Vulnerability assessment to wind damage in a protective forest stand in the Alps
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INTRODUCTION

Wind is one of the main natural disturbances that threaten mountain forests in Europe, among them protective forests are at risk too.

Assessing wind damage
Post disturbance management
—but how to assess vulnerability to prevent/mitigate wind damage in the Alps?

CASE STUDY

Storm Vaia - 30/10/2018
More than 40'000 ha damaged in 2018
More than 700 ha (20%) damaged in 2018

OBJECTIVE

From LiDAR data to vulnerability maps, using a parametrisation adapted for the alpine scenario

VULNERABILITY ASSESSMENT

We developed a LiDAR-based process to evaluate and map vulnerability to wind damage in an alpine scenario.

The creation of a DoV raster allowed us to observe the effect of the storm Vaia on vulnerability to wind damage, it appeared that:

High severity disturbance -> high vulnerability to future storms
Low severity disturbance -> "thinning" effect, lower vulnerability to future storms

MAIN RESULTS

Models were validated combining vulnerability assessment model (Fg), topographic exposure to wind (TOPEX) and data from the storm Vaia. To validate our results modelled damage were compared to observed damage, creating a confusion matrix. The matrix was used to calculate the Success Index, the model was considered validated when it was higher than a threshold of 0.7, the same threshold was used for the Area Under the Curve (AUC)

When considering a distance from the horizon of 1000 m and winds coming from S<5E and the Si was equal to 0.74 with an AUC for the Receiver Operating Curve (ROC) of 0.79.

MAIN TAKE HOME MESSAGES

More accurate airflow models are needed, multi-disciplinary approach is the key (e.g., meteorologists)
Models can be used to identify new areas at risk after a storm

NEXT STEPS

- Coupling wind risk models (static) with dynamic vegetation models on a landscape scale
- Models can be used for prevention of future disturbances, e.g., simulating different forest management strategies
- Automatic extraction of tree parameters from LiDAR data (species differentiation, dominant height, crown width, distance to the edge)