

## Development of a remote sensing based fast response system to support the management of storm calamities in forests



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### **Abstract:**

In consequence of heavy storm events in forests, the crisis management aims to a contemporary refurbishment of storm damages to provide further problems. Forest crisis managers have to consider extensive information to wind throw areas (e.g. size, location, timber volume) to insert available resources reasonably. Therefore, a fast detection of windthrow areas in forests is of a high interest. Remote sensing data combined with geographic information systems (GIS) analysis techniques are supposed to lead to an efficient and cost reducing crisis management.

The project ‚Fast Response‘, funded by the Federal Ministry of Economics and Energy (BMWi), aims to allocate a concept supporting the storm crisis management in Bavarian and Austrian forests with remotely sensed methods. The concept is based on three consecutive process steps:

- 1.) An early storm detection, based on long term weather forecast models, aims to identify and track upcoming storm events that would affect the observation area. This will be the basis to acquire satellite data.
- 2.) With the remote sensing data two independent change detections will be conducted. First a fast estimation of the extent and location of windthrow areas on a large scale within three days. Second a detailed one to provide substantial information about them after two weeks by using different data sets. A mandatory step to reach the temporal objectives is to automate this processes as far as possible.
- 3.) The subsequent GIS-analysis combines the detected windthrow areas with previously generated forest maps (e.g. tree distribution) and geodata (e.g. digital terrain models, etc.). This will lead to additional information of the affected areas (e.g. expected timber losses and logistic aspects).

A first change detection test was conducted in summer 2014 on a test site of the Austrian federal forest enterprise (ÖBf) in Austria. A logging was monitored with both TerraSAR-X (fast estimation) and WorldView-2 (detailed estimation) data. The results are reasonable and showed the applicability of SAR and optical data for the purposes of the project. The final concept will be supplemented with forest maps and refurbishment strategies for different storm scenarios as a thread for the crisis managers.

### **FastResponse**

**Duration:** 01.09.2013 – 31.05.2016

**Data source:** TerraSAR-X,  
Sentinel-1, RADARSAT-2, RapidEye,  
WorldView-2

**Support program:** Copernicus services  
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