

ON THE CASE

EARSC HAS CREATED A NEW SERIES OF ANALYSES, LOOKING AT THE BENEFITS OF USING COPERNICUS EARTH OBSERVATION DATA. HERE, **GEOFF SAWYER** LOOKS AT THE FIRST IN THE SERIES – AGRICULTURE

Last year, we published three cases analysing the benefits arising from using Copernicus Sentinel data. These were all based on a methodology that traced the impact of the use of one EO product along a value-chain.

This year, we are happy to bring the first of our new series of analyses. For the first case, we went to Denmark and looked at one of their strongest sectors – agriculture. If there is one sector benefiting from the availability of the free and open Sentinel data, it is agriculture. Everywhere we look, there seem to be new companies springing up with products to support farmers or other parts of the agriculture business. But given the importance of the sector to the Danish economy, it seems appropriate we start there.

The service in question is Fieldsense, which is also the name of the company that provides it. Fieldsense offer farmers an online service through fixed or mobile platforms that allows them to identify areas of their fields where there is an anomaly. This allows the farmer to focus his time to investigate areas where problems are probable.

Fieldsense has a really strong focus on information to aid decision-making for cereal farmers. Satellite data is the key data source to provide their service. Data from Sentinel 2 (A and B) is gathered every five days over Denmark, allowing a regular coverage during

the growing season from May to July even accounting for cloudy conditions. The imagery is processed using a variant of the NDVI algorithm into stress maps, which are overlaid onto the farm field boundaries. A ground resolution of around 15m allows field sizes of 5ha and above to be analysed. The service is generally targeted at farm sizes of 50ha and above.

If the crop-stress reaches a certain level, then an alert is sent to the farmer. The alert allows the farmer to further investigate the

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cause of the stress and hence to react. By comparing the images received at regular intervals, the evolution of the situation can be seen. This gives valuable clues as to the cause of the problem in the field and saves the farmers time on inspections (crop scouting), reduces the use of chemicals and increases yield by enabling earlier detection of a problem. It also helps farmers gain a 'digital picture' of their farm, improving overall management practices.

Benefits today are modest, but the potential is high. Fieldsense serves around

3% of the farming land in Denmark devoted to cereals. It is also early on the technology capability curve meaning that much more significant benefits are expected in the future as improved algorithms coupled with machine learning and artificial intelligence allow higher reliability to determine the cause of the stress without farmers scouting (or visual inspections). The stress maps are used to derive rate maps, which can be ingested directly into the tractor. With accurate location information, this enables precise application

of the right amount of chemicals. Remote farming from the office starts to become reality!

Benefits accrue to the farmer through reduced costs of chemicals and time saved. These benefits are very much focused on the farmer, although in time some of the benefit may be shared with others in the value-chain. Other service providers are following different models which distribute benefits differently. The value-chain may change with time as players who are suppliers to the farmers look to expand their role.



Denmark's Fieldsense provides farmers with an online service through fixed or mobile platforms that allows them to identify areas of their fields where there is an anomaly. Photo © Fieldsense

The financial benefits for farmers are clear and lie in the range of €3-€7 per hectare per annum (phpa), rising to a full potential of €45 phpa in the future. With nearly 1.2 million ha of cereal crops, the potential benefit to the farming sector in Denmark is between €3.8m and €54m every year, once all the potential can be realised.

In the case, we have interviewed players at the core of the value chain in

order to develop a close understanding of the use of Sentinel data and the impact on farming in Denmark.

Fieldsense is just one service in this market and we hope in the future to contrast what is done in Denmark with other countries.

Geoff Sawyer is EARSC secretary general (www.earsc.org)



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