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A coupled modeling study on roles of South China Sea Throughflow in the global climate

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Roles of the South China Sea throughflow (SCSTF) in the global climate system are investigated using a coupled general circulation model called the University of Tokyo Coupled Model. We have conducted two experiments with and without the SCSTF and shown that the sea surface temperature (SST) becomes cooler in the eastern and far western equatorial Pacific and south of Japan, but warmer in the South China Sea (SCS) and the Kuroshio Extension region, when the SCSTF is blocked. The cooling in the far western equatorial Pacific is due to a stronger southward flow in the warm surface layer of the Makassar Strait. The strong warming in the SCS occurs because the heat received from the atmosphere cannot be exported out of the SCS. These SST changes further modulate the Walker Circulation, SST field, and precipitation pattern over the equatorial Indian and Pacific Oceans such that the mean climate state becomes more La Nina-like and negative IOD-like without the SCSTF. Also, they affect the SST pattern on global scale through atmospheric teleconnections. Therefore, the SCSTF plays a more active role than previously thought in regulating the global climate system.

Keywords: South China Sea, Indonesian Throughflow, Coupled general circulation model