Object-based automatic change detection in forested areas of Poland between 2000 and 2006 using NDVI times series at moderate resolution.

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In the framework of the Geoland2 project, the Seasonal and Annual Change Monitoring Service (SATChMo) was initiated in order to close the gap between low-resolution global coverage and the high-resolution land cover (LC) and land cover change (LCC) parameters.
The SM-14 product aims at developing timely continental and dynamic land cover change indicator maps over Europe and Africa, at moderate resolution. These land cover specific maps indicate where a major land cover change occurs but do not aim to identify the type of change. It can refer to land cover classes as well as to major events affecting temporarily the land surface such as flooding events, volcano, large burnt scarce, etc.

In this context, this work applied an automatic and probabilistic change detection algorithm to spot changed objects of the forest of Poland between 2000 and 2006. By the adjustment of the change thresholds, this algorithm allows producing change probability maps rather than binary change/no change according to the needs of end-users.

A multispectral segmentation simultaneously using yearly 250m MODIS composites of NDVI of 2000 and 2006 was applied over the coniferous forest defined by the Corine Land Cover 2000 map. This produced spatially homogeneous objects with similar behaviour over time. Under the hypothesis of minor changes in the study area, each object is statistically compared to an unchanged reference using the Mahalanobis distance. All the objects detected as changed by this trimming procedure are then flagged and spatially represented as a change probability map.

An assessment of correct detection was performed by confronting the detected changed objects to the Corine Land Cover Change Map 2000-2006. Results show a strong dependency between agreements and the size of changed objects. Both user's and producer's accuracy improve with bigger objects. In the assessment of accurate coverage, taking into account the 250m MODIS pixels and assuming the low reliability of small objects, objects with a size inferior to 25ha were removed from the analysis. According to the probability threshold the area of correctly changed objects reached up to 80%.

This study showed the possibility to automatically detect changes in coniferous forest at moderate resolution and according to different probability thresholds. It also underlined the limitation in the effectiveness of the detection when using 250m pixel. However, as the methodology is independent from the sensor and the main limitation underlined here above was the spatial resolution, the use Sentinel 2 data is expected to significantly improve change detection results.