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Diurnal and Seasonal Relationships between Nocturnal Cooling and Meteorological Parameters: Validation Using Observation Data

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Abstract

We investigated diurnal and seasonal relationships between nocturnal cooling and meteorological parameters by using 5-year observation data from the NARO Tohoku Agricultural Research Center, Japan. Multiple regression analysis between nocturnal cooling (T_{noc}) and meteorological parameters (total net radiation, Rn_{tot} ; total weak-wind duration, Wd_{tot} ; and snow depth, SD) revealed that Rn_{tot} and Wd_{tot} dominantly contributed to T_{noc} . Diurnal relationships among T_{noc} , Rn_{tot} , and Wd_{tot} suggested that a strong temperature drop occurred not only on calm nights but also at nights when weak wind conditions lasted at least a few hours. In addition, in the warm season, correlation coefficients between T_{noc} and Rn_{tot} were nearly the same in every Wd_{tot} category. In the cold season, however, those coefficients varied with Wd_{tot} . We attributed this difference to the strong, synoptic-scale winds that accompanied cold and warm advection in the cold season.

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