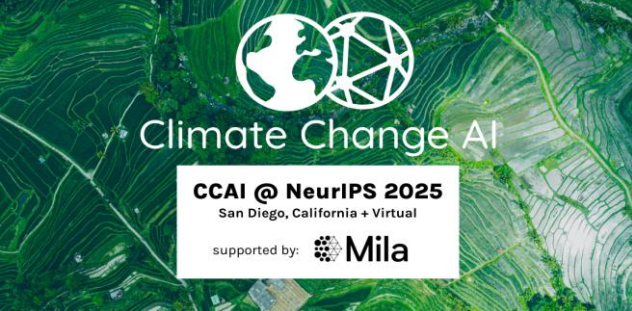




PiggyCast: Improving weather prediction accuracy through a stacking-based ensemble AI approach.

AUTHORS:

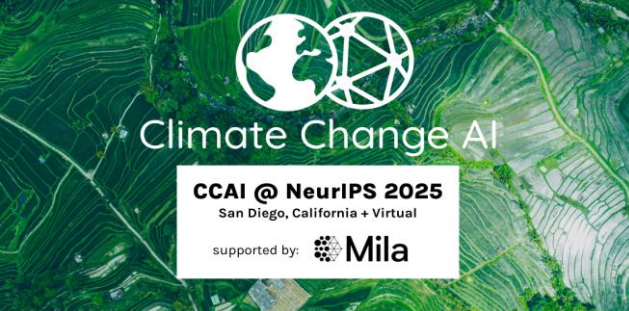
Josiah K. Kimani – African Institute for Mathematical Sciences (AIMS)-South Africa

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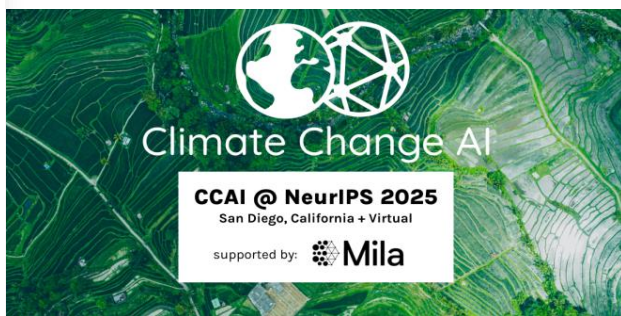


Flow

What
Why
How
Then
Next

WHAT?

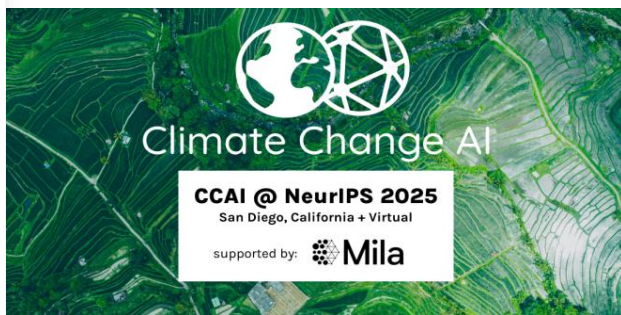
Develop and assess an **ensemble machine learning model** through **stacking** forecasts from **numerical, AI-based** and **hybrid weather** prediction models for **enhanced predictive performance**.



WHY?

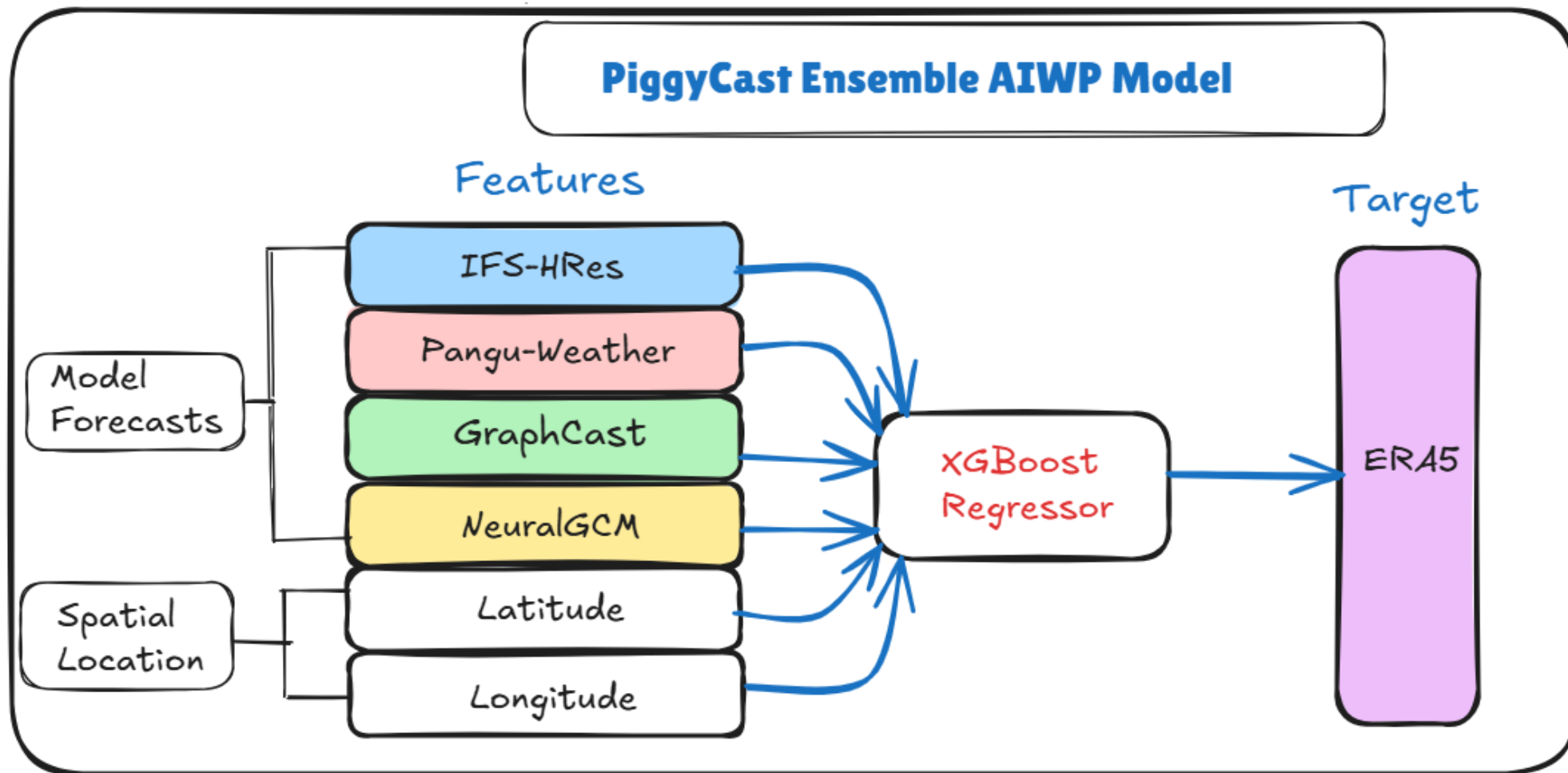
This isn't just a fun experiment.

Better weather forecasts **save lives**. **Accurate** predictions, even by a few hours, can give communities the critical **time** they need to **prepare** for **floods, droughts**, and other extreme events.



5

How?



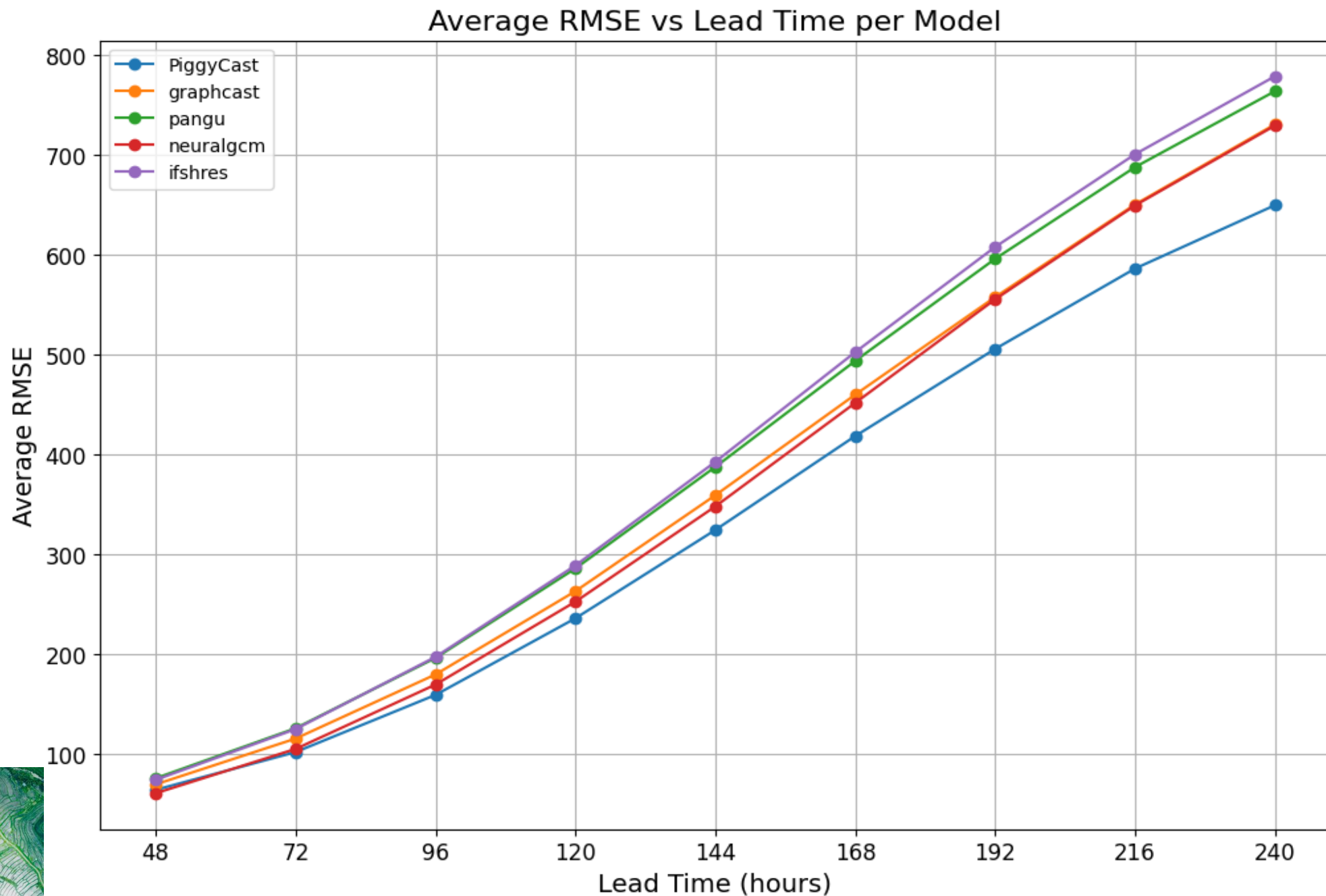
$$\mathbf{x}_{\text{input}} = \left[f_{t+\tau}^{(\text{GraphCast})}(\mathbf{x}), f_{t+\tau}^{(\text{Pangu})}(\mathbf{x}), f_{t+\tau}^{(\text{NeuralGCM})}(\mathbf{x}), f_{t+\tau}^{(\text{IFS HRES})}(\mathbf{x}), \text{lon}(\mathbf{x}), \text{lat}(\mathbf{x}) \right],$$

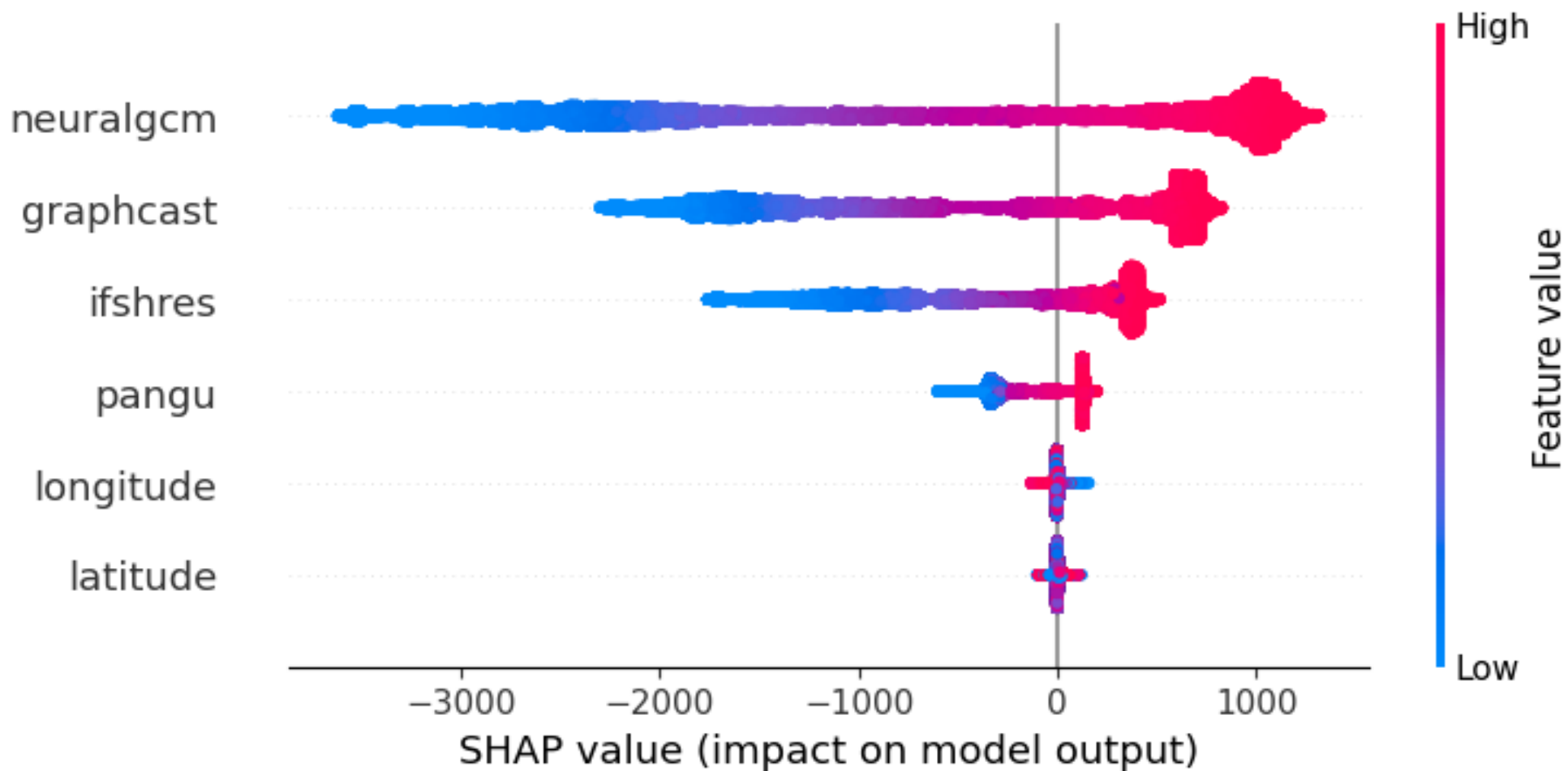
with the target variable:

$$y = f_{t+\tau}^{(\text{ERA5})}(\mathbf{x}).$$

6

Then





A beeswarm plot of SHAPley values of PiggyCast's features at 72-hour lead time.

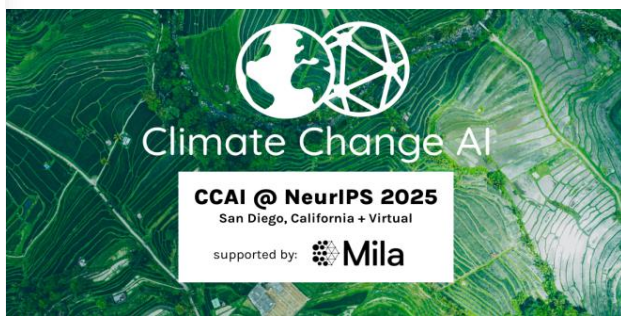
Next?

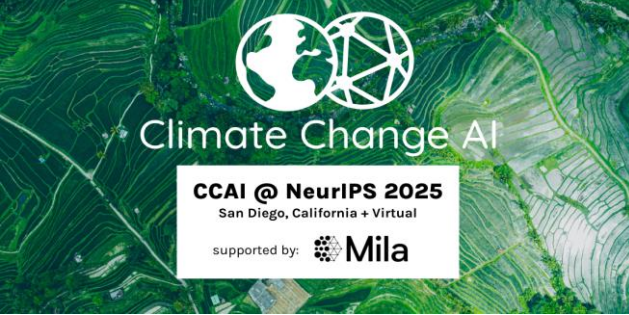
1. Probabilistic forecasts

Extension of the framework to address **uncertainty quantification and extreme weather events**.

2. Spatial sensitivity analysis

Optimise for **smaller spatial scales** to see if PiggyCast exhibits impressive results.





Thank you, Merci, Danke, Asante!

- **Josiah K. Kimani** – African Institute for Mathematical Sciences (AIMS)-South Africa
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