Manaaki Whenua
Landcare Research

High Flyers - Advanced Remote Sensing Aotearoa

The following questions were asked during our live webinar with John Dymond. Due to time restrictions, we were unable to answer all question during the session.

The questions have been broken down in to sections including vegetation, pasture, wetlands and LiDAR.

Vegetation

What would it take/cost to map individual kauri in a region?

Uncertain at this stage. We think WorldView 2 imagery is necessary and this costs approximately $30/km2 which comes to about $150K just for imagery for the Auckland region

What are the indicators of stress for the Kauri trees? Color and canopy height from lidar?

Essentially kauri leaves become less green. This is difficult to detect at an early stage, but easy when the tree is dead.
See Remote Sens. 2020, 12, 1906; doi:10.3390/rs12121906

What causes the beech gap?

Historical climate change. Beech is re-establishing less quickly then other species after the ice age.

How would the indigenous forest classes be determined in the new proposed data layer? Using Wiser's classifications?

See Remote Sens. 2019, 11, 1911; doi:10.3390/rs11161911 for the likely indigenous forest classes to be rolled out in national layer

How will you discern between different types of indigenous trees?

Indigenous trees have different spectral signatures.
See Remote Sens. 2019, 11, 1911; doi:10.3390/rs11161911

How accurate is the system for detecting wilding conifers in Native forest?

Able to detect mature wilding stands but not accurate enough for early detection.

Is it relatively straightforward to identify changes in vegetation types over time e.g. vegetation clearance, replacement of tussock or shrubland with pasture?
Could this be done on an annualised basis to allow councils to more quickly identify vegetation clearance issues, particularly of indigenous vegetation?

Yes, it is easy to identify changes, and we already use this to prioritise update mapping in the LCDB. The difficulty for automation is to determine the meaning behind the change. This is a work in progress.

How are native species distinguished from introduced species?

Exotic forest is easily differentiated from native because it is homogenous and dark in red reflectance.

Layers for Exotic cover would be hugely beneficial to industry. Have you any plans/intentions to develop layer(s) for these?

Different types of exotic trees such as eucalypts, willows, poplars, Douglas fir, are difficult to map.

Pasture

How do you measure "pasture productivity"?

Pasture productivity is the average amount of dry matter that a pasture produces in a year. It is measured by cutting pasture in stock excluded areas (usually a cage). We relate mean annual pasture productivity to median NDVI. It is measured as tonnes of dry matter/hectare/year.

Can the pasture productivity layer be produced timely enough to do drought impact monitoring? Is the information readily available?

The pasture productivity layer is a long-term average of tonnes of dry matter/ ha/yr.

How is recent grazing accounted for in the pasture productivity layer?

The calibration between measured productivity and median NDVI of satellite imagery is developed on grazed systems.

Do you also use the mask to distinguish between pasture and indigenous grasses?

Questions & Answers

Yes, currently we use the LCDB to distinguish between pasture and tussock grasslands, and we hope to map several types of tussock grasslands.

The pasture productivity information would have great value for farmers. How can they access this information?

We will be putting this information on our LRIS portal for public access in a few months.

LiDAR

In which end use case was LiDAR the most important parameter for analyses?

In the large tree inventory use case.
See Forests 2018, 9, 702; doi:10.3390/f9110702

Is your LIDAR inventory of published/accessible anywhere?

We are going to make it accessible in a few months' time.

What sort of cost is associated with getting this sort of LIDAR/spectral data? Do you have a cost per square kilometre?

Of the order of $20 million for all NZ. See https://foresttech.events/nz14m-to-expand-lidar-mapping-across-nz/

How do you distinguish individual trees using LiDAR?

The algorithm looks for treetops (i.e. local maxima) and then cascades down local points assigning them to the crown associated with the tree top.
See Forests 2018, 9, 702; doi:10.3390/f9110702

Wetlands

Which data is used in wetland mapping and when is this expected to be available?

LCDB5 maps freshwater wetlands down to 1ha already. These will be combined with the WONI wetland database to provide revised extent of wetlands down to 1ha. This will be released within a year.

How are wetland areas delineated?

Currently wetlands are delineated manually by an operator looking at a sequence of satellite images over the last 20 years.

What can be distinguished along the coastline? Can you identify mangroves, erosion, and/or encroachment due to sea level rise?

Yes, mangroves are easily seen. Coastline changes of greater than 10m can be detected. Smaller than that needs aerial photography.

Will your new wetlands layer detect wetlands down to 0.5 ha?

Currently wetlands are delineated down to 1ha.

Is it possible to map agal content of rivers and lakes?

Yes, I believe it would be.

Other Questions

Can you please explain monthly bare ground for soil erosion monitoring?

This work is being written up for submission to a science journal. Once submitted in a few months we could give you an early copy.

Monthly bare ground: Can I get the monthly changes in bare land?

Yes, it is possible from the raw data. Currently we summarise the average % bare ground over the winter period (for winter forage grazing) or over a year (for forestry).

What are the clouds replaced with once they are removed?

Codes are inserted which mean no-data. Mosaics of multiple satellite images do not use the no-data code.

How is this different from LINZ basemaps?

LINZ has very basic vegetation information on basemaps.

Can the stored carbon content of the trees be estimated from this information?

Yes, carbon content can be estimated to a certain level of accuracy from LiDAR.
See Coomes et al. Forest Ecosystems (2018) 5:10
DOI 10.1186/s40663-017-0119-6