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Salinification and warming of the South Atlantic due to the Indonesian Throughflow

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Experiments on the influence of the Indonesian Throughflow on the structure and water properties of the Southern Hemisphere supergyre is presented. In a strongly eddying global ocean model, we compare an upper ocean flow for a closed Indonesian Seaway experiment with that of a control simulation. Most of the volume transport from the Indonesian Throughflow flows through the Mozambique Channel into the Agulhas Current. Import of warm and fresh water from the Pacific leads to increasing temperature of the upper Indian Ocean and decreasing salinity of the Agulhas Current. Agulhas Leakage is strengthened and, even though its salinity decreases, brings extra salt and heat from the Indian into the Atlantic Ocean. This causes a warming and salinification of the South Atlantic.
The dynamical relation between Indonesian Throughflow transport and Agulhas leakage is analyzed using a regional idealized model at high resolution. This allows us to derive a non-linear relation between these two quantities and to identify the important physical mechanisms involved.