

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

Whitecap Suppression by Cloud Shadows on the Potomac River¹

Allen H. Schooley

*Naval Research Laboratory
Washington, D.C. 20390*

Whitecaps are often generated on the Potomac River near the Naval Research Laboratory by wind fields associated with the passage of cold fronts. When the fronts clear the air so that sunshine prevails during the morning hours, usually about midday scattered cumulus clouds begin to appear. As viewed from the 20-m-high roof of The NRL building, their shadows scurry down and across the river. Several visual observations from the roof during the spring, summer, and fall of 1970 revealed that there is usually a drastic suppression of the whitecaps related to the passage of a single cloud shadow. Particular care was taken to make sure that the observations were not merely illumination illusions.

On a few occasions 16-mm motion pictures were taken of whitecaps that were present just prior to the occurrence of a cloud shadow over the water and then of the calming effect under the cloud shadow. Figs. 1 and 2 are reproduced from cine frames taken 3.8 min apart at 1330 hr. local time on May 6, 1970. The wind was steady at 8.2 m sec^{-1} , the air temperature was 14.4°C . The bucket-water temperature was 17.3°C , and the relative humidity was 36%. In Fig. 1, when the sun was on the water, there are at least nine whitecaps visible. In Fig. 2, when the cloud shadow was over the water, there are no whitecaps in the same field of view.

I have found no references on relatively fast reaction of the naviface to cloud-shadow transients. Not enough is known to give an explicit energy-balance explanation of the observed phenomenon.

1. Accepted for publication and submitted to press 1 July 1972.

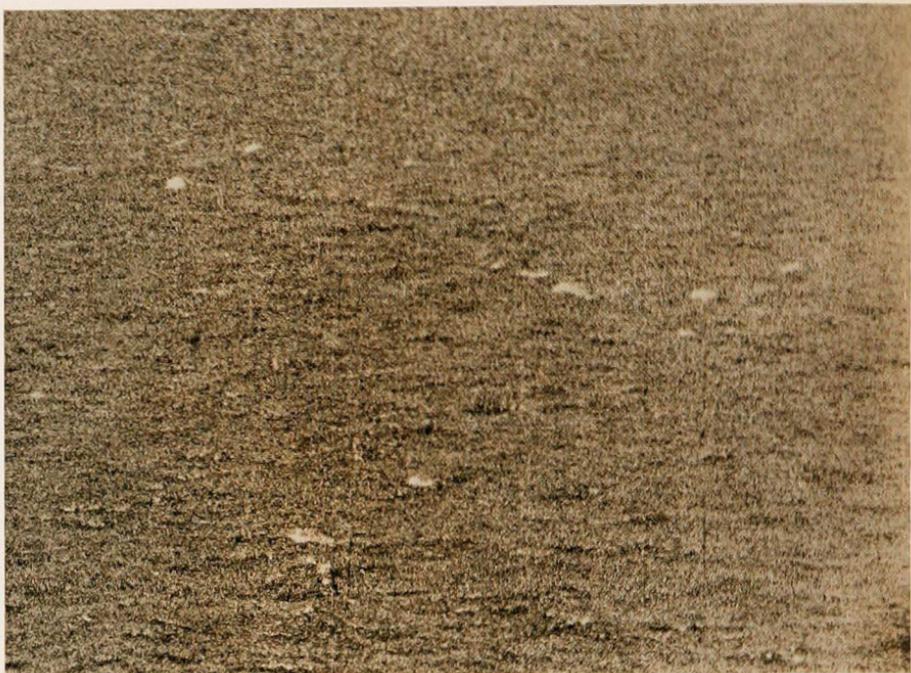


Figure 1. Whitecaps on the river during sunshine (see Fig. 2).



Figure 2. Absence of whitecaps 3.8 min after Fig. 1 was taken; the same area was then covered by a cloud shadow.