

The Region Growing Plugin

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Purpose

- The purpose of this QGIS Plugin is to allow a user to click anywhere within an RGB drone image and similarly coloured pixels will automatically selected.
- This provides a quick and easy way to generate training data which can be used for image classification.

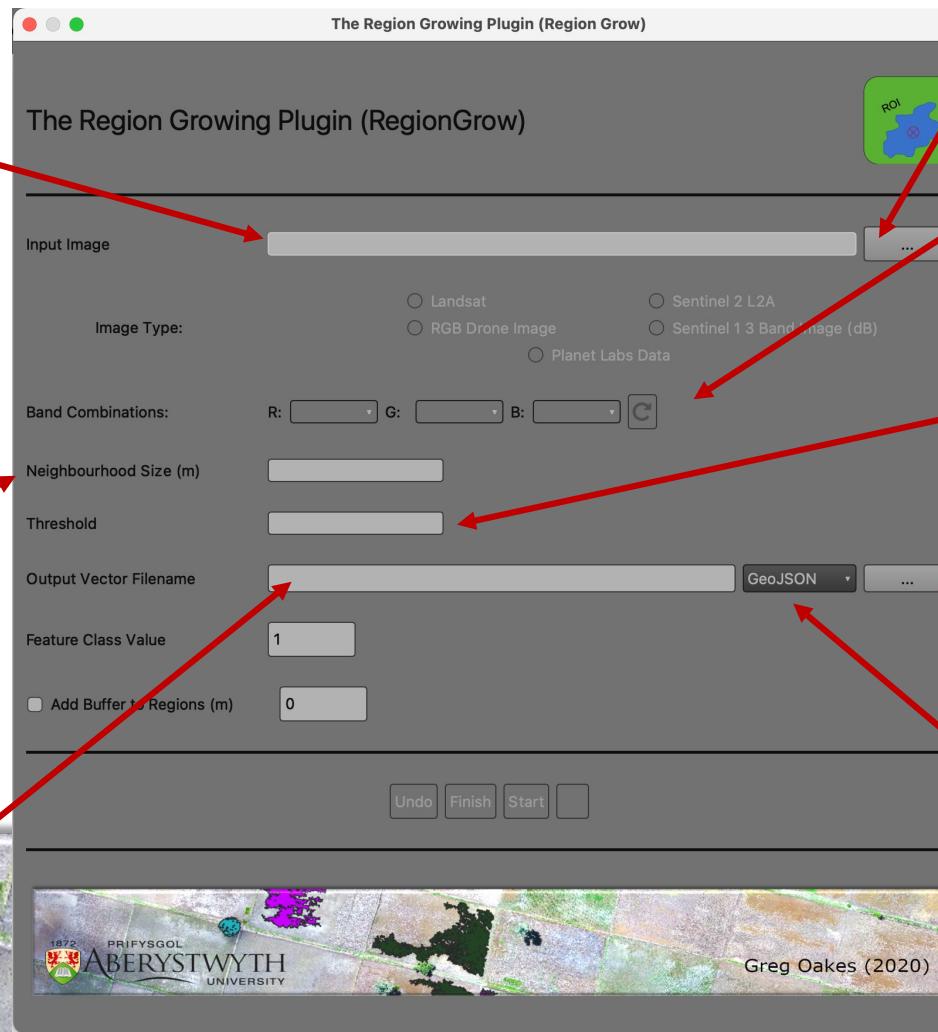


Main User Interface

Input Image Type, Either
RGB Drone Image, Sentinel
1 3 band image (usually
VV, VH and VV/VH), or
multispectral optical
(Landsat, Sentinel 2 or
PlanetLabs)

Size of the neighbourhood
to grow around the clicked
point to search for like
pixels. A suggested
neighbourhood size is
automatically entered
when an image type is
selected

Output Vector filename.
This will be saved in the
same directory as the
input imagery.



Select Input Imagery

Band combination
selection for multiband
optical imagery. This can
be dynamically updated
while digitising

Like Pixel Threshold, a
higher value will include
more dissimilar pixels, a
lower value gives a
stricter selection of like
pixels.

Select output vector
dataset

Output Vector Datatype

Main User Interface

Class value to add to the attribute table of the output dataset for the next feature to be digitised.

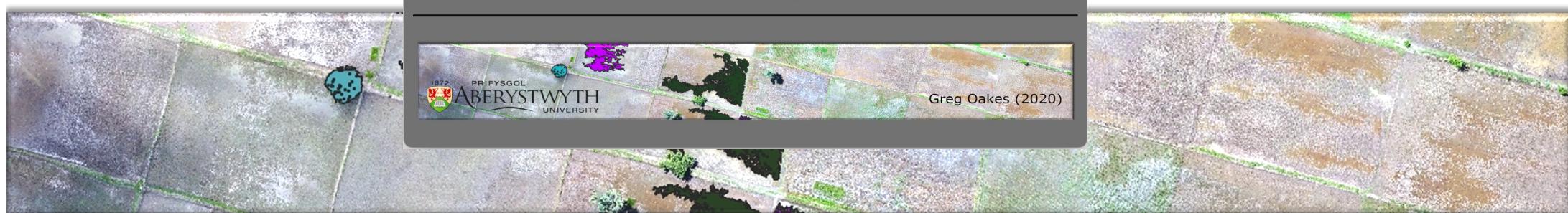
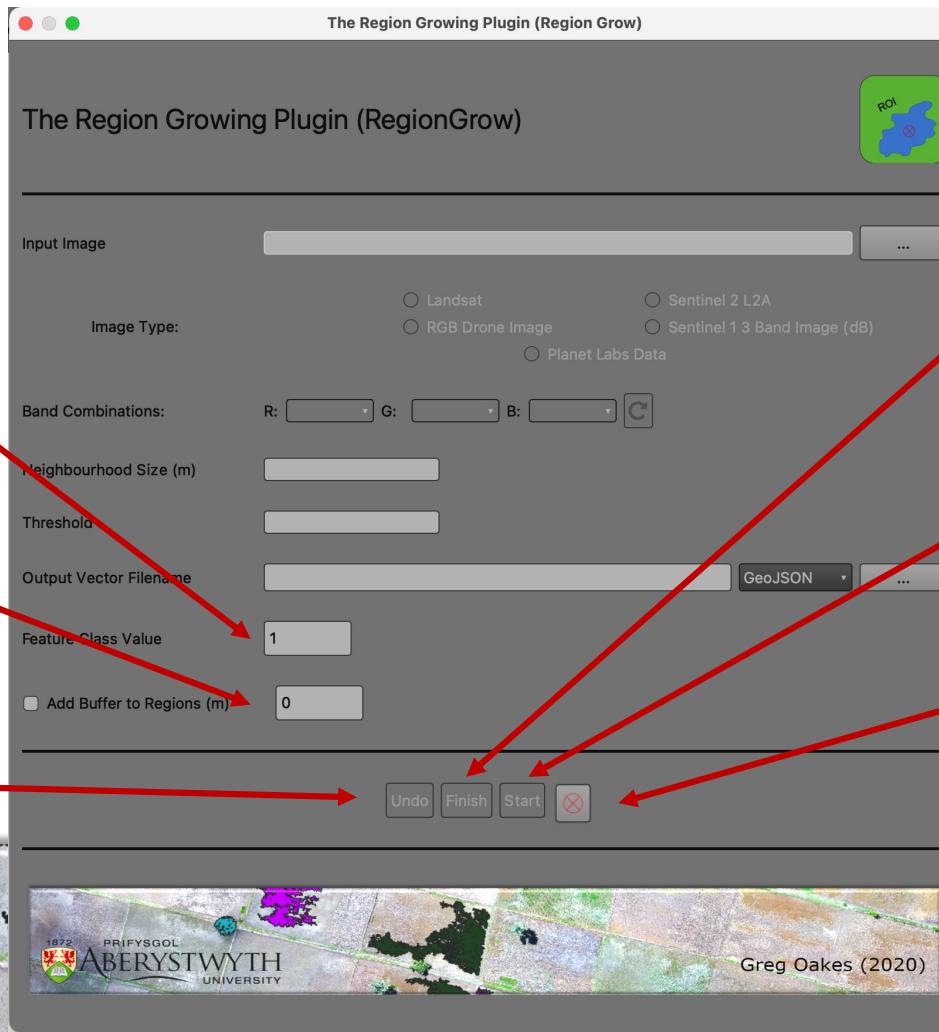
Add an optional buffer to each feature of a specified distance.

Remove the previous feature.

Create the final dataset and close plugin.

Start the region growing plugin.

Reactivate Point and Click Tool.

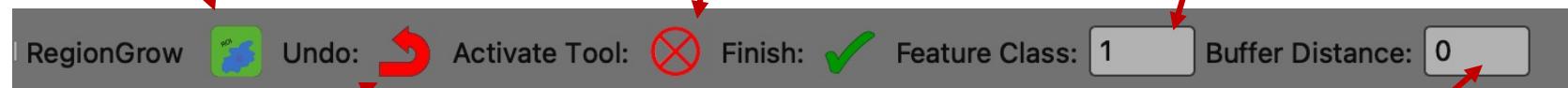


Main User Interface – Toolbar

Open the main user interface dialogue box

Reactivate the point and click tool

Class value to add to the attribute table of the output dataset for the next feature to be digitised. This can be dynamically updated during digitisation



Remove the previously digitised feature

Create the final dataset and close the plugin

Add an optional buffer to each feature of a specified distance. The 'Add Buffer' checkbox must be selected in the main region grow dialogue box



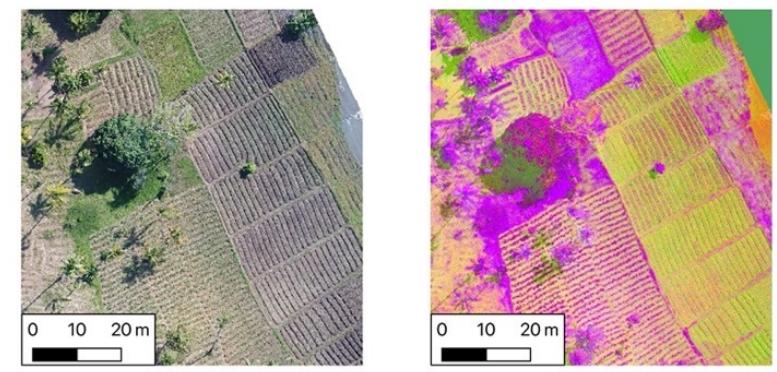
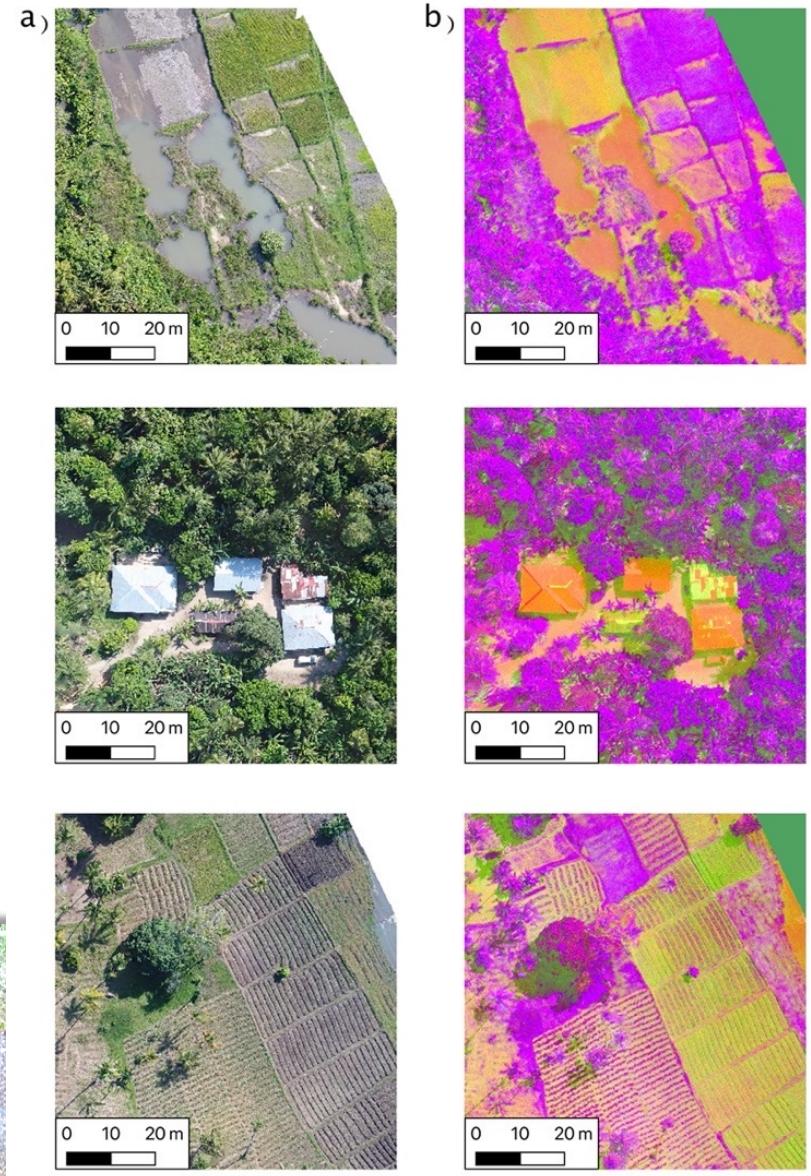
Map Navigation

- The Map can be navigated using the keyboard arrow keys and the zoom level changed by using the mouse scroll wheel.
- If you use the QGIS navigation tools in the toolbar you will deactivate the plugin map clicking tool, this can be reactivated by clicking the “Reactivate Point Click Tool”



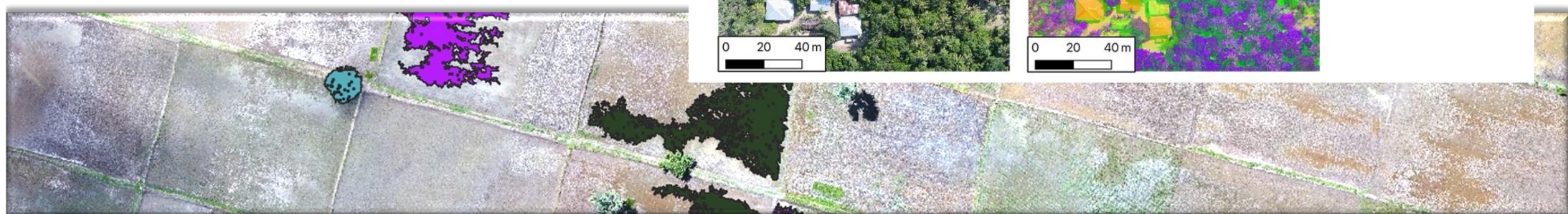
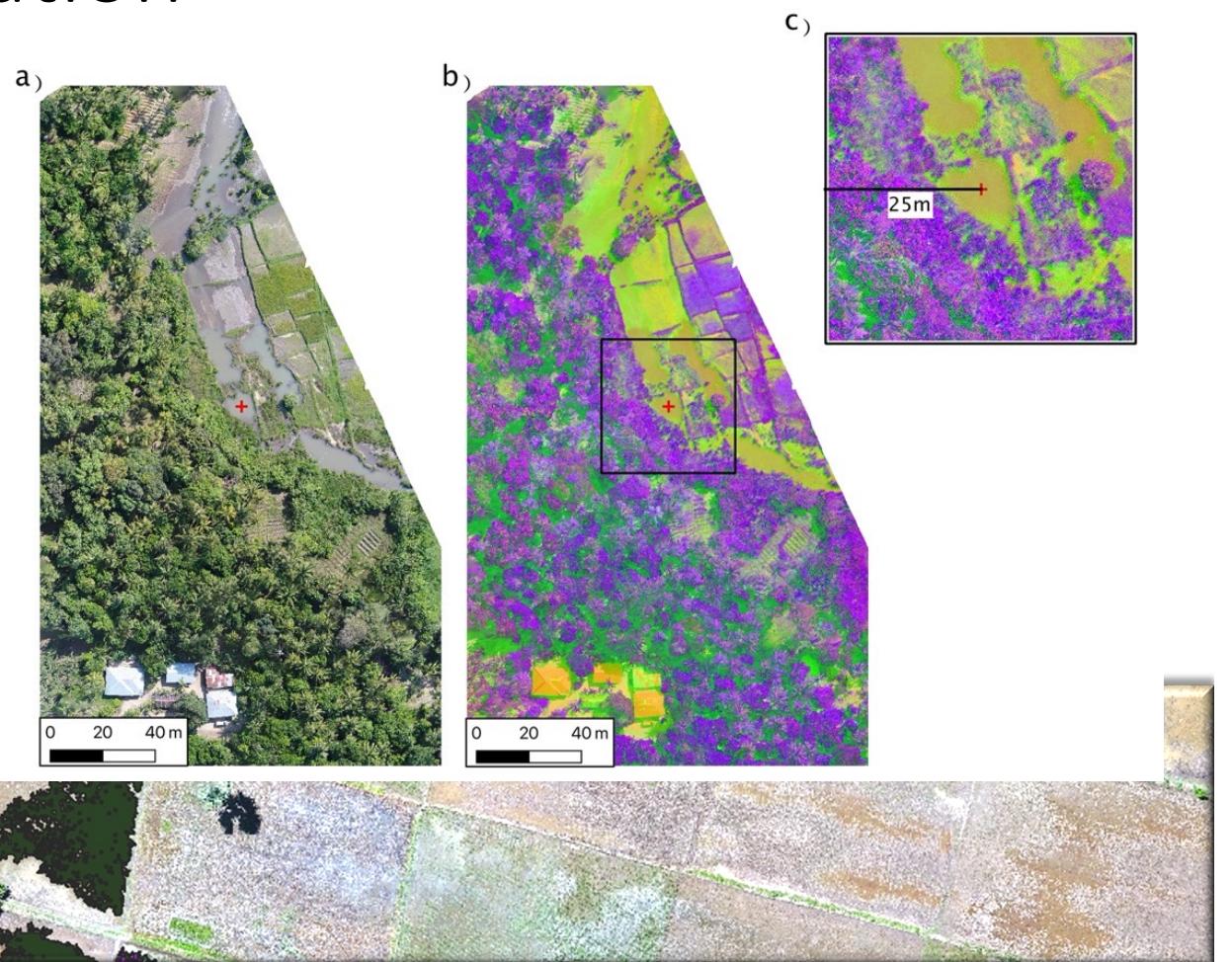
Principle Of Operation for Drone Imagery – LAB Colour Transformation

- RGB drone imagery is transformed into an LAB colour space, but still displayed to the user as RGB
- An L*A*B* colour space allows for each pixel to be represented in an XYZ coordinate system.
- The LAB colour space is different to RGB as pixels values are a component of:
 - L = Lightness between 0 - 100
 - A = Position on a Green – Red Spectrum
 - B = Position on a Yellow – Blue Spectrum



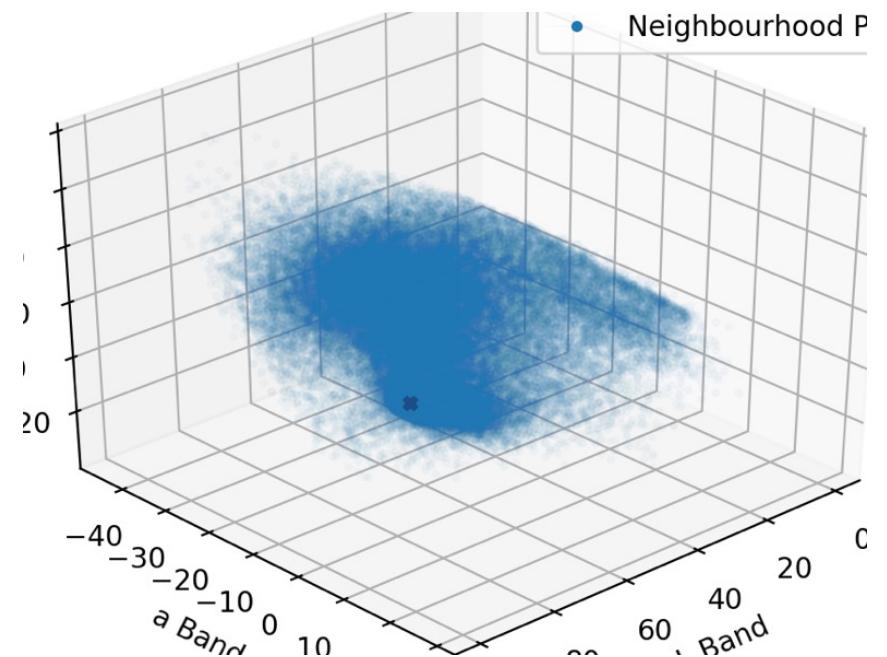
Principle Of Operation for Drone Imagery – LAB Colour Transformation

- When a user clicks the map a subset of the L*A*B* image is formed.
- The size of the window is defined by the user.
- In this window is where like pixels will be found.



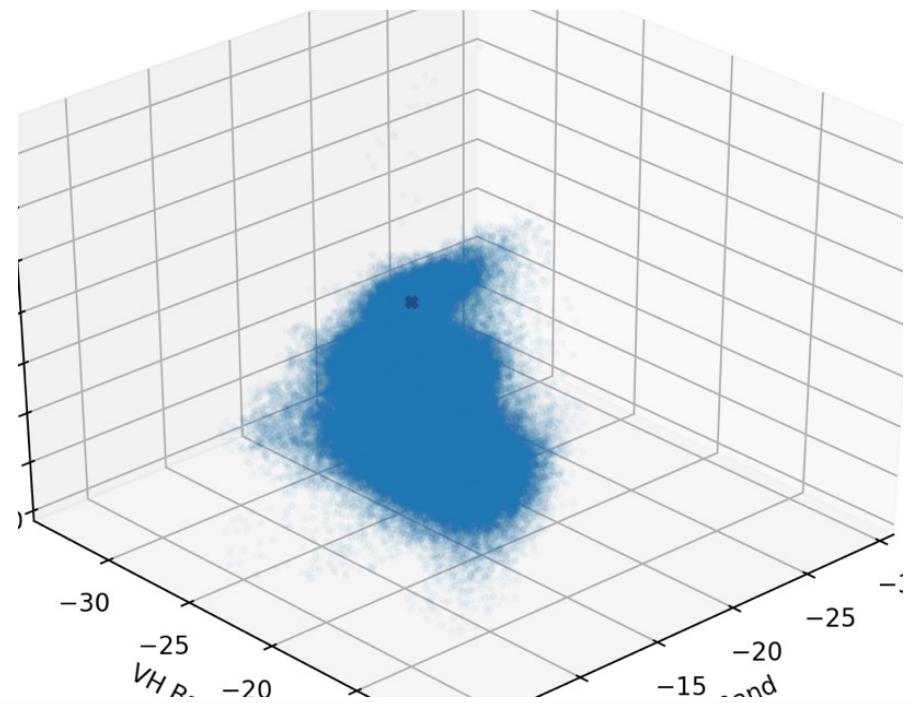
Principle Of Operation Drone Imagery – LAB Feature Space

- All pixels within the neighbourhood window are then plotted into an L*A*B* feature space.
- The L*A*B* values of the pixel clicked by the user is also plotted.
- The Euclidean distance between each pixel in the feature space and the pixel clicked by the user is calculated.



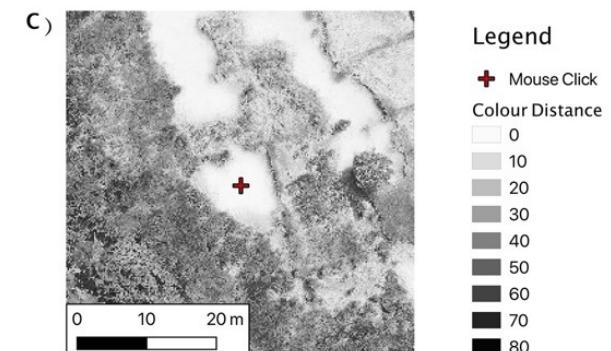
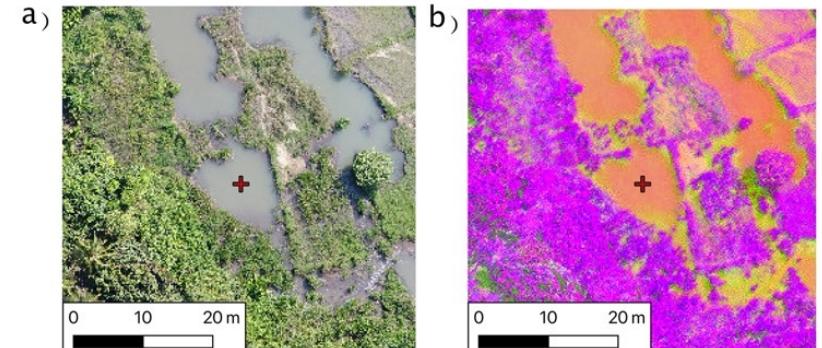
Principle Of Operation Radar and Multispectral Imagery – Pixel Value Feature Space

- For radar and multispectral data the pixel values are already expressed as floating point numbers which can be expressed in an XYZ feature space.
- These pixel values do not need to be transformed into a different colour space.
- The Euclidean distance between each pixel in the feature space and the pixel clicked by the user is calculated.



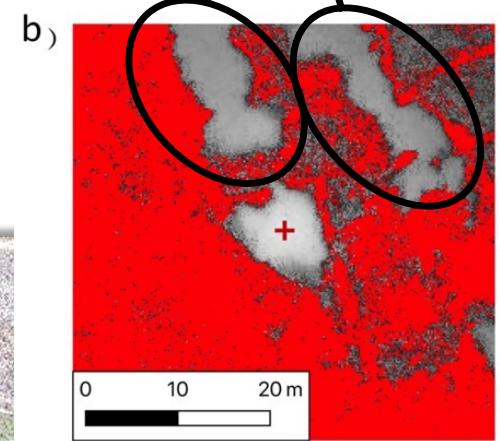
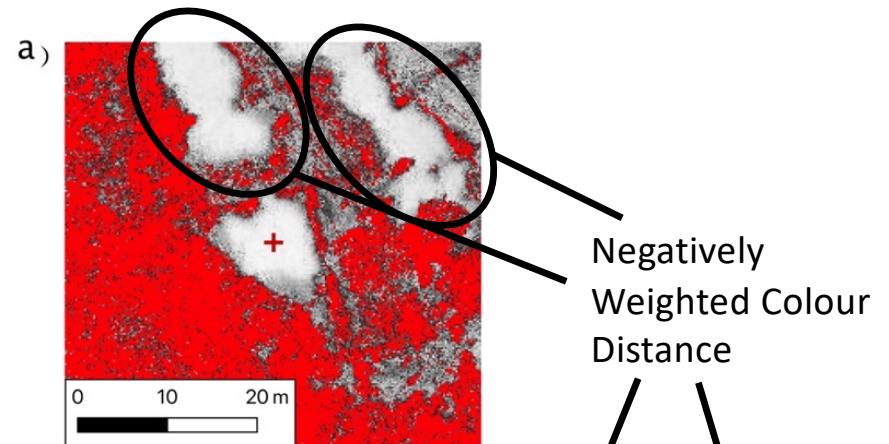
Principle Of Operation – Colour Distance

- Pixels which have a similar colour will be expected to appear close to the user clicked pixel in the feature space.
- These similar pixels will therefore have a low colour distance.
- This is independent of where those pixels are spatially within the neighbourhood window.



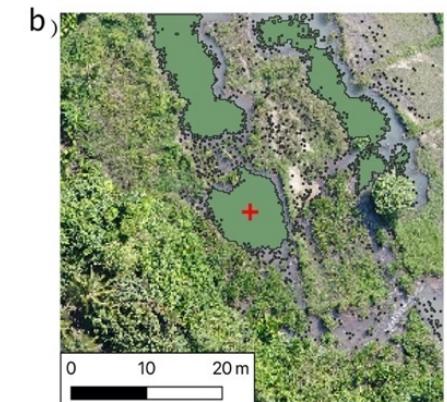
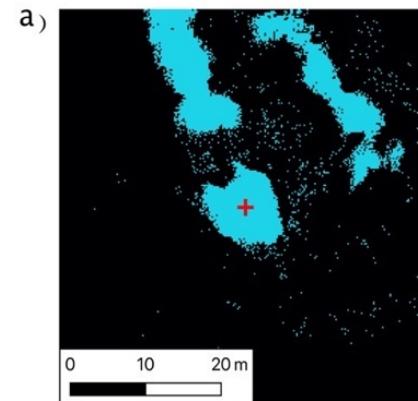
Principle Of Operation – Spatial Weighting

- Pixels are spatially weighted based on how far away they are from the user clicked pixel.
- Pixels further away from the user's click, which may be a similar colour but a different object have their colour distance increased.



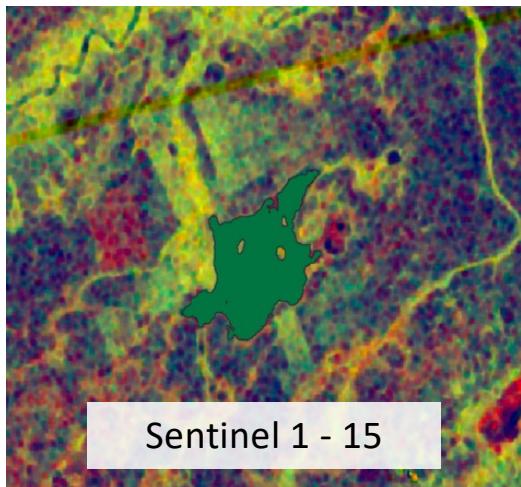
Principle Of Operation – Colour Distance Thresholding

- The colour distance image has a user defined threshold applied to determine pixels which are similar after weighting.
- The user defined threshold value determines how like or unlike pixels need to be to be considered as one feature.
- The threshold Value is dependent on the input imagery.

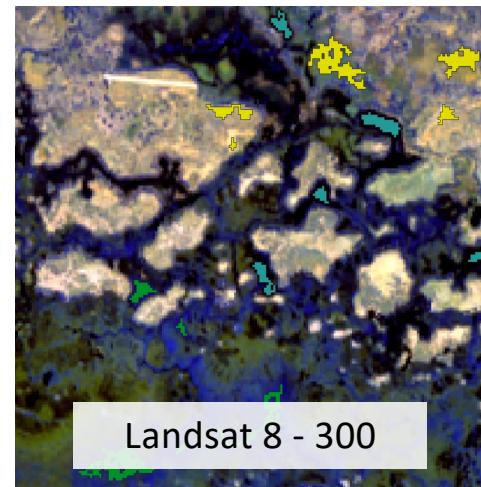


Principle Of Operation – Colour Distance Thresholding

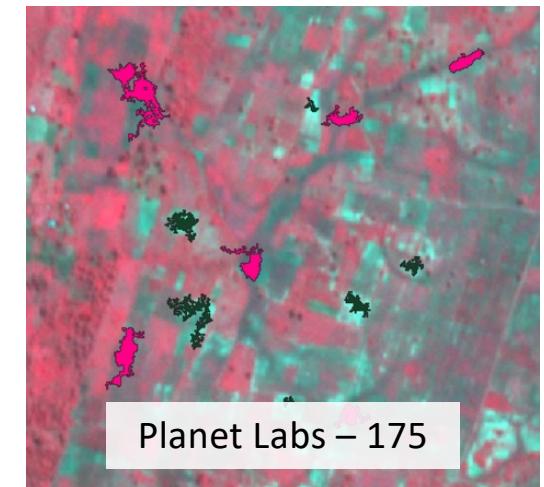
- The range of pixel values in the input image determines the threshold value which should be used, and a suggestion is automatically provided.



Sentinel 1 - 15



Landsat 8 - 300

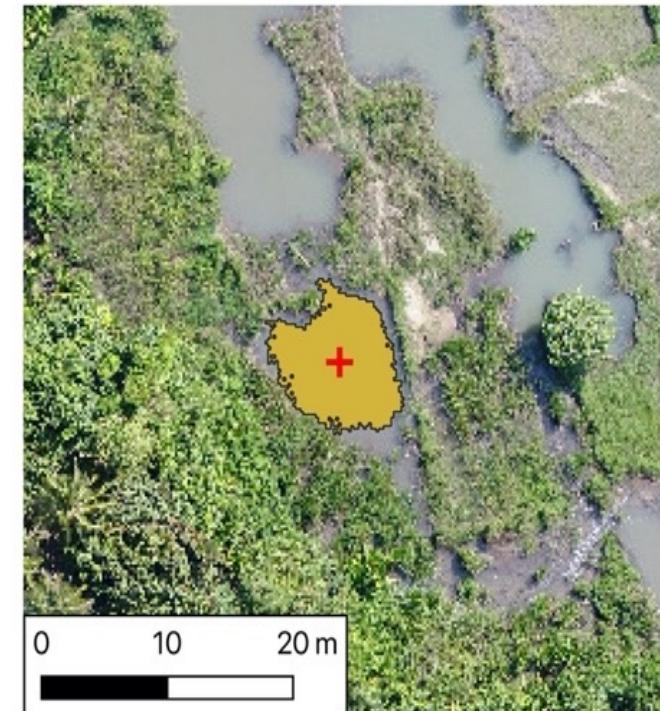


Planet Labs – 175

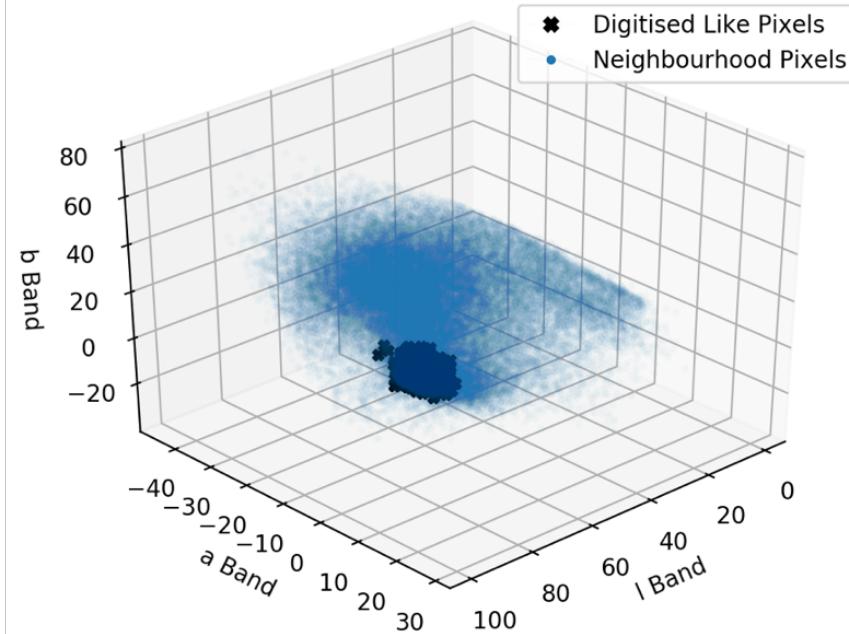
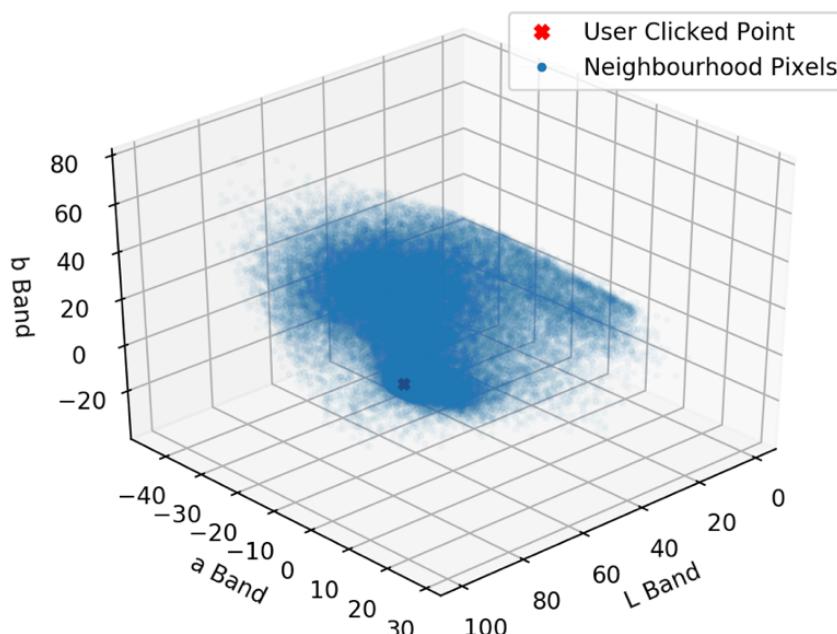


Principle Of Operation – Vector Dataset Intersection

- The plugin will commonly identify many objects, containing similar pixels, as well as some single pixels.
- To remove these an intersection is made between the user clicked point and the vector dataset.
- These leaves a digitised feature at the location the user has clicked containing similarly coloured pixels.



Identified Pixels in the LAB Feature Space



Pixels which have been digitised with the tool can be seen to cluster around the location of the user's mouse click.

