8th International Conference on Fog, Fog Collection and Dew
Taipei, Taiwan, 14–19 July 2019
IFDA2019-5

The relationship between radiation fog, dew formation and turbulence, determined using data from the LANFEX field campaign.

Jeremy Price
UK Meteorological Office, Met Research Unit Cardington, Shortstown, United Kingdom (jeremy.price@metoffice.gov.uk)

The LANFEX campaign included an 18 month long field trial in a region of small hills (Shropshire, UK), that were extensively instrumented at a number of sites, to investigate how subtle interactions between processes affected the formation of radiation fog and dewfall. Given sufficient clear-sky nocturnal radiative-cooling, the data have quantified three turbulence regimes which favour either fog or dew formation, or when neither are likely to form. For example, radiation fog was never observed to form in these regions when the vertical velocity variance, σ_w^2, exceeded 0.005 m^2s^2. In contrast, dew deposition was measured to be greatest when vertical velocity variance $0.005 < \sigma_w^2 < 0.01$ m^2s^2. This result appears to be a response to how efficiently saturation (i.e. RH of the air) is transported to the surface. When turbulence intensity was relatively high, downward sensible heat fluxes, offsetting the nocturnal radiative cooling, were sufficient to prevent the surface reaching the dewpoint temperature of the air, such that dewfall was not instigated. At lower turbulence intensity, the sensible heat fluxes to the surface were reduced, and the surface reached dew point temperature, allowing dewfall to occur, but the air above the surface remained sub-saturated and fog did not form. When turbulence intensity levels fell to very low values, the efficiency of transport of air to the surface reduced, such that dewfall rates reduced. This allowed air at higher levels to saturate and fog to form. Various data are presented to quantitatively illustrate these findings.