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Examination of temperature spectra in stably stratified boundary layers measured using nano-scale probe FIONA SPENCER, University of Washington, TYLER VAN BUREN, University of Delaware, ALEXANDER J SMITS, Princeton University, OWEN WILLIAMS, University of Washington — Thermally stable turbulent boundary layers are prevalent in the polar regions and nocturnal atmospheric surface layer but measurements are challenged by changing conditions and small fluxes. Here, we examine the influence of increasing stratification on the spectrum of temperature fluctuations in a laboratory-scale boundary layer over a rough surface. A nanoscale cold-wire (T-NSTAP) is employed to significantly increase frequency response and resolution compared to conventional cold-wires. This method is used to examine boundary layer conditions from near-neutral, through to the collapse of turbulence. This novel dataset allows examination of changes to temperature spectra, their energy cascade and wall-normal locations of maximum spectral energy in both inner and semi-local coordinates. These results when compared to atmospheric data, provide insights into the separation of Reynolds and Richardson number influences.

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