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March, 2004

A correlation study of wind speeds at Norski Runs and Valders Hall of Science

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A Correlation Study of Wind Speeds at Norski Runs and Valders Hall of Science

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Photograph of Hill Anemometer

INTRODUCTION

- 1976 and 1977 wind speeds were recorded from the roof of Valders Hall of Science, Luther College, Decorah, Iowa in a correlation study of wind-sun energy.
- Summer 2004 wind speeds and directions were recorded with the hopes of correlating the speeds at Valders Hall of Science and at Norski Runs, Chattahoochee County Park, Decorah, Iowa, a site for a potential Luther College wind farm.
- Motivation behind the study was to determine if topology of Upper Iowa River Valley affected wind speeds.

MATERIALS AND METHODS

- Anemometers from Davis Instruments Vantage Pro™ Weather Stations were mounted on lengths of 2" well piping, with 60 feet of pipe at the Hill site and 23 feet at Valders.
- The Hill anemometer was positioned at 1127 feet above sea level, while the Valders anemometer was at 1002 feet.
- Each anemometer was connected to a Weatherlink system that recorded both wind speed and direction data at intervals mainly of one minute.
- Data were downloaded from the Weatherlink onto a laptop computer and transferred to Microsoft Excel for analysis.
- Thirty minute moving averages of the wind speeds were calculated for each site.
- A ratio of the Hill speed versus the Valders speed in relation to Valders speed was then calculated and charted.



Photograph of Tree with Hill Anemometer

RESULTS

- A correlation was found, but it was highly specific to wind direction.
- For Northwest winds the correlation shows the Hill speed to be more than twice the speed at Valders.

DISCUSSION

- Only data for which the wind speed was greater than two miles per hour at both sites were included in the analysis.
- The system determines wind direction in terms of 16 sectors, however the equipment appeared to malfunction in one of the sectors and the data from that sector was eliminated.
- At the Hill site there are a great number of trees that undoubtedly influence the air flow at the level of the anemometer.
- At Valders there are not only several sizable trees within a 500 yard radius of the site but also three large buildings that most certainly affect the air currents.
- The observatory on the roof of Valders might also have influenced the readings, especially on evenings when the roof was opened.

FUTURE RESEARCH

- Wind speeds must be measured at heights above the influence of trees, preferably at that of a potential turbine.
- Further analysis of the effects of topology must be performed.
- It must be determined whether or not the difference in elevation explains the increase in wind speeds.

ACKNOWLEDGMENTS

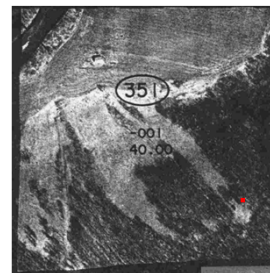
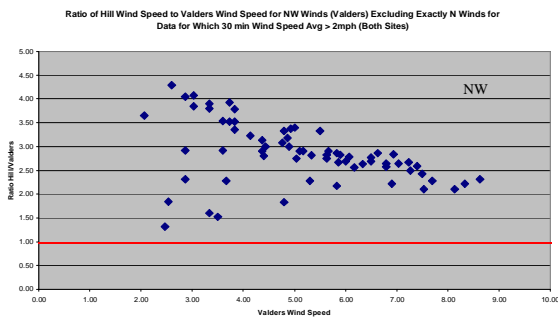
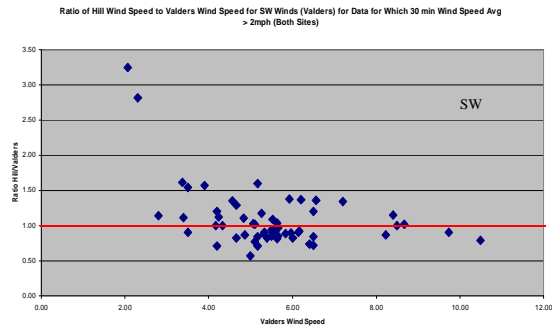
- Financial support for this summer undergraduate research project was provided by a grant from the Lancy Foundation to study Winneshiek County environmental land use issues.
- We would like to thank Facilities Management, in particular Jay Uthoff, for all of their help in constructing and erecting the Hill anemometer.
- A special thank you also to the summer researchers who assisted in erecting the first Hill anemometer.



Photograph of Valders Anemometer



Photograph of Valders roof Anemometer



Aerial Photograph of Norski Runs
Study Site Indicated by ■



Map of Study Area
Study Sites Indicated by ■

