

JOURNAL OF MARINE RESEARCH

The *Journal of Marine Research* is an online peer-reviewed journal that publishes original research on a broad array of topics in physical, biological, and chemical oceanography. In publication since 1937, it is one of the oldest journals in American marine science and occupies a unique niche within the ocean sciences, with a rich tradition and distinguished history as part of the Sears Foundation for Marine Research at Yale University.

Past and current issues are available at journalofmarineresearch.org.

Yale University provides access to these materials for educational and research purposes only. Copyright or other proprietary rights to content contained in this document may be held by individuals or entities other than, or in addition to, Yale University. You are solely responsible for determining the ownership of the copyright, and for obtaining permission for your intended use. Yale University makes no warranty that your distribution, reproduction, or other use of these materials will not infringe the rights of third parties.



This work is licensed under the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License. To view a copy of this license, visit <http://creativecommons.org/licenses/by-nc-sa/4.0/> or send a letter to Creative Commons, PO Box 1866, Mountain View, CA 94042, USA.



Journal of Marine Research, Sears Foundation for Marine Research, Yale University
PO Box 208118, New Haven, CT 06520-8118 USA
(203) 432-3154 fax (203) 432-5872 jmr@yale.edu www.journalofmarineresearch.org

On the Anomalous Deep Water South of the Aleutian Islands¹

R. K. Reed

Pacific Oceanographic Laboratories
Environmental Science Services Administration
Seattle, Washington 98102

Several oceanographers have concluded that Pacific deep water enters the North Pacific from the southern hemisphere and is warmed along its northerly path of flow. The deep water near the Aleutian Trench, however, is noticeably colder than the water lying between it and 30°N in the region east of 170°E. Knauss (1962) attributed this condition to the rising of colder water from below; Gordon and Gerard (1970) were unable to find a path of flow into the northern region.

Reed (1969), however, showed that, near the Aleutians, water very near the bottom (and at the 5-km level) has a colder potential temperature than that immediately south of it; thus the cold *bottom* water cannot be explained as a result of rising water. Reed has therefore suggested that a "younger" water flows northward along the western side of the extensive rise along 170°E

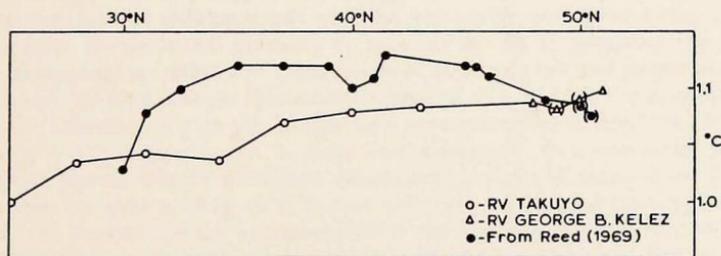


Figure 1. Comparison of potential temperature (computed according to Fofonoff 1962) at 5 km along 165°E (RV TAKUYO, August 1967, Preliminary Data Report of Cooperative Studies of the Kuroshio, No. 105), between 164°E and 168°E (RV GEORGE B. KELEZ, March 1966, Preliminary Data Report of Cooperative Studies of the Kuroshio, No. 34), and between 170°W and 180°W (from Reed 1969). Data points in parentheses indicate average values from stations at the same latitude.

(Emperor Seamount Chain) and enters the area south of the Aleutians through breaks in the Chain north of 45°N . At that time insufficient data were available to demonstrate this hypothesis, but observations recently obtained by the RV TAKUYO (Preliminary Data Report of Cooperative Studies of the Kuroshio, No. 105) support such a path of flow.

The TAKUYO data (Fig. 1) show a northward increase in potential temperature that is consonant with a northward flow of deep water and its modification by mixing with warmer water from above.² It is notable that the anomalously cold water near the Aleutians east of the Emperor Seamount Chain is essentially identical to the culminating temperature of the section west of the Chain. Thus the only logical source of the water near the Aleutians is the water west of 170°E .

2. Salinity and dissolved oxygen distributions are in agreement with that of temperature, but the data 'scatter' is somewhat greater.

REFERENCES

FOFONOFF, N. P.

1962. Physical properties of sea-water, *In* The Sea, Vol. 1, pp. 3-30, M. N. Hill, Editor. Interscience Publishers, 864 pp.

GORDON, A. L., and ROBERT GERARD

1970. North Pacific bottom potential temperature, *In* Geol. Soc. Amer. Memoir, 126 (in press).

KNAUSS, J. A.

1962. On some aspects of the deep circulation of the Pacific. *J. geophys. Res.*, 67 (10): 3943-3954.

REED, R. K.

1969. Deep-water properties and flow in the central North Pacific. *J. mar. Res.*, 27 (1): 24-31.