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Inferring Near-Surface Tornado Wind Fields from Simulated Surface Marks¹ MICHAEL ZIMMERMAN, West Virginia Univ. Dept. of Physics, DAVID LEWELLEN, West Virginia Univ. Dept. of Mech. and Aerosp. Engineering — In 1967, T. T. Fujita proposed estimating tornado wind speeds from various classes of surface marks left behind by translating, debris-laden tornadoes. Here we revisit this approach by merits of Fujita's idea in the context of simulated surface marks, after decades of inactivity by the scientific community. We employ large eddy simulations of tornadoes with fully-coupled, sand-like debris that may be lofted from and redeposited to the surface. The resulting patterns of debris removal and deposition are convolutions of events in space and time that contain information about the wind fields that created them. The most prominent marks are insensitive to modest changes in the parameterizations employed. We extend Fujita's original treatment of surface marks to encompass more general families of marks, inferring near-surface flow velocities and spatial scales in different types of simulated tornadoes. Finally, we show how our methods and results could be applied to improve interpretations of observational data.

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