Hochschule
für nachhaltige Entwicklung
Eberswalde

THÜNEN

FNR
Fachagentur Nachwachsende Rohstoffe e.V.

Gefördert durch:
Bundesministerium für Ernährung und Landwirtschaft
aufgrund eines Beschlusses des Deutschen Bundestages

WINMOL

WINMOL
Detection and Prediction of Forest Storm Damage

Relevance

WINMOL – Detection and Prediction of Forest Storm Damage

Photos: Stuart Krause, Marco Natkhin, Tanja Sanders

Relevance

WINMOL – Detection and Prediction of Forest Storm Damage

Extreme storm events are going to increase over the 21st century (Donet et al. 2011).

Damages to forests have extensive economic, environmental and social consequences!

Photos: Stuart Krause, Marco Natkhin, Tanja Sanders

Relevance

WINMOL – Detection and Prediction of Forest Storm Damage

WINMOL

Developing methods and tools to identify vulnerable forest stands to prevent storm damage and to map storm damaged areas rapidly after the storm event

Photos: Stuart Krause, Marco Natkhin, Tanja Sanders

About the Project

WINMOL – Detection and Prediction of Forest Storm Damage

WINMOL

36 months
July 2020 - June 2023

Project partners

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Co-operation

CoKnow Consulting

Funded by

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About the Project

WINMOL – Detection and Prediction of Forest Storm Damage

WINMOL GOALS

IMPROVE:

STORM RISK MANAGEMENT
Avoidance and reduction of storm damage in managed forests

STORM CRISIS MANAGEMENT
Rapid recording and assessment of storm damaged forests (avoidance of consequential damage)

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Windthrow detection ⟷ **Windthrow prediction**

- ✓Detection of storm affected areas with ESA Copernicus Satellite imagery
- ✓ Assessment of storm damages with UAV images

- ✓Growth models & wind risk models
- ✓ Prediction of the vulnerability to storm incidents
- ✓ Vulnerability maps

CoKnow Consulting

Evaluation and communication

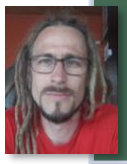
Project Team

WINMOL – Detection and Prediction of Forest Storm Damage

HNEE

Prof. Dr. Jan-Peter Mund
Overall project lead

Nicole Albert
Project coordinator and scientific researcher

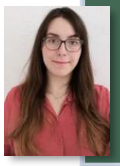


Stefan Reder
Scientific researcher

Ramazan Bülbül
FST student intern

Thünen

Dr. Marco Natkhin
Head of project at TI

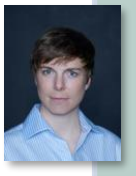


Catrin Stadelmann
Scientific researcher

Line Grottian
Scientific researcher

CoKnow

Dr. Jennifer Hauck
Scientific researcher and coach



Dr. Jennifer Schmidt
Scientific researcher and coach

Tasks Team - HNEE

Detection of storm damages (ESA Copernicus Satellite imagery)

Assessment of storm damages (UAV)

„Digital Twins“ of undamaged stands (wearable laser scanner)

MAIN TASKS

- Localization
- Quantification
- Derivation of parameters for the modeling

- Data collection
- Data pre-processing
- Data processing
- Semi-automated process chains

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Project Status Report – Team HNEE

Detection - Sentinel 1 SAR

- **Active Sensor**
- **Change Detection**
- **Large scale**

Assessment – UAV

- **Automated flight plans**
- **Neural Networks**
- **Intermediate scale**

Reference – WLS

- **3D - Inventory**
- **Segmentation**
- **Small scale**

Milestones and Outlook – Team HNEE

- Survey with foresters
- Collection of historical windthrow data (SAR and UAV)
- Proof of concept – Detection of windthrown stems with NN

- Publication of intermediate results (Conferences and Journals)
- Collection of storm data (Sentinel 1, UAV and WLS data)
- Development and improvement of semi-automated process chains

Tasks Team – Thünen

Calculate the wind damage risk for Germany with ForestGALES

Combine ForestGALES and the tree growth model BWINPro

Create an easy to use tool for detecting at-risk areas

MAIN TASKS

- Parametrizing the models for German conditions
- Calculating the vulnerability for central European stands
- Analyzing the transferability and usability for practical forestry

- Literature Analysis
- Interviews
- Data Collection
- Analyzing Data with R

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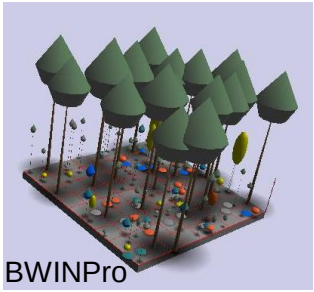
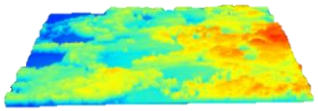
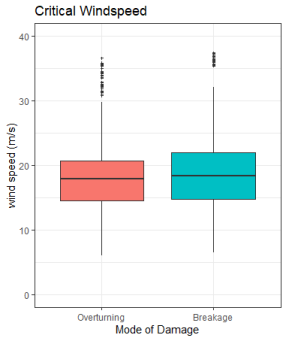


BWINPro



LiDAR



Storm data analysis

Project Status Report – Team Thünen

Working with the models

- Compiling existing storm and tree data
- Processing the input data to fit the model requirements
- Creating the model set-up in R
- Parametrizing the models for Germany
- Finding connections between the models

Insights from the interviews…

… help us understand how to present our results

How can we cover different scales?
Which data are we using?
How can we ensure practicability?

Data availability → no recent storm events means no current data

Latest Project updates: *https://winmol.thuenen.de/aktuelles/* *(Webpage in German)*

Milestones and Outlook – Team Thünen

- Several Interviews with modelling experts
- Collecting Datasets to train the models
  - airborne LiDAR, gust speeds, tree and stand characteristics, …
- Testing the models
- Preliminary coupling of the models with R

- Present intermediate results at the FOWITA Conference
- Complete model parametrization for German conditions
- Validate the model output with data from previous storm events
- Create vulnerability maps for stakeholders

Topics for Theses

You would like to work with us?

Topics for Theses 1)

The WINMOL research team at the **HNEE** is searching for one candidate to conduct the **research project and/or Bachelors‘ thesis:**

Topic: **Qualitative and quantitative analysis of questionnaire and interview data**
Literature review on pre- and post-storm management of forestry practitioners

- General interest in social scientific research
- German language skills
- Literature review in English language
- Sound knowledge of descriptive statistics

Contact:

Stefan.Reder@hnee.de

Topics for Theses 2)

The WINMOL research team at the **HNEE** is searching for two candidates to conduct their **research project and/or Masters‘ thesis:**

Topics on SAR and optical remote sensing

- General interest in the topic
- GIS & Remote Sensing skills (optical & SAR)
- Programming skills (Python, R)
- Sound knowledge of statistics

Contact:

Nicole.Albert@hnee.de

Websites

Find out more about us online and feel free to contact us!

https://winmol.thuenen.de/

https://www.fnr.de/presse/pressemitteilungen/aktuelle-mitteilungen/aktuelle-nachricht/risiken-und-folgen-von-stuermen-minimieren

https://www.it4forest.de/

https://www.thuenen.de/de/wo/

https://www.coknow.de/

Thank you very much!