# What would LLMs do on climate change policy making?

## Comparative analysis between generic and African-centric LLMs in South African Parliament.

## 1 INTRODUCTION

**BACKGROUND**

This project investigates climate-related discourse in South African parliamentary proceedings using NLP. Exploratory Data Analysis revealed a sharp increase in climate-related discussions from 2014 – 2023, with a major spike during the April 2022 KwaZulu-Natal floods.

### RESEARCH GAP

**Why This Matters**

Keyword-based approaches produce high false positives by capturing metaphorical or irrelevant uses of climate terms. Limited research has compared classical NLP, general-purpose LLMs, and African-centric transformers on SA parliamentary discourse.

### RESEARCH QUESTIONS

- Can NLP accurately detect climate discourse in SA Hansard?
- Do African-centric LLMs outperform generic models on this task?
- Does the April 2022 KZN flood event produce a measurable parliamentary discourse spike?

## 2 DATASET SUMMARY

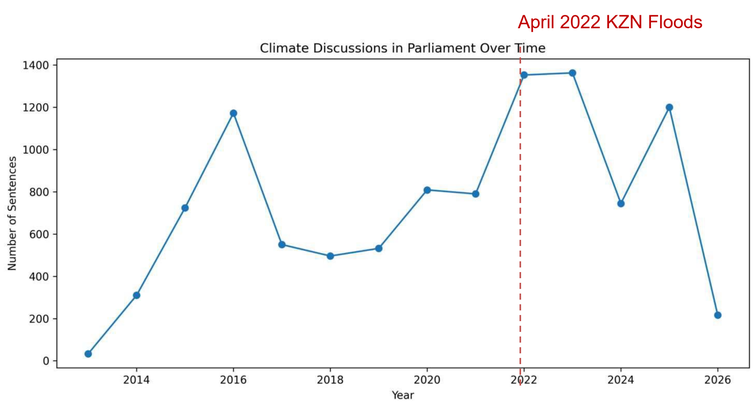
**1132** Parliamentary Proceedings

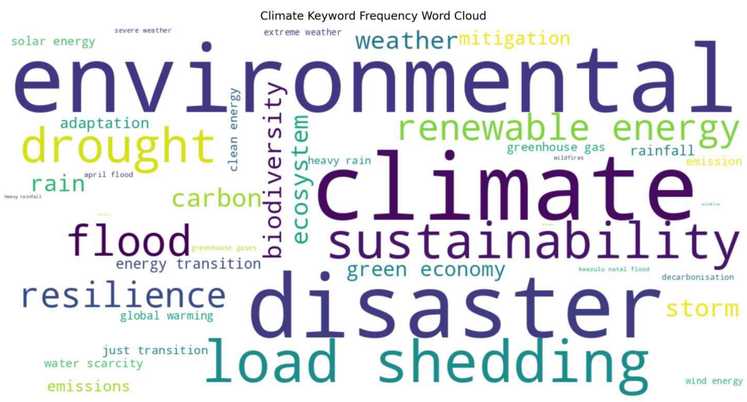
**26** Climate Event Docs

**10** Amended Policy Documents

| Name of the files | No. of files | formats | Start Date | End Date |
|---|---|---|---|---|
| Parliamentary Proceedings | 1132 | PDF & Word | 1999 | Present |
| Climate Events | 26 | PDF | 2016 | Present |
| Policy Documents | 10 | PDF | 2022 | Present |

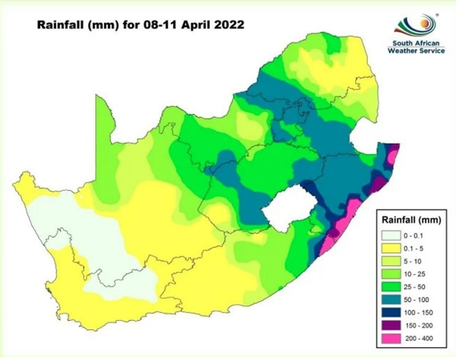
## 3 EXPLORATORY ANALYSIS




**APRIL 2022** **KWAZULU-NATAL FLOODS –KEY EVENT ANCHOR**

The April 2022 KZN floods serve as the event-based anchor for this study, triggering a measurable parliamentary discourse spike. Rainfall of 200–400mm recorded across coastal KZN in the month of April 2022.

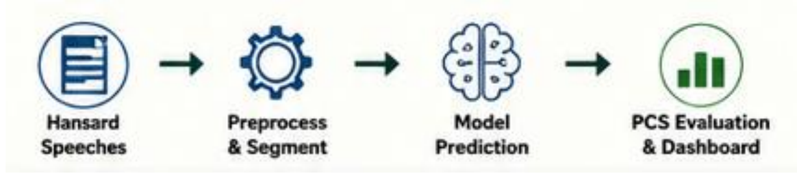



## 4 METHODS

**TF-IDF + Logistic Regression**
· Baseline · Interpretable · Classical NLP

**BART Zero-Shot**
· Generic LLM · No fine-tuning required

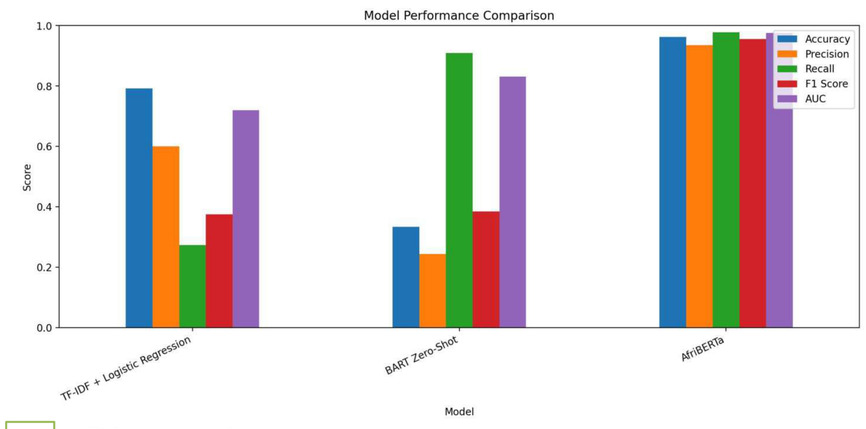
**AfriBERTa**
· African-centric transformer · Fine-tuned




## 5 RESULTS

AfriBERTa Dominates:

| Model | Accuracy | Precision | Recall |
|---|---|---|---|
| TF-IDF + Logistic Regression | 0.7917 | 0.6 | 0.2727 |
| BART Zero-Shot | 0.3333 | 0.2439 | 0.9091 |
| AfriBERTa | 0.9626 | 0.9348 | 0.9773 |




## 6 Discussions

AfriBERTa's pre-training on African languages gives it a meaningful edge over generic models on SA parliamentary text.

Parliamentary attention is reactive: spikes follow extreme weather events rather than proactive agenda-setting.

NLP dashboards can serve as real-time monitors of legislative climate responsiveness for parliamentary analysts and researchers

## Results Analysis

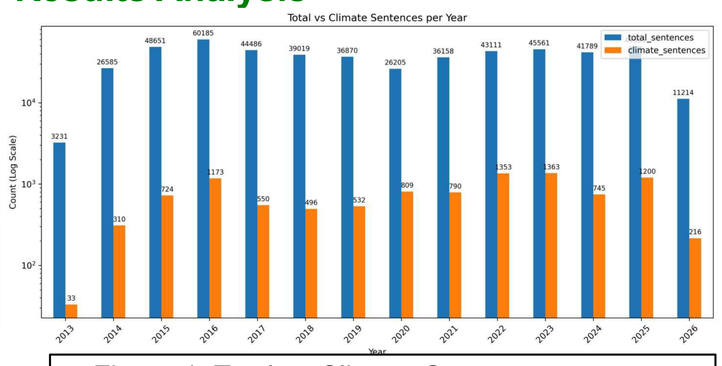



Figure 1: Total vs Climate Sentences per year


Figure 2: Climate Topic Trends Over Time

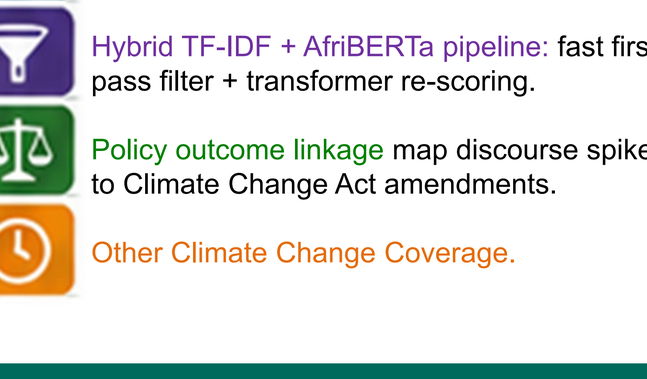



Figure 3: Flood-Related Parliament Discourse Around the April 2022 Flood Event

## 7 PCS FRAMEWORK VALIDATION

**P** **Predictability**
Identical metrics (Acc, P, R, F1, AUC) applied to all models. Plain-language dashboard interpretations.

**C** **Computability**
All predictions pre-computed as CSVs. Graceful degradation fallback if AfriBERTa cannot load

**S** **Stability**
K-fold (K=5) CV — narrow F1 spread. All three models identify April 2022 as discourse peak.

## 8 Next Steps:

Multi-class model: distinguish flood, drought, disaster & recovery sub-topics

Hybrid TF-IDF + AfriBERTa pipeline: fast first-pass filter + transformer re-scoring.

Policy outcome linkage map discourse spikes to Climate Change Act amendments.

Other Climate Change Coverage.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