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Passive scalar transport to and from the surface of a Pocillopora coral colony MD MONIR HOSSAIN, ANNE STAPLES, Virginia Tech — Three-dimensional simulations of flow through a single *Pocillopora* coral colony were performed to examine the interaction between the flow conditions and scalar transport near a coral colony. With corals currently undergoing a third global bleaching event, a fuller understanding of the transport of nutrients, weak temperature gradients, and other passive scalars to and from the coral polyp tissue is more important than ever. The complex geometry of a coral colony poses a significant challenge for numerical simulation. To simplify grid generation and minimize computational cost, the immersed boundary method was implemented. Large eddy simulation was chosen as the framework to capture the turbulent flow field in the range of realistic Reynolds numbers of 5,000 to 30,000 and turbulent Schmidt numbers of up to 1,000. Both uniform and oscillatory flows through the colony were investigated. Significant differences were found between the cases when the scalar originated at the edge of the flow domain and was transported into the colony, versus when the scalar originated on the surface of the colony and was transported away from the coral. The domain-to-colony transport rates were found to be orders of magnitude higher than the colony-to-domain rates.

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