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## Applying Deep-learning Models in Observation Simulation Experiments of Throughflows Across the Indonesian Seas

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The Indonesian Throughflow (ITF) plays a vital role in the global ocean circulation and climate system. The intricate labyrinth of passages around the Indonesian Seas poses a grand challenge in monitoring and understanding the throughflow in the region. In this study, we employ the deep-learning approach to examine to what degree known sea level variations can determine main in- and outflows through the Indonesian Seas. The approach is first validated using the simulated environment from a regional circulation model. Our results show that the Recurrent Neural Network (RNN) models can well represent the temporal variations of throughflows across the Indonesian Seas. Moreover, the skills can be significantly improved if aided by time series of transport from a small number of passages. We also apply the trained model to the satellite derived sea surface height in design of more effective allocations of observation assets.