



## Abstract View

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## Pacific and Indian Ocean Upper-Layer Salinity Budget

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### ABSTRACT

The freshwater balance in the upper layer of the Pacific and Indian Oceans is investigated by means of mass and salinity conservation arguments in simple advective box models.

The model uses estimates of atmospheric freshwater input to the ocean and upwelling of deep water into the upper layer at a rate required to balance North Atlantic deep water formation, proportioned by the areas of each ocean. The salinity of the upper layer outflow relative to observed salinity is too low for the Pacific and too high for the Indian Ocean. Either the upwelling rates are 5 to 20 times higher than estimated or the freshwater input is grossly exaggerated. The problem is alleviated by taking account of the Pacific-Indian tropical link within the Indonesian Passages of the Southeast Asian Seas.

The role of the Pacific-Indian Ocean equatorial connection (through the Southeast Asian Seas) is tested by dividing the Pacific Ocean basin into three zones. Meridional mass transports between zones are estimated from the mass and freshwater balances by imposing a uniformly distributed upwelling rate from the deep ocean. From the equatorial zone budget of the Pacific Ocean a flow of  $14 \times 10^6 \text{ m}^3 \text{ s}^{-1}$  at 33.6‰ salinity into the Indian Ocean through the Southeast Asian Seas is required. This transport agrees with that derived from the Indian Ocean mass and freshwater balances.

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