Identification of Dynamic Atmospheric Conditions via Total Variation[1] NICHOLAS HAMILTON, National Renewable Energy Laboratory — Selection of atmospheric events that conform to particular conditions of interest within multivariate data is necessary to validate of emerging high-fidelity simulations of wind plant flows. Conditions of interest are frequently determined simply as those that occur most often, given the need for well-converged statistics from observations. Aggregation of observations without regard to covariance between time series discounts the dynamical nature of the atmosphere and is not sufficiently representative of wind plant operating conditions. Identification and characterization of continuous time periods representative of atmospheric conditions that have a high value for analysis or simulation sets the stage for validation of more advanced physical mechanisms. The total variation of the atmosphere is a metric that takes into account variability within each channel as well as covariance between channels and identifies periods of interest that conform to desired objective functions, such as quiescent conditions, wind speed ramps or waves, or sudden changes in wind direction. Direct identification and classification of events of interest within atmospheric data sets is vital to developing our understanding of wind plant response and to the formulation of forecasting and control models.

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