HOKKAIDO UNIVERSITY

Title	The contribution of the Indo-Pacific sea surface height variability to the Indonesian Throughflow under changing climate. [an abstract of dissertation and a summary of dissertation review]
Author(s)	Shilimkar Vivek Kishor
Degree Grantor	北海道大学
Degree Name	博士(環境科学)
Dissertation Number	甲第15221号
Issue Date	2022-12-26
Doc URL	https://hdl.handle.net/2115/87951
Rights(URL)	https://creativecommons.org/licenses/by/4.0/
Type	doctoral thesis
File Information	Shilimkar_Vivek_Kishor_abstract.pdf, 論文内容の要旨

Hokkaido University Collection of Scholarly and Academic Papers : HUSCAP

学 位 論 文 内 容 の 要 旨

シリムカル ヴィヴェック キショール
博士（環境科学）　　氏 名 Shilimkar Vivek Kishor

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 12º 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.