OPEN ACCESS Freely available online

Journal of Oceanography and Marine Research

Editorial

A Discussion of the Complex System of Ocean Currents

Jackie Robinson*

Department of Marine Biology Research, University of California, La Jolla, USA

EDITORIAL

The ocean is relatively opaque to all forms of electromagnetic radiation, from very long radio waves to the short ultraviolet. What small transmission window exists is in the visible spectrum; but even there the transmission is poor compared to that of the atmosphere. Of the sunlight that reaches the surface of the earth, less than 1% goes as deep as 100 m in even the clearest ocean waters. If one is to transmit information or see through the ocean space for any appreciable distance, electromagnetic radiation is not the way. The ocean, on the other hand, is much more transparent to sound transmission than is the atmosphere. A few pounds of TNT detonated off Hawaii can be heard by an underwater microphone (a hydrophone) off San Francisco. The sound generated by a few hundred pounds of TNT exploded near Australia made its way through the Southern Ocean and up the Atlantic and was monitored by hydrophones near its antipode off Bermuda. Marine animals are well adapted to using sound; humans use sound for communicating underwater, tracking submarines, measuring the depth of the ocean and the thickness of the sediments below, finding schools of fish, and observing oceanic processes. It is also used in a variety of oceanographic instruments, for underwater beacons, for tracking neutrally buoyant instruments floating at mid-depth, as well as for relaying data from such instruments. However, the difficulty of wing sound energy rather than electromagnetic energy should not be underestimated. The equipment is usually bulkier, the power requirements greater, the information bandwidth smaller, and the options and flexibility considerably less with sonic devices than with radio or radar; but in principle there is an acoustic analog for nearly every technological use of the electromagnetic spectrum in the atmosphere. A discussion of the complex system of ocean currents is facilitated by dividing the subject into more manageable pieces. Reference is often made to the surface circulation as distinguished from the intermediate or deep circulation. Likewise, some books attempt to distinguish wind-driven currents (mostly surface circulation) from thermohaline circulation (mostly intermediate and deep circulation). Although such tags are useful during one's introduction to the subject, they are misleading if taken too literally. The Gulf Stream and Antarctic Circumpolar Current are part of the wind-driven surface circulation, yet both extend to the bottom of the ocean. Although the general pattern of surface currents of the ocean can be approximately deduced by assuming that the wind is the only driving force, few experts believe that heating and evaporation are trivial factors in determining the surface circulation patterns. Similarly, surface processes impact the deep circulation; the distinction between intermediate and deep circulation is an arbitrary one and is usually based on the origin of the water masses involved. Vertical mixing makes such distinctions less meaningful. We discuss the deep circulation as well as certain features of the interior ocean well removed from the major wind-driven ocean currents. Combined, these components describe the meridional overturning circulation (MOC) that integrates the parts into a unified concept. The literature in the field is vast and growing rapidly. Because the material is largely descriptive, it is not easy to summarize. No attempt is made at completeness. The examples chosen are representative and are intended to provide insight into other aspects of the ocean circulation that are either ignored or only noted.

Correspondence to: Jackie Robinson, Department of Marine Biology Research, University of California, La Jolla, USA, E-mail: robijackie@gmail.com

Received date: December 02, 2021 ; **Accepted date:** December 10, 2021 ; **Published date:** December 22, 2021

Citation: Robinson J (2021) A Discussion of the Complex System of Ocean Currents. J Oceanogr Mar Res. 9:030.