



THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

PHD STUDENT SEMINAR

E-TCN: An Embedded Temporal Convolutional Network for Surface Chlorophyll-a Concentration Prediction in a Large Marginal Sea

By

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Abstract

Chlorophyll a (chl_a) concentration is one of the prime parameters for assessing marine primary production. Predicting its temporal and spatial changes offers timely insights into the marine ecological conditions. Existing ML models haven't fully accounted for the heterogeneity of chl_a's spatial-temporal dynamics. We propose a novel embedded temporal convolutional network (E-TCN) model to improve chl_a prediction in the South China Sea (SCS), the largest marginal sea in the western Pacific Ocean. E-TCN encodes chl_a dynamics' spatial-temporal heterogeneity in their learnable spatial-temporal embedding, by modeling each chl_a time series' predictive TCN models as a combination of basis TCN models with its embedding as the coefficients, thus the differences in model parameters accommodate the heterogeneity. Based on MODIS data in the SCS, we demonstrated the superior performance of E-TCN. Moreover, the spatial-temporal embedding is related to ocean drivers in the SCS that interplay with chl_a's dynamics and is used to partition SCS, revealing the spatial-temporal patterns of chl_a concentration in this region.

Date : 26 Sep 2024 (Thursday)

Time : 10:30am

Venue : Room 1103 (Lift 19)

All are Welcome!