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学位論文内容の要旨

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学位論文題名

The contribution of the Indo-Pacific sea surface height variability
to the Indonesian Throughflow under changing climate.

(変わりゆく気候系におけるインド太平洋地域の海面高度変動が
インドネシア通過流に及ぼす影響)

The Indonesian throughflow (ITF) transports a significant amount of warm freshwater from the Pacific to the Indian Ocean, making it critical to the global climate system. This study examines decadal ITF variations using ocean reanalysis data as well as climate model simulations from the Coupled Model Inter-comparison Project Phase 5 (CMIP5). While the observed annual cycle of ITF transport is known to be correlated with the annual cycle of sea surface height (SSH) difference between the Pacific and Indian Oceans, ocean reanalysis data (1959–2015) show that the Pacific Ocean SSH variability controls more than 85% of ITF variation on decadal timescales. In contrast, the Indian Ocean SSH variability contributes less than 15%. While those observed contributions are mostly reproduced in the CMIP5 historical simulations, an analysis of future climate projections shows a 25%–30% increase in the Indian Ocean SSH variability to decadal ITF variations and a corresponding decrease in the Pacific contribution. These projected changes in the Indian Ocean SSH variability are associated with a 23% increase in the amplitudes of negative zonal wind stress anomalies over the equatorial Indian Ocean, along with a 12° eastward shift in the center of action in these anomalies. This combined effect of the increased amplitude and eastward shift in the zonal wind stress increases the SSHA variance over the Indian Ocean, increasing its contribution to the ITF variation. The decadal ITF changes discussed in this study will be crucial in understanding the future global climate variability, strongly coupled to Indo-Pacific interactions.