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Spatial locality of turbulent fluxes: the filtering approach SCOTT SALESKY, MARCELO CHAMECKI, Pennsylvania State University — A number of methods exist for decomposing turbulent fluxes, including those that are local in scale (e.g. cospectra, structure functions) or in scale and space (e.g. wavelets). We propose a new spatially local decomposition of turbulent fluxes based on a filtering operation where the filter width Δ defines the scale of the local fluctuations. The Germano identity is used to show the ensemble average of the local flux recovers the Reynolds-averaged flux at any given scale Δ. Properties of local flux-gradient relationships are investigated using atmospheric surface layer data from the Advection Horizontal Array Turbulence Study (AHATS). In atmospheric surface layer measurements, random error in measured turbulent fluxes occurs due to insufficient averaging times for the time mean to converge to the ensemble mean by the ergodic hypothesis. Maximum possible averaging times are limited due to nonstationary large scale atmospheric motions. A new method of estimating random error in atmospheric surface layer data based on local fluxes is evaluated, and other applications of local fluxes are considered.

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