

# ASSESSING LARGE LANGUAGE MODELS AS CLIMATE TOOLS

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## Objective

Understanding the capabilities of large language models as platforms for disseminating climate knowledge across contextually different languages (English, German, Hindi, Spanish) in climate discourse.

### Context

- Extensive use of LLM in recent years
- Two perspectives in literature on their role in climate change
  - Pro: synthesis, democratization, simplification
  - Con: physical impacts (energy, water), societal impacts (biases, misinformation)
- Rapidly evolving → Research challenging → Governance complex



### Introduction

**Background:** Large Language Models (LLMs) are primarily trained in English but are often not used in this language. We use LLM to identify climate discourse across various contexts and evaluate LLM language capabilities.

#### Research Questions:

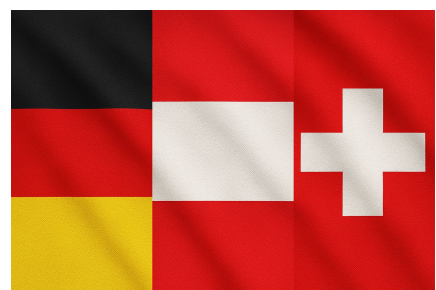
1. How is climate discourse framed differently across different languages?
2. How well do LLMs perform across these languages?

### Methods

- Development of question framework on problem definition, impact, and solutions related to climate change
- Posed to Chat GPT 4.0 in English, German, Hindi, and Spanish
- Qualitative thematic analysis of responses

	English
Problem definition	What is climate change?
	Why is climate change an issue?
	Who is most affected by climate change?
	Where is climate change hitting the hardest?
Problem cause	Who is most responsible for causing climate change?
	Which country/industry/companies are most responsible for causing climate change?
Problem solution	What is the solution to climate change?
	Which actions should individuals take to solve climate change?
	Which actions should countries/industries/companies take to solve climate change?
	Which role does technology play in solving climate change?

### Results



- High overlap with English responses and of the **same quality**
- German responses provide **fewer quantitative details when blaming countries/companies.**
- German responses are more concerned with **economic losses.**
- German responses are **less region-specific** and focused on the **forestry sector.**
- German responses support **technological interventions.**



- Responses vary significantly, **reflecting differences in priorities and regional** climate concerns.
- Hindi responses provide fewer quantitative details and **avoid explicitly blaming countries.**
- Hindi responses are more concerned about **urban pollution,** and its repercussions.
- Hindi responses focus on **raising public awareness around sustainability.**
- German responses **do not blame oil and gas so much**



- **Generally aligned** with English responses, but lack the **same level of precision and clarity.**
- Spanish responses tend to be **less conceptually rigorous.**
- Spanish responses tend to place greater emphasis on **individual responsibility**
- Spanish responses emphasize **raising awareness and fostering personal commitment**

### Discussion

#### Engaged Debates:



→ Techno-optimism versus pessimism:  
German responses possibly overlooks negative social and ecological consequences of using technology to solve climate change.



→ Environmental Justice:  
Hindi responses point to a tension between local realities and global political sensitivities in climate discussions.



→ Individualism versus Structuralism:  
Spanish responses possibly reduce the emphasis on broader institutional or policy-level solutions.

## Conclusion

The discourse on climate change varies by language, complicating international collaboration. While large language models (LLMs) can serve as valuable tools in revealing diverse narratives, they simultaneously reinforce regional biases as knowledge dissemination platforms. Ongoing research and implementation of governance of LLMs is needed in the climate context.