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Transport and retention of dormant copepods in the Gulf of Maine

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## Abstract

Variability in the availability of dormant copepods to seed productive shelf areas  
3 has been hypothesized to influence the abundance of the dominant copepod species  
*Calanus finmarchicus* in several regions of the North Atlantic. One source of this  
variability is advection of dormant copepods in deep water. Using Lagrangian particle  
6 simulations, we examined the influence of environmental forcing and copepod behavior  
on transport and retention of dormant *C. finmarchicus* in the deep Gulf of Maine, in the  
northwestern Atlantic. Retention in the Gulf of Maine was relatively high, > 40% over six  
9 months, under all conditions simulated. Transport within the Gulf of Maine was high,  
resulting in shifts of eastern copepods into the western Gulf and of upstream copepods,  
from slope and Scotian Shelf waters, into the eastern Gulf. Copepod behavior during  
12 dormancy was a major source of uncertainty, but it is probably not a major source of  
interannual variability in retention. Retention increased with the initial depth of dormant  
copepods, and vertical positioning behavior had a strong influence on retention for  
15 simulations started at depths greater than 150 m, because copepods that can stay below  
basin sill depths are retained. Mean cross-shore winds reduced retention slightly (< 2%  
absolute difference), and mean alongshore winds increased retention by 4 – 8%. Wind-  
18 driven interannual variability in retention was low. Variability in Scotian Shelf inflow  
had a greater influence on retention than did variability in winds, and inflow-driven  
changes in retention may contribute to interannual variability in copepod abundance  
21 associated with changes in deep-water temperature.