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Journal of Marine Research Classic Articles

On the process of upwelling

by H. U. Sverdrup

Originally published April 9, 1938, in the *Journal of Marine Research* 1(2), 155–164.

EDITOR'S COMMENTARY

Although Harald Sverdrup is now probably best known for his work on basin-scale ocean circulation, his interests were remarkably diverse, and included continental shelf processes. As a coastal oceanographer, I can't resist highlighting this contribution to the coastal upwelling literature. A relatively simple data set is exploited here, consisting of cross-shelf sections taken near Point Conception, California.

Building on Vagn Walfrid Ekman's conceptual framework, Sverdrup uses these data to show its qualitative consistency with available wind data, and goes on to diagram a cross-shelf vertical circulation pattern. This paradigm, which neglects alongshore variability, dominated oceanographic thought into the early 1970s—a strikingly long reign.

This was not Sverdrup's only excursion into this part of the ocean. His paper with Richard Fleming (Sverdrup and Fleming 1941) presents a remarkable set of three-dimensional observations in the same general region. These measurements reveal eddies and jets that show the considerable three-dimensionality of the system.

This very insightful and informative work was apparently largely forgotten until the 1970s, when satellite sea surface temperature observations started to reveal the same sorts of features. This new, exciting data led eventually to a recognition of Sverdrup's earlier accomplishments on this subject.

—Kenneth H. Brink

REFERENCE

Sverdrup, H. U., and R. H. Fleming. 1941. The Waters Off the Coast of Southern California. March to July 1937. Berkeley: University of California Press. Bull. Scripps Inst. Oceanogr. *4(10)*.