



Abstract View

[Volume 11, Issue 1 \(January 1981\)](#)

Journal of Physical Oceanography

Article: pp. 3–14 | [Abstract](#) | [PDF \(926K\)](#)

Circulation of Tritium in the Pacific Ocean

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(Manuscript received July 14, 1980, in final form October 30, 1980)

DOI: 10.1175/1520-0485(1981)011<0003:COTITP>2.0.CO;2

ABSTRACT

The input of bomb tritium into the high-latitude Northern Hemisphere waters has demonstrated the spread of a tracer in three dimensions in the North Pacific Ocean. Subsurface tritium maxima in middle and low latitudes clearly show the importance of lateral mixing (along isopycnals) in the upper waters. The tritium pattern as mapped on isopycnal surfaces puts definite time bounds on the exchange between the subtropical anticyclonic gyre of the North Pacific and both the subarctic cyclonic gyre and the system of zonal flows in the equatorial region. The penetration of bomb tritium to depths below 1000 m in the western North Pacific Ocean shows that these waters have been ventilated at least partially in the past 17 years of the post-bomb era. From the tritium pattern the upper waters of the North Pacific can be divided into three regions: a mixed layer that exchanges rapidly with the atmosphere, a laterally ventilated intermediate region (between the mixed layer and at most the winter-outcrop isopycnal) that exchanges on decadal time scales with the atmosphere, and a deeper layer penetrated by vertical diffusion alone, with a longer atmospheric exchange time scale. The greatest percentage of the tritium inventory of the North Pacific is in the intermediate region. This indicates that such lateral ventilations, which take place from all high-latitude regions, are a major source of penetration for atmospheric constituents into the oceans on decadal time scales.

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