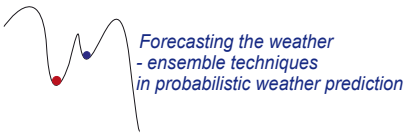
EMS Annual Meeting Abstracts
Vol. 8, EMS2011-607, 2011
11th EMS / 10th ECAM



On the Distortion of Atmospheric Eddy-Correlation Heat-Flux Measurements at Fog Conditions

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At fog conditions, there is significant transformation of internal energy due to phase changes of water (evaporation/condensation) in the air parcels undergoing adiabatic vertical turbulent motion at scales with significant compression/expansion effects. This transformation reduces the temperature-effect of adiabatic compression/expansion along the vertical path, so that eddy-correlation measurement of vertical heat flux is biased. In consequence, continuous-turbulence neutral-stability situations are measured as unstable (upward heat flux). Instability is overestimated and stability is underestimated, including wrong-sign cases at small stability. The quantitative effect is formulated and demonstrated in application to results for the Obukhov length.