Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Characterizing Intermittency in the Stable Arctic Atmospheric Boundary Layer[1] MOHAMMAD ALLOUCHE, ELIE BOU-ZEID, Princeton University, JOSE FUENTES, Penn State, MARCELO CHAMECKI, UCLA, OTAVIO ACEVEDO, UFSM, SHAM THANEKAR, Penn State, CEDRICK ANSORGE, U of Cologne — To elucidate the physics of surface-atmosphere exchange processes in Polar Regions, our understanding of the stable atmospheric boundary layer (SABL) where buoyancy damps turbulent kinetic energy needs to advance significantly. We seek to understand the intermittent turbulence regime observed in the strongly stable case. The inertial sublayer, referred to as the atmospheric surface layer (ASL), under such regime is characterized by abrupt transitions between turbulent and laminar states. In this study, we analyze field experimental data from Barrow, Alaska to detect intermittent periods based on non-dimensional statistical metrics. We reveal three clusters of turbulence regimes, two of which correspond to the weakly turbulent periods that feature intermittent behavior (cluster 1: intermittent, cluster 2: transitional) and the third cluster is a fully turbulent regime (cluster 3) only mildly damped by stability. We then investigate the origins of the intermittent bursts based on analyses of the Turbulent Kinetic Energy (TKE) budget equation over these bursts in the TKE time series, and assess the combination of velocity and length scales needed in the eddy diffusion theory under intermittent conditions.

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Date submitted: 24 Jul 2019 Electronic form version 1.4