

Melania Cabezas-García & Pilar León-Araúz (2023) Term and concept variation in climate change communication, *The Translator*.

DOI: [10.1080/13556509.2023.2182168](https://doi.org/10.1080/13556509.2023.2182168)

## Term and concept variation in climate change communication

Melania Cabezas-García  
University of Granada

<https://orcid.org/0000-0002-8622-1036>

Pilar León-Araúz  
University of Granada

<https://orcid.org/0000-0002-8520-2749>

### Abstract

Environmental science has become especially important because of a growing awareness of the need to slow global warming. As in all risk-related types of discourse, clear communication is the key. However, the frequent variation of terms and concepts in specialized domains may hinder effective communication. This paper analyzes the presence of term and concept variation in climate change terminology, which is illustrated with the concept GLOBAL WARMING, its English variants and their translations into Spanish. Our goals were: (i) to examine how and why variation occurs, and (ii) to investigate its consequences, especially in translation contexts. For this purpose, we focused on English-Spanish translation by means of three parallel corpora: the OPUS2 English-Spanish corpus, the EurLex English-Spanish corpus, and Linguee. Our results showed that variation is very frequent in climate change communication, affecting semantics, the communicative situation or both. Inaccuracies were regularly found both in English and Spanish. These should be avoided because they can hinder communication and exacerbate hazards. Finally, the influence of communicative intention in the construction of climate change discourse was also confirmed.

**Keywords:** term variation, concept variation, specialized translation, terminology, climate change

### 1. Introduction

Environmental science has become especially important because of a growing awareness of the need to slow global warming. As in all risk-related types of discourse, clear communication is the key (Federici and O'Brien 2019). To this end, properly understanding and communicating terminology becomes essential. This is especially true of multilingual settings, in which terminological aspects and conceptual facets are not always parallel. For this reason, the creation and maintenance of terminological resources is indispensable.

Dynamism is a common feature of specialized domains, which results in the presence of changing terms and concepts (León-Araúz 2017). This variation is one of the main difficulties that hinder effective communication. Nevertheless, it is not always represented in terminological resources and, when it is, conceptual, pragmatic and communicative factors that are of interest to translators are not always included (León-Araúz et al. 2020).

This paper analyzes the presence of term and concept variation in climate change terminology. Our goals were: (i) to examine how and why variation occurs, and (ii) to investigate its consequences, especially in translation contexts. For this purpose, we focused on English-Spanish translation by means of three parallel corpora: the OPUS2 English-Spanish corpus, the EurLex English-Spanish corpus, and Linguee.

The rest of this article is organized as follows. Section 2 focuses on climate change communication. Section 3 describes variation and its role in translation contexts. Section 4 presents the materials and methods of the study, and Section 5 describes the results obtained. Finally, Section 6 summarizes the conclusions of this study.

## 2. Climate change communication

Climate change communication is a type of environmental communication, which shares features with risk, health, and science communication (Nerlich et al. 2010). Lundgren and McMakin (2009: 5) even affirm that climate change communication is a type of risk communication. Risks begin with a hazard, which is a potential or actual danger to the environment or human health or safety (e.g. droughts). Then, the risk is characterized and its probability of occurrence and outcomes are assessed. Finally, risk managers decide what to do and their decisions are communicated to the people affected by or interested in the risk.

The hazards arising from climate change include droughts, ice melting at the poles, heat waves, increased acidity of oceans, etc. All of them have disastrous consequences for human health. For this reason, climate change communication has often been equated with crisis communication. According to Declercq and Federici (2021: 7), crisis relief communication should be provided as soon as possible and should include clear and customized messages, made as relevant as possible for the individual receiver. In this sense, variation may have a positive role in raising awareness (e.g. *climate emergency* instead of a more neutral *climate change*) or a negative one when it dilutes discourse and causes confusion (e.g. using *global warming* as a synonym of *climate change*).

Climate change communication has been the subject of various studies. Weingart et al. (2000) examined the role of the news media in climate change discourse. Boykoff (2007) studied bias in the coverage of global warming in the US prestige press. Ereaut and Segnit (2006) identified particular lines of talking and thinking about climate change and concluded that the discourse related to alarmism and small actions was prevalent. However, Nerlich et al. (2010) argue that the use of alarmism in climate change communication might have the opposite effect to what is intended.

The language used in climate change communication plays a significant role. On the one hand, language has effects on our attitudes. This is important since risk

communication may have to inform, encourage the building of consensus, or even motivate its audience to action (Lundgren and McMakin 2009). Pezzullo and Cox (2018) affirm that our actions within the environment depend on the ways in which the different forms of climate change communication (i.e. in news, films, public debate, etc.) shape our environmental values, choices, and actions. They add that communication choices can be intentional or not, and provide the example of language choices by the Evangelical Environmental Network, which invite an ecological orientation by drawing attention to spiritual reasons. The following excerpt is a case in point: “Because we worship and honor the Creator, we seek to cherish and care for the creation” (2018: 77).

On the other hand, inaccurate or ambiguous language in climate change communication can have unintended effects, such as misunderstandings (Lundgren and McMakin 2009). This highlights the significant role of terminology in climate change communication. The United Nations Office for Disaster Risk Reduction promotes a common understanding of disaster risk reduction concepts and terms, also including climate change terminology. Furthermore, the audience and the communicative intention must be considered when planning the message since their interpretation can be affected by education, feelings concerning the risk, and experience with risks (Lundgren and McMakin 2009).

However, although climate change communication is the order of the day, environmental problems are still present. While some years ago the goal was to convince the audience that climate change existed, the objective now is to motivate them to take action. According to Nerlich et al. (2010: 6), “climate change is generally perceived as something which mostly affects other parts of the world, and which will have profound effects on future, not current, generations”.

Therefore, to engage audiences’ attention and involvement, language must be simple, narrative, and appealing. Simple language requires only peripheral information processing (e.g. images, humor), fosters positive reactions to climate-friendly behaviors, and personalizes the threat by referring to places close or significant to the audience (Pezzullo and Cox 2018: 164). Narrative and appealing language are related since narrative language is considered to be more appealing.

Bilingual or multilingual settings often complicate the task of achieving effective and attractive climate change communication. However, these scenarios are frequent since climate is the topic of controversial debates between countries with varying interests. Each of them may have its own characteristics that affect how people perceive and communicate hazards, which include religious beliefs, health and environmental regulations, and community traditions. Lundgren and McMakin (2009: 330) compare hazard perceptions in China and Western countries. In the latter, unknown or less controllable threats are conceived as more threatening than others,

whereas Chinese people normally judge less controllable threats as less troubling. This is influenced by the Confucian teachings about focusing on things that we can control, rather than on things that cannot be controlled through personal influence.

Terminological resources can solve many translation problems derived from variation when they thoroughly describe variants and are frequently updated. This is especially important given the instability of climate change terminology, due to its relatively recent development, which also hinders translation (Biros et al. 2020). The following section describes term and concept variation, which can be the result of instability but also of a particular intentionality.

### 3. Variation and its relevance in translation

Variation can be denominative or conceptual. Denominative or term variation occurs when different designations are used to name the same concept (e.g. *ozone layer* and *ozonosphere*). Term variation can cause problems, for example, in identifying the different variants that allude to the same concept, the preferred variant in a specific context or register, or their different connotations. Besides, in specific contexts some terms are understood as term variants even though they do not point exactly to the same reality (e.g. *global warming* is part of the more general concept *climate change* but they are often used interchangeably). These aspects may not coincide in source and target languages.

Variation can also be conceptual when it affects the categorization of concepts. This is related to multidimensionality, which occurs when concepts can be organized according to different facets or dimensions (Bowker and Hawkins 2006). For example, the concept SAND can be regarded either as a type of waste or a filter in the domain of Water Treatment. Conceptual variation can hinder translation, for instance, when the different facets of the same concept are not recognized, which often leads to mistakes due to concept misunderstanding. Similarly, the use of the same term to name different concepts (e.g. *wood* can refer to the material made from trees or a forest) is not always reproduced in the target language.

Rogers (1997) and Bowker and Hawkins (2006) affirm that variation is not necessarily attributed to the carelessness of subject experts, but can also be derived from their desire for precision. In fact, the choice of translation variants has effects on the audience. Cameron et al. (2015: 279) explain how the term chosen to translate *resilience* in Inuktitut may greatly influence Inuit's response to climate change as it implies that environmental threats must be accepted, observed, and adapted to. Therefore, variation sometimes happens with a specific purpose, while other times it reveals the novelty and instability of concepts.

Term variants are not always interchangeable. Biros et al. (2020: 5-6), who investigate the term variants used to refer to climate change in English and French,

found that *vulnérabilité*, instead of *résilience*, was preferred to translate the English term, *vulnerability*, when the context was related to calculations of degrees of vulnerability and to geographic areas. However, they underlined that updating terminological resources leads to further term stabilization and thus the preference for that term in all contexts.

As stated by Candel-Mora and Carrió-Pastor (2012), discovering the causes or types of variation is important because they reflect the mental processes involved in the selection of one term over another. Furthermore, this information is helpful for terminologists or translators in production tasks, since they need to know when to use a specific variant and the reasons why it is the best choice in a particular context. Traditionally, the reasons for variation have been user-based (temporal, geographic, or social variation) or usage-based (field, tenor, and channel). Nevertheless, additional reasons can be involved. Causes of term variation can thus be (i) dialectal; (ii) functional; (iii) discursive; (iv) interlinguistic; and (v) cognitive (Freixa 2006). Several of these causes can also cooccur. Cognitive term variants are of particular interest in this study because of their presence in risk communication. They are the natural reflection of multidimensionality and can also have an effect on the semantics or the communicative situation, since they are used depending on the reaction sought from the receiver (*climate change*, *climate emergency*). Term and concept variation, far from being unrelated, are thus the consequence of the convergent influence of multidimensionality, context and dynamism in specialized domains (León-Araúz 2017).

It is also important to reflect on the consequences of variation. According to Fernández-Silva (2019), term variation can have no cognitive consequences when there is only a change in the form but not in the meaning (e.g. *marine product*, *sea product*). Alternatively, term variation can have cognitive effects, when there is a shift in perception along with the change in form (e.g. *sea product*, *fishing product*).

Furthermore, the use of one term or another may affect the semantics of a concept or the communicative situation in which the concept is activated (as well as a particular communicative situation may trigger the choice of a specific variant by the sender). Based on this distinction, their experience in the development of a terminological knowledge base, and other foundational work on term variation, Faber and León-Araúz (2016: 12-13) proposed the following extended classification of term variants, which includes additional subcategories:

- orthographic variants (*groundwater*, *ground water*)
- diatopic variants (*gasoline*, *petrol*)
- short form variants (*greenhouse gas*, *GHG*)
- diaphasic variants (*carbon dioxide*, *CO2*)

- cognitive variants (*photochemical smog, summer smog*)
- metonymic variants (*accidental water pollution, accidental marine pollution*)
- diachronic variants (*carbonic anhydride, carbon dioxide*)
- non-recommended variants (*mental retardation, intellectual disability*)
- morphosyntactic variants (*digestive disease, digestion disease*).

Besides, dealing with variation when translating controversial topics, such as hazards, may be particularly challenging. Reflecting on these variants is important because the term chosen may influence how the public faces this hazard. Furthermore, ascertaining term variants in the source language is relevant with a view to facilitating equivalent identification. Rogers (1997) underlines that translators are frequently obliged to make decisions not only regarding synonymy within the source text, but also regarding the equivalents of these synonyms in the target language, which can have a multiplying effect in languages with more overt inflection than English, especially with multiword terms. Furthermore, translators and terminologists need to know when to use each variant as well as its conceptual and communicative implications, since this will affect the receiver's interpretation of the message. Otherwise, translators can over-standardize, thus creating consistency in places where the use of variants was deliberate and well-reasoned (Bowker and Hawkins 2006: 80). Word-for-word translations are often regarded as safer because they reduce the risk of misunderstandings and create consistency between English and the target languages. According to Birós et al. (2020: 11), "the ideological framing that is carried with this set of terms is also gradually transferred from one language to the other".

Along these lines, León-Araúz and Cabezas-García (2020) developed a classification of translation equivalents, which compares the Spanish translations of English multiword terms. Although many of the variants described in Faber and León-Araúz (2016) occurred in their dataset (e.g. orthographic variants, short form variants), most of them entailed morphosyntactic and cognitive changes, which called for an expansion of variation categories in translation scenarios (León-Araúz and Cabezas-García 2020). This taxonomy includes the following types, which are further specified by subcategories:

- Omissions (*contaminación **de fuentes** difusas, contaminación difusa*) [English: non-point source pollution]. Subcategories in this section include: (i) the omission of articles; and (ii) the omission of formants.
- Structural shifts (*emisiones **antropogénicas** de gases de efecto invernadero, emisiones de gases de efecto invernadero **antropogénicas***) [English: anthropogenic greenhouse gas emissions]. Subcategories in this section include:

(i) the shift of prepositions; (ii) permutations; (iii) the shift of noun within a modifier; (iv) the shift of noun within the head; (v) the shift of both modifier and head; and (vi) the shift of modifying adjectives.

- Transpositions (*ozono superficial*, *ozono de superficie*) [English: surface ozone]. Subcategories in this section include: (i) the transposition of an adjective by periphrasis; (ii) the transposition of an adjective by *of + noun*; and (iii) the transposition by inflection of one of the formants.

- Expansions (*contaminación de origen terrestre*, *contaminación marina de origen terrestre*) [English: land-based pollution]. Subcategories in this section include: (i) expansions making conceptual information explicit; and (ii) expansions adding a second variant.

- Inaccuracies (*contaminación del terreno*, *contaminación de origen terrestre*) [English: land-based pollution]. Subcategories in this section include: (i) inaccuracies related to the semantics of one of the formants; (ii) inaccuracies related to the semantic relation between the formants; (iii) inaccuracies related to bracketing; (iv) inaccuracies due to style and redundancy; and (v) inaccuracies due to ad hoc translations.

#### 4. Materials and methods

Three parallel corpora, which consisted of original texts aligned with their translations, were used for the purposes of the study. One of them is the OPUS2 English-Spanish corpus (Tiedemann 2012). It is an open source parallel corpus that can be accessed at Sketch Engine (<https://www.sketchengine.eu/>) (Kilgarriff et al. 2014) and encompasses 40 languages. It is organized in subcorpora, such as the European Parliament Proceedings (EUROPARL) and the Translated UN documents (MultiUN).

We also consulted the EurLex English-Spanish corpus (Vaisa et al. 2016), a multilingual corpus in all the official languages of the European Union that includes texts in the EUR-Lex database and is also available in Sketch Engine. Finally, the online corpus of aligned translations Linguee (<https://www.linguee.es/>) was used, which includes general and specialized texts in different languages, such as English and Spanish. Although specific Corpus Query Language (CQL) queries cannot be performed in Linguee, and it displays just a sample of the possible translations, it complemented the alignment mismatches that were often found in OPUS2 and EurLex and provided more translations choices.

Ideally, parallel corpora of English and Spanish texts on the environment would have been preferable. However, because of their scarcity, we decided to use parallel corpora encompassing both general and specialized discourse in a wide variety of domains and focused on concepts and terms related to climate change. This is a current

topic that is widely present in these corpora, which are mostly composed of texts from institutions that must tackle environmental problems. We focused on a central concept in climate change: GLOBAL WARMING. The English term variants used to refer to this concept were then identified in terminological resources such as IATE (<https://iate.europa.eu/>) and Termium Plus (<https://www.btb.termiumplus.gc.ca/>), extending the list extracted from parallel corpora. This was complemented by a specific search for knowledge patterns, which are lexical-syntactic structures that make semantic relations explicit in natural language (Meyer 2001). Particularly, lexical knowledge patterns conveying synonymy were queried (e.g. *also known as*), which explicitly indicate synonymy between two or more terms. Table 1 shows the CQL expressions used to query these knowledge patterns.

---

<pre>[tag="RB.*"]{0,}[word="known called referred"][tag="RB.*"]{0,}[word="to"]{0,}[word="as"]{0,}[tag="N.* JJ.* RB.* VVG.* VFN.*"]{0,}[lemma="global warming"]</pre>
<pre>[lemma="be"]{0,}[]{0,3}[lemma="synonym"][word="of for to"][tag="N.* JJ.* RB.* VVG.* VFN.*"]{0,}[lemma="global warming"]</pre>
<pre>[] {1,3}[lemma="spelling"][word="of"][] {0,3}[tag="N.* JJ.* RB.* VVG.* VFN.*"]{0,}[lemma="global warming"]</pre>

---

Table 1: CQL queries that target synonymic knowledge patterns.

The first query searches for *known*, *called* and *referred* ([word="known|called|referred"]) preceded or followed by an adverb ([tag="RB.\*"]{0,}). They can also be followed by *to as* ([word="to"]{0,}[word="as"]{0,}) and a possible noun, adjective, adverb, and present or past participle ([tag="N.\*|JJ.\*|RB.\*|VVG.\*|VFN.\*"]{0,}). Finally, the lemmas *global* or *warming* ([lemma="global|warming"]) must appear.

The second query searches for *synonym of/for/to* ([lemma="synonym"][word="of|for|to"]) preceded by *to be* and a span of 0 to 3 elements ([lemma="be"]{0,}[]{0,3}). Then, the sequence *synonym of/for/to* can be followed by a noun, an adjective, an adverb, and a present or past participle ([tag="N.\*|JJ.\*|RB.\*|VVG.\*|VFN.\*"]{0,}) and, finally, the lemmas *global* or *warming* ([lemma="global|warming"]) must appear.

The third query searches for *spelling of* ([lemma="spelling"][word="of"]), preceded by a span of 1 to 3 elements ([]{1,3}), followed by a possible span of 0 to 3 elements ([]{0,3}), and a possible noun, adjective, adverb, and present or past participle ([tag="N.\*|JJ.\*|RB.\*|VVG.\*|VFN.\*"]{0,}). Finally, the lemmas *global* or *warming* ([lemma="global|warming"]) must appear.

These queries revealed terms that are used as term variants, such as *climate change*, which is often used to refer to *global warming*, as observed in this excerpt:

“climate change, also referred to as ‘global warming’”. These terms are often interchanged, although they do not express the same concept, since global warming is just one aspect of climate change. As explained below, this variation in the source language can also affect translation and give rise to equivalent proliferation. Table 2 shows the English term variants of GLOBAL WARMING.

GLOBAL WARMING	
global warming	global heating
climate change	atmospheric warming
global climate change	greenhouse effect
climate warming	greenhouse warming
warming climate	

Table 2: English term variants of GLOBAL WARMING.

With a view to exploring how variation occurs in the source language, these term variants were then analyzed following the classification proposed in Faber and León-Araúz (2016) (see Section 3).

Then, the Spanish translations of these variants were collected from the parallel corpora. A total of 100 translation segments were analyzed for every English term variant in each of the two corpora available in Sketch Engine (i.e. OPUS2 and EurLex), as well as the whole (limited) sample proposed in Linguee. Table 3 lists the Spanish translation equivalents found for the concept GLOBAL WARMING clustered together according to its English variants (a total of 89 distinct target variants).

Translations of <i>global warming</i>	
amenaza climatológica	calentamiento mundial
aumento de las temperaturas	calentamiento mundial de la atmósfera
aumento de temperatura de nuestro planeta	calentamiento planetario
aumento de la temperatura en el planeta	calentamiento producido por el efecto invernadero
aumento de las temperaturas en todo el mundo	calentamiento terrestre
calentamiento	calor global
calentamiento a escala mundial	cambio climático
calentamiento atmosférico	cambio climático mundial
calentamiento atmosférico mundial	contaminación
calentamiento climático	contaminación calentadora
calentamiento de la atmósfera	crisis climática
calentamiento de la atmósfera mundial	efecto invernadero
calentamiento de la atmósfera terrestre	efecto invernadero mundial
calentamiento de la atmósfera global	elevación mundial de la temperatura
calentamiento de la tierra	precalentamiento global
calentamiento de la Tierra	recalentamiento
calentamiento del clima	recalentamiento atmosférico
calentamiento del clima a escala mundial	recalentamiento climático
calentamiento del clima del planeta	recalentamiento del clima
calentamiento del planeta	recalentamiento del clima de la atmósfera
calentamiento global	
calentamiento global de la Tierra	

calentamiento global de la tierra	recalentamiento del clima terrestre
calentamiento del globo terráqueo	recalentamiento de la atmósfera
calentamiento global del planeta	recalentamiento de la Tierra
	recalentamiento de la tierra
	recalentamiento del globo terráqueo
	recalentamiento del planeta
	recalentamiento del planeta Tierra
	recalentamiento global
	recalentamiento medioambiental
	recalentamiento mundial
	recalentamiento de nuestro planeta
	recalentamiento planetario
	recalentamiento progresivo de la Tierra
	sistema climático
<b>Translations of <i>climate change</i></b>	
cambio climático	cambio de clima
cambios climáticos	cambio del clima
clima	cambios de clima
transformación del clima	cambios del clima
	recalentamiento climático
<b>Translations of <i>global climate change</i></b>	
alternaciones climáticas globales	cambio climático mundial
cambio climático	cambios climáticos mundiales
cambio climático a escala mundial	cambio climático planetario
cambio climático a escala planetaria	cambio del clima mundial
cambio climático a nivel mundial	cambios del clima mundial
cambio climático de nuestro planeta	cambio en el clima mundial
cambio climático del planeta	cambios en el clima mundial
cambio climático de la Tierra	cambio global del clima
cambio climático en el mundo	cambios globales del clima
cambio climático global	calentamiento mundial
cambios climáticos globales	evolución mundial del clima
cambios climáticos en el mundo	modificación global del clima
<b>Translations of <i>climate warming</i></b>	
calentamiento climático	cambio climático
calentamiento de la atmósfera	recalentamiento climático
calentamiento del clima	recalentamiento del planeta
calentamiento del planeta	recalentamiento global
calentamiento global	
<b>Translations of <i>warming climate</i></b>	
calentamiento climático	clima cálido
calentamiento del clima	
<b>Translations of <i>global heating</i></b>	
calentamiento global	calefacción global
<b>Translations of <i>atmospheric warming</i></b>	
calentamiento atmosférico	calentamiento climático
calentamiento de la atmósfera	
<b>Translations of <i>greenhouse effect</i></b>	

efecto invernadero	efecto Greenhouse
efecto de invernadero	fenómeno de invernadero
Translations of <i>greenhouse warming</i>	
calentamiento del planeta por los gases de efecto	
invernadero	efecto invernadero
calentamiento global	

Table 3: Spanish translations of *global warming* and its term variants.

These variants were classified according to León-Araúz and Cabezas-García's (2020) taxonomy (see Section 3). After that, the results of both taxonomies were used to compare source and target variants from an interlinguistic viewpoint. To conclude, with a view to investigating the consequences of variation in translations contexts, we carried out a qualitative study which entailed an analysis of the discourse surrounding variation.

## 5. Variation in climate change communication: the case of GLOBAL WARMING

### 5.1. Variation in the source language

Based on Faber and León-Araúz's (2016) classification, source variants were categorized by comparing them to the main term, *global warming*:

*-(global) climate change*: this term can be regarded either as a metonymic variant, since global warming is just one aspect of climate change that is related to temperatures, or as a cognitive variant, because the text sender tries to catch the audience's attention by referring to a larger scale event. In both cases semantics is affected, and the communicative situation can also be influenced because a reaction in the audience is sought.

*-climate warming*: this is a metonymic variant, which affects semantics by referring to a part of the concept (*climate* can be understood as a component of *global* since it alludes to the average state of the Earth atmosphere).

*-warming climate*: this is also a metonymic variant, which is related to the previous one (*climate* can be understood as a component of *global*), and also affects semantics. Besides, *climate* plays a central role because it becomes the head of the multiword term.

*-global heating*: this is an informal variant, which affects the communicative situation because it entails a lower level of expertise.

*-atmospheric warming*: this is a metonymic variant, which affects semantics by referring to a part of the concept, because *atmospheric* can be understood as a component of *global*.

-*greenhouse effect*: this term is often used as a synonym of *global warming*, although it is one of its causes. Thus, it could be considered a metonymic variant in which *global warming* is replaced by its cause (*greenhouse effect*).

-*greenhouse warming*: this is a cognitive variant, which affects semantics by conveying a different dimension of the same concept: while *global warming* highlights the global dimension of this phenomenon, *greenhouse warming* underlines its cause.

This analysis reveals that GLOBAL WARMING variants are mainly metonymic and cognitive. Ascertaining the causes of this variation is not always easy. For example, the use of metonymic (e.g. *global warming*, *greenhouse effect*) or cognitive variants (e.g. *global warming*, *greenhouse warming*) may respond to a specific intention of the text sender, such as highlighting the cause of global warming when using *greenhouse effect* or *greenhouse warming* as term variants. The text sender may also use variants to avoid repetition. In contrast, the use of these term variants may also come from a lack of knowledge of the differences between these concepts (*greenhouse effect* is just one aspect of *global warming*) or the dimensions of the same concept (even though *global warming* and *greenhouse warming* allude to the same concept, the latter focuses on its cause). Thus, their use as term variants may sometimes show that communication is not completely accurate. These phenomena can be reflected in translation –or even multiply– and thus hinder hazard communication, as will be shown in Sections 5.2 and 5.3.

## 5.2. Variation in the target language

For the Spanish terms, which are mostly cognitive (as the source term variants) and morphosyntactic, the classification used in the previous section (Faber and León-Araúz 2016) falls short due to the existence of both discovered correspondences and created equivalents (i.e. genuine terms vs. the result of translation). For this reason, the classification of Spanish variants follows a translation variation perspective (León-Araúz and Cabezas-García 2020), accounting for the fact that term variants in the target language proliferate due to the process of translation itself and through mechanisms that can be further specified. In this case, different term variant pairs within all of the clusters are compared.

### 1. Omissions

#### a. Omission of articles

e.g. cambio **del** clima, cambio **de** clima

#### b. Omission of formants

##### a. Omission of modifiers

- e.g. calentamiento **global**, calentamiento
- e.g. recalentamiento **global**, recalentamiento
- e.g. calentamiento atmosférico **mundial**, calentamiento atmosférico

## 2. Structural shifts

### a. Inflection shifts

- e.g. cambio climático, cambios climáticos

### b. Shift of prepositions

- e.g. cambios **del** clima mundial, cambios **en** el clima mundial

### c. Permutations

#### a. Permutation of modifiers

- e.g. cambio del **clima global**, modificación **global del clima**
- e.g. calentamiento de la **atmósfera mundial**, calentamiento **mundial de la atmósfera**

#### b. Permutation of head and modifiers

- e.g. **calentamiento del clima**, **clima cálido**

### d. Shift of modifier

#### a. Shift by synonym

- e.g. calentamiento **global**, calentamiento **planetario**, calentamiento **terrestre**, calentamiento **mundial**
- e.g. calentamiento global de la **Tierra**, calentamiento global del **planeta**

#### b. Shift by metonym

- e.g. calentamiento **global**, calentamiento **atmosférico**
- e.g. calentamiento **global**, calentamiento **climático**

### e. Shift of head

#### a. Shift by synonym

- e.g. **calentamiento global**, **recalentamiento global**

- e.g. **calentamiento** climático, **recalentamiento** climático
- e.g. **cambio** climático, **transformación** del clima
- e.g. **cambio** del clima global, **modificación** global del clima
- e.g. **efecto** de invernadero, **fenómeno** de invernadero

b. Shift by metonym

- e.g. **calentamiento** climático, **cambio** climático

c. Shift by modulation (multidimensionality)

- e.g. **cambio** climático, **crisis** climática
- e.g. **cambio** climático, **amenaza** climatológica

f. Shift of both modifiers and head

- e.g. **calentamiento global**, **efecto invernadero**
- e.g. **calentamiento global**, **cambio climático**
- e.g. **calentamiento global**, **crisis climática**

3. Transposition

a. Transposition of adjective by periphrasis

- e.g. cambio climático **mundial**, cambio climático **a nivel mundial**

b. Transposition of adjective by "of + noun"

- e.g. calentamiento **planetario**, calentamiento **del planeta**

4. e.g. calentamiento **terrestre**, calentamiento **de la Tierra** Expansion

a. Making conceptual information explicit

- e.g. calentamiento global, **aumento de temperatura de nuestro planeta**
- e.g. calentamiento del planeta, calentamiento del planeta **por los gases de efecto invernadero**

5. Inaccuracies

a. Inaccuracies related to the semantics of one of the formants

- e.g. calentamiento climático, **sistema climático**

- e.g. calentamiento climático, **clima cálido**
  - e.g. calentamiento global, **contaminación calentadora**
  - e.g. calentamiento global, **calefacción** global
- b. Inaccuracies due to incorrect bracketing (i.e. internal dependencies)
- e.g. **calentamiento climático, clima cálido**
- c. Inaccuracies due to style and redundancy
- e.g. calentamiento global, calentamiento **global de la Tierra**
  - e.g. recalentamiento del planeta, recalentamiento del **planeta Tierra**
- d. Inaccuracies due to modulation (multidimensionality)
- e.g. **calentamiento** climático, **crisis** climática
  - e.g. **calentamiento** climático, **amenaza** climatológica
  - e.g. **calentamiento** mundial, **efecto invernadero** mundial
- e. Inaccuracies due to ad hoc translations
- e.g. calentamiento global, aumento de las temperaturas en todo el mundo

As can be inferred from the classification above there are several structural shifts that also convey a difference in meaning (i.e. inaccuracies, modulations, and certain omissions). Cognitive variants occur on the changes mostly affecting nouns, whether in the modifier or in the head, but especially in the latter. As mentioned earlier, the Spanish translation equivalents of *global warming* and its English variants cause a multiplying effect in the proliferation of variants. Even though these translations were documented in the parallel corpora, they could be regarded as inadequate in some cases (i.e. certainly some of the inaccuracies, such as *calefacción global* or *clima cálido*). Therefore, a further contrastive analysis needs to be conducted, taking into account additional pragmatic features, such as frequency or co-text. In this sense, Section 5.3 explores term variants from a contrastive point of view based on term formation devices and frequency (5.3.1) as well as co-text analysis (Section 5.3.2).

### 5.3. Term variation contrastive analysis

#### 5.3.1. Types of translation variants

After contrasting translation variant pairs in Spanish, a comparison of source and target terms is in order. Therefore, this section explores how variation in English is rendered into Spanish. When comparing variants interlinguistically, traditional translation strategies (Newmark 1981; Hurtado Albir 2001) come to the forefront, some of which coincide with the translation variants classification (i.e. transposition, modulation) (León-Araúz and Cabezas-García 2020). In what follows the categorization of term formation devices that apply in the Spanish rendering of the concept GLOBAL WARMING is shown. Structural shifts are very often necessary to follow the linguistic conventions of the target language, but sometimes they also entail semantic shifts (i.e. when heads or modifiers are replaced with metonymic or cognitive shifts). For this reason, this categorization only focuses in the latter.

1. Word-for-word translations (*atmospheric warming* > *calentamiento atmosférico*)
2. Omissions (*global warming* > *calentamiento*)
3. Borrowing (*greenhouse effect* > *efecto Greenhouse*)
4. Calque (*global warming* > *calentamiento global*, since originally in Spanish *global* did not have the sense of *planetary*)
5. Semantic shift (*global warming* > *cambio climático*)
6. Transposition (*global climate change* > *cambio climático a escala mundial*)
7. Expansion (*greenhouse warming* > *calentamiento del planeta por los gases de efecto invernadero*)
8. Modulation (*global warming* > *crisis climática*)
9. Inaccuracies (*global warming* > *calefacción global*)

Most frequent devices were calques (due to the most frequent term *calentamiento global*) and semantic shifts, namely through the cognitive, metonymic, or synonymic variant of the multiword term's constituents, affecting the conceptual dimensions conveyed in the translation of GLOBAL WARMING. For instance, in the pair *climate warming* > *calentamiento de la atmósfera* the target term focuses on a part of the climate; in *greenhouse warming* > *calentamiento global*, while the source term alludes to a metaphoric appearance referring to its cause (*greenhouse*), the target term focuses on its location (global); in *global warming* > *crisis climática* or *amenaza climatológica*, the shift in the head (*crisis*, *amenaza*) reconceptualizes global warming by adding a dramatic component.

Inaccuracies were also quite prevalent. However, this does not necessarily entail that they are mistranslations. These solutions were often inaccurate because they were redundant (*global warming* > *calentamiento global del planeta*), had an awkward style as ad hoc translations (*global warming* > *aumento de las temperaturas en todo el mundo*), or conveyed a wrong sense (*warming climate* > *clima cálido*). In these cases, these mistranslations hinder understanding of such a significant issue as climate change and make the source unreliable.

Nevertheless, inaccuracies can also consist in the widespread use of terms conveying different concepts as if they were translation variants (*global warming* > *cambio climático*). Even though this can produce the same effect in the audience, namely confusion of the related concepts, in our opinion this would not be regarded as a mistranslation strictly speaking given their widespread use.

As part of the interlinguistic comparison, this qualitative analysis was followed by a quantitative analysis in order to explore term choice preferences and frequency. In this case, only the equivalents found for the source term *global warming* were studied, since we cannot expect to distinguish the use of certain terms (e.g. *climate change*) as cognitive and metonymic variants of global warming or as distinct concepts. Furthermore, this search was only performed on the OPUS2 and EurLex corpora, since Linguee does not provide all possible results.

As shown in Table 4, a total of 56 target variants were found as the equivalents of *global warming*, from which *calentamiento global*, *calentamiento atmosférico*, *calentamiento del planeta*, *calentamiento mundial*, *calentamiento de la Tierra*, and *calentamiento de la atmósfera* stand out, which means that calque, word-for-word, and semantic shift are the preferred translation strategies employed.

Global warming	OPUS2 English-Spanish	EurLex English-Spanish	Total count
calentamiento global	366	361	727
calentamiento atmosférico	297	241	538
calentamiento del planeta	292	108	400
calentamiento mundial	221	42	263
calentamiento de la Tierra	174	23	197
calentamiento de la atmósfera	147	3	150
recalentamiento del planeta	48	15	63
calentamiento climático	5	29	34

cambio climático	16	17	33
calentamiento	21	4	25
recalentamiento mundial	22	2	24
calentamiento de la tierra	12	9	21
calentamiento planetario	5	15	20
recalentamiento de la Tierra	10	2	12
efecto invernadero	7	2	9
recalentamiento global	6	1	7
recalentamiento climático	5	0	5
aumento de la temperatura mundial	2	2	4
calentamiento del clima	3	1	4
recalentamiento de la atmósfera	4	0	4
elevación mundial de la temperatura	4	0	4
calentamiento de la atmósfera mundial	4	0	4
calentamiento atmosférico mundial	4	0	4
calentamiento producido por el efecto invernadero	0	2	2
recalentamiento del globo terráqueo	0	2	2
calentamiento de la atmósfera terrestre	1	1	2
aumento de la temperatura de nuestro planeta	1	1	2
aumento de las temperaturas	1	1	2
calentamiento terrestre	1	1	2
calentamiento global del planeta	2	0	2
calentamiento del globo terráqueo	2	0	2
recalentamiento del clima	0	1	1
recalentamiento del planeta Tierra	0	1	1
recalentamiento progresivo de la Tierra	0	1	1
recalentamiento atmosférico	0	1	1

cambio climático mundial	0	1	1
calentamiento del clima a escala mundial	1	0	1
recalentamiento medioambiental	1	0	1
recalentamiento de la tierra	1	0	1
recalentamiento de nuestro planeta	1	0	1
amenaza climatológica	1	0	1
calor global	1	0	1
contaminación calentadora	1	0	1
precalentamiento global	1	0	1
contaminación	1	0	1
aumento de las temperaturas en todo el mundo	1	0	1
calentamiento del clima del planeta	1	0	1
aumento de la temperatura en el planeta	1	0	1
calentamiento de la atmósfera global	1	0	1
calentamiento mundial de la atmósfera	1	0	1
recalentamiento	1	0	1
efecto invernadero mundial	1	0	1
recalenamiento del clima terrestre	1	0	1
sistema climático	1	0	1
calentamiento a escala mundial	1	0	1
recalentamiento planetario	1	0	1

Table 4: Frequency of Spanish equivalents of *global warming*.

### 5.3.2. Co-text analysis

The analysis of variation in climate change translation into Spanish revealed that communicative intention largely drives language use. This was evident in the selection of term variants and the different mechanisms used to catch the audience's attention, as well as in the large number of inaccuracies found, which affect this type of hazard communication. However, co-text analysis of target term variants can also be useful to observe whether term choice correlates with any other discourse feature.

First, specific variants seem to be chosen when a particular goal is pursued. For instance, when *global warming* is translated as *crisis climática* or *amenaza climatológica*, the underlying intention might be that of drawing the recipient's attention to the importance of this hazard. Similarly, *climate warming* and its translation variants seemed to be preferred when emphasizing the natural consequences of this event (Segment 1) and *global warming* and its Spanish counterparts when in the rest of the text a particular focus is placed on emissions (Segment 2). This can be surmised from the surrounding contexts. In the first case, contexts were often related to biodiversity, animal species, water resources, etc.; in the second one to atmospheric components, greenhouse effect and the rise of temperatures. (Table 5).

Segment 1	
English	The size of <b>sea-ice zones</b> and the length of their <b>margins</b> are likely to decrease dramatically with <u><i>climate warming</i></u> , shrinking <b>habitats</b> and threatening the <b>biodiversity</b> of these <b>fragile ecosystems</b> .
Spanish	Es probable que el tamaño de las <b>zonas de hielos marinos</b> y la longitud de sus <b>márgenes</b> disminuyan extraordinariamente con el <u><i>recalentamiento climático</i></u> , lo cual reducirá los <b>hábitats</b> y amenazará la <b>biodiversidad</b> de estos <b>frágiles ecosistemas</b> .
Segment 2	
English	The <b>global warming</b> potentials used to calculate the carbon dioxide equivalence of anthropogenic emissions by sources and removals by sinks of greenhouse gases listed in Annex A shall be those accepted by the Intergovernmental Panel on Climate Change and agreed upon by the Conference of the Parties at its third session.
Spanish	Los potenciales de <b>calentamiento atmosférico</b> que se utilicen para calcular la equivalencia en dióxido de carbono de las emisiones antropógenas por las fuentes y de la absorción por los sumideros de los gases de efecto invernadero enumerados en el anexo A serán los aceptados por el Grupo Intergubernamental de Expertos sobre el Cambio Climático y acordados por la Conferencia de las Partes en su tercer período de sesiones.

Table 5: Use of *recalentamiento climático* and *calentamiento atmosférico*.

When producing climate change texts, the sender usually aims at catching the audience's attention due to the relevance of this hazard and its influence in people's lives (Ereaut and Segnit 2006; Nerlich et al. 2010). To this end, different mechanisms are used, which were found in a co-text analysis and include direct discourse, fight terminology, reference to the future, alarmism, and structural changes in the sentences. These are often reproduced in the source and target languages, while sometimes they are only present in one of the languages involved.

A direct discourse is usually achieved by means of first-person pronouns, involving the text sender and receiver, and highlighting that we are all together in this

planet and suffer the consequences of climate change. Table 6 presents a segment in which this technique has been adopted in the target language as a means to draw the audience’s attention in a translation setting.

English	Carbon dioxide emissions are widely believed to be a major source of <b>global climate change</b> .
Spanish	Muchos consideran que las emisiones de dióxido de carbono son una causa fundamental del <b>cambio climático en nuestro planeta</b> .

Table 6: Direct discourse in English and Spanish.

Furthermore, the use of fight terminology is a case in point of how intention can guide communicative choices. The fight terminology is a widely known metaphor, also used in the medical domain, among others, which underlines the problematic nature of an undesirable event. Some of the most commonly used terms in this semantic field are *fight (lucha)*, *threaten (amenazar)*, *challenge (desafío)*, and *win the battle against (ganar la batalla contra)*. This metaphor is often paralleled in the source and target language. Nevertheless, it is sometimes introduced as a change of paradigm in the target language, in which a more alarmist perspective is adopted. This can be observed in the translation of “**action against** global climate change” by “**lucha contra** el cambio climático global”.

Along these lines, reference is often made to the future to make the public aware that our actions today will have repercussions tomorrow. This is often found both in the source and target languages, as can be observed in the following English segment “the threat of global warming hangs over our **future**” and its Spanish translation “se cierne sobre nuestro **futuro** la amenaza del calentamiento global”.

Several of the mechanisms previously described contribute to creating an alarmist atmosphere in the text. This alarmism can be intentional when its goal is to convince the readers of the magnitude of the hazard and, consequently, persuade them to take action. The choice of more conceptually-loaded translations is often indicative of alarmism, as observed in the English excerpt “**increase** in global warming”, translated into Spanish as “**agravación** del calentamiento mundial”. It can also be observed in the general use of a frightening discourse. This type of atmosphere is very frequently found in climate change communication (Table 7). It is often reproduced in the source and target languages, even though changes can also be introduced. Alarmism can be achieved by means of a specific term selection (segment 1, which speaks of *mortal danger* and *peligro mortal*, and also provides an example of attenuation: *threat* > *problema* instead of *amenaza*). It can also be achieved by emphasizing the negative consequences derived from climate change (segment 2).

Segment 1	
English	Given the <b>mortal danger</b> posed to the world by the greenhouse effect, proposals that seek to improve measures taken to reduce <b>the scale of the threat</b> cannot be neglected.
Spanish	Frente al <b>peligro mortal</b> que supone el efecto invernadero en el mundo, no pueden despreciarse las propuestas que intentan mejorar las medidas tomadas para atenuar <b>la magnitud del problema</b> .
Segment 2	
English	We must therefore restrict ourselves, because the ice is melting, the water is rising, the greenhouse effect is going to suffocate us, the sun is going to burn out and raw materials are going to run out because the Chinese are consuming everything.
Spanish	Por tanto, tenemos que autolimitarnos, porque los hielos se funden, el agua sube, el efecto invernadero va a ahogarnos, el sol se expandirá y las materias primas se agotarán porque los chinos lo consumen todo.

Table 7: Sample of alarmism discourse.

Another type of attenuation is usually found when the short form term variant *calentamiento* is employed, as it usually occurs in samples where the source texts sound less alarmist (or even related to denialism) (Table 8):

Segment 1	
English	It is true that we are observing a <b>global warming</b> , but as Mrs Schleicher has suggested in her speech, there is nothing to prove that this warming comes from the emission of greenhouse gases produced by human activity.
Spanish	Es cierto que estamos observando un <b>calentamiento</b> , pero como la dicho la Sra. Schleicher en su intervención, nada demuestra que dicho calentamiento provenga de la emisión de gases de efecto invernadero producidos por la actividad humana.
Segment 2	
English	There is thus undoubtedly a great deal of exaggeration in this field when human activity is accused of <b>global warming</b> .
Spanish	No hay duda de que hay mucho de exageración cuando se culpa del <b>calentamiento</b> a la actividad humana.

Table 8: Sample of attenuated discourse.

In line with the use of a frightening discourse, another mechanism to draw the audience's attention is the preference for longer explanations in the form of paraphrases, rather than the use of the compact form in Spanish. These longer translation choices create alarmism (Table 9), because they usually include verbs that highlight the consequences for people (*se ven sometidos* in segment 1) or specific

tenses, such as the future (*se calentará* in segment 2), which underlines the imminent outcomes of climate change.

Segment 1	
English	If this <b>global warming continues</b> , then part of the territory of the EU Member States will become sea or desert.
Spanish	Una parte del suelo de los países de la Unión Europea se convertirá en mar o desierto como consecuencia del <b>continuo calentamiento al que se ven sometidos</b> .
Segment 2	
English	Climatologists belonging to the United Nations' Intergovernmental Panel on Climate Change (IPCC) predict <b>global warming</b> of between 1 and 3.5° C over the next 50 to 100 years.
Spanish	Los expertos en el clima integrados en el grupo de expertos (IPCC) de las Naciones Unidas manifestaron que, entre los próximos cincuenta y cien años <b>la tierra se calentará</b> entre 1° y 3,5 °C.

Table 9: Sample of the use of longer translation choices.

Finally, the sender can also catch the addressee's attention by means of structural changes in the sentences. For example, the English sentence "If this global warming continues, then part of the territory of the EU Member States will become sea or desert", included in the previous table, is translated into Spanish as "Una parte del suelo de los países de la Unión Europea se convertirá en mar o desierto como consecuencia del continuo calentamiento al que se ven sometidos". The consequence has been moved to the beginning of the sentence in Spanish, thus giving it a more prominent role.

The analysis of climate change translation into Spanish also showed a large number of inaccuracies. These can hinder communication, because imminent risks must be communicated clearly and efficiently (Declercq and Federici 2021). The loose use of terminology can exacerbate the hazard, because the people involved can misunderstand the problem and, consequently, ignore how to take action. Inaccuracies were found both at the term level and at the context level. At the term level, Spanish equivalents were often found to convey different concepts as compared to the source. The translation of *global warming* by *cambio climático* or *efecto invernadero* are some examples.

Unlike the previous examples, in which the interchange of terms that do not convey the same concept is inaccurate but widespread, translation errors include the use of terms that are not adequate in a particular context or other terms that convey a wrong sense (Table 10).

English	<b>Climate change</b> and water policy are subjects that are of great concern to the European public and which have deserved considerable attention from this House.
Spanish	Las <b>enmiendas sobre el clima</b> y la política del agua se refieren a materias que preocupan mucho a los ciudadanos europeos y que han merecido una atención muy grande por parte de esta Asamblea.

Table 10: Translation error.

*Climate change* is wrongly translated as *enmiendas sobre el clima* (literally, “amendments to climate”), an equivalent that does not convey the sense of a climate that is changing. As pointed out by Declercq and Federici (2021: 5), this inaccurate communication in institutional texts leads to the organization being “perceived as inept, adding to the existing distrust and maintaining the distance between those affected and those aiming to provide relief”.

Inaccuracies were also observed in the context of *global warming* and its variants. These can have different consequences. First, dramatic and demagogic nuances are often introduced even if they were not present in the source text and modify the message. This is evident in the English sentence “The fight against the greenhouse effect (...) constitutes a specific duty in respect of the peoples of the developing world who are already **paying for the consequences** of global warming”. This is translated into Spanish as “La lucha contra el efecto invernadero (...) es especialmente un deber hacia los pueblos del tercer mundo que ya **pagan con su vida las consecuencias** del calentamiento climático”. The translation *pagar con su vida las consecuencias* means that people are losing their lives as a consequence of greenhouse effect. This information is not conveyed in the source text and can be considered demagogic since *pay for the consequences* does not always mean that people die.

In contrast, Spanish translations are often softened, which causes some hints to be lost. For instance, in the translation of “**the country mainly responsible** for greenhouse gas emissions”, the reference to a responsible country has been omitted, thus mentioning just “the main responsible” (i.e. *el principal responsable*): “**el principal (país) responsable** de las emisiones de gases con efecto de invernadero”. However, the truth is that drawing the line between inaccuracies and frightening or alarming intention is a complex task.

Finally, the analysis of the discourse surrounding *global warming* and its variants revealed that the translation of contextual elements was often inaccurate because their equivalents conveyed a wrong sense. Table 11 shows an example in which *side-effects* has been translated as *efectos (medioambientales) secundarios*, which downplays the importance of the problem and suggests that the effects are of little importance. Since *secundario* can have different meanings in Spanish, choosing the right place of this

adjective in the translation can influence meaning. A better translation would be *efectos secundarios medioambientales*.

English	If we do not address this issue in a structured and streamlined manner, then global warming will increase, with serious <b>side-effects</b> for land, marine and aerial environments, not to mention human life.
Spanish	Si no abordamos esta cuestión de forma estructurada y racional, el calentamiento de la Tierra continuará, con graves <b>efectos medioambientales secundarios</b> para los suelos, el mar y la atmósfera, por no hablar de la vida humana.

Table 11: Contextual inaccuracies.

This study of variation in climate change translation demonstrated the influence of communicative intention in the construction of climate change texts in English and Spanish. This was confirmed in term selection and the use of mechanisms to catch the audience’s attention. Besides, inaccuracies were frequent in climate change translation, which exacerbate this type of hazard. These aspects, among others, lead to a higher presence of variation in the target language, which is also influenced by the different translation possibilities.

## 6. Conclusions

The study of climate change communication in English and its translation into Spanish revealed the dynamic nature of environmental terminology, which results in term and concept variation. In English, the source language, variation is usually a reflection of metonymy and multidimensionality, and can affect semantics and the communicative situation. Alternatively, the communicative situation may also guide the selection of variants. Evidently, these cognitive and conceptual implications cannot be overlooked. In Spanish, the target language, different types of translation variants were found, which included omissions, structural shifts, transpositions, expansions, and inaccuracies. These can hinder communication and exacerbate the hazard.

The influence of communicative intention in climate change discourse was also confirmed. This shows the importance of language on people's attitudes, especially in such a relevant topic, where the aim is usually to draw the audience’s attention. Accordingly, Declercq and Federici (2021) affirm that language, mediation, and translation are part of disaster relief. For this reason, translators of environmental texts must carry out translation-oriented terminology tasks to activate terms and concepts within the right context. In hazard settings, such as the one studied in this paper, a good expertise in the field and a proper use of terminology are key to effective communication. The creation and maintenance of terminological resources is thus indispensable to facilitate the task of language service providers. In particular, a comprehensive representation of term and concept variation (León-Araúz et al. 2020),

which includes information regarding the use of each variant, would certainly solve many translation problems and promote effective communication.

### **Disclosure statement**

There are no relevant financial or non-financial competing interests to report.

### **Data availability statement**

The data that support the findings of this study are available from the corresponding author, MCG, upon reasonable request.

### **References**

- Biros, C.; Rossi, C. and Talbot, A. (2020) "Translating the International Panel on climate change reports: standardisation of terminology in synthesis reports from 1990 to 2014." *Perspectives* 29:2, 231-244.
- Bowker, L. and Hawkins, S. (2006) "Variation in the organization of medical terms. Exploring some motivations for term choice." *Terminology* 12:1, 79-110.
- Boykoff, M.T. (2007) "Flogging a dead norm? Newspaper coverage of anthropogenic climate change in the USA and UK from 2003-2006." *Area* 39:4, 470-481.
- Cameron, E.; Mearns, R. and McGrath, J.T. (2015) "Translating Climate Change: Adaptation, Resilience, and Climate Politics in Nunavut, Canada." *Annals of the Association of American Geographers* 105:2, 274-283.
- Candel-Mora, M.A. and Carrió-Pastor, M.L. (2012) "Corpus analysis: a pragmatic perspective on term variation." *Revista Española de Lingüística Aplicada* 2012, 33-50.
- Declercq, C. and Federici, F. (2021) *Intercultural Crisis Communication. Translation, Interpreting and Languages in Local Crises*. London: Bloomsbury Academic.
- Ereaut, G. and Segnit, N. (2006) *Warm Words: How are we telling the climate story and can we tell it better?* London: Institute for Public Policy Research.
- Faber, P. and León-Araúz, P. (2016) "Specialized knowledge representation and the parameterization of context." *Frontiers in Psychology* 7:196, 1-20.
- Federici, F. and O'Brien, S. (2019) *Translation in Cascading Crises*. London: Routledge.
- Fernández-Silva, S. (2019) "The cognitive and communicative functions of term variation in research articles: a comparative study in Psychology and Geology." *Applied Linguistics* 2019, 40:4, 624-645.

- Freixa, J. (2006) "Causes of Denominative Variation in Terminology: A typology proposal." *Terminology* 12:1, 51-77.
- Hurtado Albir, A. (2001) *Traducción y Traductología: Introducción a la traductología*. Madrid: Cátedra.
- Kilgarriff, A.; Baisa, V.; Bušta, J.; Jakubiček, M.; Kovař, V.; Michelfeit, J.; Rychly, P. and Suchomel, V. (2014) "The Sketch Engine: ten years on." *Lexicography* 1:1, 7-36.
- León-Araúz, P. (2017) "Term and Concept Variation in Specialized Knowledge Dynamics." In Drouin, P. et al. (eds.), *Multiple Perspectives on Terminological Variation*, 213-258. Amsterdam: John Benjamins.
- León-Araúz, P. and Cabezas-García, M. (2020) "Term and translation variation of multiword terms." *MonTI. Monografías de Traducción e Interpretación*, special issue 6, 210-247.
- León-Araúz, P.; Cabezas-García, M. and Reimerink, A. (2020) Representing Multiword Term Variation in a Terminological Knowledge Base: a Corpus-Based Study. In *Proceedings of the 12th Conference on Language Resources and Evaluation (LREC 2020)*, 2351-2360. Marseille: ELRA.
- Lundgren, R.E. and McMakin, A.H. (2009) *Risk communication: A Handbook for Communicating Environmental, Safety, and Health Risks*. New Jersey: IEEE.
- Meyer, I. (2001) "Extracting knowledge-rich contexts for terminography. A conceptual and methodological framework." In Bourigault, D., Jacquemin, C. and L'Homme, M.C. (eds.), *Recent Advances in Computational Terminology*, 279–302. Amsterdam, Philadelphia: John Benjamins. <https://doi.org/10.1075/nlp.2.15mey>.
- Nerlich, B.; Koteyko, N.; Brown, B. (2010) "Theory and language of climate change communication." *WIREs: Climate Change* 1:1, 97-110.
- Newmark P. (1981) *Approaches to Translation*. Oxford: Pergamon.
- Pezzullo, P.C. and Cox, R. (2018) *Environmental Communication and the Public Sphere*. Los Angeles: SAGE.
- Rogers, M. (1997) "Synonymy and equivalence in special-language texts. A case study in German and English texts on Genetic Engineering." In Trosborg, A. (ed.), *Text Typology and Translation*, 217-245. Amsterdam, Philadelphia: John Benjamins.
- Tiedemann, J. (2012) "Parallel Data, Tools and Interfaces in OPUS." In *Proceedings of the Eighth International Conference on Language Resources and Evaluation (LREC'12)*, 2214-2218. Istanbul: ELRA.

Vaisa, V.; Michelfeit, J.; Medved, M. and Jakubiček, M. (2016) "European Union Language Resources in Sketch Engine." In *Proceedings of the Tenth International Conference on Language Resources and Evaluation (LREC'16)*, 2799-2803. Portorož: ELRA.

Weingart, P.; Engels, A. and Pansegrau, P. (2000) "Risks of communication: Discourses on climate change in science, politics, and the mass media." *Public Understanding of Science* 9:3, 261-283.