Newsletter

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The research leading to these results has received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 262786 EUFODOS

A message from the coordinators

By Klaus Granica, Joanneum Research

Dear EUFODOS users and project partners, welcome to the seventh issue of the EUFODOS Newsletter.

The EUFODOS coordinators can report the successful achievements of the objectives for the first 18 months. During the progress meeting in Vienna from 19th – 20th June 2012 the REA project officer and the evaluator followed the presentations of the service providers, who reported about the first products in their testcases. The beneficiaries showed the demonstration products and gave a forecast on the second Phase of EUFODOS. On the following day, 21st June, a user workshop was held and coordinated by EAA. During this workshop the Pros and Cons of Phase 1 were intensively discussed amongst users and service providers. Additionally, future perspectives were anticipated by both parties and an engaged program for Phase 2 was finally scheduled.

The coordinators thank all participants for a fruitful cooperation and especially REA for its guiding role with great support for EUFODOS.

EUFODOS project partners at the Interim Meeting, 20.06.2012 in Vienna, Austria. (Photo: S. Linser).

In this issue

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EUFODOS - Enhancing satellite-based forest monitoring capabilities in Poland using RapidEye data

By A. Marx, RapidEye AG, and R. Bałazy, Forestry Office Świeradów

The 668 km² test area of the Polish service case is defined by the administrative boundaries of the forestry districts Świeradów and Szklarska Poręba, both belonging to the state forest directorate of Wrocław. It is situated in the Sudety Mountains, in the three country triangle Poland, Czech Republic and Germany, which was in the 1980`s called the "black triangle", when its forests were strongly affected by polluting agents of the heavily industrialized cities of the surrounding. Today, the situation has strongly improved, however, some forest stands have not yet entirely recovered and are prone to various stress effects. The terrain is characterised by low mountain ranges not exceeding 1126m. Typical main tree species are Norway spruce, European larch, Scots pine, European beech, mountain maple, birch and aspen.

User Requirements

The Forestry Office Świeradów expressed a high interest in testing together with RapidEye in the framework of the EUFODOS project satellite-based technologies, which could potentially contribute to their operational business. Recent technological developments are an integral part of the user´s business which becomes apparent when considering the availability of a GIS lab in their premises, the use of GPS devices in the daily work of the foresters and the availability of a very high resolution digital elevation model derived from a LIDAR survey covering the entire forest district.

The Forestry Office Świeradów and RapidEye defined in a fruitful discussion the service- and product developments being of highest interest and documented them in a Service Level Agreement. These were in particular the products "Forest Cover Map", "Storm Damage Map" and "Forest Vitality Map". In this sequence, the Forest Cover Map has a high priority.

"Forest Cover" is defined as the forest area covered by green vital trees. The application cases of this product are versatile: Apart from being useful for highly accurate updates of the stocked and non-stocked forest areas within the boundaries of the state forest, the Forestry Office can obtain "fresh" information about the private forest, too. Private forests are managed by local civil administration but sometimes they entrusts it to the Polish State Forests. In this case, it is important for the state forest offices to know were the private forest areas exactly are and how their current status is. Moreover, the Forest Cover Map serves as a mandatory and crucial input for all further space-borne forest monitoring activities focusing on the stocked forest area. In the presented service case this applies to Storm Damage Mapping and Forest Vitality Mapping. Storm Damage

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Mapping requires "before storm"- imagery with an acquisition date as close as possible to the storm event. For the "before storm"- imagery, the Forest Cover Map is processed. It serves as a mask under which the "before and the after storm"- imagery will be compared, so that accurate detection of the wind fall and wind break areas within the forest can be accomplished. In the case of Forest Vitality Mapping, a yearly update of the Forest Cover is meaningful.

Figure 1: State Forest Boundaries (red lines) of the forest district Świeradów draped over aerial ortho image; some forest patches are privately owned and therefore not recorded as vector polygons in the state forest GIS data base (Source: Nadleśnictwo Świeradów).

Figure 2: GMES core service EL-04 Forest Area (yellow) visualized together with state forest boundaries and aerial ortho image; the forest is not captured fully (Sources: Nadleśnictwo Świeradów, geoland2-origin GAF AG).

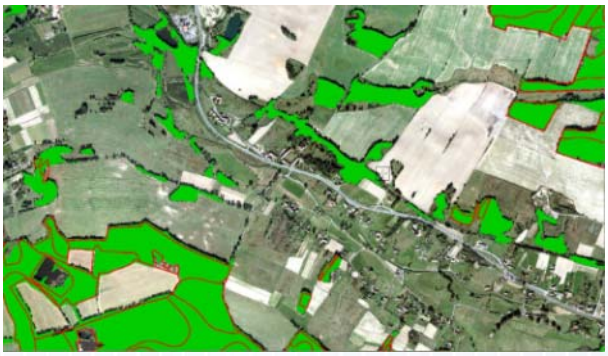

Figure 3: RapidEye Forest Cover Mapping result (green) visualized together with state forest boundaries and aerial ortho image; the forest including small privately owned forest patches is well captured (Sources: Nadleśnictwo Świeradów, RapidEye AG).

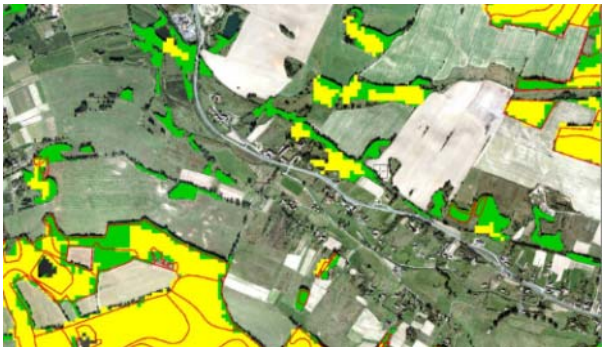

Figure 4: Visual comparison of state forest boundaries (red lines), the GMES core service product EL-04a Forest Area (yellow) and the RapidEye Forest Cover Mapping result (green) (Sources: Nadleśnictwo Świeradów, RapidEye AG, geoland2-origin GAF AG).

Enhanced GMES service quality needed

A Forest Cover Map is already available as a GMES core service product EL-04a Forest Area. Its production is based on IRS LISS-3, Spot4 and Spot5 scenes from the reference year 2006. The Minimum Mapping Unit accounts for 0.5 hectares and the pixel size is 20m. Such product was ordered for the project area, examined and assessed and found insufficient to fulfill the operational needs of the foresters. For this reason, an alternative method using RapidEye images of the year 2012 was developed, yielding very high accuracies. While the product EL-04a is derived from thresholding of the GMES core service product EL-05 Forest Density which is based on ground samples and a logistic regression model, the alternative method utilizes a machine learning algorithm (C5) and samples extracted from the RapidEye images by visual interpretation. At a Minimum Mapping Unit of 0.2 hectares and 5m pixel size, the forest could be mapped with 98 % accuracy.

Benefits of Rapid Eye Data

The results suggest that using RapidEye data, higher accuracies at a smaller Minimum Mapping Unit and at higher geometric resolution can be achieved when compared to the existing GMES core service product. As a conclusion, RapidEye is a suitable data source for enhanced GMES service quality for the product EL-04 Forest Area. The question of how much the alternative analysis method contributes to the enhanced results remains is still to be answered.

EUFODOS Website

http://www.eufodos.info/