Remote Sensing – more than meets the eye webinar series 2023

Directing predator control from space: using satellites to detect beech tree flowering

The following questions were asked during our live webinar with Ben Jolly but due to time restrictions, we were unable to answer these in the session.

You mentioned you've only just finished collating the 2022 data- what is the timeline between satellite imagery being taken and map outputs being available for the people who need to see it (i.e. DOC decision makers)?

I may have mis-spoken, our usual turnaround for creating a 'final' map of a given Spring season is mid-December.

Do you have goals for improvement in this area? Or plans on how this tool will develop?

It would be good to include different satellite data sources to increase the temporal resolution of our image sequence. We could also investigate further fine-tuning, improved cloud detection, and incorporating more ground data.

Is there a study correlation on the Masting and Wild Animals movement / presence over a certain area?

These are the studies we used in the paper: Elliott, G.; Kemp, J. Large-scale pest control in New Zealand beech forests. Ecol. Manag. Restor. 2016, 17, 200Ð209.

Ruscoe, W.A.; Pech, R.P. Rodent Outbreaks: Ecology and Impacts. In Rodent Outbreaks: Ecology and Impacts; Singleton, G., Belmain, S., Brown, P., Hardy, B., Eds.; International Rice Research Institute: Los Ba–os, Philippines, 2010; pp. 239Ð251.

King, C.M.; Powell, R.A. Managing an invasive predator pre-adapted to a pulsed resource: A model of stoat (Mustela erminea) irruptions in New Zealand beech forests. Biol. Invasions 2011, 13, 3039Ð3055.

Does the model and index applicable on Higher resolution imagery? (I.e. Planet labs, Word Views, etc)

Probably, though going much higher than 10m per pixel will introduce a lot more noise. With truly high-res imagery (ie aerial), a crown-based approach would likely work better (ege segment the tree

crowns in the image, then calculate the mean spectra for each crown and use that for deciding masting/no masting)

Can you provide the google earth engine code?

No, sorry though the earth engine part is only used to display pre-computed maps so most of the code is just for the UI.

How many images did you used for each year? What learning methods did you use there? Training dataset is whole country or just some areas?

It varies per-pixel, some only have 2 - 3, most have 4 - 7, a few have up to 12 or 13 in areas of high overlap between S2 passes (or 'orbits').

Would it help to have smaller imagery pixels?

See answer above, generally no, it would just add more spatial complexity which isn't very helpful for the algorithm. That said, it would definitely help with manual spot-checking of imagery (better than 50-100 cm/px).

Would hyperspectral data help?

We didn't investigate truly hyperspectral data, but did look further into the Red Edge, NIR, and SWIR bands of Sentinel. It is possible that one of those could help fine-tune the initial Red/Green result, but they generally either showed no difference during flowering, or added more complexity by also triggering on other (non-beech) species during periods of fresh leaf growth for example.