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Underactuated (bouyancy) control of sensor vehicle distributions in highly stratified flows GIANLUCA MENEGHELLO, THOMAS BEWLEY, Flow Control Lab, UC San Diego — Balloons and drifters are useful tools in observation and monitoring of the atmosphere and the ocean. In their simpler configuration, data acquisition is performed while they are passively transported by the flow and no control on their distribution is possible. We present a control strategy employing vertical (buoyancy) actuation only to control both their vertical and horizontal distribution, with application to hurricane monitoring. The desired horizontal distribution is obtained leveraging knowledge of the stratified flow velocity field. The optimal control framework is employed to compute the buoyancy time sequence driving the vehicles to the desired spatial distribution. Uncertainties in both the flow field description and the vehicles position are accounted for.

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