SYMPOSIUM OP'24 ADVANCING OCEAN PREDICTION SCIENCE FOR SOCIETAL BENEFITS

Improvements of Operational systems

Enhancing Significant Wave Height Forecasts for the Southeast Coast of the Korean Peninsula Using a SWAN and Deep Neural Network

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1. Introduction

- The Korea Operational Oceanography System (KOOS) of the KIOST currently employs Simulaing WAves Nearshore (SWAN) model for wave forecasts around the Korean Peninsula (Fig. 1)
- This study aims to **enhance the accuracy of significant wave height forecasts** by applying a data-driven Deep Neural Network (DNN) model and evaluating its performance

2. Dataset

- Input: SWAN forecast results
  - 2-day forecast results (2 km spatial resolution)
  - Significant Wave Hight (m), Wave Direction (deg.)
  - Wave Period (sec), forecast date, time, grid location
- Target: Observational Significant Wave Height at 24 sites near southeast coast (Fig.1)
- Model: Multi-layer perceptron neural network (Fig. 2)
  - 4 hidden layers
  - Training: 2019-2021 data (3-years)
  - Test: 2022 (1-year)

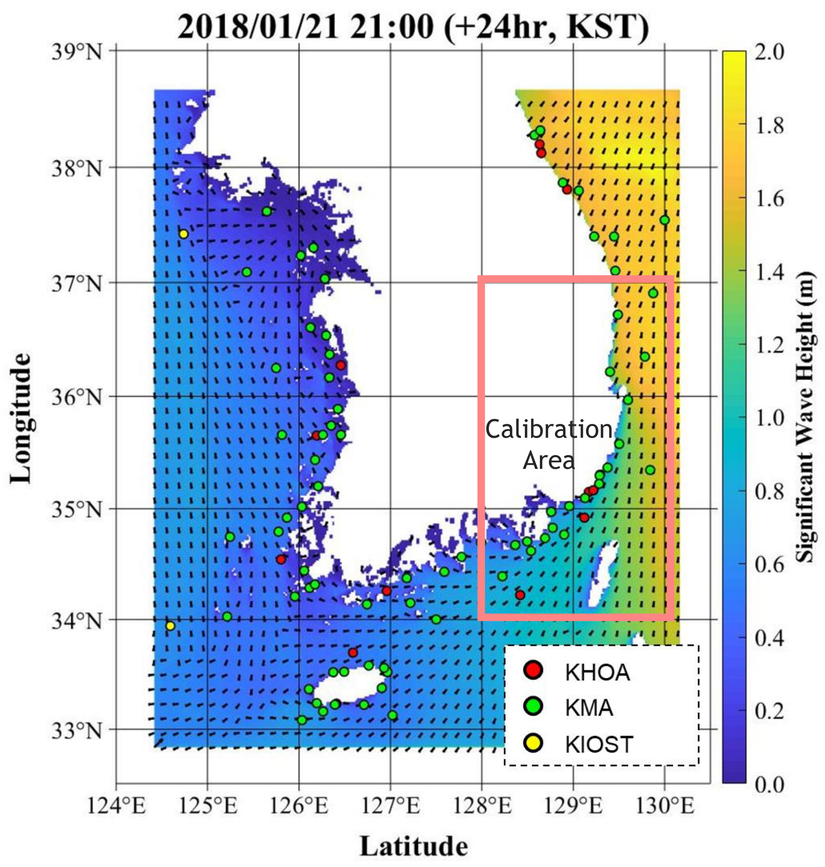

Figure 1: Study area and location of observational sites

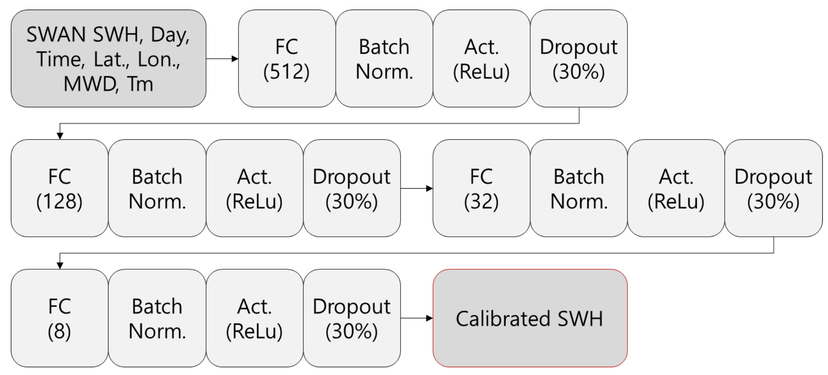

Figure 2: DNN architecture used for training

3. Results

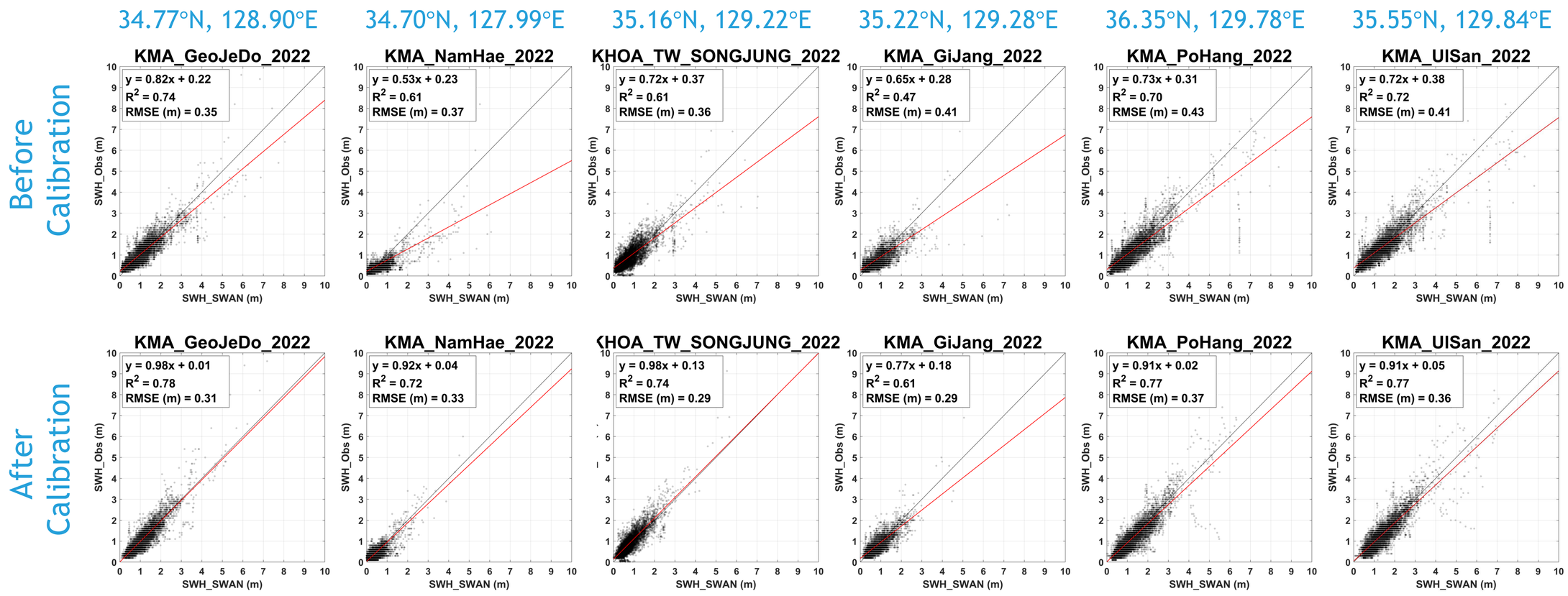

Figure 3: Results before and after calibration using DNN

4. Conclusions

- The slope increased from 0.63±0.13 to 0.81±0.13, the R^2 increased from 0.62±0.10 to 0.67±0.11, and the RMSE decreased from 0.34±0.07 m to 0.31±0.05 m, respectively, on average in the test set