

1 I am in general happy with the responses and alterations the authors have made in this round.  
2 I believe that much of mine and the reviewers comments stem from the previous overreaching  
3 research question. The authors have indeed altered the research question itself, but not followed  
4 through with the rest of the article, as I clearly articulated previously.  
5 The word “humanity” and it’s relationship to the poems is still mentioned 11 times throughout  
6 the text. This must be amended before I can accept for publication.

7

8 *That has now been removed from anywhere in the manuscript.*

9

10

1 **In my remembered country: what poetry tells**  
2 **us about the changing perceptions of**  
3 **volcanoes between the XIX and XXI centuries**

4  
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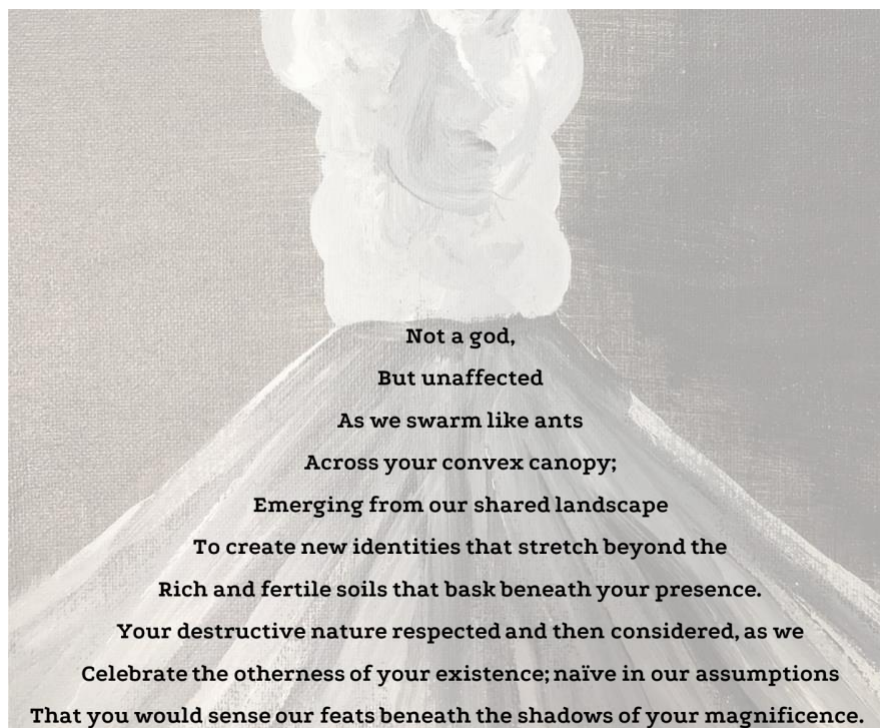
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13

## 1 **Abstract**

2  
3 In this study we investigate what poetry written about volcanoes from 1800 to the  
4 present day reveals about the relationship between volcanoes and the societies and  
5 times represented by poets who wrote about them, including how it evolved over that  
6 time frame. In order to address this research question, we conducted a qualitative  
7 content analysis of a selection of 34 English-language poems written about the  
8 human-volcano interactions. Firstly, we identified the overall connotation of each  
9 poem. Then, we recognized specific emerging themes and grouped them in  
10 categories. Additionally, we performed a quantitative analysis of the frequency with  
11 which each category occurs throughout the decades of the dataset. This analysis  
12 reveals that a spiritual element is often present in poetry about volcanoes,  
13 transcending both the creative and destructive power that they exert. Furthermore,  
14 the human-volcano relationship is especially centred around the sense of identity  
15 that volcanoes provide to humans, which may follow from both positive and negative  
16 events. These results highlight the suitability of poetry as a means to explore the  
17 human perception of geologic phenomena. Additionally, our findings may be relevant  
18 to the definition of culturally appropriate communication strategies with communities  
19 living nearby active volcanoes.

## 23 **Graphical Abstract**



# 1. Introduction

We live on a geologically active planet, and volcanoes are one of the most visually impressive geological features of our world. Whereas most geologic phenomena (e.g. orogeny, erosion) occur slowly over a timescale of millions of years, being *de facto* invisible to us humans, volcanic activity is a fast process that can radically change the natural landscape within a matter of hours, directly affecting the nearby communities. There are 150 active volcanoes in the world, and at any given time, about 20 of them are erupting (Durant et al., 2010;Venzke, 2013). The range of volcanic activity is broad (effusive to explosive), and so is the spectrum of feelings they inspire (from awe to fear). Certainly, they do not leave us indifferent (see e.g. Esperanza et al., 2008)

The areal impact footprint of eruptions depends on their Volcano Explosivity Index (VEI). In past times, only large eruptions affecting people (i.e. occurring in inhabited areas) would have been reported and become known worldwide. Large eruptions (VEI>4) statistically occur every few years, and have footprints of tens of kilometres (Brown et al., 2015). Small eruptions (VEI<4) can also significantly affect local population, but before the development of modern means of communication their occurrence would have frequently gone unreported beyond national boundaries. At the beginning of the 19<sup>th</sup> century there were 10 million people worldwide living within 100 km of volcanoes that have erupted during the Holocene (Siebert et al., 2011); nowadays, that number has increased to 800 million.

Volcanoes constitute a fundamental part of the Earth system, recycling elements from the mantle to the surface and the atmosphere. But cohabiting with them comes with a unique set of challenges and rewards for local communities. Understanding how people perceive volcanoes is fundamental in shaping effective scientific communication strategies, including in times of crises (see e.g. Nave et al., 2016;Donovan et al., 2018;Avvisati et al., 2019). These perceptions may in turn be affected by a variety of factors, including: scientific knowledge, spiritual beliefs, oral history, and personal experience (direct or indirect), which vary widely in space and time across different cultures and historical periods.

Monitoring people's perception of volcanoes is difficult. Psychologists sometimes work with local communities in the aftermath of eruptions (Paton et al., 2000;Sword-Daniels et al., 2018;Paton, 2019), yet these works mainly focus on a very small, specific part of the human-volcano interaction (i.e. the instances in which volcanic activity conflicts with human life), and therefore paint a partial, skewed view of this relationship. Additionally, these interventions have only become common practice in recent times, and therefore cannot shed light on the evolution of the relationship between humans and volcanoes over time

1 A potential medium through which a more nuanced and expansive dataset of this  
2 relationship can be established is the arts. The arts might be thought of as ubiquitous  
3 expressions of human nature, and have often been inspired by volcanoes, with  
4 notable examples including paintings by Turner (Daly, 2011), Warhol (Sigurdsson,  
5 2015), and Munch (Olson et al., 2007). We can conceivably use art pieces to guide  
6 us in our understanding of how volcano-human relations have changed through time  
7 (Hamilton, 2013; Alexander, 2016) For example, previous research has shown how  
8 the colours of sunsets painted by famous artists can be used to estimate  
9 stratospheric particulate concentrations in the Earth's past atmosphere, revealing  
10 that ash and gas released during major volcanic eruptions enhanced sunlight  
11 scattering, making sunsets appear redder, as reflected by the paintings that were  
12 produced in the aftermaths of such events (Zerefos et al., 2014). Similarly, studies  
13 have been conducted which have: dated volcanic eruptions through Neolithic cave  
14 paintings (Schmitt et al., 2014), investigated the extent to which artists have used  
15 volcanoes to represent societal upheaval and transformation (Sivard, 2011), and  
16 even demonstrated how drawing volcanoes can be used to empower children in  
17 informal learning environments (Weier, 2004). These examples concern mainly  
18 drawings and paintings, aside from which there has been a relative paucity in  
19 research that investigates how the arts might be used to shed light on changing  
20 perceptions of volcanoes, and how this information can be directly useful in the  
21 communication of volcanic hazards and risk in the modern era.

22  
23 In this study, we begin to address this gap in the literature by choosing to focus on  
24 another form of art: poetry. While attempts to define what is and what is not poetry  
25 can be contentious (see e.g. Ribeiro, 2007), here we take poetry to be any written  
26 form that is composed by the line. We consider prose to be differentiated from  
27 poetry, in that prose is instead composed by sentences and is written with standard  
28 grammatical structure. This line-by-line composition of poetry means that it is able to  
29 convey meaning in a concise manner, which in turn lends itself to analysis and  
30 interpretation. Poetry provides a powerful medium through which to interpret human  
31 behaviours and perceptions, and an analysis of poetry as data has been used to  
32 provide understanding on topics ranging from living with HIV (Poindexter, 2002) and  
33 dementia (Zeilig, 2014), to attitudes relating to environmental change (Illingworth and  
34 Jack, 2018) and compassion fatigue in nurses (Jack and Illingworth, 2017). In this  
35 study, we aim to build on this research, using poetry as a medium through which to  
36 investigate perceptions of human-volcano interactions. Donovan et al. (2011) and  
37 Skinner (2011) have also used poetry to gain insight on the human perception of a  
38 specific, erupting volcano (Montserrat). Instead, we aim to conduct a wider study.

39  
40 By conducting a detailed qualitative content analysis for a selection of volcano  
41 poetry, this study aims to understand how poets have interpreted the relationship  
42 between humans and volcanoes from the beginning of the nineteenth century to the  
43 modern day. In Section 2, we discuss the methodology that was utilised in this study,  
44 outlining why this approach was adopted and establishing its validity and reliability.

1 Section 3 contains a discussion of how categories and themes emerged from our  
2 analysis, and how this relates to the research question defined in Section 2. Finally,  
3 Section 4 contains the conclusions of this study, along with future directions for  
4 further research.  
5

## 6 **2. Methodology**

7

8 The methodology that we have adopted in this study involved treating poetry as data,  
9 allowing for text to be analysed with respect to attitudes relating to volcanoes. While  
10 several other methods exist for the analysis of textual data (e.g. ethnography,  
11 phenomenology, grounded theory, etc.), we have chosen qualitative content analysis  
12 because of its ability to highlight both the context and the content of the chosen text,  
13 which for a subjective medium such as poetry is essential.

14 The methodology that is adopted in this study largely follows that of Illingworth  
15 (2019), insofar as the qualitative content analysis of the poetry is guided by these six  
16 steps: formulation of research questions; selection of poetry to be analysed;  
17 definition of codes and categories to be applied; outline and implementation of  
18 coding process; determination of trustworthiness; and analysis of results. The first  
19 five of these steps are outlined below, with the analysis of the results presented in  
20 Section 3.

21  
22 We note here that the poems that were analysed in this study are presented  
23 according to the following format: 'Poem Name' by Author Name (Year of  
24 Publication), and that links to the full texts of all these poems can be found in Soldati  
25 and Illingworth (2019).  
26

### 27 **2.1 Formulation of research question**

28

29 By performing a qualitative content analysis on poetry that has been written about  
30 volcanoes, but critically not for the purpose of research, this study aims to better  
31 understand the way in which poets, as representatives of society and culture they  
32 live in, have interpreted the relationship between humans and volcanoes (both active  
33 and not). For the purposes of this study, this has been formulated into the following  
34 Research Question (RQ):  
35

36 RQ: what does poetry written about volcanoes reveal about the relationship between  
37 volcanoes and the societies and times represented by poets who wrote about them?  
38

### 39 **2.2 Selection of poetry to be analysed**

40

41 We began by selecting poetry that mentioned or featured volcanoes in some  
42 capacity. In doing so we set ourselves three constraints. Firstly, the poetry must be  
43 written in English, or else have an author-sanctioned English translation; this

1 constraint was because English is the only common language that is shared by the  
2 authors of this study. Secondly, the poems must have been written from 1800  
3 onwards; this constraint was introduced to make the list more manageable for  
4 analysis purposes, and because this was when many consider volcanology to have  
5 first been fully established as a scientific discipline through the research of Ben  
6 Franklin, James Hutton, Alexander von Humboldt, and others (Sigurdsson, 2000).  
7 Finally, where possible, we aimed to find at least one poem per decade, in order to  
8 try and better capture any change in attitudes from the early nineteenth century to  
9 the present day. Given these constraints, we looked for poetry that mentioned the  
10 word 'volcano' or 'volcanoes' and which, in the first instance, came from recognised  
11 poets and/or well-established poetry journals, in the following three databases:  
12 Poetry Foundation, Poetry Society, and Poetry Archive. Additionally, we reached out  
13 to the volcanology research community through the volcanology listserv  
14 ([volcano@lists.asu.edu](mailto:volcano@lists.asu.edu)) asking for further suggestions. Finally, we performed a  
15 manual Google search to fill in decade gaps.

16

17 At this stage, we had a list of 53 poems, spanning every decade from the 1800s to  
18 the 2010s. The two authors then independently read these poems and filtered them  
19 according to two further criteria: only poems that were 100 lines or less were to be  
20 considered, and any poet could only have one of their poems considered for further  
21 analysis. The line limit was introduced in order to make the analysis more  
22 manageable, and a limit of one poem per poet was introduced to allow for a wider  
23 selection of voices to be considered, and also to improve the validity of the approach  
24 in terms of the triangulation of data (see Section 2.5). In instances where there were  
25 multiple poems from a single poet, we agreed upon the one that we both found to be  
26 the most aesthetically pleasing, prior to any formalised content analysis. Poems that  
27 were removed because of length included 'The last days of Herculaneum' by Edwin  
28 Atherstone (which is over 500 lines long), while poets with more than one poem  
29 included Emily Dickinson (six poems, for whom 'I have never seen "Volcanoes"' was  
30 chosen) and PB Shelley (two poems, for whom 'The Cloud' was chosen). Following  
31 the application of this further selection criteria, 41 poems remained available for  
32 analysis. Of those, seven were written by women. The higher representation of male  
33 poets is merely due to the higher number of male poets who wrote about volcanoes  
34 over the considered time span.

35

36 Both authors then independently read each of the poems and categorised them as  
37 being either 'Positive', 'Negative', 'Positive & Negative', 'Neutral', or 'Invalid' in their  
38 portrayal of volcanoes from a human perspective (in line with RQ), the results of  
39 which can be seen in Table 1.

40

41 Performing this analysis enabled each of the authors to better familiarise themselves  
42 with the poetry, and also highlighted any further poems that needed to be removed  
43 from the study, because they were 'Invalid', i.e. those poems that did not concern the  
44 relationship between volcanoes and the societies and times represented by the

1 poets who wrote about them. Following this individual analysis (the rows  
2 corresponding to 'AS' and 'SI' in Table 1), the two authors met up to exchange their  
3 analyses and agree upon a broad classification of the poems in terms of connotation  
4 ('Both' in Table 1). This broad categorisation was useful for three reasons. Firstly, it  
5 revealed several differences in how the poems had been individually categorised,  
6 highlighting how these differences could be discussed and developed, thereby  
7 helping to improve the trustworthiness of the subsequent in-depth content analysis  
8 by ensuring investigator triangulation (see Section 2.5). Secondly, it revealed that  
9 this broad categorisation of the connotations of the poems as either: 'Positive',  
10 'Negative', 'Positive & Negative', or 'Neutral' was too broad to offer any in-depth  
11 analysis with respect to the RQ. Finally, this approach revealed additional poems  
12 that should be removed from the study because they did not obviously concern the  
13 relationship between volcanoes and the societies and times of the poets who wrote  
14 about them. For example, 'Inside the Ghost Volcano' by Will Alexander (1998) was  
15 removed at this stage because the volcano was being used as an abstract metaphor  
16 from which no perspective of the perceived relationship between volcanoes and the  
17 societies and times of the poets who wrote about them could be directly observed. In  
18 total a further 7 poems (the 'Invalid' column in Table 1) were removed following this  
19 step, resulting in a total of 34 poems on which to perform a more in-depth content  
20 analysis. This further selection criteria meant that two decades were now absent  
21 from our study (1940 and 1960). However, given that every other decade from the  
22 1800s onwards was still present we were satisfied that we had a sufficient temporal  
23 representation of poems to conduct a detailed content analysis with respect to the  
24 RQ.

25

### 26 **2.3 Definition of codes and categories to be applied**

27

28 A conventional approach to qualitative content analysis was adopted in this study,  
29 with preconceived categories being avoided, and categories being determined by the  
30 implementation of the coding process instead (see Section 2.4). While in some  
31 instances a directed content analysis might be more appropriate, this methodology is  
32 usually used in those instances where an existing theory would benefit from further  
33 description (Hsieh and Shannon, 2005). As the research question to be addressed in  
34 this study is unique, a directed approach is inappropriate. Similarly, a summative  
35 content analysis (i.e. one in which the frequency of words and/or phrases was only  
36 quantitatively assessed) would fail to fully account for the context of the poetry  
37 alongside its content.

38

### 39 **2.4 Outline and implementation of coding process**

40

41 Both authors individually read each of the 34 poems, and assigned codes to sections  
42 of the text (Table 2). As each new code emerged we individually went back through  
43 the poems that had previously been coded to check whether these also contained



1 any lines that could be labelled with any newly emergent code. After coding all of the  
2 poetry in this manner, we independently read all of the poems in full again and made  
3 sure that each of them had been coded accurately and that a saturation of emergent  
4 codes had been reached, thereby improving the trustworthiness of the approach  
5 (see Section 2.5). As can be seen from Table 2, this resulted in a total of 28 codes (9  
6 for SI and 19 for AS). We then read each of the poems again to make sure that no  
7 coding had been missed.

8  
9 Following this independent coding process, the two individual codebooks (one for AS  
10 and one for SI) shown in Table 2 were combined in order to search for emergent  
11 categories. This categorisation of the individual codes was initially done by SI, before  
12 being modified by AS, and then ratified by both SI and AS, with both authors  
13 agreeing upon the five emergent categories (and corresponding codes) shown in  
14 Table 3: 'Landscape', 'Identity', 'Destruction', 'Spiritual', and 'Creation', each of which  
15 will be discussed in detail in Section 3. After these codes had been grouped as such  
16 we went back through each of the individual occurrences (e.g. the 61 segments of  
17 poetry that were categorised as 'Landscape') to make sure that they did indeed  
18 belong in this category.

19  
20 In this combination of codebooks to search for emergent categories, we found that  
21 some of our early individual coding had been done erroneously, e.g. in 'Ice Child' by  
22 John Haines (1999), the following section was coded as 'Identity' by SI and  
23 'Destruction' by AS; however, in the merger of our codebooks we decided that a  
24 more appropriate category was actually 'Landscape', which as can be seen from  
25 Table 3 was not associated with either of these codes:

26  
27       we find your interrupted life,  
28       placed here among the trilobites  
29       and shells, so late unearthed.

30  
31 Following this categorisation, each of the five categories shown in Table 3 were  
32 further examined for any theme(s) that expressed underlying meaning in relation to  
33 RQ, the results of which are presented in Section 3.7.

## 34 35 **2.5 Determination of Trustworthiness**

36  
37 At each stage of the qualitative content analysis that was adopted in this study, the  
38 individual codes and categories were re-examined in order to confirm that they  
39 accurately captured the poetry in relation to RQ. Each author carried out this coding  
40 independently, until there were no further codes or categories found to be emerging  
41 from the data, i.e. until descriptive saturation had been reached (Lambert and  
42 Lambert, 2012). Triangulation as a validation strategy (Flick, 2004) was achieved by  
43 using data drawn from different times and places (the poems) and conducting an  
44 analysis using two different investigators (the authors). This use of systematic

1 sampling, triangulation and constant comparison, and proper audit and  
2 documentation (see Section 2.2 and 2.4) combined to ensure both the reliability (i.e.  
3 the consistency with which this analysis would produce the same results if repeated)  
4 and the validity (i.e. the accuracy or correctness of the findings) of this approach  
5 (Leung, 2015). Given that the analysis of the poetry as described here represents a  
6 somewhat subjective approach, the reliability of the findings might be called into  
7 question. However, as outlined by Morse et al. (2002), our methodological  
8 coherence, sampling strategy, and saturation of emergent codes ensures the  
9 reliability, and trustworthiness, of our approach in this qualitative analysis.

### 11 **3. Results and Discussion**

13 As can be seen from Table 3, five major categories emerged from the thematic  
14 coding of the poems used in this study. We will now discuss each of these emergent  
15 categories, how they relate to RQ ('what does poetry written about volcanoes reveal  
16 about the relationship between volcanoes and the societies and times represented  
17 by poets who wrote about them?'), and how these findings compare to other  
18 research that has been conducted into the changing perceptions of volcanoes  
19 (Section 3.1 - Section 3.5).

21 Following a discussion of these categories we present a quantitative analysis of the  
22 poems in terms of how the frequency of these emergent categories have changed  
23 over time (Section 3.5), followed by a presentation of the overall theme that emerged  
24 from conducting this analysis, and how this relates to RQ (Section 3.6).

#### 26 **3.1 Landscape**

28 Landscape is the most recurrent of the five emergent categories, being present in  
29 every poem that was analysed, regardless of when it was written. Here volcanoes  
30 serve primarily as a backdrop; they are part of the environment where the poem is  
31 set, typically a prominent feature that dominates the landscape. For example, in  
32 'Hunched Back Volcano' by Genevieve Taggard (1914), the poet paints a particularly  
33 vivid image of an active volcano, anthropomorphised as having a passionate  
34 (erupting) mouth (crater), set against a backdrop of stars:

36 Red is the mouth of Pele, passionate  
37 Against the fires of the kindling stars:  
38 Fire to fire moves: the heavens wait

40 By contrast, in 'Mount Broadshield' by Jónas Hallgrímsson (1841) the volcano is now  
41 quiet and peaceful - an image highlighted by the presence of snow - though it still  
42 dominates the landscape with its (regal) presence:

1 Queen of all our country's mountains,  
2 crowned with snow sublime and pure!  
3 Once you poured from fiery fountains  
4 floods of lava down the moor.

5

6 In 'Flowers from the Volcano' by Claribel Alegría (2013), the volcanic crater,  
7 presumably at least temporarily inactive, becomes part of the human landscape,  
8 representing the place where the flower growers of the poem now live:

9

10 Farther up, in the crater  
11 within the crater's walls  
12 live peasant families  
13 who cultivate flowers  
14 their children can sell.

15

16 Even in its absence, the volcano can still dominate the landscape. For example, in  
17 'Road Trip' by Vijay Seshadri (2016), it is not the volcano itself which provides the  
18 poem's setting, but rather the beaches that came from its erosion, with their black  
19 sand and tide pools excavated in its obsidian lava:

20

21 Tomorrow or the day after or the day after that,  
22 on the volcano beaches fringed with black sand  
23 and heaped with tangled beds of kelp,  
24 by the obsidian tide pools that cradle the ribbed limpet  
25 and the rockbound star,

26

27 These poems also capture the effect that volcanoes have in changing the landscape,  
28 such as in 'Peace' by D H Lawrence (1929), which provides a description of an  
29 effusive eruption; firstly, as it occurs:

30

31 Brilliant, intolerable lava  
32 Brilliant as a powerful burning-glass  
33 Walking like a royal snake down the mountain to-  
34 wards the sea.

35

36 And then, after the eruption has ceased:

37

38 Peace congealed in black lava on the doorstep.  
39 Within, white-hot lava, never at peace  
40 Till it burst forth blinding, withering the earth;  
41 To set again into rock  
42 Grey-black rock.

43

1 These descriptions of the changing landscape also highlight how the language that is  
2 used by poets in their descriptions can both reinforce and counteract scientific  
3 terminology and understanding. The likening of lava to glass is scientifically  
4 accurate, as both lava and glass are examples of a silicate melt. In contrast to this,  
5 the use of colour in this passage, whilst evocative, is not actually grounded in reality:  
6 lava does indeed turn into black or grey-black rock as it cools down, but is never  
7 white-hot. The colour choice may have been dictated by a contrast (black vs. white)  
8 or by the idea, pushed further than it actually occurs in reality, that the hotter  
9 something gets the closer it gets to white (with lava typically stopping at red-orange),  
10 and the idea of hot, molten lava still persisting within a cooled, solid outer crust does  
11 in fact accurately reflect the inward cooling process of lava flows. This is of course  
12 not to say that poems should ensure scientific accuracy at the cost of their  
13 aesthetics; we draw attention to these scientific inaccuracies only to highlight that we  
14 are not interested in how accurately these poems capture volcanic behaviour, but  
15 rather what the poetry can tell us about the relationship between volcanoes and the  
16 societies and times represented by poets who wrote about them. This use of poetry,  
17 mirrors that which Aristotle observed in the *Poetics*, i.e. that whilst history deals with  
18 specific events, poetry deals with general truths (Yanal, 1982).

19

20 The fact that volcanoes feature so prominently as a setting in these poems highlights  
21 that the poets perceived very clearly how volcanoes could relate to their societies  
22 and times. Similarly, the language used in the poetry acts to position volcanoes as  
23 an awesome part of our shared landscape, perhaps explaining in part why humans  
24 were first drawn to them before they became valued for more tangible goods such as  
25 precious metals and stones (Fisher et al., 1998), as well as soil fertility.

26

### 27 **3.2 Identity**

28

29 Volcanoes are often used to represent or highlight part of the poet's identity. They  
30 are present in their childhood memories, as well as in family history or cultural  
31 heritage. Identity is the second most recurrent category (after 'Landscape'), missing  
32 from only two of the analysed decades: the 1860s and 1880s. This ubiquity is  
33 extremely revealing of the profound tie between humans and volcanoes; here the  
34 volcanoes are not merely passive elements of the landscape, but rather active  
35 agents. Even when they are standing still, their presence is so impactful as to be  
36 defining for the poet, as evidenced in 'Punctuation Marks' by Phillip Nanton (1992),  
37 set on the author's native island of Saint Vincent (Saint Vincent and the Grenadines),  
38 whose landscape is metaphorically dominated by the active volcano La Soufrière:

39

40       Come nearer, focus on one dot of an island  
41       I was born there, on the rim of a volcano  
42       on the edge of a large full stop  
43       where the sand is black  
44       where the hills turn a gun-barrel blue

1           where the sea perpetually dashes at the shoreline  
2           trying to reclaim it all.

3

4       Similarly, in 'Flowers from the Volcano' by Claribel Alegría (2013), the poet's home  
5       country of El Salvador is remembered nostalgically, its personal resonance defined  
6       by the situation of its volcanoes:

7

8           Fourteen volcanos rise  
9           in my remembered country  
10          in my mythical country.

11

12       In this poem, the volcanoes represent not only the literal volcanoes in that region, but  
13       also the eruption of violence brought about by the civil wars of the 1970s and 1980s  
14       across El Salvador, Nicaragua, and Guatemala, and how they too came to form a  
15       part of the poet's life and identity.

16

17       This personalisation of the volcano is continued in 'Sonnet 5' by Pablo Neruda  
18       (1959), for whom volcanoes become the distinctive feature of his native Chile,  
19       elevated to the same rank as the love / lover which the poet found there:

20

21           and on through the streets like a man wounded,  
22           until I understood, Love: I had found  
23           my place, a land of kisses and volcanoes.

24

25       In many of these instances of identity, the volcano takes centre stage in a formative  
26       childhood memory, such as in 'What For' by Garrett Hongo (1982), where the poet  
27       expresses the extent to which his childhood identity was itself defined by the  
28       presence of volcanoes:

29

30           I lived for the red volcano dirt  
31           staining my toes, the salt residue  
32           of surf and sea wind in my hair,  
33           the arc of a flat stone skipping  
34           in the hollow trough of a wave.

35

36       In contrast to this, 'Axis' by Ray Gonzalez (2015) captures the way in which a  
37       particular volcano is a matter of family history, a mythical entity that the poet himself  
38       did not experience personally, but which is nonetheless present in the defining  
39       stories of his heritage:

40

41           The volcano in my grandmother's Mexican village  
42           smothered the town, though the girl escaped because  
43           the axis of revolution sent her family into exile,

44

1 Here this identity is not necessarily a positive one: the forced exile of the poet's  
2 grandmother is remembered as an environmental revolution which they were  
3 powerless to avoid, but which became a defining aspect of both the grandmother  
4 and her grandson's assumed identity.

5  
6 Identity is a nuanced concept, and has both positive and negative connotations  
7 associated with it. However, what is evident from these poems is that these  
8 associations are typically not purely adverse, and even when they are they form  
9 important societal ties that have come to define both past and current generations.  
10 Although the destructive impacts of volcanoes are well documented and recognized,  
11 many of the possible societal and cultural benefits are not always fully considered  
12 (Kelman and Mather, 2008), and the emergence of identity as a key category across  
13 the majority of the analysed poems serves to further highlight this disparity.

### 15 **3.3 Destruction**

16  
17 This category considers those poems that make reference in some part to the  
18 destructive power of volcanoes, in relation to humankind. Poems that were  
19 categorised as such include those that make reference to physical damage of  
20 societal assets or destruction to human beings, such as is evident from this extract  
21 from 'Blankets of Blood' by Arthur Rimbaud (1872):

22  
23 Oh my friends! —My heart knows its own brothers!  
24 Dark strangers, what if we were to leave? So leave! Leave!  
25 O misfortune! How the earth melts upon us,  
26 How I shake as it melts on me and you,

27  
28 These poems also consider those that make reference to physical damage or  
29 destruction to property or land that is owned and/or cherished by humans, such as in  
30 this passage from 'Peace' by DH Lawrence (1929):

31  
32 Forests, cities, bridges  
33 Gone again in the bright trail of lava.  
34 Naxos thousands of feet below the olive-roots,  
35 And now the olive leaves thousands of feet below the  
36 lava fire.

37  
38 This category also includes those poems that highlight the mental anguish of people  
39 caused by the negative effects of volcanoes, either directly through their eruptions or  
40 indirectly through the oppressive nature of living within close proximity to them, as  
41 can be seen in this extract from 'Negotiations with a Volcano' by Naomi Shihab Nye  
42 (1995):

43  
44 We need dreams the shape of lakes,

1           with mornings in them thick as fish.  
2           Shade us while we cast and hook—  
3           but nothing else, nothing else.

4  
5   The permeating sense of fear that is evident from this extract acts as a powerful  
6   testament to the severe mental anguish that experiencing a volcanic eruption and/or  
7   living near an active volcano can have on local residents, capturing these negative  
8   mental health effects in a manner that does not diminish them in comparison to more  
9   tangible examples of volcanic destruction. Research into the mental health impacts  
10   following volcanic eruptions have shown that nearby residents are at an increased  
11   risk of experiencing symptoms of post-traumatic stress disorder (Gissurardóttir et al.,  
12   2019) and mental stress due to the loss (or threat of loss) of property (Horwell et al.,  
13   2015). Indeed, such research has also highlighted the importance of implementing  
14   psychosocial interventions with volunteers, both during and after a volcanic eruption,  
15   in order to alleviate severe mental health risks (Espinoza et al., 2019). By  
16   highlighting the mental distress that volcanoes can cause to humans, these poems  
17   serve to highlight why this should not be neglected when considering the potential  
18   impacts of volcanic activity.

19  
20   Finally, this category also considers those poems in which volcanoes are responsible  
21   for the fatality of human beings, as can be seen in these lines from 'Flowers from the  
22   Volcano' by Claribel Alegría (2013):

23  
24           Eternal Chacmol collects blood,  
25           the gray orphans  
26           the volcano spitting bright lava  
27           and the dead guerrillero  
28           and the thousand betrayed faces,  
29           the children who are watching  
30           so they can tell of it.

31  
32   Here 'Chacmol' likely refers to a distinctive form of Mesoamerican sculpture  
33   associated with sacrifice, and in this poem, the poet asks us to reflect on the role of  
34   the volcanoes in shaping the landscape of Central America. Through death, several  
35   of these poems invite us to consider how such sacrifices can result in new creation  
36   (see Section 3.5), but they also serve as a reminder to the reader of the vast power  
37   that these volcanoes possess, encouraging us humans to both respect and, at times,  
38   fear their presence.

39  
40   Given the severe destruction that volcanoes can wrought, as highlighted by this  
41   emergent category, these poems might suggest that communities would not choose  
42   to live in such environments of their own volition. However, when such destructive  
43   incidents occur in the poetry, they rarely appear in isolation, and instead tend to  
44   appear alongside other categories which represent potential benefits, not least

1 'Identity' (Section 3.2) and 'Creation' (Section 3.5). This contrast of categories  
2 implies that in many instances the poets were intending to capture a mutuality of  
3 both potential hazards and benefits. This interpretation further supports the findings  
4 of other studies which have highlighted that many communities choose to expose  
5 themselves to the negative consequences of volcanic hazards, so that they might  
6 enjoy the benefits and opportunities that arise within the human–volcano system  
7 (see e.g. Bachri et al., 2015;Stoffle et al., 2015).

### 8 9 **3.4 Spiritual**

10  
11 As can be seen from Table 2 and Table 3, this category emerged from a single code,  
12 which both authors independently labelled as such. This category represents those  
13 poems that were considered to make reference to aspects of volcanoes that were of  
14 spiritual significance. Some of the poems that were coded in this category make a  
15 specific mention of religious figures, such as these references to Christ in 'Etna' by  
16 Emily Pfeiffer (1889):

17  
18       Martyr of mountains, shall I say, the Christ,  
19       Bearing earth's sorrows, for its trespass made  
20       Sin, that her sons may reap the fair increase  
21       Of smiling fields? The offering hath sufficed:

22  
23 And also, those in 'St Telemachus' by Alfred Tennyson (1892):

24  
25       In the great name of Him who died for men,  
26       Christ Jesus!' For one moment afterward  
27       A silence follow'd as of death, and then  
28       A hiss as from a wilderness of snakes,  
29       Then one deep roar as of a breaking sea,  
30       And then a shower of stones that stoned him dead,  
31       And then once more a silence as of death.

32  
33 Given the selection of English-language poems for this study, there is a strong  
34 weighting towards poems that make reference to biblical figures from Christianity,  
35 although other religious figures, such as the Buddha and several Mesoamerican  
36 deities also feature, especially in those poems which were originally written in  
37 another language, and yet for which an author-sanctioned translation exists (see  
38 Section 2.2). For example, in 'A tale for Puuooo' by Taeko Jane Takahashi (2002),  
39 we hear how:

40  
41       Pele the goddess pierced and  
42       thrusted, spilling lava into  
43       Royal Gardens subdivision.



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Here, Pele is the goddess of volcanoes and fire in the Hawaiian religion, where she is also considered to be the creator of the Hawaiian Islands. In some instances, the volcano itself is considered to be the chief religious figure or deity, such as in these lines from 'Ice Child' by John Haines (1999), in which the volcano is explicitly referred to as a now dormant god:

Under the weight of this mountain—  
once a god, now only restless stone,  
we find your interrupted life,  
placed here among the trilobites  
and shells, so late unearthed.

Or in 'Burning Island' by Gary Snider (1970), in which the volcano is given the status of a spiritual creator and protector:

Volcano belly Keeper who lifted this island  
for our own beaded bodies adornment  
and sprinkles us all with his laugh—

At times this spirituality manifests itself with the poet (or their protagonist) appealing to the volcano for either forgiveness or clemency, such as in 'Negotiations with a Volcano' by Naomi Shihab Nye (1995), where the author pleads for mercy with the volcano as they might do with another deity or spiritual figure:

Forgive any anger we feel toward the earth,  
when the rains do not come, or they come too much,  
and swallow our corn.  
It is not easy to be this small and live in your shadow.

These lines also demonstrate how this associated spirituality serves to create an 'otherness', i.e. that volcanoes and humans might occupy the same landscape but they are vastly different entities in terms of both temporal and spatial scales. The separation that is imposed by this emergent spirituality also highlights potential difficulties for cohabiting. There is at times a perceived unidirectional flow of power that makes establishing a truly symbiotic relationship seem improbable, as can be seen in the following lines from 'Ice Child':

Was it God—the sun-god of the Incas,  
the imperial god of the Spaniards?  
Or only the priests of that god,  
self-elected—voice of the volcano  
that speaks once in a hundred years.

1 The interpretations of volcanic eruptions have been shown to be interconnected with  
2 the understanding of tradition by different religions and religious figures (see e.g.  
3 Gaillard and Texier, 2010). The poems that feature in this category further  
4 demonstrate that there is clearly a spiritual connection between volcanoes and  
5 humans, whilst also serving to highlight the spiritual reverence in which volcanoes  
6 are held, and the distance that this can introduce. By considering the spirituality of  
7 volcanoes, these poems also ask us to contemplate the persistence of the spiritual  
8 life system within a particular territory, aligning with previous research which has  
9 shown how when humans push these boundaries in order to exploit them, the  
10 system can become disrupted (Vitale, 2017).

11  
12

### 13 **3.5 Creation**

14

15 The final category to emerge from this analysis is one of 'Creation'. Poems that  
16 feature in this category demonstrate how volcanoes can act as a creative (as  
17 opposed to, or in addition to being a destructive) force. For example, 'Darkness' by  
18 George Byron (1816) unknowingly explores the aftermath and potential  
19 consequences of the 1815 eruption of Mt Tambora, Sumbawa, Indonesia, an event  
20 whose subsequent volcanic winter resulted in the infamous 'year without a summer'  
21 (Stommel and Stommel, 1979), as it would have been later discovered. Yet, despite  
22 the overall negative connotations of this poem, Byron still recognizes that prior to this  
23 eruption living alongside volcanoes was a positive experience, a source of happiness  
24 even:

25

26 Happy were those who dwelt within the eye  
27 Of the volcanos, and their mountain-torch:

28

29 Another poem that demonstrates the creative potential of the volcano is 'Burning  
30 Island' by Gary Snider (1970), in which the poet asks us to consider the fertile soils  
31 that volcanoes provide, enabling a peaceful and profitable co-habitation:

32

33 As we hoe the field  
34 let sweet potato grow.  
35 And as sit us all down when we may  
36 To consider the Dharma  
37 bring with a flower and a glimmer.  
38 Let us all sleep in peace together.

39

40 Many residents who live near volcanoes view eruptions as agents of change, often  
41 change for the good (Dove, 2008), which can in turn influence the extent to which  
42 they perceive the hazard and risk of living of living near to volcanoes. 'Burning  
43 Island' highlights the potential benefits of living in volcanic regions, where the rich  
44 volcanic soils can support highly productive agriculture (Rampengan et al., 2016).

1 However, it also draws attention to the fact that the benefits of this relationship would  
2 appear to be unidirectional – volcanoes do not benefit from cohabiting the landscape  
3 with humans.

4  
5 Continuing with notions of cohabiting, this category features those poems that  
6 demonstrate how such a relationship can be peaceful. For example, in ‘Peace’ by  
7 DH Lawrence (1929) the concept of placatory cohabitation is explored in the very  
8 first lines:

9  
10 PEACE is written on the doorstep  
11 In lava.

12  
13 Here the potentially destructive lava gets all the way to the house, yet stops on the  
14 doorstep, respectful of the human space. However, even here the potential dangers  
15 of this cohabitation are clearly apparent: is this message from the volcano a genuine  
16 offering of peace, or a warning shot across the bow; a reminder to humans of their  
17 position in the hierarchical relationship that emerges through a consideration of the  
18 ‘Spiritual’ (Section 2.4)? ‘Negotiations with a Volcano’ by Naomi Shihab Nye (1995)  
19 further explores the fragile nature of this cohabitation, explicitly wishing for the  
20 volcano to remain dormant, and offering to be peaceful themselves if this wish is  
21 granted:

22  
23 We would be happy if you slept forever.  
24 We will tend the slopes we plant, singing the songs  
25 our grandfathers taught us before we inherited their fear.  
26 We will try not to argue among ourselves.

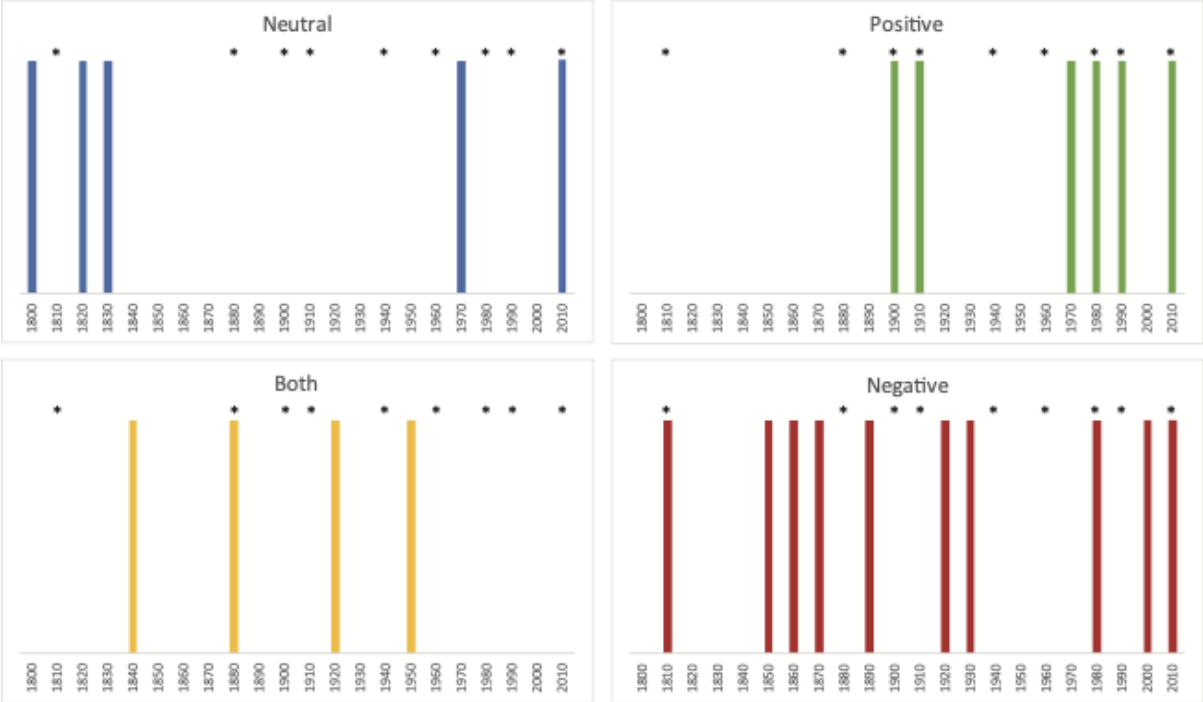
27  
28 In considering the potential for a creative and peaceful cohabitation of the landscape,  
29 this category demonstrates how such a relationship is conditional, and is reliant on  
30 the volcanoes to ‘behave’ in a certain manner towards (or with respect to) humans.

### 31 32 **3.6 Quantitative Analysis**

33  
34 After performing this qualitative content analysis, we quantitatively analysed how  
35 both the connotation of volcanoes (‘Neutral’, ‘Positive’, ‘Negative’, ‘Both’) as well as  
36 the frequency of the five emergent categories evolved through time in our dataset.  
37 Due to the limited sample size (n=34), this quantitative analysis cannot be  
38 considered statistically significant. In order to do so, we aggregated our dataset by  
39 decade, and normalized the identified connotations and categories to the number of  
40 poems in which they were represented (Table 4). Furthermore, we considered the  
41 major eruptions which occurred in the Northern Hemisphere (where the majority of  
42 the poets used in this study lived) across the considered time frame (Table 5), and  
43 correlated these with the connotations and categories of the dataset. The purpose of  
44 this quantitative analysis was not to apply a statistical interpretation of the volcano-

1 human interactions of the analysed poetry; rather it was read alongside the  
 2 qualitative analysis in support of the emergent theme (Section 3.6) that arose from a  
 3 consideration of these poems.

4  
 5 As can be seen from Fig. 1, poems in which volcanoes have either a 'Neutral' or  
 6 'Both' a positive and negative connotation, and therefore do not express a partial  
 7 value judgement, can be found consistently throughout the time span considered  
 8 (i.e. from the 1800s to the 2010s). The same can be also said for poems where  
 9 volcanoes are depicted with an overall 'Negative' connotation. In contrast, a  
 10 'Positive' representation of volcanoes only emerges in the 1900s, and does not  
 11 become frequent until the 1970s.



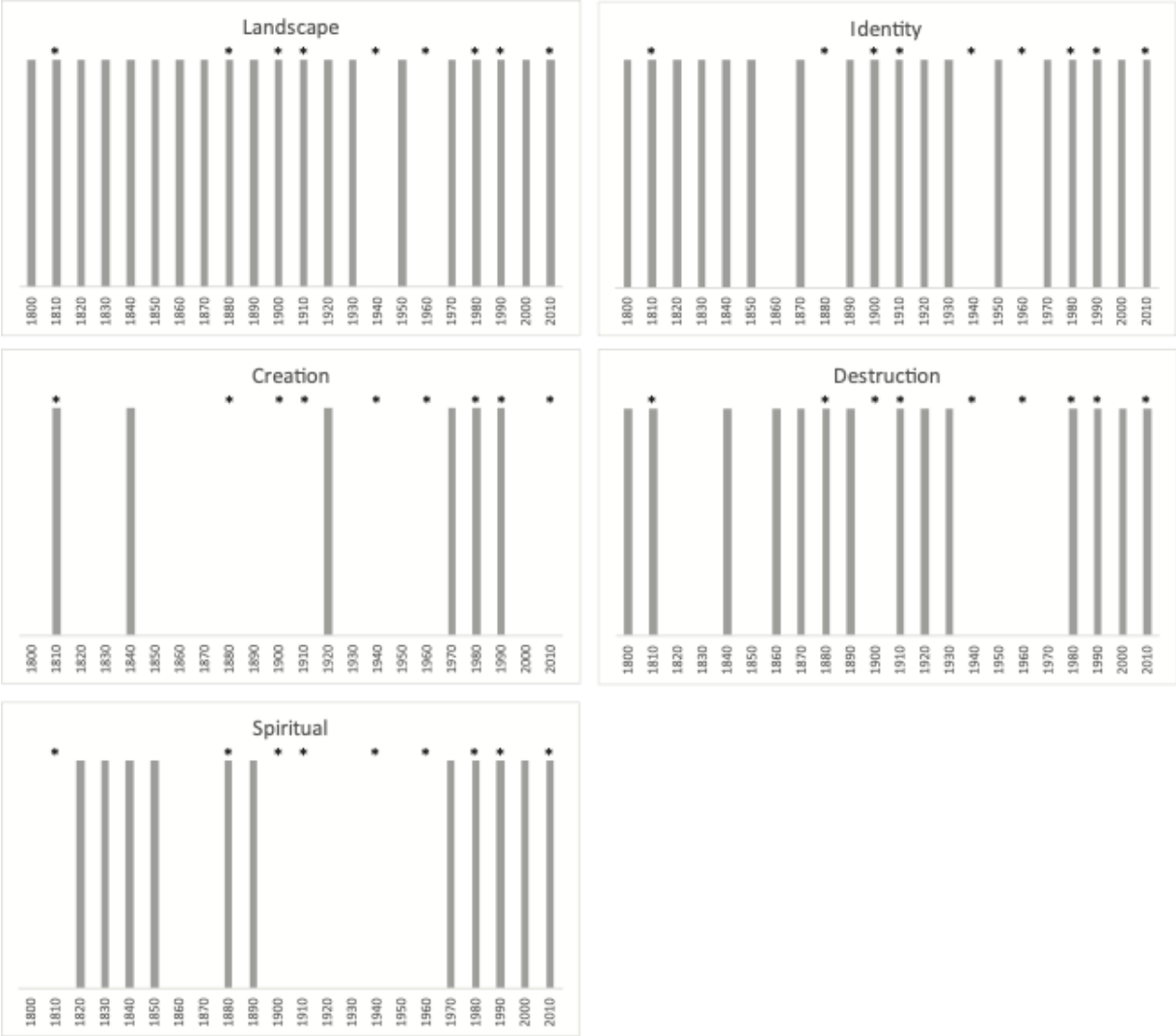
12  
 13 *Figure 1. Connotations ('Neutral', 'Positive', 'Negative', or 'Both') of the considered*  
 14 *poems, arranged chronologically and aggregated by decade. Asterisks indicate*  
 15 *major eruptions (as shown in Table 5).*

16  
 17 Plotting major eruptions alongside the associated connotations of the selected  
 18 poems (Fig. 1) does not reveal any obvious correlation. This can be attributed to the  
 19 fact that the vast majority of the analysed poems do not focus on specific volcanic  
 20 eruptions, but rather that they consider human-volcano interactions more generally.  
 21 One notable exception is the poem 'Darkness' by George Byron (1816), which as  
 22 discussed in Section 3.5 is grounded in the eruption of Mount Tambora in 1815, and  
 23 the subsequent 'year without summer'. During this eruption, volcanic ash was  
 24 injected high into the stratosphere, where it circled the globe and persisted for a  
 25 considerable time, visibly filtered the sunlight, and causing a negative thermal  
 26 anomaly of at least half a degree Celsius in the Northern Hemisphere, as well as a  
 27 famine that ultimately killed over 70,000 people (Brohan et al., 2016). This event

1 inspired artists in all fields (e.g. Turner’s famous sunset paintings, and Mary  
 2 Shelley’s *Frankenstein*), with Byron’s poem also bearing witness to this event:

3  
 4 I had a dream, which was not all a dream.  
 5 The bright sun was extinguish'd, and the stars  
 6 Did wander darkling in the eternal space,  
 7 Rayless, and pathless, and the icy earth  
 8 Swung blind and blackening in the moonless air;  
 9 Morn came and went—and came, and brought no day,

10



11  
 12 *Figure 2. Emerging categories in the considered poems, arranged chronologically*  
 13 *and aggregated by decade. Asterisks indicate major eruptions (as shown in Table 5).*

14  
 15 At the categories scale (Fig. 2), we see that the volcano-human interactions in  
 16 relation to the ‘Landscape’ occur in all represented decades (as discussed in Section  
 17 2.2 the 1940s and 1960s are not represented in this analysis). The notions of  
 18 ‘Identity’ that are associated with these interactions are almost as ubiquitous, with  
 19 the only exceptions being the 1860s and 1880s.

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As can be seen from Fig. 2, the 'Destruction' in the volcano-human interactions of the selected poetry is represented more frequently across the considered time period than the 'Creation' of such interactions. There is also somewhat of a correlation between 'Destruction' and each of the major volcanic eruptions that happened in this period, with the 1900s being the only decade which featured a major volcanic eruption in the Northern Hemisphere (Table 5) and which did not feature a poem that considered the destructive nature of volcano-human interactions (again noting that the 1940s and 1960s are not represented in this analysis). This would indicate that even if poets were not writing about specific volcanic events, their attitudes might have been affected by them (and the social and economic impacts that these large volcanic events resulted in), leading to poems that more readily considered the 'Destructive' rather than 'Creative' nature of such interactions.

The 'Spiritual' category occurs across the considered time period, with a notable gap in the first half of the twentieth century. This might in part be explained by the tensions between poetry and religion that had manifested themselves throughout the Victorian age (because of the constraints in the selection of the poetry discussed in Section 2.2, the majority of the poems from this era came from either British or American writers), with religion becoming increasingly personal and secular as society became more democratic (Fraser, 1986). Similarly, the re-appearance of this category in later poems corresponds to the emergence of a new Romantic movement that began in the 1960s, in which people (and poets) began identifying themselves as 'spiritual but not religious' (Thomas, 2006), which could explain the re-emergence of 'Spirituality' in the poetry of this period.

### **3.7 An emergent theme**

In considering the five categories identified in this analysis of the poetry, a clear theme emerges with respect to the RQ (what does poetry written about volcanoes reveal about the relationship between volcanoes and the societies and times represented by poets who wrote about them?): that there is a strong sense of identity associated between humans and volcanoes.

An analysis of these poems has revealed that humans and volcanoes occupy the same 'Landscape', and that whilst there is a certain reverence associated with their 'Destruction', there are also many positives associated with living alongside them. Surprisingly however, these positives are mainly linked to notions of 'Identity' (e.g. family histories and cultural heritages) rather than the physical benefits of 'Creation' (e.g. fertile soils). These poems also highlight that this is a unidirectional relationship, in part because of the distancing brought about by the associated 'Spirituality' or otherness of the volcanoes, with humans ultimately of neither benefit nor concern to the volcanoes that they write about. A different selection of poems, including work

1 from indigenous communities who grant volcanoes a higher cultural stand (e.g.  
2 personification or divinization), might yield a different perspective.

3  
4 This emergent theme is further supported by the quantitative analysis discussed in  
5 Section 3.6, where over the time period considered there is a relative ubiquity of the  
6 'Identity' to emerge from the poems. Similarly, despite the major cultural and societal  
7 changes that have occurred over this time period, attitudes towards the human-  
8 volcano interaction have not noticeably shifted in favour of one category or another;  
9 the volcanoes have remained an ever present, suggesting that they are impervious  
10 to these changes and further highlighting their unidirectional relationship with the  
11 poets that wrote about them, and in turn the societies and times that they represent.  
12

## 13 **4. Conclusions**

14  
15 The purpose of this study was to investigate what poetry written about volcanoes  
16 reveals about the relationship between volcanoes and the societies and times  
17 represented by the poets who wrote about them. By conducting a qualitative content  
18 analysis of a selection of poems written from the 1800s to the present day, a series  
19 of themes emerged that characterised this relationship. The volcanoes as  
20 'Landscape' and 'Identity' were seen as dominant, with consideration also given to  
21 the 'Destruction' and 'Spirituality' associated with these human-volcano interactions,  
22 and to a lesser extent their potential for 'Creation'. The main theme to emerge, both  
23 from these categories and the poems themselves, is that there is a strong sense of  
24 identity associated with volcanoes by humans (e.g. in terms of family histories,  
25 cultural heritage etc.), and that it is the humans (and not the volcanoes) that are  
26 affected by this relationship. A quantitative analysis of the frequency with which  
27 these categories occurred throughout the decades of this dataset supported the  
28 findings of this qualitative analysis, thereby further improving the validity and  
29 reliability of the main finding of this study, i.e. that the relationship between  
30 volcanoes and the societies and times of the poets who wrote about them is  
31 unidirectional and focused on identity.  
32

33 The outcomes of this study support other research findings which have  
34 demonstrated that many communities are willing to accept the associated risks of  
35 living near volcanoes, including active ones, in order to experience the cultural and  
36 societal benefits (i.e. 'Identity') that they afford (see e.g. Schmincke, 2004;Kelman  
37 and Mather, 2008). Furthermore, by asking us to consider the emergent  
38 unidirectional nature of this relationship, this study also challenges us to re-consider  
39 our interactions with volcanoes. Unlike many other elements of our natural  
40 environment that have a strong sense of cultural and social identity attached to them  
41 – for example, glaciers (Gagné et al., 2014), rivers (Macklin, 1999), and rainforests  
42 (Roosevelt, 2013) – volcanoes are unlikely to be affected by e.g. anthropogenic

1 climate change. Indeed, aside from humans, volcanism is itself a key driver in short-  
2 term climatic variations.

3  
4 The main limitation for this study is that only English-language poems were  
5 considered. This means that there is likely a bias towards certain attitudes or  
6 behaviours, especially those that were found to emerge from the 'Spirituality'  
7 category. Future research could, and should, include poetry written in multiple  
8 languages to account for this limitation, as doing so would reveal a broader  
9 understanding of how poets interpret human-volcano interactions, especially for  
10 communities from the Southern Hemisphere. Additionally, the majority of poems  
11 considered were authored by male poets, due to the scarcity of poems about  
12 volcanoes written by female poets, especially for the 19<sup>th</sup> Century. It is also worth  
13 noting that throughout the 220 years considered in this study, the cultural, social, and  
14 political backdrop of the poems has changed significantly. For example, colonialism  
15 has the potential of having significantly affected the representation of cultural  
16 elements in poetry. Whereas a detailed analysis of how these changes affected the  
17 content and tone of the poems is beyond the scope of this work, future studies  
18 focussing on this aspect would certainly be valuable. Finally, the limited size of the  
19 analysed dataset, i.e. 34 poems, advises caution when extrapolating the findings of  
20 this study to the poets' fellow human beings.

21  
22 In addition to future studies considering a wider variety of languages and cultures,  
23 such work might also consider how different attitudes towards human-volcano  
24 interactions are captured by those poets who have physically encountered a volcano  
25 versus those who are relying on second-hand testimony. Furthermore, by outlining  
26 how poems can be used as a form of data to provide further insight into how human-  
27 volcano interactions are perceived, this study suggests that a similar approach might  
28 also be adopted for other geoscientific events or phenomena.

29  
30 This study has demonstrated that poetry is a powerful medium through which to  
31 consider perceptions of our natural environment. Our methodology could become an  
32 integral part of a deeper analysis to develop communication strategies with  
33 communities living nearby active volcanoes. For example, it could provide more  
34 appropriate (i.e. locally sourced) language to engage the communities in  
35 conversation. It is in fact critical that local cultural and religious beliefs be taken into  
36 account when communicating volcanic hazard, as demonstrated by several social  
37 volcanology studies (Cashman and Cronin, 2008;Donovan, 2010;Lavigne et al.,  
38 2008;Paton et al., 2008). We welcome interested readers to get in contact with us for  
39 participation in the next stage of this research, in which we hope to broaden our  
40 analysis beyond the constraints of the English language.



1 **Data Availability**

2

3 The poems that were selected for the analysis, along with their coded categories, are  
4 available through Soldati and Illingworth (2019;  
5 <https://doi.org/10.17605/OSF.IO/2D5K6>).

6

7 **Author Contribution**

8

9 AS and SI worked together to conceive the design of this study, conduct the  
10 research and analysis, and write the paper.

11

12 **Competing interests**

13

14 Author SI is the chief executive editor of *Geoscience Communication*.

15

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17

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21

22

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## 1 Tables

2  
3 Table 1: classification of the 41 poems according to their portrayal of the relationship  
4 between volcanoes and the societies and times represented by poets who wrote  
5 about them as either 'Positive', 'Negative', 'Positive & Negative', 'Neutral' or 'Invalid'.  
6 Here the rows represent who the coding was performed by ('AS' - Arianna Soldati;  
7 'SI' - Sam Illingworth; 'Both' - Arianna Soldati and Sam Illingworth).

Coder	Positive	Negative	Positive & Negative	Neutral	Invalid
<b>AS</b>	5	8	7	10	11
<b>SI</b>	13	16	0	9	3
<b>Both</b>	9	12	5	8	7

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10 Table 2: the codes that emerged from an individual content analysis of the 34  
11 poems, arranged according to the number of times they occurred ('AS' - Arianna  
12 Soldati; 'SI' - Sam Illingworth). \*The number of occurrences is not limited to one per  
13 poem.

Code	Coder	Description	Occurrences*
<b>Landscape</b>	<b>AS</b>	Simple description of volcanoes as part of the environment	<b>30</b>
<b>Human</b>	<b>AS</b>	Referring to fellow human beings	<b>28</b>
<b>Destruction</b>	<b>AS</b>	Associated with destruction	<b>24</b>
<b>Spiritual</b>	<b>AS</b>	Evoking a spiritual connection or being	<b>23</b>
<b>Destruction</b>	<b>SI</b>	Something that brings / is associated with destruction	<b>15</b>
<b>Creation</b>	<b>SI</b>	Associated with new life and fostering life	<b>13</b>
<b>Plants</b>	<b>AS</b>	Reference to plants / flowers	<b>13</b>



<b>Spiritual</b>	<b>SI</b>	Associated with spiritual / religious feelings and/or presence	<b>12</b>
<b>History</b>	<b>AS</b>	Bringing a historical perspective	<b>12</b>
<b>Death</b>	<b>AS</b>	Associated with death	<b>12</b>
<b>Animals</b>	<b>AS</b>	Reference to animals	<b>11</b>
<b>Identity</b>	<b>SI</b>	Associated with a sense of identity for a person / people	<b>8</b>
<b>Fear</b>	<b>SI</b>	Something to be feared / afraid of	<b>8</b>
<b>Cohabiting</b>	<b>SI</b>	Living alongside the volcano (both positive and negative consequences)	<b>8</b>
<b>Natural Beauty</b>	<b>SI</b>	Described as something beautiful and/or awesome.	<b>7</b>
<b>Setting</b>	<b>SI</b>	The volcano is a neutral setting for the poem	<b>6</b>
<b>Universe</b>	<b>AS</b>	Reference to stars/planets	<b>5</b>
<b>Force / Power</b>	<b>AS</b>	Evoking the strength of the volcano	<b>5</b>
<b>Childhood</b>	<b>AS</b>	Reminiscing of childhood	<b>4</b>
<b>Peace</b>	<b>AS</b>	Relating to peace/absence of war	<b>3</b>
<b>Positive Metaphor</b>	<b>SI</b>	The volcano is used as a positive metaphor / simile	<b>2</b>
<b>Creation</b>	<b>AS</b>	Evoking the creation of land or life	<b>2</b>
<b>Rocks / Minerals</b>	<b>AS</b>	Reference to the rock/mineral element of landscape	<b>2</b>

<b>Wish</b>	<b>AS</b>	Expressing a desire, wish	<b>2</b>
<b>Time</b>	<b>AS</b>	Encompassing the passage of time	<b>2</b>
<b>Quiet</b>	<b>AS</b>	Related to a feeling of stillness, quiet	<b>2</b>
<b>Pain</b>	<b>AS</b>	Related to physical pain	<b>1</b>
<b>Fear</b>	<b>AS</b>	Related to a feeling of fear	<b>1</b>

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2 Table 3: the categories that emerged from the coding process, alongside their  
3 corresponding codes, and arranged according to the number of times they occurred  
4 ('AS' - Arianna Soldati; 'SI' - Sam Illingworth). \*The number of occurrences is not  
5 limited to one per poem. \*\*This code originally had both positive and negative  
6 connotations.

<b>Category</b>	<b>Corresponding Codes (Author)</b>	<b>Occurrences*</b>
<b>Landscape</b>	Landscape (AS); Natural Beauty (SI); Universe (AS); Rocks/Minerals (AS); Force / Power (AS); Animals (AS); Plants (AS); Setting (SI)	61
<b>Identity</b>	History (AS); Heritage (AS); Humans (AS); Identity (SI); Childhood (AS); Positive Metaphor (SI); Time (AS)	49
<b>Destruction</b>	Death (AS); Pain (AS); Destruction (S); Destruction (AS); Fear (SI); Cohabiting** (SI); Fear (AS)	36
<b>Spiritual</b>	Spiritual (AS); Spiritual (SI)	25
<b>Creation</b>	Creation (SI); Creation (AS); Wish (AS); Cohabiting** (S); Peace (AS); Quiet (AS)	8

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8 Table 4. Poem connotation and categories by decade. In this table each decade was  
9 considered to have an associated connotation if at least one poem written in this  
10 decade was considered to be either 'Neutral', 'Positive', 'Negative', or 'Both'.  
11 Similarly, a particular decade was assumed to be associated with an emergent  
12 category if at least one of the poems that were written in that decade was  
13 categorised as such.

Decade	Connotation				Categories				
	Neutral	Both	Positive	Negative	Landscape	Identity	Creation	Destruction	Identity
1800	x				x	x		x	
1810				x	x	x	x	x	
1820	x				x	x			x
1830	x				x	x			x
1840		x			x	x	x	x	x
1850				x	x	x			x
1860				x	x			x	
1870				x	x			x	
1880		x			x			x	x
1890				x	x	x		x	x
1900			x		x	x			
1910			x		x	x		x	
1920		x		x	x	x	x	x	
1930				x	x	x		x	
1940									
1950		x			x	x			
1960									
1970	x		x		x	x	x		x

<b>1980</b>			x	x	x	x	x	x	x
<b>1990</b>			x		x	x	x	x	x
<b>2000</b>				x	x	x		x	x
<b>2010</b>	x		x	x	x	x			x

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Table 5. Some of the major eruptions from the 1800s to the present day. These are defined as those eruptions having had either a Volcanic Explosivity Index (VEI) greater than three, and having occurred in the Northern Hemisphere, where the majority of the authors of the considered poems lived, or having had a global impact and resonance. Data taken from the Global Volcanism Program (Venzke, 2013).

<b>Volcano</b>	<b>Eruption Year</b>
Tambora	1815
Krakatoa	1883
La Soufrière, Pelée, Santa Maria	1902
Novarupta	1912
Paricutin	1943-54
Vesuvius	1944
Hekla	1947-48
Surtsey	1963
St Helens	1980
El Chichon	1982
Redoubt	1989

Pinatubo	1991
Eijafjallajokull	2010

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