Climate Fiction and AI Translation: Challenges and Opportunities

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Abstract

This study investigates the role of AI in translating climate fiction (Cli-Fi) literature, focusing on key challenges such as metaphorical language, cultural references, and specialized climate terminology. By analyzing the English narrative Woodland, the research examines how AI-assisted translation handles the nuanced linguistic and cultural features critical to disseminating Cli-Fi and raising awareness of climate change issues. This study employs an error analysis framework by the American Translator Association (ATA) error parameters to evaluate the accuracy and quality of AI-generated translations compared to human efforts. The results shows that there are 26 metaphors, 23 cultural words, and 10 climate terms found in the data, while the errors mostly found in the meaning transfer. The findings highlight both the potential and limitations of AI in literary translation, especially in terms of cultural specificity and metaphor interpretation. The findings offer practical insights for translators, AI developers, and climate communicators seeking to enhance AI's effectiveness in cross-cultural and environmental literary dissemination. This research provides the view that AI can assist translators in translating and analyzing. The study also opens up opportunities for cross-disciplinary collaboration between linguists, translators, literary practitioners, and AI observers to create more in-depth solutions to understand climate change through a multidisciplinary approach.

Keywords: ATA framework; climate fiction; climate change; AI; translation errors

Introduction

Climate fiction (Cli-Fi) is a work of fiction that contains stories about climate change, environmental crises, and their impact on society (Manjhi, 2022). Fiction about climate is starting to be widely discussed because this topic is considered important in inviting

people to care about climate change that occurs. Dědinová (2023) mentioned that the study of this field is indeed relatively new but very important in literary works as a concern for climate change and environmental crises in general. Dědinová (2023) supports Goodbody's (2019) statement that Cli-Fi is a phenomenon of literary works that emerged in response to climate change, such as floods, droughts, sea level rise, famine, the spread of disease, and other natural damage events. Literary authors also express their concerns about phenomenon of climate change through their written works. These written works are poems, short stories, or fictional novels. With the increasing number of literary works that discuss climate, these works must be translated if the author's message is to be conveyed more broadly. Therefore, translating these works is very important to reach a wider audience (Mathur, 2017).

Meanwhile, artificial intelligence (AI) is also used in writing stories about climate change. Blythe (2023) compared writing by AI with humans and stated that AI writing results look more rigid than human writing. However, AI results can be polished again by giving more critical and detailed prompts or commands. Related to this goal, the use of AI in the field of literary translation has experienced rapid development. This technology can translate text with better quality (Gao et al., 2024). However, a major challenge arises when AI is applied to literary works that are rich in cultural contexts, idioms, language style, and author intentions (Obeidat & Jaradat, 2024). Some researchers proved that models like GPT-4o can recognize emotional patterns and writing styles in text but still struggle to capture and retain deep meaning within them. In addition to language and creativity challenges, the use of AI in literary translation raises various ethical issues. AI is trained with large datasets, but it is often biased and poorly reflects cultural diversity (Tomalin et al., 2021). AI risks highlighting certain cultural stereotypes and reducing variation in its translation results. Thus, human involvement is still needed to ensure equivalence in translation and address emerging ethical issues (Taivalkoski-Shilov, 2019).

This challenge is increasingly evident in the translation of climate fiction (CLI-FI), which not only relies on strong narratives but also conveys the profound cultural and emotional impact of environmental issues (Elkins, 2024). The AI technology used to write climate change stories still faces limitations. Blythe (2023) revealed that AI-generated stories tend to be more rigid and less expressive because of their limitations in capturing the nuances of language and the complexity of emotions that are generally found in literary works. However, he also stated that providing more critical and detailed prompts can enhance AI results. Meanwhile, Querubin and Niederer (2024) added that AI cannot only help in the writing process but also play a role as a co-author in the creation of climate-themed stories. They explained that AI can be "trained" using existing climate fiction novels to construct new, more structured stories and create illustrations that are relevant to environmental issues. On the other hand, related to cli-fi, the use of AI can expand its reach to multiple languages, thereby increasing global awareness of environmental issues. The collaboration between AI efficiency and human translator intervention offers a solution that can strike a balance

between translation efficiency and quality. Therefore, while AI has shown potential in translating climate literature, the challenge of preserving cultural meaning and nuances remains an aspect that needs attention (Mohamed et al., 2024).

Based on the above explanation, this study aims to explore how AI translates Cli-Fi metaphors, cultural words, and technical terms or terminology and evaluate whether AI can convey the same message from the source text to the target text. Therefore, this study aims to:

1. Explore the ability of AI to translate metaphors, cultural words, and technical terms or terminology found in Cli-Fi;
2. Evaluate the AI-translated messages in the Cli-Fi;
3. Analyze the contribution of AI-assisted translation to the dissemination of Cli-Fi and awareness of climate change issues.

Literature Review

a. Characteristics of the Climate Fiction

Climate fiction usually includes environmental crises, ethical dilemmas, and images of a future full of gloom, misery, oppression, and deteriorating social conditions (Manjhi, 2022). For example, Kim Stanley Robinson's novel *The Ministry for the Future* in 2020 imagines a global organization working to mitigate the effects of climate change. Another example is *Possible Solutions*, written by Hellen Phillips and published in 2017 as a collection of short stories dealing with climate change.

Climate fiction is a subgenre of speculative fiction that focuses on environmental change and its impacts. This speculative fiction allows explorations that depict future situations based on scientific scenarios or imagination about the future related to climate change (Nierste, 2024). In addition, in climate fiction or Cli-Fi, the author uses world-building to create a setting that convinces readers about future conditions affected by climate change. For example, how the world is changing because of global warming, environmental destruction, or natural disasters.

Holdsworth and Wilson (2024) explained that the use of speculative fiction and world building in Cli-Fi can serve as an early warning or solution to the environmental damage that occurs. Detailed world building will make readers feel and connect emotionally about climate change issues so that they can more easily understand the implications of climate change and environmental damage. An example of speculative fiction and world building is available in the novel *New York 2140* by Kim Stanley Robinson in 2017. This novel tells the story of New York City, which is flooded and the sea water rises to a height of 5 m.

With the development of this genre of fiction, translation is crucial to reach a wider audience. With a wider readership, it is hoped that more people will become aware of climate change and its impacts so that they can prevent or reduce its adverse effects.

However, translating a genre that combines fiction, scientific, and social elements is not easy. Several challenges are faced by translators in translating Cli-Fi.

This study has some similarities with previous studies, especially in terms of translation and issues related to climate conditions. Khafiza (2024) addressed the challenges in translating language terms and styles in science fiction, especially in the context of climate fiction. Meanwhile, Hanishaffira and Krisbiantoro (2023) analyzed the translation of texts on climate change from the NRDC (Natural Resources Defense Council) website, focusing on nonfiction texts, which differs from this study, which focuses on fictional texts. Querubin and Niederer's (2024) research were also relevant because it examines how AI is used to create and translate climate change-themed stories. Nonetheless, they emphasize the role of AI as a co-author, while the study focuses on the assessment of AI translation in translating climate fiction.

However, this study offers something that has not been discussed much in previous studies. Unlike Khafiza (2024), who focuses on science fiction translation in general, this study is more specific in assessing how AI translates Cli-Fi metaphors, cultures, and terminology. In addition, the use of the ATA parameters as the scoring standards provide a more objective approach to assessing the quality of AI translations. This aspect demonstrates the novelty of this research that has not been applied in previous research. Furthermore, this study not only discusses the quality of AI translations but also examines how AI-assisted translation results can help the public disseminate and understand climate change issues. Thus, this study complements previous studies by delving deeper into AI's role in the translation of climate fiction and its impact on environmental literacy.

b. Challenges in the Translation of Climate Fiction

In general, translators face two major challenges in translating Cli-Fi (Jinfang et al., 2025). First, cultural challenges. Many Cli-Fi novels refer to cultural and local references, such as specific climate events in a region. In addition, several local terms related to the environment, agricultural practices, and natural mythology are difficult to translate while maintaining the same meaning. Another problem of cultural barriers is related to the way of storytelling in a culture and ethical values related to nature. For example, when there are characters in the novel who relate to spiritual relationships with certain environments or communities.

The second challenge in Cli-Fi translation is linguistic issues, such as terminology and metaphor and symbolism use. Some terms related to climate change, such as carbon footprint, biodiversity, greenhouse gas, ecofriendly, and ocean acidification, may not have an Indonesian equivalent. Examples related to the use of metaphors and symbolism in Cli-Fi, including weather-based metaphors such as *storm brewing*, may have different meanings in other languages and cultures.

In addition to the two translation challenges mentioned above, there is another

important aspect in Cli-Fi translation, namely, the importance of maintaining tone and message ((Mathur, 2017). Cli-Fi usually has a strong emotional tone that signifies hope to helplessness. Humor or satire is also a challenge in terms of tone. For example, the novel *The Ministry for the Future* by Kim Stanley Robinson in 2020 uses satire. This novel tells the story of the humanitarian/environmental organization The Ministry for the Future, which acts as a legal service provider for future citizens so that their rights are the same as those of citizens today. Translations that maintain tone and message can help readers understand the dangers of environmental damage and climate change. If the translator fails to convey the tone and message, for example weakening the emotions conveyed by the author of the target text, then the intention of the author cannot be conveyed properly.

c. AI in the translation of literary works

The development of AI in translation is accelerating with the existence of some among the few such as ChatGPT 4o, DeepL, and Google Translate, which utilize natural language processing (NLP) technology. According to According to Amazon Web Series, NLP is "a machine learning technology that gives computers the ability to interpret, manipulate, and understand human language." This means that NLP technology can quickly and accurately analyze text and spoken data. Although AI can translate very quickly and is quite capable of maintaining the consistency of the translation of terms that often appear in Cli-Fi, it still has shortcomings in translating metaphors. Literary texts such as Cli-Fi have many metaphors and tones (Muscan, 2024). Therefore, translation by AI still requires a human translator.

In literary works, several things can be explored, one of which is metaphor. Metaphor is "a thing regarded as representative or symbolic of something else, especially something abstract" (Oxford, 2025). The American Heritage Dictionary adds that metaphor is "A figure of speech in which a word or phrase that ordinarily designates one thing is used to designate another, thus making an implicit comparison, as in "a sea of troubles" or "All the world's a stage" (Shakespeare)." Therefore, metaphors can be considered as figurative language as they use words or phrases in a figurative sense, not the actual meaning. This metaphor embellishes language, strengthens meaning, sparks emotions, and helps the imagination (Aprilia et al., 2022).

One example of a metaphor is as follows: *You are my sunshine*. In this example, a person is associated to the sun. The sun is bright and shines with its light on the earth. By comparing a person to sunlight, the person is bringing happiness to others. Another example is that *her home was a prison*. In this sentence, the house is associated to a prison. Therefore, this sentence means that he cannot leave his house and is trapped in it. Here, the word prison is a metaphor.

Literary works also contain many cultural words. According to Abdelaal (2019), the word culture or cultural reference word, is "Extralinguistic references to items that are

tied up with a country's culture, history, or geography, and tend therefore to pose serious translation challenges". In other words, culture is a word or phrase that has an attachment or peculiarity to a region, history, or geography. The word culture is interesting to discuss in the translation of literary works, especially by AI, in terms of whether or not AI succeeds in translating the source culture word into the target language.

The word culture is generally divided into three categories based on the geographical, ethnographic, and socio-political conditions of an area (Abdelaal, 2019). Some examples of such cultural words are savanna, tornado, plaza mayor, sequoia, gringo, machete, Thanksgiving, Romeo and Juliet, inches, pound, county, and sheriff. Translating these cultural words is challenging. The same is true of the word culture found in this text titled Woodland.

d. ATA Framework

In translation studies, the evaluation or analysis of translation errors is a field of study that is often used as an object of research. Many translation experts, such as House (2014), Maurits van der Veen (2023), Moorkens et al. (2024), and Mossop (2014), have developed theories about translation quality assessment. House (2014) stated that translation quality assessment is an effort to evaluate the quality of translations against the source text and review the functional equivalence between the source and target texts. Karoubi (2025) emphasized that a decision-making process that includes the collection, synthesis, and interpretation of translation data is involved in evaluating this translation. He added that in conducting a translation evaluation, one must really understand what is being evaluated, how, and why to evaluate. Therefore, a difference exists between the definition of translation quality assessment and translation error.

Translation quality assessment is a systematic process of evaluating translations to determine how well a translation meets established quality standards, such as accuracy, acceptableness, consistency, and suitability for the target reader. Meanwhile, according to Mossop (2014), as quoted by Wahyuningsih (2021), translation errors occur in understanding the meaning of the source language to the target language and inaccuracies in translation that follow the conventions of writing in the target language. Therefore, many translation practitioners develop models for analyzing these translation errors to evaluate translations. The ATA Framework is one of the commonly used parameters to measure translation errors.

The ATA Framework is a translation quality assessment framework issued and used by the ATA. In its assessment model, the ATA classifies translation errors into three main categories: meaning transfer, target language mechanics, and writing quality. Transfer has sub-categories, namely, addition, omission, faithfulness, ambiguity, literalness, cohesion, terminology, false friend, misunderstanding of source text, indecision, and unfinished. The penalty value for the transfer ranges from 1 to 16 points.

Then, for the second category, namely target language mechanics, there are seven subcategories, namely grammar, syntax, spelling/characters, diacritical marks/accent, and punctuation. The penalties for translation errors in categories range from 1 to 4. The third category, writing quality, which includes usage, text type, register, and style, has a penalty of 1–4 points.

Methodology

a. Research Methods

The research method used in this study is a qualitative descriptive research method. According to Creswell and Creswell (Creswell & Creswell, 2018), in qualitative research, researchers try to interpret the collected data. This approach is carried out by paying more attention to individual opinions, but it can also explain the complexity that exists.

b. Data sources and research instruments used

The data source is a short story text downloaded from https://www.guernicamag.com/woodland/ and consists of 3,148 words. This English-language Cli-Fi film is titled Woodland and was written by Lidya Millet.

This short story was chosen for the following reasons:

1. Relevance to the climate fiction genre (Cli-Fi): Woodland is explicitly part of climate fiction. This short story discusses environmental degradation, resource scarcity, and adaptation to ecological change. This makes this short story particularly relevant for analyzing linguistic aspects in the context of climate narratives.
2. Contains a wealth of language: Woodland uses specific terminology related to environmental issues and metaphors or symbolism to describe the impacts of climate change. With this wealth of language, sufficient material is available for linguistic analysis, especially translation challenges in climate-related concepts.
3. Accessibility and length of the text: This short story consists of 3,148 words; therefore, this text can be analyzed and rich in metaphors, cultural words, and terminology. The availability of this text on the Guernica Magazine website ensures easy access.
4. Author reputation: Lydia Millet is the author of twelve books of literary fiction, the most recent of which is a collection of stories titled *Fight No More*. She is best known for her contributions to the environmental literature. Her work often explores complex themes related to nature and its impact on human life and the environment. This adds credibility and depth to the selected text for analysis.

This short story depicts a post-destruction world where resources are scarce, civilizations have changed drastically, and wildlife has become a commodity for the elite. In conclusion, nature has lost its meaning as something accessible to everyone

and instead becomes an exclusive item, while the public struggles to survive in harsh conditions. The character manages to reach the place of his dreams, but in the end, he still faces the inevitable limitations, loss, and degradation of the environment. Data were selected based on cultural elements, narrative complexity, and metaphor.

c. Data Collection

1. The English source text in the form of a Cli-Fi short story titled *Woodland* is translated by AI, namely ChatGPT, into Indonesian by being given the prompt "You are a professional translator who often translates fictional texts. Translate this climate fiction text into Indonesian by paying attention to the target reader and text type. Remember that this is a fictional text with a climate fiction genre. The target reader is adjusted to the text's type and content. This text will be displayed on the website".
2. Sentences containing metaphors, culture, and terminology are selected and separated.
3. The selected sentences are translated by ChatGPT, one of the AIs.
4. Compare sentences that contain metaphors, cultures, and terminology in the source text with sentences that are translated by AI.

d. Data Analysis:

1. Categorize translation errors according to the error framework of the ATA by requesting an assessment from two raters.
2. Measure readers' understanding and engagement with climate fiction translated by AI through questionnaires.
3. Analyze the assessment given by two raters of AI translation.
4. Analyze the questionnaire filled out by the raters.
5. Interpret the data analyzed.

Results and Discussion

This section sheds light on how AI, specifically Chat GPT, translates metaphors, cultural words, and technical terms or terminology related to Cli-Fi and evaluates whether AI can convey the same message from the source text to the target text.

Results

The source text entitled Woodland contains 26 metaphors. This metaphor is translated by ChatGPT and rated based on two categories of errors according to the ATA Framework (American Association of Translators), namely, meaning transfer and target language mechanics or writing in the target text. At least 23 cultural words and 10 technical terms or climate-related terminology are found within the source text. The following are the assessment results by raters A and B for the overall data.

Table 1. Scoring by Raters A and B

Category	Number of segments	*Meaning Transfer*		*TL Mechanics*	
		Rater A	Rater B	Rater A	Rater B
Metaphor	26	34	45	0	5
Cultural Words	23	15	21	0	5
Climate Terms	10	24	12	0	1
Total	**59**	**73**	**78**	**0**	**11**

As shown in Table 2, for meaning transfer, the two raters assessed that there was a translation error in each metaphor, cultural word, and climate term in the source text. Although the assessments given by the two raters differ, the raters agree that ChatGPT is still imperfect and fails to translate metaphors, cultural words, and climate terms. Nonetheless, raters have different judgments about target language mechanics. Rater A does not award or subtract points for this category, whereas rater B does. The assessment given by rater B for this category is less than that for the meaning transfer category. This indicates that Chat GPT is quite neat in translating by following the conventions of writing in the target language.

In Figures 1 and 2, it appears that rater A does not assign points to the TLM translation error. However, rater B awards points to this category. An explanation of this will be explained in the Discussion section.

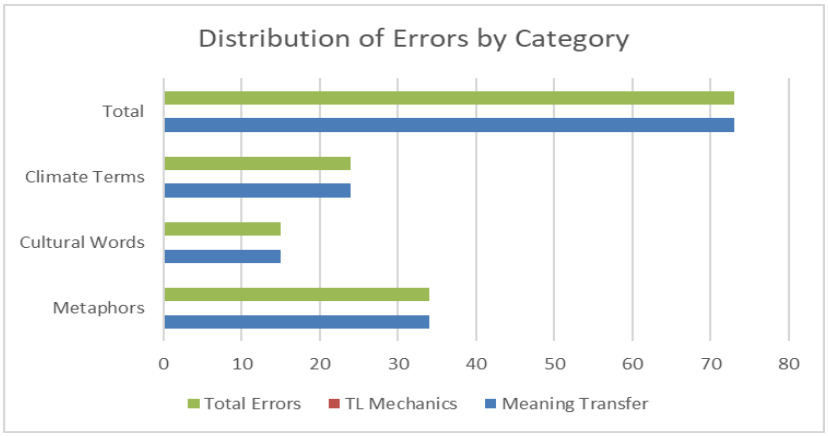

Figure 1. Distribution of Translation Errors according to Rater A

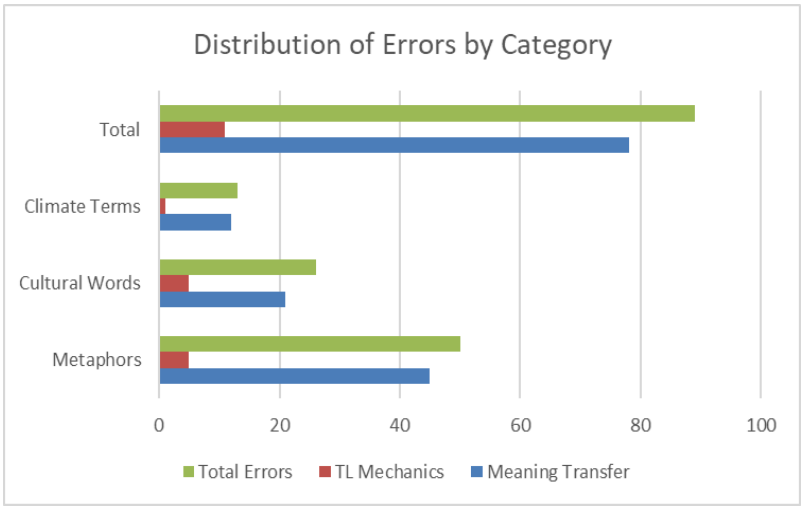

Figure 2. Distribution of Translation Errors according to Rater B

DISCUSSION

a. Metaphor translation errors

The results of the assessment of 26 items in the Climate Fiction and AI-Assisted Translation categories show that the process of transferring meaning, especially in translating metaphors related to climate issues, still has several problems. Based on the penalty scores given by both raters, many translations suffer from loss or distortion of meaning, especially when the metaphor is not contextually translated. Rater A gave a total penalty of 34 points, while Rater B gave a higher penalty of 45 points. This indicates that while AI, like Chat GPT, is capable of providing structurally correct translations, it still struggles to capture the depth of figurative or metaphorical meaning that is often inherent in climate fiction discourse.

Metaphors in climate fiction usually serve not only as a language style but also as a means to convey social criticism and the emotional impact of climate change. When AI-based machine translations literally translate these metaphors, their nuances and implicit messages are at risk of being lost or demeaning. Some items in the assessment received high penalty scores (e.g., items 5 and 12), indicating a significant failure to maintain the original metaphorical meaning contained in the source text. This is evidence that AI although sophisticated, still requires human intervention to deal with language's indirect or idiomatic elements.

In addition to meaning issues, errors in TL mechanics still appear, albeit in a more limited number. Rater B recorded a mechanical penalty of 5 points, whereas Rater A recorded no mechanical errors. This shows that in general, AI can generate neat sentence structures and be free of technical errors. However, formatting does not always guarantee the accuracy of meaning.

Thus, the use of AI, such as Chat GPT, in the translation of literary or climate fiction texts offers great opportunities in terms of efficiency but also presents serious

challenges in terms of figurative language interpretation. Advanced editing is still needed by translators, especially in dealing with complex metaphors that cannot be fully captured by data-driven systems. Therefore, the use of AI should be positioned as an aid, not a full substitute, for the practice of interpreting texts that are rich in meaning and full of interpretive layers.

b. **Translation errors in cultural words**

Based on the results of the assessment of 23 items containing the cultural words, the challenge in translating cultural elements is still quite high, especially when viewed from the penalty score in the aspect of meaning transfer. The total penalty of Rater A is 15, while Rater B gives a bigger penalty of 21. This penalty score shows that many translations have not succeeded in conveying cultural meanings appropriately, and some have distorted or lost the essential meaning of cultural terms in the source text.

High-penalty items, such as items 4 and 8 of Rater B, which each received a penalty of 2, indicate a serious error in understanding or conveying the cultural meaning of the term. Cultural words often contain local references, social values, and symbols that cannot be directly translated lexically. Therefore, the translation of cultural words requires contextual sensitivity and a deep cross-cultural understanding, which is still a major weakness in the translation results under review.

In terms of TL mechanics, Rater A did not give a penalty at all, whereas Rater B recorded a total penalty of 5. Technical or mechanical errors in the target language are not a major problem in the translation of cultural words. In contrast, errors occur more in the dimensions of meaning and interpretation than in the structure of the target language.

Overall, these results confirm that although the translations' grammatical structure tends to be good, errors in the aspect of meaning transfer—especially related to cultural terms—are still quite high. This shows the need for training or debriefing on cultural translation strategies, both for human translators and in the use of technology such as machine translation, so that the translation results are not only linguistically correct but also culturally accurate.

c. **Mistranslation of the Climate Terms**

The results of the assessment of 10 items containing the term climate showed a significant difference in the level of meaning transfer errors, with a total penalty score of 24 and 12 from Rater A and 12 from Rater B. Because this score is a penalty, the higher the score, the more fatal the translation error. This data indicates that a number of climate terms have not been accurately translated, and in some cases, serious errors of meaning have been made, such as in item 4, which was penalized 8 by Rater A.

The high penalty scores that Rater A gives to some items—for example, items 3, 4, and 9 (with scores of 4, 8, and 4 respectively)—indicate that errors occur not only at the level of word equivalent selection but also possibly in the context of the inappropriate

use of climate terms. This is important because terms in climate discourse are often technical and require a proper conceptual understanding, such as the difference between climate change, global warming, and carbon footprint, which, if not translated correctly, can lead to misconceptions.

In terms of TL mechanics, the two raters hardly found any significant errors. Rater A did not record a penalty at all, and Rater B only recorded one penalty on the mechanics aspect in item 10. This means that the translation results are relatively neat and free from technical errors such as punctuation or basic grammar in terms of the structure of the target language.

Overall, although the mechanical aspects of translating climate terms are quite good, the main challenge still lies in accurately understanding and conveying meaning. This shows the need for a deepening of climate terminology for translators, as well as special training in handling technical terms so that the translation results are not only readable but also scientifically and contextually on target.

The results of this study show strong similarities to the findings of Hanishaffira and Krisbiantoro (2023) in terms of the persistent challenges of meaning transfer. Just as the present study revealed that metaphorical and culturally loaded terms often suffer distortion or loss of nuance when translated literally by AI, Hanishaffira and Krisbiantoro (2023) also reported difficulties in choosing precise equivalences for climate change terminologies and idiomatic expressions in texts available on the National Research and Development Center website. Both studies underscore that grammatical or mechanical aspects are adequately well-handled—demonstrated by minimal penalty scores for TL mechanics—the main concern is the translator's capacity to maintain the deeper meaning, style, and cultural resonance of the source text. However, while the current research highlights the necessity of training on cultural and figurative language interpretation, Hanishaffira and Krisbiatoro (2023) concentrate more on particular challenges, such as a lack of understanding of climate idiom and technical vocabularies, which they addressed through supervisor consultation, dictionaries, and numerous revisions.

The challenges noted in this study are consistent with Khafiza's (2024) work on translating science fiction, particularly with regard to complex metaphors and specialized vocabularies. The high penalty scores for climate-related metaphors and terms in this study show how frequently AI-generated translations fail to express implied meanings. This supports Khafiza's (2024) finding that neologisms and unfamiliar terms in science fiction necessitate innovative approaches such as glossaries, footnotes, and word creation. Both studies emphasize that translation in this situation must involve complex contextual and linguistic solutions rather than relying on lexical equivalences to maintain the creative and conceptual layers of the original text. Khafiza's emphasis on collaboration with authors, editors, and experts further supports the findings of the current study, which indicate that AI outputs need human intervention. These findings provide evidence that translating creative and specialized genres effectively involves not

only language competency but also interpretive ability and teamwork.

Querubin and Niederer's (2024) Climate Future project offers a different perspective on the importance of AI's meaning-making mechanism, which differs from the findings of this study. Querubin and Niederer highlighted the significance of accepting the peculiarities of machine-generated outputs as creative measures to expand climate imaginaries. However, the current study shows the limitations of AI in accurately transferring cultural, metaphorical, and technical meanings. In addition, Querubin and Niederer's experiments with machine-assisted storytelling show that AI can make people think and use their imagination instead of merely copying how humans speak. In contrast, the current study treats errors in AI-generated translations as penalties, highlighting the importance of accuracy and fidelity in translation. However, both recognize the need for human agency, whether for curating AI-assisted artworks or for editing or improving AI translations to attain accuracy.

Another significant difference is how each study perceives cultural perspectives. This study underscores that translating culturally specific terminologies can result in meaning loss or distortion. In a similar vein, Querubin and Niederer recognized the constraints of AI that is predominantly trained on Western fiction and supported the inclusion of various imaginaries, such as solarium and ideological futurism, to enrich future narratives. While this study views culture as a challenge in translation, Querubin & Niederer regard culture as a source for creative expansion that encourages new perspective, thereby enriching climate narratives.

Conclusion

This part is used to conclude the paper. Describe concisely the answers to the research problems or the findings related to the research objectives. The author might also suggest future researcher(s) to develop the article. This research reveals that AI has great potential in analyzing climate-related issues contained in literary works. This AI can transfer the problems encountered in the translation of climate fiction. This proves the potential of AI as an effective tool in the study of climate and the translation of literary works full of implicit meanings. Even so, AI still has a weakness, namely, inaccuracies in understanding metaphors, cultural words, and climate terms contained in Woodland's novel.

The main contribution of this research is the incorporation of a multidisciplinary scientific approach that combines the sophistication of AI technology in translation with a literature review that contains many climate-related vocabulary. This research provides the view that AI can assist translators in translating and analyzing. The study also opens up opportunities for cross-disciplinary collaboration between linguists, translators, literary practitioners, and AI observers to create more in-depth solutions to

understand climate change through a multidisciplinary approach.

However, this study still has shortcomings. AI is still unable to shift metaphorical meanings, cultural words, and terms that contain climate. AI translation still feels rigid in terms of language and meaning. Therefore, this study confirms that humans are still superior to AI even though AI is increasingly advanced and sophisticated because AI translations still have to be edited and processed again by humans.

References

Abdelaal, N. M. (2019). Subtitling of culture-bound terms: strategies and quality assessment. Heliyon, 5(4), e01411. https://doi.org/10.1016/j.heliyon.2019.e01411

Al-Kaabi, M. H., Alqbailat, N. M., Badah, A., Ismail, I. A., and Hicham, K. B. (2024). Examining the Cultural Connotations in Human and Machine Translations: A Corpus Study of Naguib Mahfouz's Zuqāq al-Midaqq Journal of Language Teaching and Research, 15(3), 707-718. https://doi.org/10.17507/jltr.1503.03

Aprilia, Y. I., Prasetya, G. W., & Ginanjar, B. (2022). Gaya Bahasa Metafora dalam Pemberitaan Pandemi COVID-19. Literasi: Jurnal Ilmiah Pendidikan Bahasa, Sastra Indonesia Dan Daerah, 12(2), 108-115. https://journal.unpas.ac.id/index.php/literasi/article/download/4923/2434/24712

Blythe, M. (2023). Artificial Design Fiction: Using Artificial Intelligence as a Material for Pastiche Scenarios ACM International Conference Proceeding Series, February, 195-206. https://doi.org/10.1145/3616961.3616987

Creswell, J. W., & Creswell, J. D. (2018). Research design: Qualitative, quantitative, and mixed method approach (5th ed). SAGE Publications, Inc.

Dědinová, T. (2023). Klimatická fikce jako otázka i odpověď Analýza současné cli-fi. Svět Literatury, XXXIII(67), 104-120. https://doi.org/10.14712/23366729.2023.1.8

Elkins, K. (2024). In search of a translator: Using AI to evaluate what is lost in translation. Frontiers in Computer Science, 6 (2019). https://doi.org/10.3389/fcomp.2024.1444021

Gao, R., Lin, Y., Zhao, N., & Cai, Z. G. (2024). Machine translation of Chinese classical poetry: a comparison of ChatGPT, Google Translate, and DeepL Translator Humanities and Social Sciences Communications, 11(1), 1-10. DOI: 10.1057/s41599-024-03363-0

Hanishaffira, R. (2023). Translating Climate Change Texts from the Natural Resources Defense Council (Nrdc) website from English to Indonesian Jurnal Vokasia, 3(1), 20-39. DOI: 10.20884/1.vokasia.2023.3.1.9049

House, J. (2014). Translation Quality Assessment In Translation Quality Assessment. https://doi.org/10.4324/9781315752839

Jinfang, Y., Kasuma, S. A., & Moindjie, M. A. (2025). Translator's style in fiction translation: A ten-year systematic literature Journal of Language Teaching and Research, 16(1), 125-133. https://doi.org/10.17507/jltr.1601.14https://doi.org/10.17507/jltr.1601.14

Karoubi, B. (2025). Translation Censorship: Iran's Situation Babel, 71(2), 213-238.

Khafiza, M. (2024). Vocabulary and Terminology Issues in Sci-Fi Translation. 3(3), 48-50.

Manjhi, A. (2022). Advancement of Environmental Concerns through Cli-Fi: James Bradley's Clade as a Prototype IOP Conference Series: Earth and Environmental Science, 1032(1). doi: 10.1088/1755-1315/1032/1/012037

Mathur, N. (2017). Review of environment and development: The task of the climate translator. Economic and Political Weekly EPW AUGUST, 5 (31), 31.

Van der Veen, M. A. (2023). Word-level machine translation for bag-of-words text analysis: Cheap, fast, and surprisingly good. New York: Oxford University Press. Computational Communication Research, 5(2). https://doi.org/10.5117/CCR2023.2.8.VAND

Mohamed, Y. A., Khanan, A., Bashir, M., Mohamed, A. H. H. M., Adiel, M. A., & Elsadig, M. A. (2024). The Impact of Artificial Intelligence on Language Translation: A Review. IEEE Access, 12, 25553-25579. https://doi.org/10.1109/ACCESS.2024.3366802

Moorkens, J., Way, A. and Lankford, S. (2024). Automating Translation. Automating Translation Routledge. https://doi.org/10.4324/9781003381280

Mossop, B. (2014). Revising and Editing for the Translators In Revising and Editing for Translators. https://doi.org/10.4324/9781315767130

Muscan, M. (2024). Translations in the post-digital age and the use of AI Analele Universitatii Ovidius Constanta, 35(2), 253-265.

Obeidat, M. M., & Jaradat, M. A. (2024). Artificial intelligence accuracy in translating resistance literature from Arabic into English: Google Translate and ChatGPT as models. Research Journal in Advanced Humanities, 5(2), 45-60. https://doi.org/10.58256/9yz4dx79

Querubín, N. S., & Niederer, S. (2024). Climate futures: Machine learning from cli-fi. Convergence, 30(1), 285-303. https://doi.org/10.1177/13548565221135715

Sri Wahyuningsih, N. (2021). Analisis Kesalahan Terjemahan Teks Panduan Dari Bahasa Indonesia Ke Bahasa Inggris. Lingua: Jurnal Ilmiah, 17(1), 62-80. https://www.kemkes.go.id/

Taivalkoski-Shilov, K. (2019). Ethical issues regarding machine-assisted literary text translation Perspectives: Studies in Translation Theory and Practice, 27(5), 689-703. https://doi.org/10.1080/0907676X.2018.1520907

Tomalin, M., Byrne, B., Concannon, S., Saunders, D., & Ullmann, S. (2021). Practical ethics of bias reduction in machine translation: Why is domain adaptation better than data debiasing? Ethics and Information Technology, 23(3), 419-433. DOI: 10.1007/s10676-021-09583-1