

Observed Water Exchange Between the South China Sea and Java Sea Through Karimata Strait

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Abstract	<p>Volume, heat and freshwater transports from the South China Sea (SCS) to the Java Sea through the Karimata Strait are estimated based on direct measurements of current, temperature, salinity, and satellite observations. Subject to strong seasonal variability, the volume, heat, freshwater transports are -1.98 ± 0.23 Sv ($1 \text{ Sv} = 10(6) \text{ m}^3/\text{s}$), -209.68 ± 15.19 TW ($1 \text{ TW} = 10(12) \text{ W}$), -99.87 ± 15.11 mSv ($1 \text{ mSv} = 10(-3) \text{ Sv}$) in boreal winter, and 0.47 ± 0.20 Sv, 61.06 ± 15.46 TW, 31.67 ± 8.76 mSv in boreal summer, respectively (negative transport defined from SCS to Java Sea). The annual mean volume, heat and freshwater transports are -0.78 ± 0.12 Sv, -77.31 ± 4.99 TW, and -30.87 ± 6.15 mSv, respectively. The freshwater transport through Karimata Strait is as large as 42% of rainfall input to the entire Indonesian seas in boreal winter, thereby modulating the Indonesian Throughflow (ITF) through the "freshwater plug" effect in the Makassar Strait. The interannual variability of the transports is not significantly correlated to the Indian Ocean Dipole and El Niño-Southern Oscillation. There is a significant decreasing trend of volume and heat transports from the SCS to Java Sea over the period of 1997-2015, with a reduction of 0.26 Sv and 15 TW, respectively. The freshwater transport decreases 12.29 mSv by 2016 compared with that in 2009, equivalent to 33.2%-49.72% of the annual mean freshwater transport during 2009-2016. This decreasing trend would play contradictory roles in the decadal trend of ITF transport by building a "freshwater plug" in the southern Makassar Strait and a 'buoyant plume' in the Indo-Australian Basin, respectively.</p>
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