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Interfacial flux in wetlands predicted using surface divergence measurements CRISTINA POINDEXTER, EVAN A. VARIANO, University of California, Berkeley — Surface divergence has been shown to be a robust predictor of the air-water gas transfer velocity, k. We used this surface divergence model to investigate the effects of wind on k in wetlands with emergent vegetation. We used fluoropolymer tubes to represent plant stems in a laboratory tank equipped with a wind tunnel. The fluoropolymer material provided optical access to the water flows directly around the "stems" for PIV. The k values predicted by the surface divergence model from PIV-derived near surface divergence fields in the tank matched directly-measured k values in the tank. The surface divergence fields also illustrated a mechanism for wind-induced gas transfer in wetlands with emergent vegetation. We observed an area of high surface divergence surrounding each stem and order of magnitude lower surface divergence in areas away from any stems. Thus we expect a nearly linear relationship between stem density and k (if average wind speed in the emergent canopy is held constant). The agreement between modeled and measured k values in this low-Reynolds-number, obstructed flow provides further support for the universality of the surface divergence model for k. The results also permit improved prediction of k in wetlands.

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