기후 분과 [P-005]

Error Correction of Model Analog Forecasts Using a Linear Inverse Model for Improving Statistical ENSO Prediction Skill

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Accurately predicting the El Niño-Southern Oscillation (ENSO) remains a central challenge in seasonal climate forecasting. Statistical approaches, such as the linear inverse model (LIM) and the model analog (MA), have provided valuable insights, and their weighted combination, MA-LIM, improved forecast skill over LIM and MA. However, it is still affected by residual biases from both methods. To advance this approach, this study introduces NEW MA-LIM, which unifies MA and LIM by explicitly modeling the temporal evolution of MA forecast errors within the LIM operator and applying dynamic corrections at each lead. Deterministic skill is assessed using monthly tropical sea surface temperature and sea surface height from 15 CMIP6 preindustrial control simulations and observations for the period 1961-2023. NEW MA-LIM with the best-10 ensemble achieves the highest skill across 1-12 month leads and reduces the spring predictability barrier. MA forecast errors evolve as linearly predictable signals, enabling more reliable ENSO prediction within a low-dimensional dynamical framework.

Keywords: El Niño-Southern Oscillation (ENSO), Linear Inverse Model (LIM), Model Analog (MA), CMIP6, Forecast Error Correction

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