Supplementary Information for

Assessing Machine-Learning-Based Weather Forcing in Significant Wave Height Prediction

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Figure S1 WRF computational domain: the outer red frame represents d01, and the inner red frame represents d02.

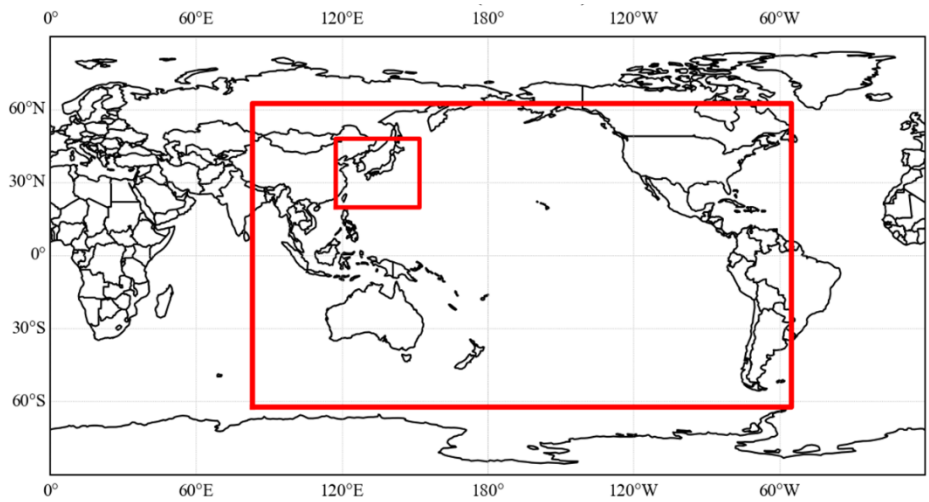

Figure S2 Time series of simulated SWH at the NOWPHAS station at Hososhima Port (32.44° N, 131.73° E), from 12 to 19 November 2022 (UTC).

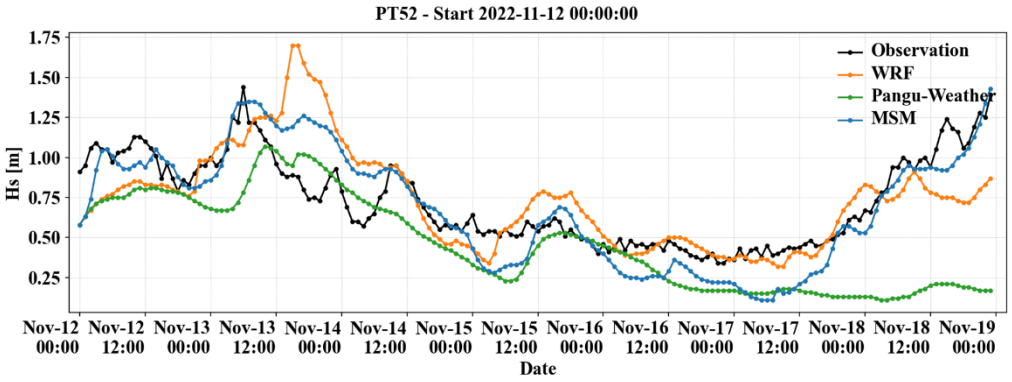

Figure S3 Annual mean significant wave period (left) and annual mean significant wave height (right) in 2022 at NOWPHAS observation points

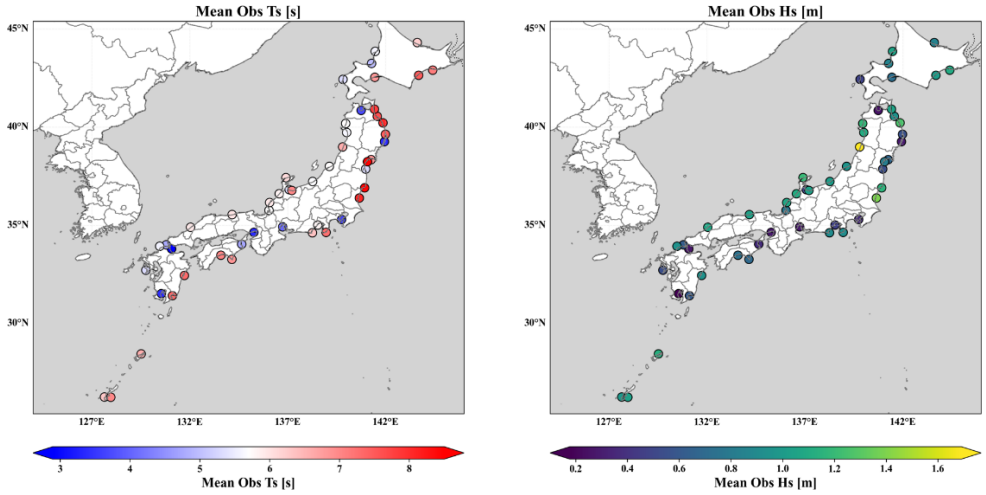

Table S1 Configuration of Physics Options in WRF

Physics	
Cloud Microphysics	WSM6
Cumulus Parameterization	Kain-Fritsch
Long/short Wave Radiation	RRTMG
Planetary Boundary Layer	YSU
Surface Layer	Revised MM5 Monin-Obukhov

Table S2 Computational performance of WRF and Pangu-Weather per single seven-day forecast case The WRF code used here was specially optimized by a research group that includes some of the authors for the Earth Simulator vector supercomputer, achieving a vector operation ratio of 90 – 92% and demonstrating potential for real-time weather forecasting with WRF (Harada et al., 2025). Although Pangu-Weather can run on both CPU and GPU, we executed it on CPU only.

	WRF	Pangu-Weather
Environment	NEC SX-Aurora TSUBASA	Intel(R)Xeon(R)Platinum 8160
Number of Grid	44,260,496	13,497,120
Number of Cores	128	24 (max)*
Computational time (s)	41,339	1,540

* The pre-trained Pangu-Weather model is distributed in Open Neural Network Exchange (ONNX) format and was executed using ONNX Runtime, which by default performs parallel inference using one execution thread per physical CPU core.