Geophysical Research Abstracts,
Vol. 11, EGU2009-2358, 2009
EGU General Assembly 2009

Spatial Predictions of Extreme Wind Speeds over Switzerland using Generalized Additive Models

C. Etienne
(christophe.etienne@unige.ch)

A method to create spatial predictions of wind speeds over Switzerland with values of the 98th percentile of daily maximum wind speeds (W98) has been investigated. From the Swiss meteorological stations weather data, Generalized Additive Models (GAMs) have been used to predict these extreme wind speeds.
Physical factors describing the highly heterogeneous landscape of Switzerland and likely to have an influence on wind flows were introduced in the regression process with the help of GIS tools. A cross-validation model selection was used to select a final model. Bootstrap methods were applied to assess errors, leading to mean and standard deviation predictions of W98 values. The resulting prediction gives convincing values of the W98. Effects of topography are evident on the results. Wind speeds are increasing with altitude and are greatest on mountain peaks in the Alps. Errors calculated on the meteorological stations do not exceed 30%, and only 12 out of 70 stations have errors above 20%.
Combination of GIS technology and modern statistical models to predict a highly uncertain variable such as extreme wind speeds gives interesting results. These results will be included in windstorm damage functions that generally use normalized wind speeds to assess damage related to a strong wind event. Work will be investigated on past windstorms and also linked to future trend under a new climate.