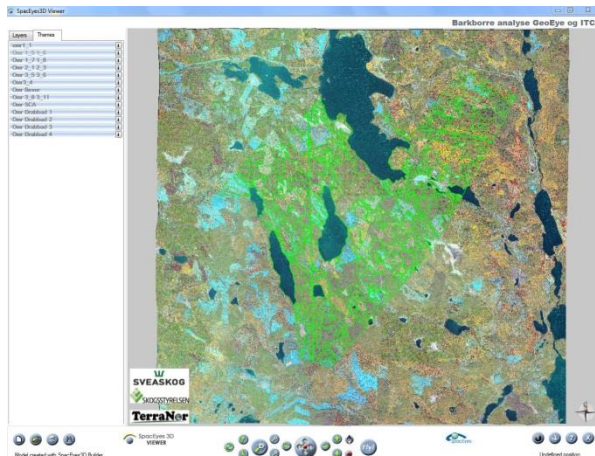


How to detect *Ips typographus* L., Spruce bark beetle on GeoEye imagery?

The beetle is only 6 mm long and is a difficult to view on a GeoEye image. So how can we find it? We don't, we can only see the result of their work. And that is very easy on infrared images.

In 2011 Swedish authorities Skogsstyrelsen together with several large Swedish forest companies wanted to detect attacks from *Ips typographus* on forests in Northern Sweden. The Norwegian company TerraNor was hired to do a remote sensing analysis of the attacked forests. With use of data from GeoEye and ADS 80 (Leica), individual sick and dead trees were detected in addition to species spruce, pine and deciduous. The detection result was good.

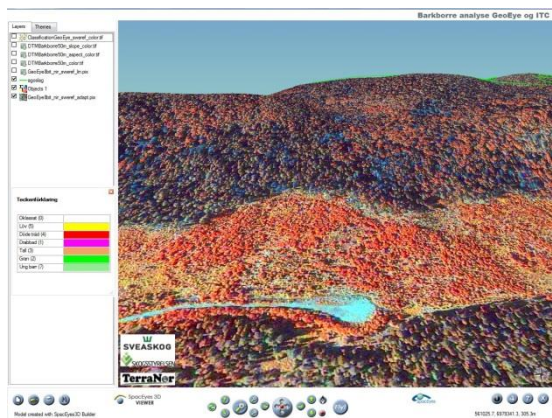


The area is between Sundsvall and Östersund. Both datasets were captured with 50 cm resolution. The area covered by GeoEye was 25*25km. Leica ADS 80 covered a little larger area.

2 methods were used. GeoEye was analyzed with ITC technology developed by Canadian forest service. The same methodology is currently used for a large forest disease attack in Eastern Canada.

Leica ADS 80 data was analyzed by use of eCognition. Both methods used field samples. eCognition turned out to be the simplest to implement and use by foresters.

The difference in result from the 2 datasets and methodologies is minor. The satellite dataset has fewer clouds than the aerial. For special projects like this, it is easier to capture good images with satellites than with aerial photography. Northern Europe has lots of clouds during summer and flying must be planned well ahead while the satellite can capture parts of the area when the area is cloud free.



This area visualized in 3D shows many sick and dead trees. We visited this area by foot. According to the Swedish foresters most of the trees in this area had died a natural death and not been killed by the beetles. The beetles come in when the trees are weak and start their attack from there. The bark beetle will normally attack weakened trees. It is very easy to see this on the satellite images. Trees standing next to clear cut dry out and are attacked by the beetles. The beetles in these trees produce a huge amount of grubs that grow up and attack all other trees in the forest in large quantities as seen on the 2 images below. Notice the dead trees – blue – along the forest clear cut.

Nils Erik Jørgensen, Forester, TerraNor.

