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Exploring Patterns in November Snowfall Using GIS Mapping and Analysis

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Exploring Patterns in November Snowfall Using GIS Mapping and Analysis

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A Geographic Information System (GIS) analysis was generated to examine patterns in November snowfall climatology for 47 observing stations surrounding Lake Michigan. Snowfall data compiled for each year from 1950 to 2012 was mapped using an interpolation method called kriging, which is a spatial analyst tool. Some of the data mapped includes average snowfall for the Lake Michigan region, number of days with measurable snowfall, number of days with snow on the ground, and correlation between snowfall and temperature. Overall, these maps show maximums in north-central and southwestern Michigan decreasing to the south, as expected. The first three loadings of principal component analysis were also mapped using the same data. Principle Component 1 (PC1) explains most of the data variance and shows that northern and southwestern Michigan do not correlate with areas on the western side of the lake, illustrating that the amount of snow that northern Michigan receives doesn't correspond to the amount of snow that Chicago receives and vice versa. Once this primary pattern is captured, the second principal component shows an inverse relationship between the main NW and SW lake-effect regions in Michigan and the third principal component reflects the influence of snowfall from synoptic systems NW of Lake Michigan.

Information about the Authors:
Dana Koning is a senior meteorology major who loves all types of weather, but has had a particular affinity for snow since she was young. Dana was excited to be able to use her knowledge of GIS to analyze snowfall patterns and correlation to temperature. In the future, she would like to further her knowledge of GIS and apply those skills to other aspects of meteorology. After graduation, Dana hopes to find a job utilizing her degree in the private or public sector. Alex Carne is a junior meteorology major who has had a passion for weather throughout his whole life. Through the years, he has gained a great interest in winter weather and snow, leading him to take on the challenge of a lake-effect snow research project. He learned how to use GIS and helped to create various maps of lake-effect snow patterns across the Lake Michigan region. After graduation, Alex hopes to attend graduate school, and ultimately aspires to have a career in either operational forecasting or research meteorology. Dr. Bharath Ganesh Babu is a GIS professor in the Geography and Meteorology Department. He assisted Dana and Alex in overcoming any issues they came across with the ArcGIS software and creating a geodatabase that would be compatible with their data.

Faculty Sponsor: Dr. Bharath Ganesh Babu

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