



Monitoring of the forest cover dynamics in the Tatra National Park using remote sensing data and GEOBIA approach – the case study of the windstorm of December 2013 in the Western Polish Tatra



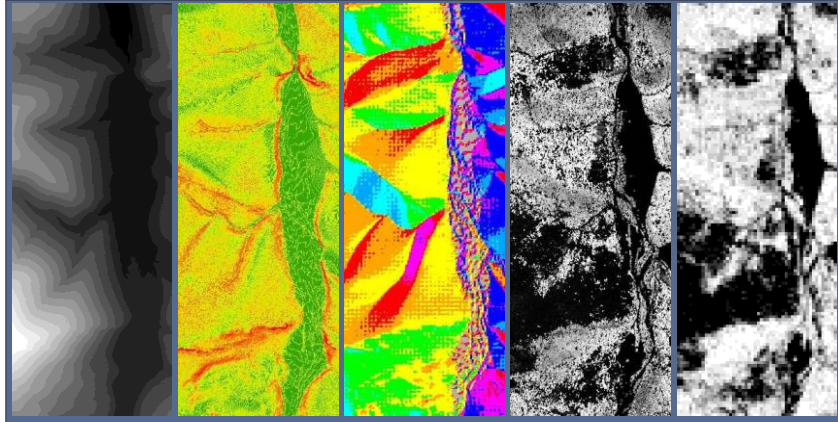
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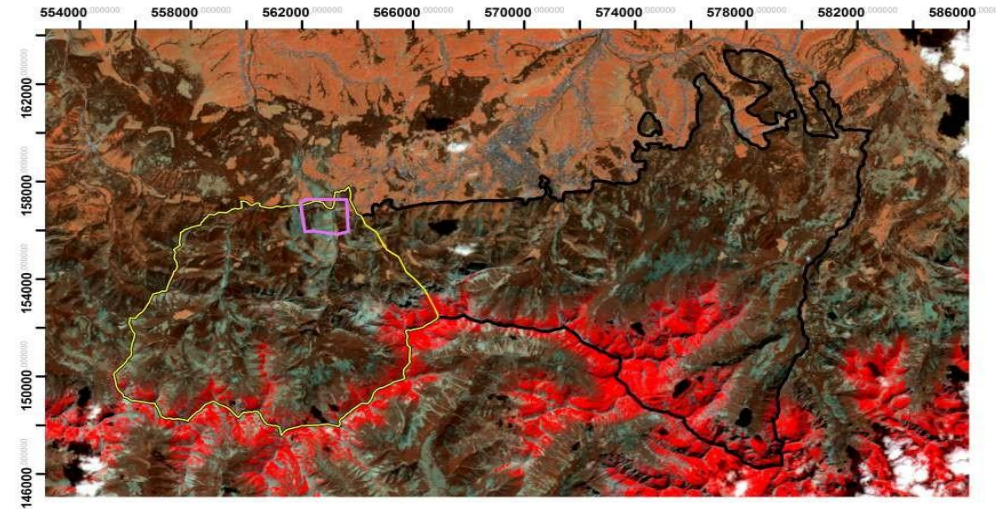
Introduction

- Damages taking place in the Norway spruce forests in Europe in the last decades, are mostly an effect of the windstorms or bark beetle attacks.
- The aim of the study was mapping the Norway spruce stands damaged by heavy windstorm (speed of 176 km/h) on December 25, 2013 in Western Polish Tatra Mts.



Maps derived from ALS data (2012)
(from left to right): DTM, Slope, Aspect, nDSM
and canopy cover

Study area Western Tatras (Tatra National Park; TPN) in Southern Poland, covering an area of approximately 7.652 ha.



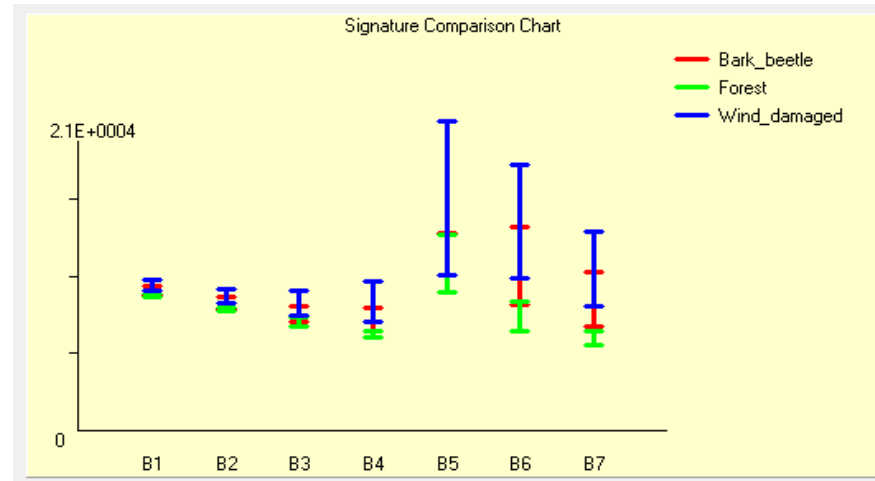
GEODATA

- Landsat 8 LDCM (May 2013);
- Landsat 8 LDCM (May 2014);
- ALS data, ISOK project (September 2012);
- BlackBride, RapidEye; GSD 5.0 m (August 2011).



Classification – OBIA approach

- Using eCognition (TRIMBLE) software, segmentation was carried out. Forested areas before the disturbance was delimited with BlackBride (RapidEye; GSD 5.0 m, 2011) satellite imagery. The spectral differences between the two Landsat datasets (May 2013 - May 2014) were considered as variables.
- The spectral signature of Landsat 8 suggested that Bands 3, 4, 6 and 7 could be considered in the detection of wind damaged. However, the spectral difference between health forest and wind damages in Band 7 was enough for detecting the disturbances.



Results

- The windstorm devastated approx. 274.6 ha, representing the 7% of the forest areas in test study decreasing the forest cover to 43.1%.
- The p95 metrics (correspond to the forest upper height) derived from normalised ALS point cloud, was 31.0 m, suggesting that destroyed spruce stands were in mature phase.
- Based on ALS we found out, that damaged forests were characterized with similar canopy cover and relative area of gaps (mean cover value was 60.1% and 65.4%, and relative area of gaps was 41.5% and 36.55% for damaged forests and remaining forests respectively).

