest removing the term 'caves' and replacing with 'excavations'.

Cities are a combination of excavations (sediment/rock removal) and placement to engineered designs. They also include subsurface developments including tunnels and basements. So, I feel they are combination of the all of those 'products' shown in orange in the figure.

Would it be possible to enhance this with colour-coded pathways for each of the socioeconomic (or other) factors as drivers for the process?

Importantly, I feel other ways of defining consumption/resource use could be used and need to be differentiated here. For example, energy consumption.

3/19 Just a personal view but here and throughout, I prefer the term geoscience to geology. Geology might imply a more traditional 'rocks and earth' whereas geoscience might suggest the wider science applied to all elements of the earth system, including anthropogenic.

3/32 I would disagree with the statement that anthropogenic geology is new. The reason being that anthropogenic deposits (and excavations) have been shown on geological maps in the UK for decades. In addition, archaeology and geoarchaeology are also studies of human-landscape/sediment interactions which should also be considered here.

I feel the newness is in the way its is studied and how processes are driven by social, economic and technological factors as part of the wider earth system.

3/36 Please define NCP

4/5 I feel that circularity and re-use should be considered here for concrete and not just metals. For example, concrete use in the urban environment is a major source of materials for infrastructure construction. If, for example, piled foundations are re-used, there is less requirement for primary materials. Do the authors have any evidence that could be added on concrete use and re-use including foundations in the built environment?

4/17 As well as 'accumulations', where do excavations (tunnels, quarries, cuttings for civil engineered designs) fit? Do they perform a geoservice?

4/21 Typo 'is'.

4/36 Please describe what is meant by a 'beneficiation activity'

5/36 Please define 'shaft masses' and what the term 'masses' means here and throughout the manuscript. Does it refer to 'deposits' for example?

Figure 2 Typo in 'Consumtion'

5/42 Typo in 'spill'

5/43 Is there a difference between a technogenic and anthropogenic deposit?

6/15 Typo in 'show on'

7/3 Please define P and PI.

7/13 Suggest replacing sedimented with accumulated.

7/25 Please replace the word mankind with humans.

7/43 Here and throughout, please check definition and therefore spelling of ton. I assume this is metric tonne?

8/33 Are there examples, in Sweden, of the cost of taking to landfill being a deterrent? For example, on major construction projects, what the incentives through legislation or pricing for not taking to landfill?

9/16 and 26 Typo 'Zink'. Typo CRMSs

10/11 Replace 'hinders' with 'a barrier'

10/21 I think the manuscript would benefit from a consideration of why public sector organisations? For example, industry and the private sector might have better knowledge and access to data and information for characterization than geological surveys. For example, the ground engineering industry (geotechnical and civil engineers) encounter the products of human activity on a daily basis and consider it for the design of new structures. How do the authors see the role of the private sector?

## QUALITY ASSESSMENT

<b>Q 6</b> → Quality of generalization and summary	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Q 7</b> → Significance to the field	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Q 8</b> → Interest to a general audience	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Q 9</b> → Quality of the writing	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>