

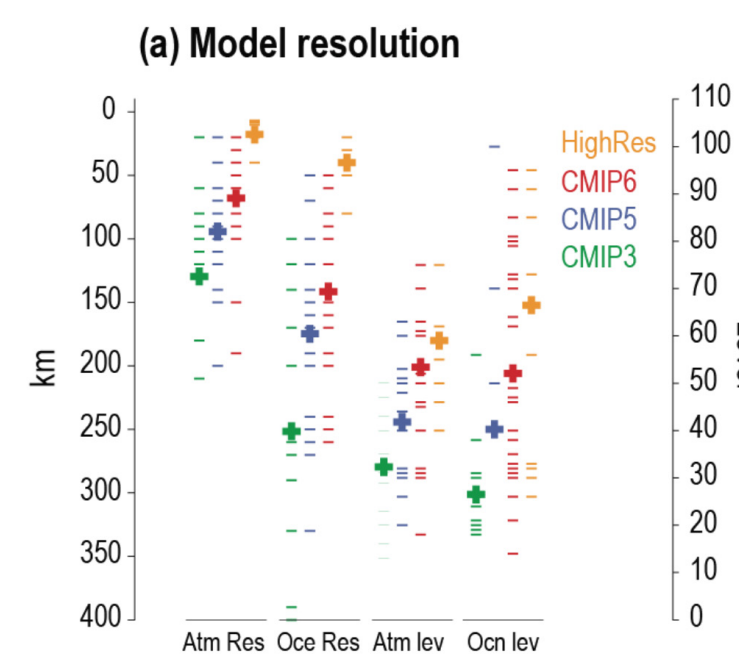
PepC-Global: A Basin-Tuned, Environment-Dependent Probabilistic Tropical Cyclone Model

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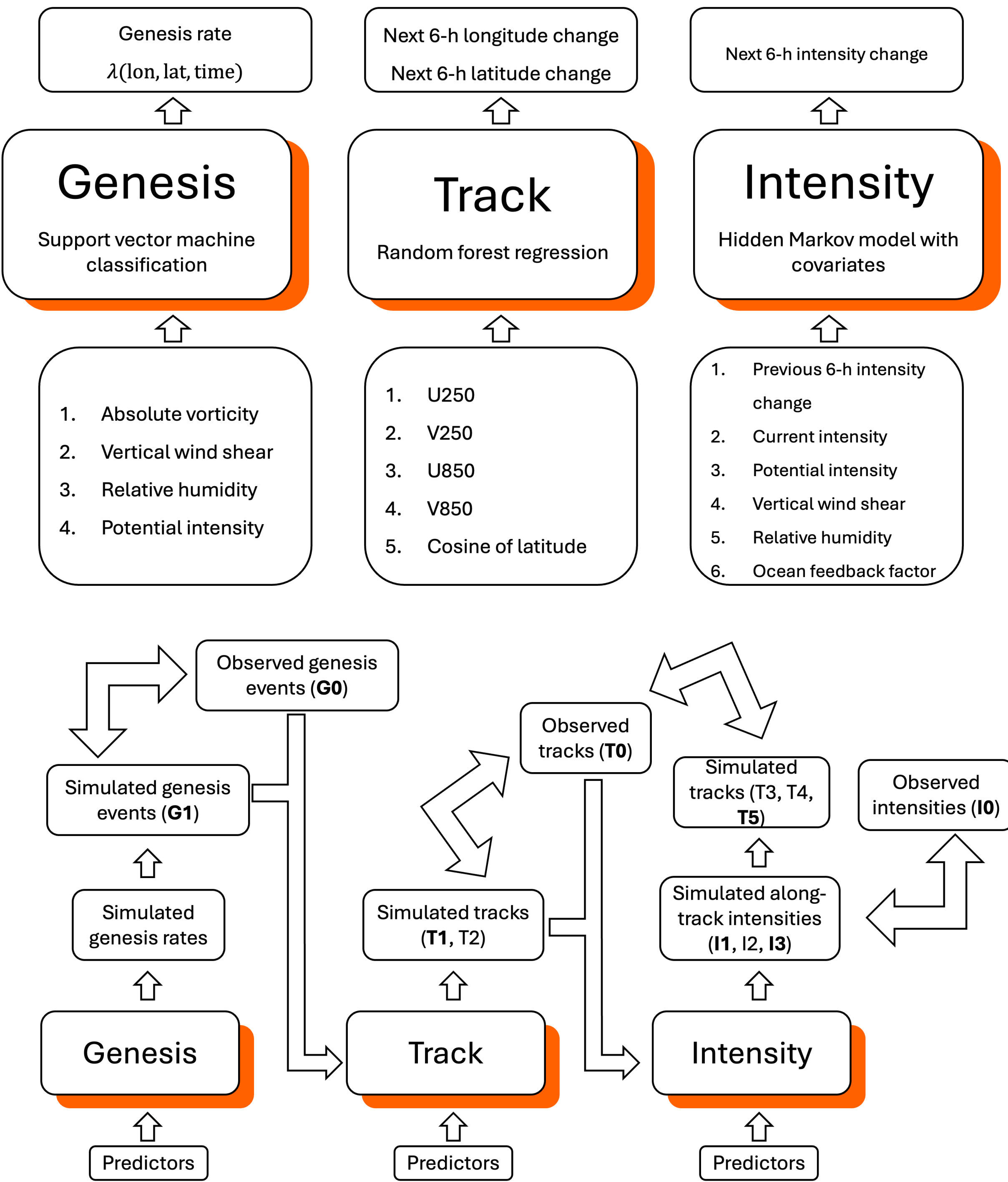
Why PepC-Global?



Climate models are generally too coarse to resolve tropical cyclones directly, while storm-resolving simulations remain too computationally expensive for large ensembles and long-term climate projections.

Coupled framework

Princeton environment-dependent probabilistic tropical cyclone model global version (PepC-Global)



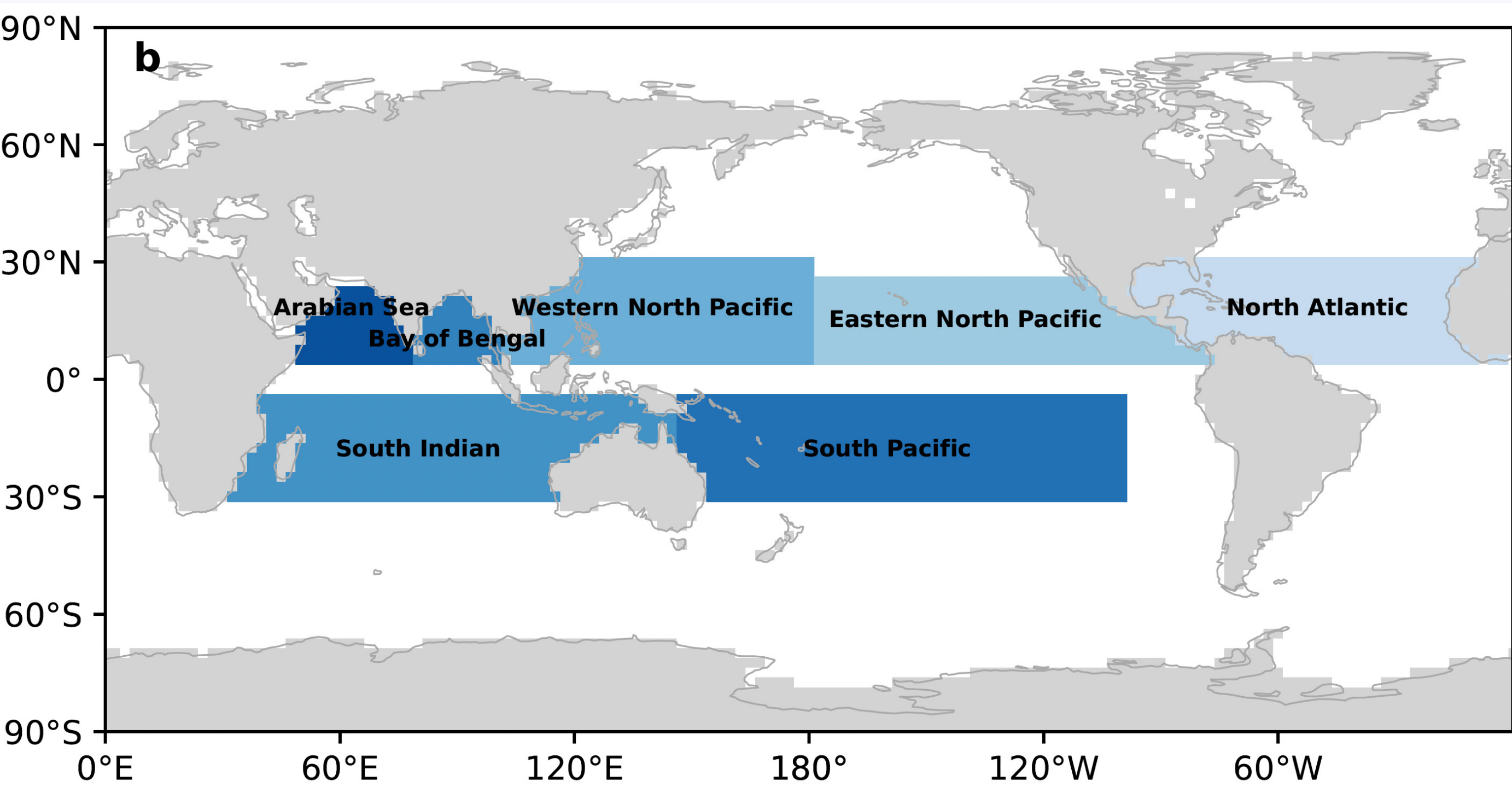
T1: simulated tracks from G0; T2: simulated tracks from G1;
I1: simulated intensities from T0; I2: simulated intensities from T1; I3: simulated intensities from T2;
T3: T0 filtered by I1; T4: T1 filtered by I2; T5: T2 filtered by I3.

What is new?

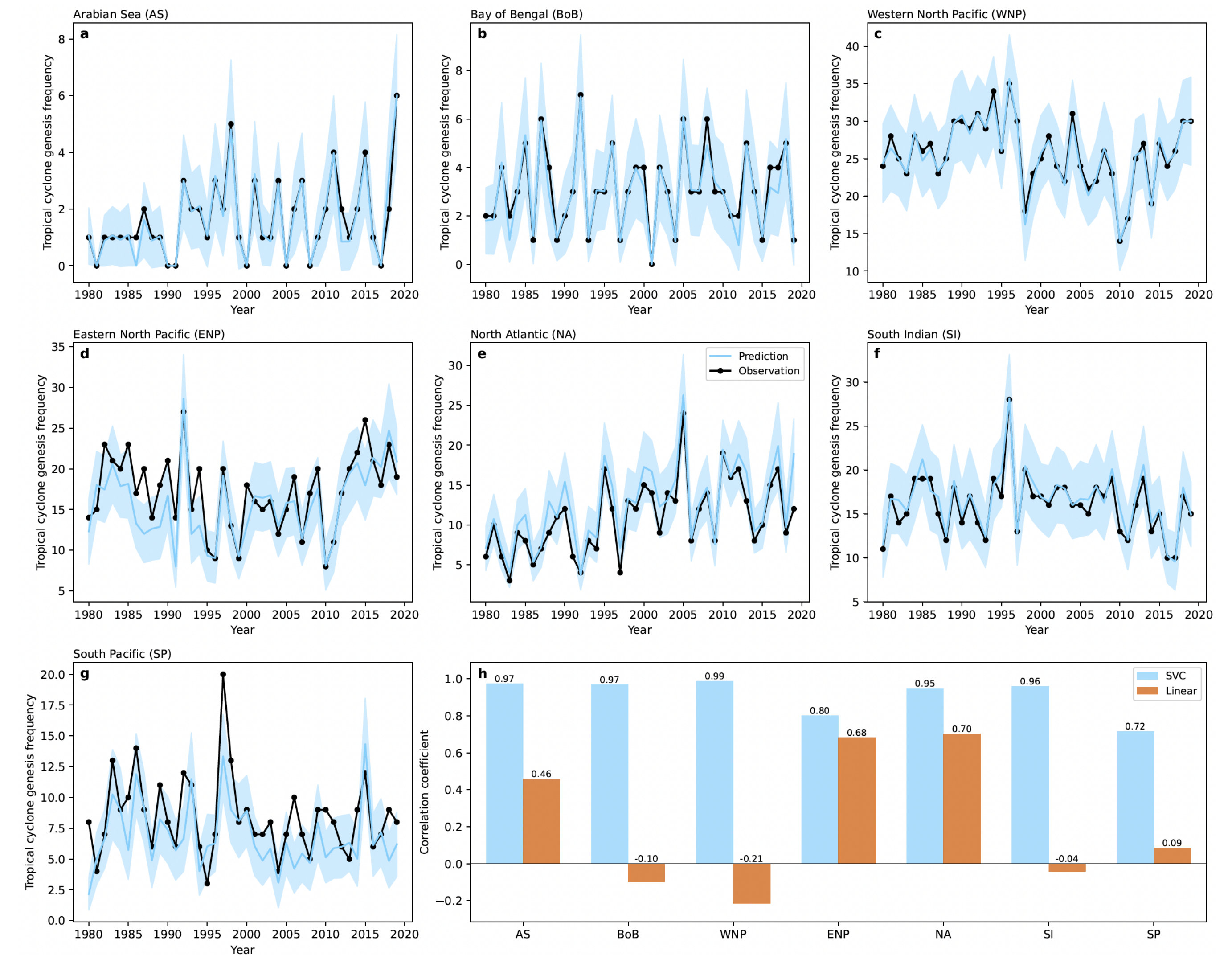
- PepC-Global uniquely uses basin-wise tuning in a global tropical cyclone climatology framework.
- PepC-Global genesis, track, and intensity modules outperform widely used linear models in out-of-sample evaluations.
- PepC-Global intensity module uses environment-dependent over-land decay, offering greater climate change sensitivity than fixed decay rates.

Contact
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Gao, Cong, Ning Lin. "PepC-Global: A Basin-Tuned Probabilistic Tropical Cyclone Model with Enhanced Out-of-Sample Skill and Climate-Sensitive Over-Land Decay".
Journal of Advances in Modeling Earth Systems (JAMES), under review.



Genesis module



Track module

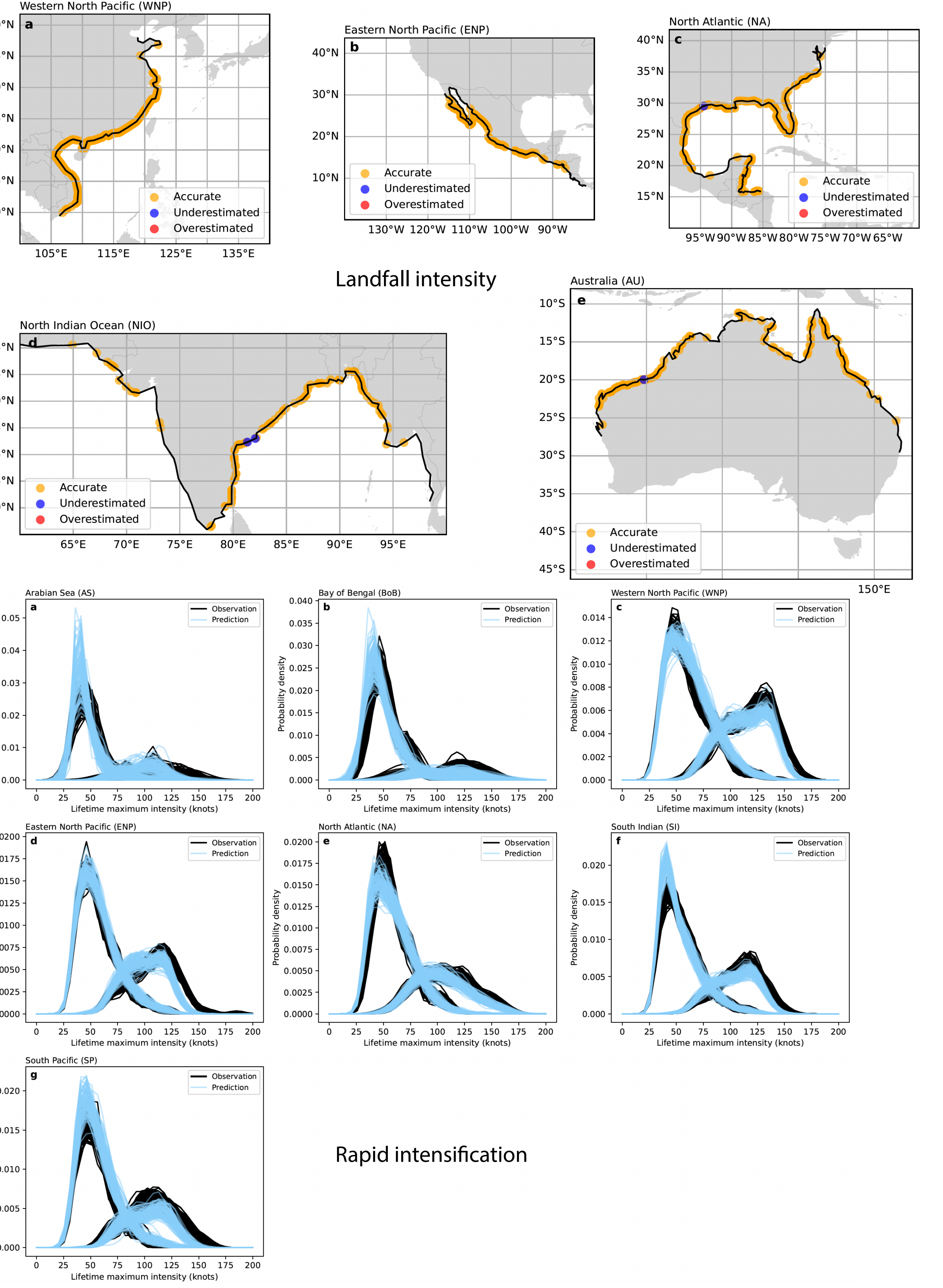
	AS	BoB	WNP	ENP	NA	SI	SP
Linear train	0.38	0.58	0.70	0.56	0.78	0.46	0.45
Linear test	0.41	0.53	0.71	0.55	0.77	0.46	0.46
RF train	0.98	0.97	0.98	0.98	0.98	0.98	0.98
RF test	0.85	0.74	0.84	0.81	0.87	0.78	0.76

	AS	BoB	WNP	ENP	NA	SI	SP
Linear train	0.23	0.45	0.54	0.40	0.41	0.43	0.47
Linear test	0.28	0.42	0.54	0.39	0.42	0.41	0.48
RF train	0.96	0.97	0.97	0.97	0.97	0.97	0.97
RF test	0.73	0.74	0.72	0.69	0.68	0.71	0.71

6-h longitude change

6-h latitude change

Intensity module



Rapid intensification

Application

