

SESSION: (B6) Frontiers in earth system prediction

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ENSO prediction using an earth system model incorporating a high-resolution tropical ocean nesting model

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Mesoscale eddies in the tropical oceans have significant impacts on the oceanic mean states, atmospheric circulation, ENSO characteristics, and other natural variabilities. Here, we found a significant improvement of ENSO prediction skill by incorporating a high-resolution (eddy-permitted) tropical ocean nesting model into a seasonal prediction system based on an earth system model MRI-ESM1. Because of the realistic representation of tropical instability waves (TIWs), the simulated eddy heat flux improved not only tropical oceanic mean states but also spatial distributions of mean surface wind stress and precipitation in the nested version of MRI-ESM1. ENSO characteristics (amplitude, period, spatial pattern, teleconnection) were also modified through the changes of mean state. Nonlinear eddy heat transports due to TIWs increased the ENSO skewness and improved the characteristics of ENSO asymmetry. These improvements resulted in more accurate ENSO prediction several months ahead.