IMPACT OF CLIMATE CHANGE ON PAVEMENT PERFORMANCE IN NEWFOUNDLAND, CANADA

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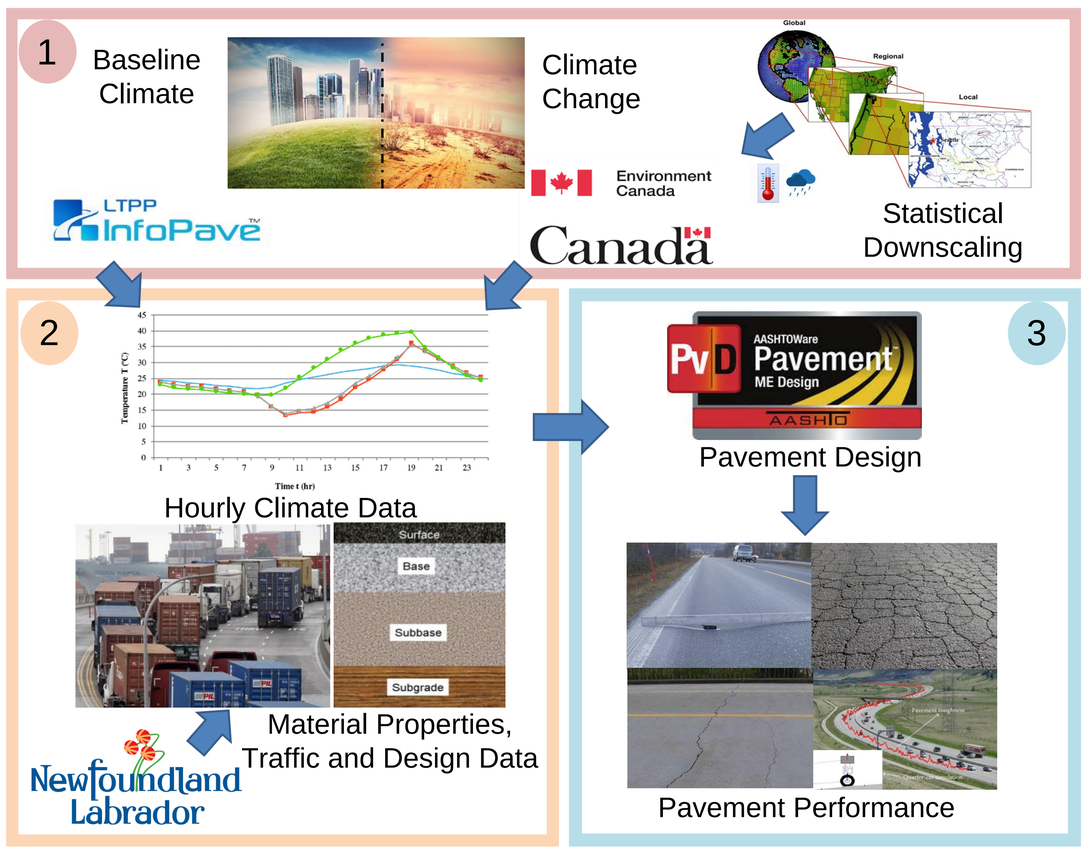
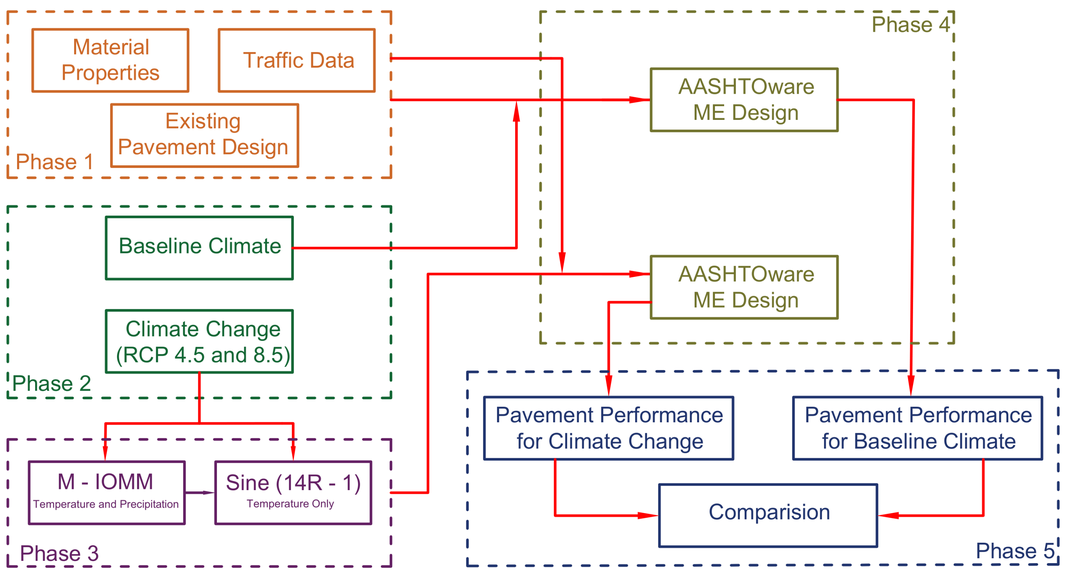
INTRODUCTION



OBJECTIVES

- To evaluate the impact of climate change on asphalt pavement performance in Newfoundland
- To adopt a new method (Sine (14R-1)) for more accurate hourly temperature estimation
- To investigate the effect of freezing index on IRI model

METHODOLOGY



RESULTS AND DISCUSSION

TABLE 1: Climate change models used in the analysis

Nomenclature	RCPs	Data Source	Hourly Data Estimation Model	
			Temperature	Precipitation
PCM-01	4.5	CCCma	M-IOMM	M-IOMM
PCM-02			Sine (14R-1)	
PCM-03	8.5		M-IOMM	
PCM-04			Sine (14R-1)	

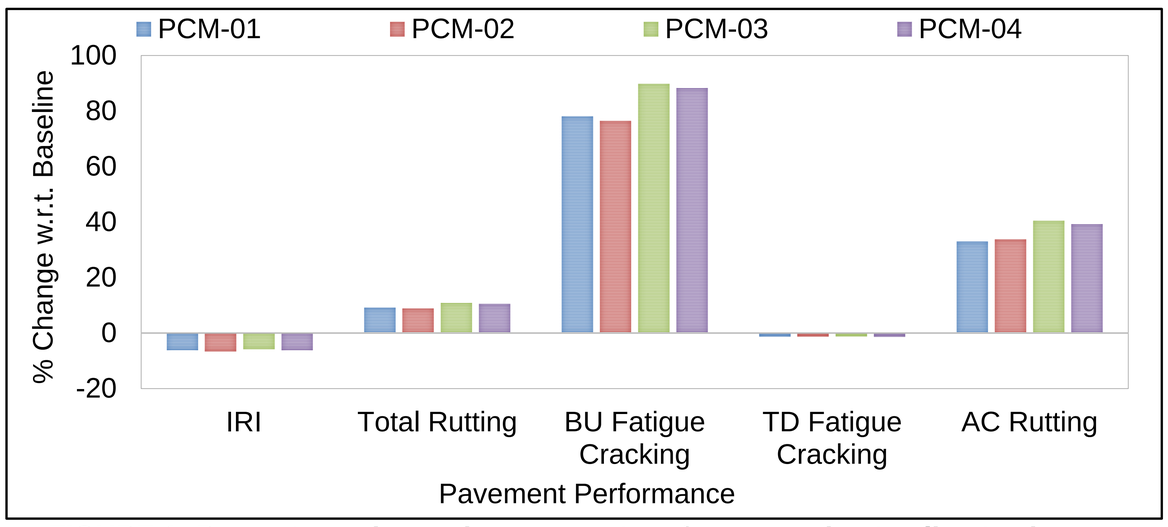


FIGURE 1: Percentage change in pavement performance due to climate change

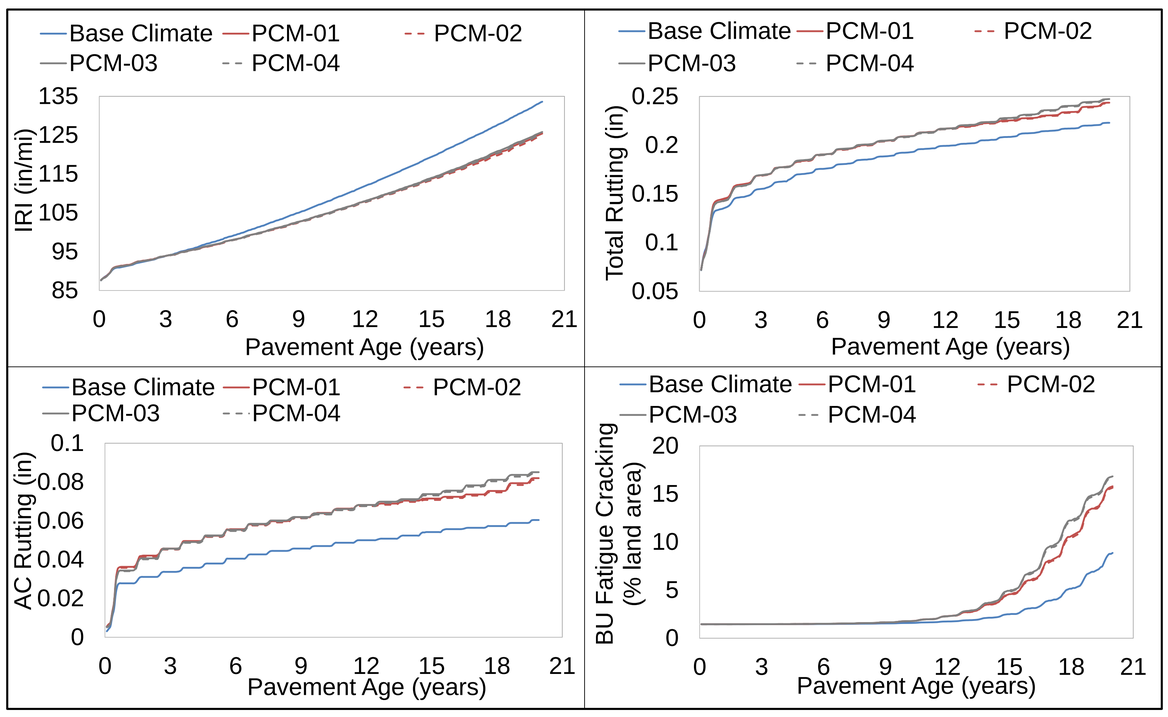


FIGURE 2: Predicted distresses over the design life of pavement

Current Issue:

- $IRI = IRI_0 + 0.0150\ (SF) + 0.400\ (FC_{Total}) + 0.0080\ (TC) + 40.0\ (RD)$
- $SF = Age\ [\ 0.02003\ (PI + 1) + 0.007947\ (Precip + 1) + 0.000636\ (FI + 1)]$

CONCLUSION

- Pavement distresses including total permanent deformation, BU fatigue cracking, AC layer rutting are significantly affected by climate change
- AC layer rutting is increased by 33–40%, which might be because of the constant increase in temperature throughout the design period
- The proposed method ‘Sine (14R-1)’ exhibits slightly lower distress compared to M-IOMM method
- This research suggests that climate change would lead to premature failure of asphalt pavement in Newfoundland, Canada
- It is found that current IRI model is not capable of capturing climate change impacts

ACKNOWLEDGEMENTS