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Climate Variability and Local Land Use in the Upper Midwest[1]

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— We have analyzed the longitudinal weather records from 12 distinct weather stations in Minnesota and the Dakotas in conjunction with long-term changes in land use in those locations including diurnal temperature range, precipitation, daily maximum, minimum, and mean temperatures and other data. The land types include rural cultivated land, urban areas and forest. One motivation for this study was to investigate the role of the transition from prairie land to high-evapo-transpiration crops such as soy and corn. The weather records were obtained from the National Climatic Data Center of the National Oceanic and Atmospheric Administration. We observe an increase in the extreme minimum temperatures throughout all months of the year. The increase in minimum temperatures is most pronounced for the northern-most locations in the dataset and for the winter months. Consistent with similar observations from other US locations, the mean daily temperature range has a decreasing trend for all non-urban locations. Urban locations are showing clear heat-island effects of increases in all temperature markers but no significant variations in daily temperature range. No significant difference in trends was found between cultivated and forested locations.

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