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Predicting subduction regions in upper ocean using surface signatures[1] MICHAEL ALLSHOUSE, H.M. ARAVIND, Northeastern University, VICKY VERMA, SUTANU SARKAR, University of California, San Diego, MARA FREILICH, MIT-WHOI Joint Program, AMALA MAHADEVAN, Woods Hole Oceanographic Institution, PATRICK HALEY, PIERRE LERMUSIAUX, Massachusetts Institute of Technology — Subduction in the upper ocean impacts surface mixing, advection of nutrients, and the ocean energy budget. Direct observations of subduction are difficult because vertical velocities in the ocean are often orders of magnitude smaller than horizontal velocities. New Lagrangian drifters can move vertically with the fluid but must be released in areas of large subduction like density fronts. To identify locations for targeted releases, target zones are identified from surface signatures computed using velocity and density fields. Eulerian analysis of these potentially noisy fields may highlight instantaneous convergence zones, but we propose a Lagrangian analysis to identify regions where subduction occurs over a time interval. Comparison with standard Eulerian based targets demonstrates the significant benefit of using Lagrangian analysis to target subduction. Analysis of three different submesoscale-resolving ocean models spanning different length-scales demonstrates the Lagrangian target zones identify larger subduction on average and are more likely to predict regions of high vertical subduction. An ensemble analysis of an ocean model demonstrates that the proposed Lagrangian predictors locate persistent subduction regions even without knowledge of the true surface velocity.

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