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Global Intermittency in Stably Stratified Turbulent Ekman Layers[1] STIMIT SHAH, Princeton University, CHARLES MENEVEAU, Johns Hopkins University, ELIE BOU-ZEID, Princeton University — Current weather models rely on similarity theories to represent fluxes in the lower atmosphere that assume turbulence is relatively homogeneous in space and time. In addition, many SGS models for LES assume turbulence is homogeneous to apply planar-averaging when computing model coefficients.However, under very stable conditions turbulence can be intermittent, resulting in inhomogeneity in space. Measurements in the atmosphere under very stable conditions have also shown oscillatory behavior of turbulent quantities (Coulter 90;Van de Weil et al 01). A number of possible mechanisms causing this have been described previously (Hunt 85;Nappo 91;Mahrt 99). In this study we investigate the dynamics of intermittency and oscillatory behavior using DNS, in order to improve our understanding and turbulence closures. For very stable cases, TKE production is found to drop down to zero resulting in laminarization of the flow field. This causes a drop in wall stress, which in turn allows the flow to accelerate, thus increasing shear culminating with increased production of TKE. The period of variations in TKE from high to low and back is on the order of a few hours, as found in the atmosphere. Dependencies of the period and other properties of the variations on Richardson number are explored.

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