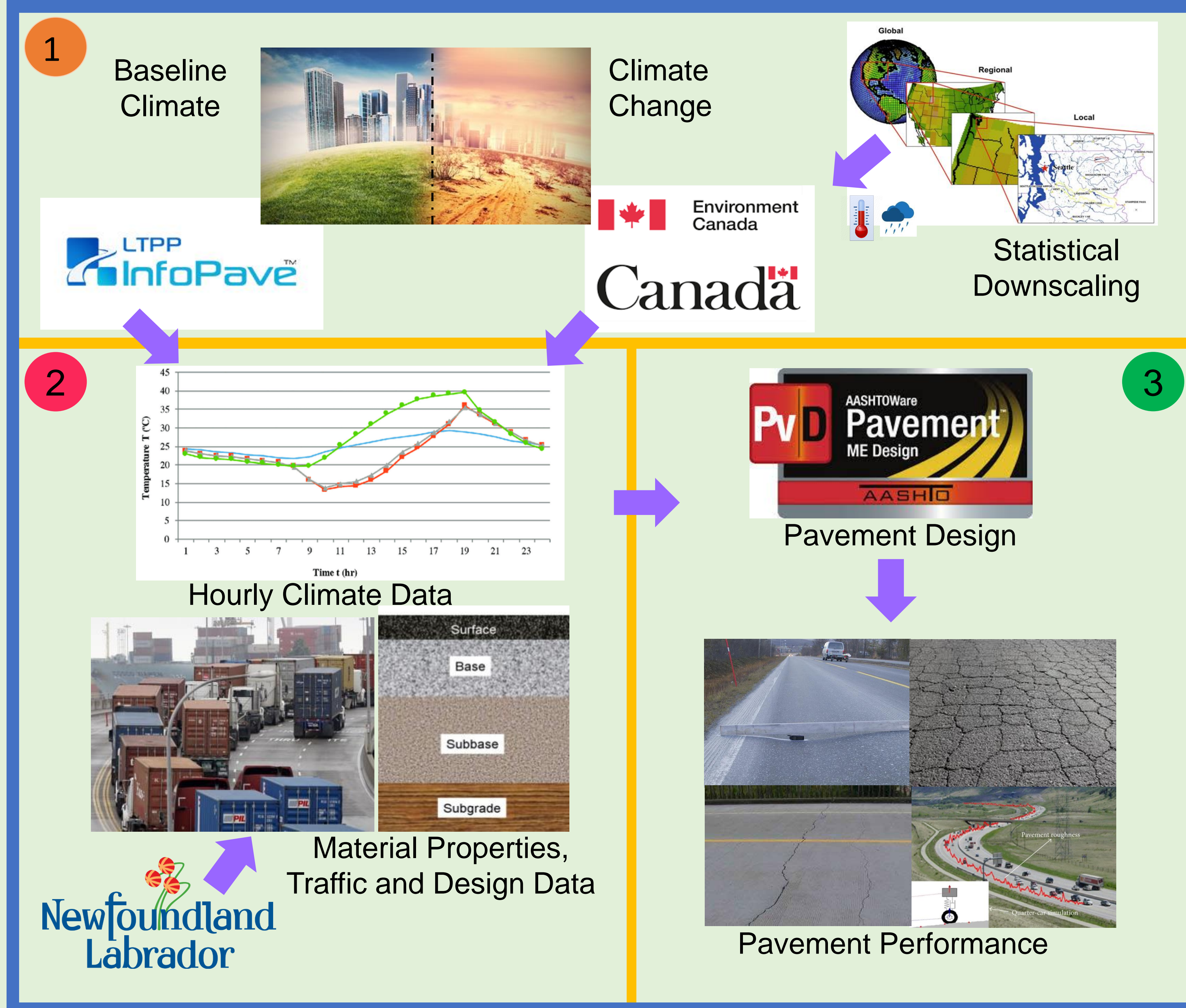


Climate Change Impact on Pavement Performance in Newfoundland, Canada

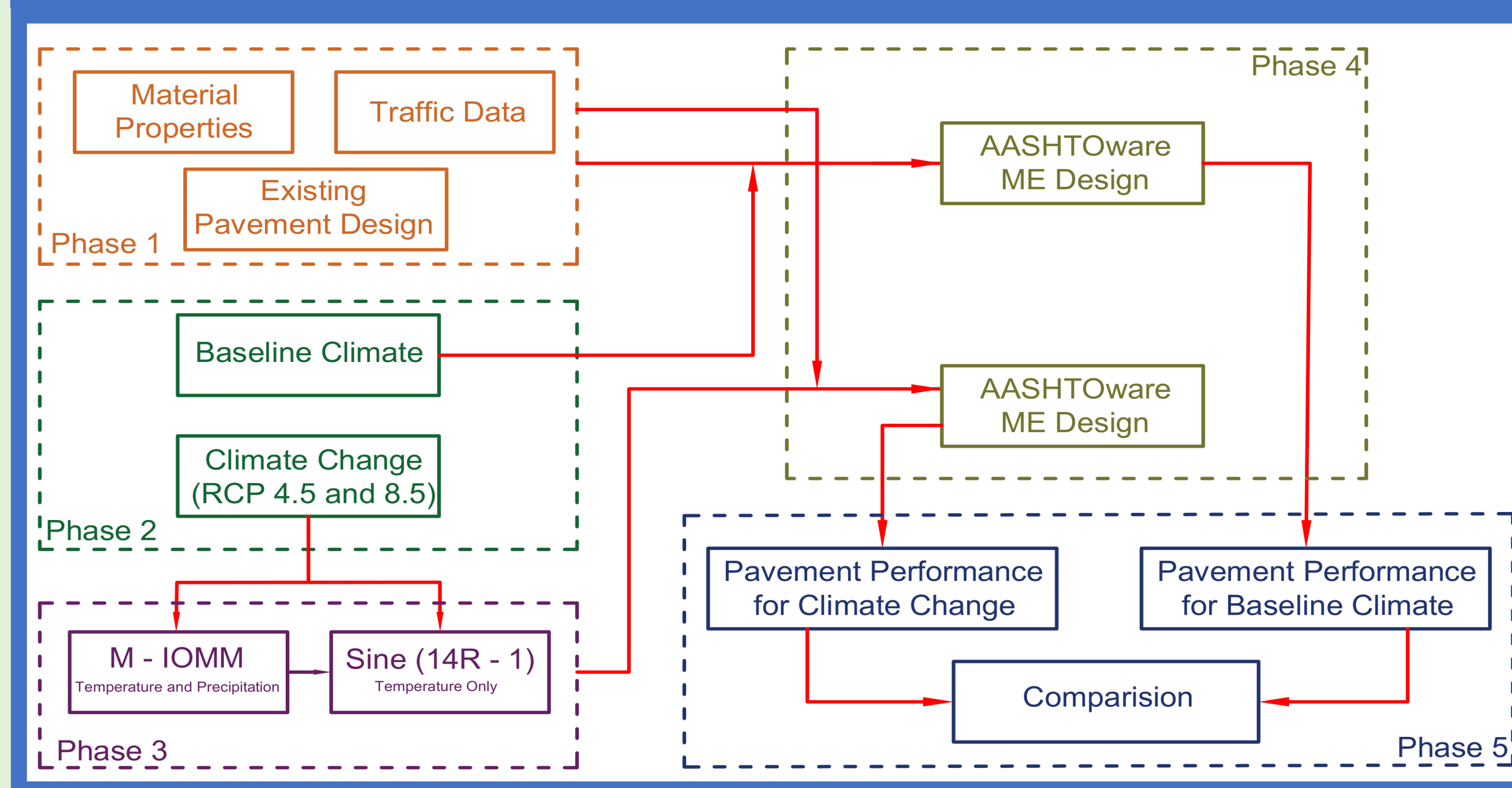
Masud Rana, Surya Teja Swarna, and Kamal Hossain

Advanced Road & Transportation Engineering Lab (ARTEL), Memorial University Of Newfoundland, Canada

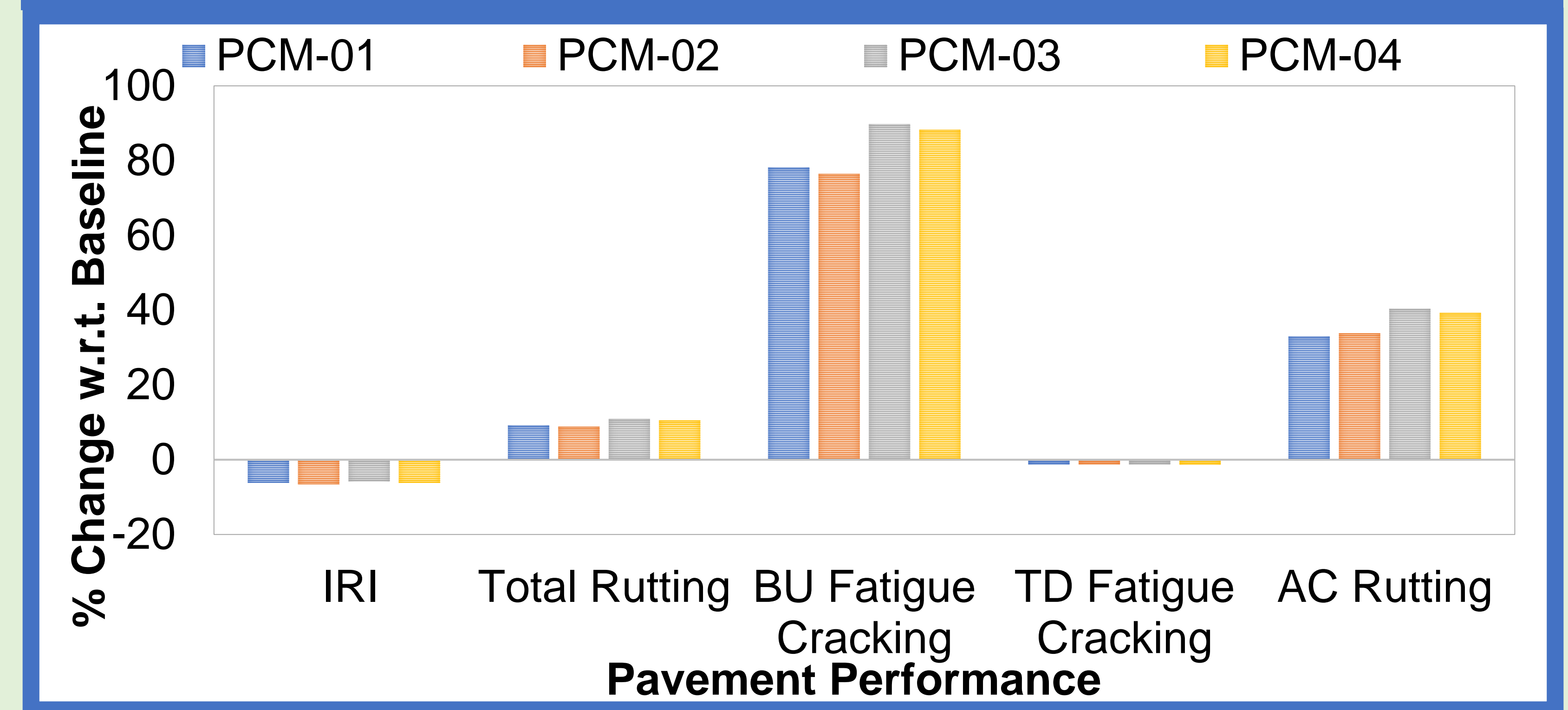
Graphical Abstract



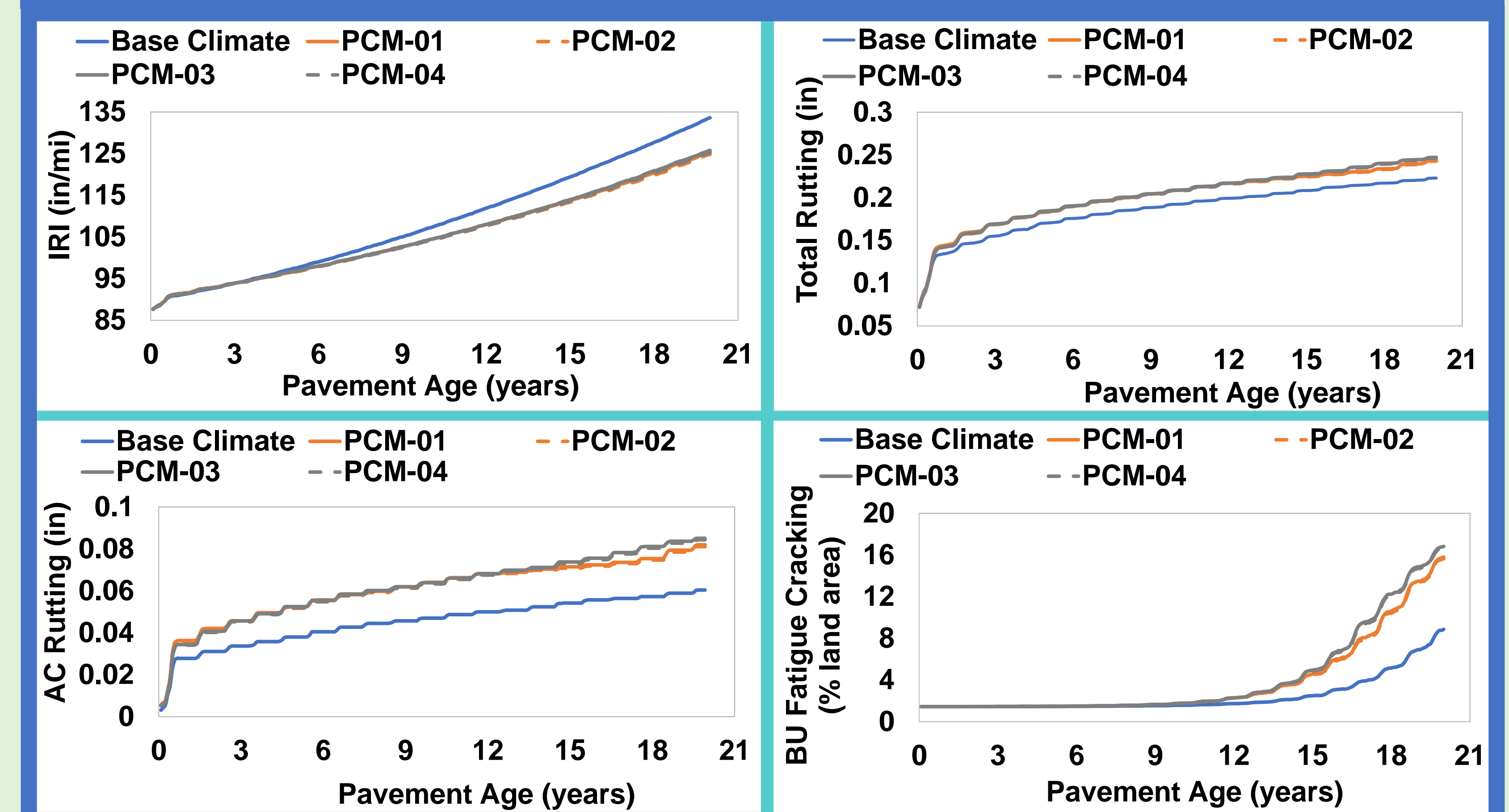
Framework of Research



Variations in Pavement Performance



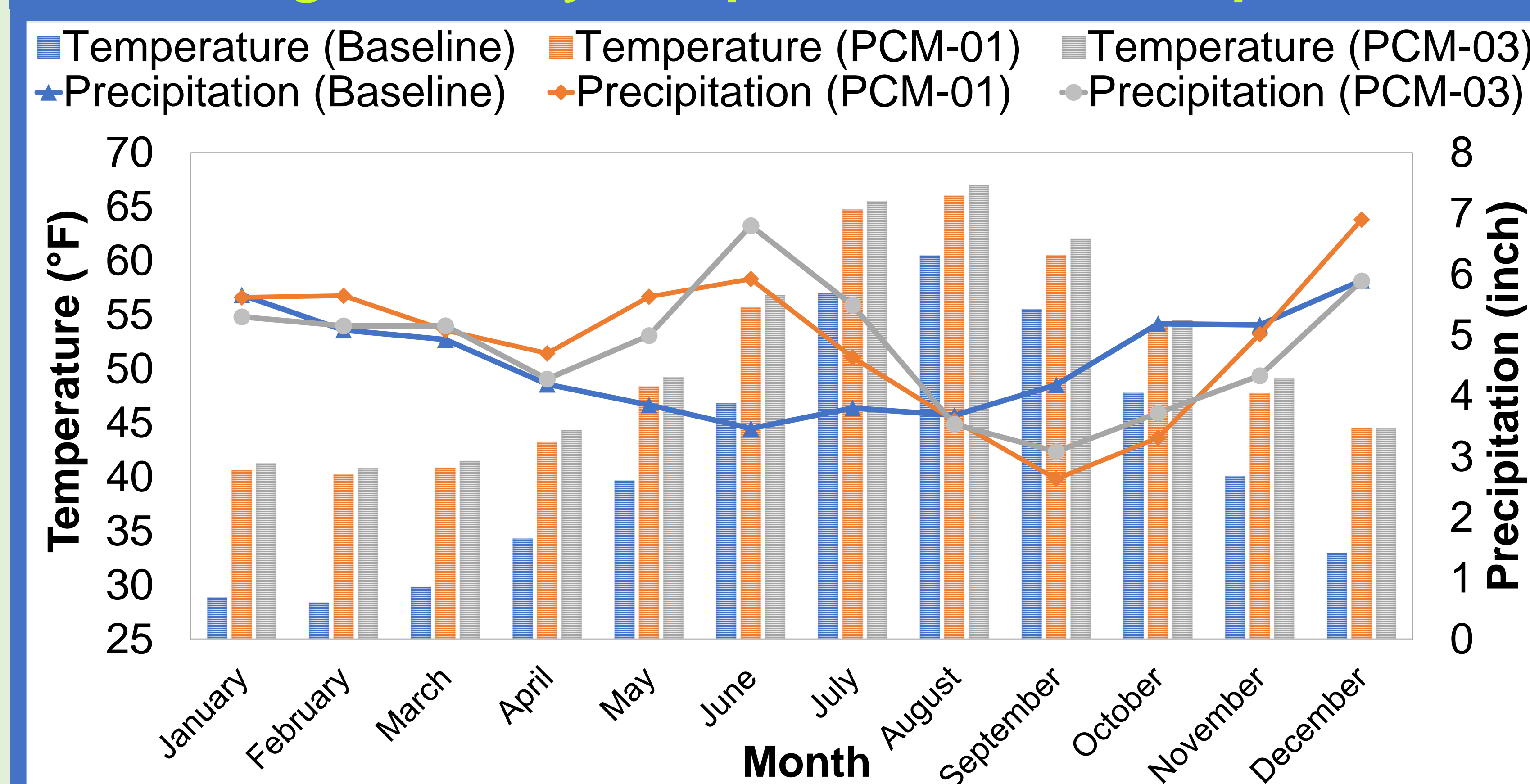
Predicted Pavement Distresses



Climate Change Models

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	M-IOMM			
PCM-04	Sine (14R-1)			

Average Monthly Temperature and Precipitation



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

Sources of Collected Data

Data	Sources	
Material Properties	Department of Transportation and Works, Newfoundland, Canada (NLDOT)	
Existing Pavement Design	NLDOT and LTPP database	
Traffic	NLDOT and LTPP database	
Climate	Baseline	AASHTOware database
	Projected	Environment Canada website

Acknowledgements



Conclusions

- 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