

# How can TRUTHS help with Land Cover mapping?

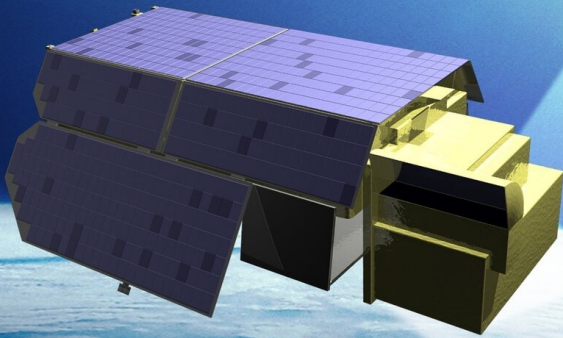


Image credit: Airbus Space and Defence UK

## The challenge

Land cover is defined as (bio)-physical cover on the Earth's surface. Changes in land cover, driven by changes in land use, alter carbon stocks (above- and below-ground biomass, soil carbon, etc.), which is equivalent to emitting/removing greenhouse gases (GHGs) to/from the atmosphere.

Estimates of carbon stock changes associated with land use are documented in annual national GHG inventory reports. These reports help to keep track of countries' progress in reducing their GHGs emissions. The land use sector stands out among other sectors covered in these reports as it is the only sector that has GHG removal capabilities, e.g. through afforestation, peatland restoration, etc. These capabilities are becoming even more relevant in view of net-zero pledges made by more than 90 countries.



Figure 1: Copernicus Sentinel-2 image [1] from 19 April 2020 over Scotland, UK.

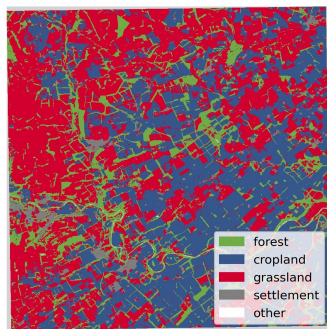


Figure 2. UK land cover map 2020 [2] converted to a land use map following the national inventory protocol [3].

## How remote sensing from satellites can help

Land cover/land use changes are monitored using land cover maps, which are produced by applying a classification algorithm to surface reflectance measurements performed by satellites. No measurement is perfect. Measured surface reflectance has uncertainties associated with it. These uncertainties should be well understood and characterised as they propagate through the classification algorithm to the resultant land cover map and affect its quality.

## How TRUTHS will be able to help

In addition to its own measurements TRUTHS will act as a low-uncertainty calibration anchor for satellites commonly used for land cover mapping. Such calibration will improve the quality of surface reflectance measurements performed by these satellites and will

*TRUTHS is a climate focused satellite mission, led by the UK Space Agency (UKSA) in partnership with several European states*

Additionally, acting as a calibration source for multiple satellites, TRUTHS will help to better harmonise their measurements. This will address another problem faced by land cover map producers – insufficient temporal and spatial coverage by individual satellites, as a lot of data has to be discarded due to cloud contamination.

## What we are doing now

At the moment, NPL is working on understanding the impacts of various sources of uncertainties associated with different steps of land cover map production, and propagating land cover map uncertainties further to downstream products, such as carbon stock estimates of the land use sector.