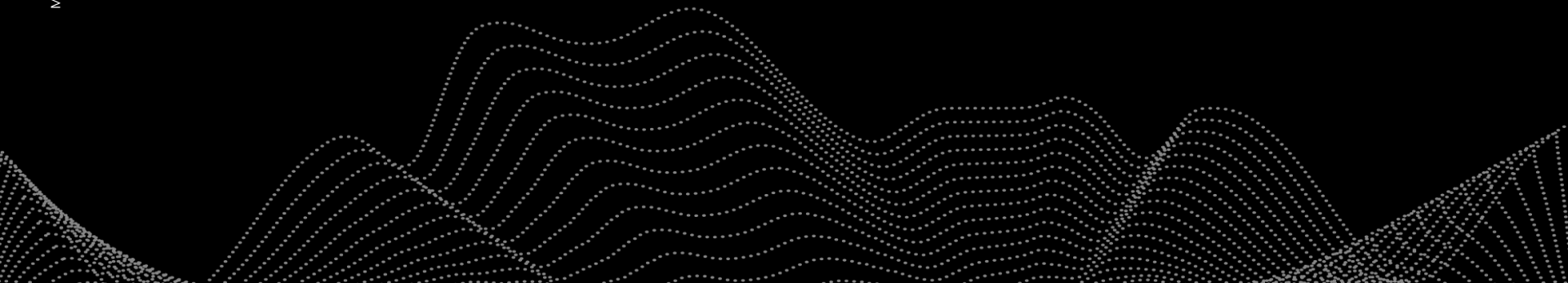




# Challenges in a cloudy NZ for analysis-ready satellite imagery

**James Shepherd**





Article

# Automated Mosaicking of Sentinel-2 Satellite Imagery

James D. Shepherd <sup>1,\*</sup> , Jan Schindler <sup>2</sup> and John R. Dymond <sup>1</sup>

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Article

# Operational Large-Scale Segmentation of Imagery Based on Iterative Elimination

James D. Shepherd <sup>1,\*</sup> , Pete Bunting <sup>2</sup>  and John R. Dymond <sup>1</sup>

<sup>1</sup> Landcare Research, Private Bag 11052, Palmerston North 4442, New Zealand; dymondj@landcareresearch.co.nz

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## Directional reflectance of vegetation measured by a calibrated digital camera

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The authors are with Manaaki Whenua-Landcare Research, Private Bag 11052, Palmerston North, New Zealand.

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Remote Sensing Letters

Vol. 5, No. 7, 637–641, <http://dx.doi.org/10.1080/2150704X.2014.950761>



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Agricultural and Forest Meteorology 86 (1997) 143–155

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METEOROLOGY

## Reflection of visible light from a dense vegetation canopy—a physical model

John R. Dymond<sup>a,\*</sup>, Jianguo Qi<sup>b,1</sup>

<sup>a</sup>Landcare Research - Manaaki Whenua, Private Bag 11052, Palmerston North, New Zealand

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J. D. SHEPHERD<sup>\*</sup> and J. R. DYMOND

Landcare Research, Palmerston North, New Zealand

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Article

## A Python-Based Open Source System for Geographic Object-Based Image Analysis (GEOBIA) Utilizing Raster Attribute Tables

Daniel Clewley<sup>1,\*</sup>, Peter Bunting<sup>2</sup>, James Shepherd<sup>3</sup>, Sam Gillingham<sup>3</sup>, Neil Flood<sup>5</sup>, John Dymond<sup>4</sup>, Richard Lucas<sup>6</sup>, John Armston<sup>7</sup> and Mahta Moghaddam<sup>1</sup>

2018

IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING, VOL. 37, NO. 5, SEPTEMBER 1999

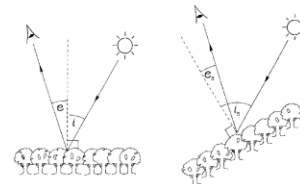
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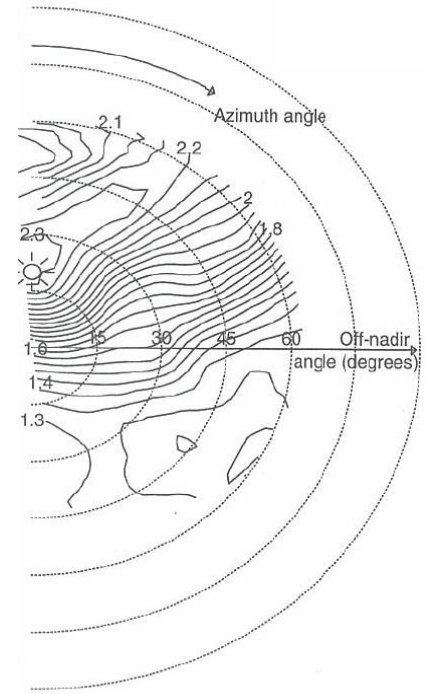
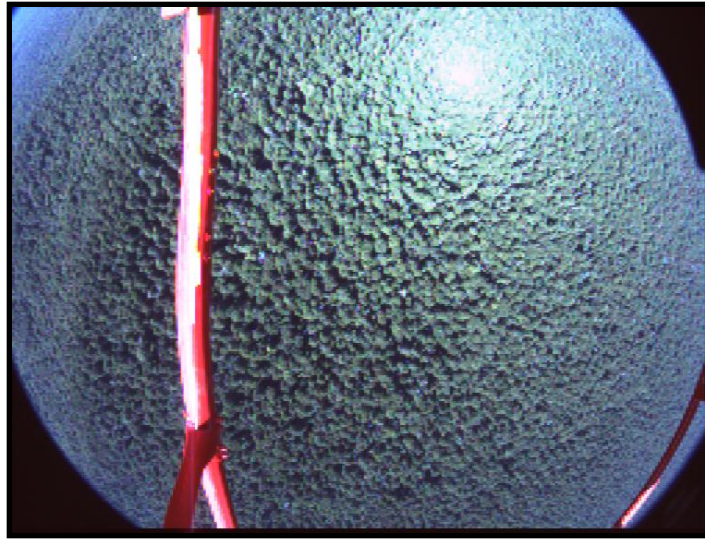
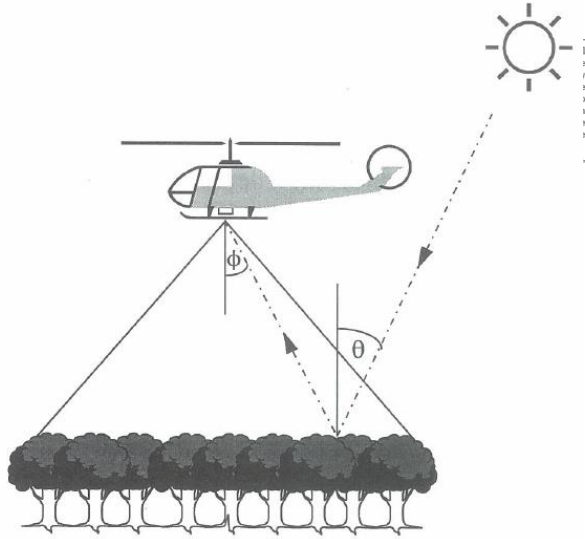
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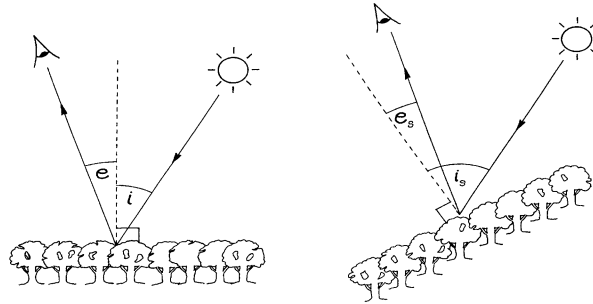
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$$L = \frac{2wE \cos i}{3\pi^2 (\cos i + \cos e)} [a + (\pi - a)e^{-k\alpha}]$$



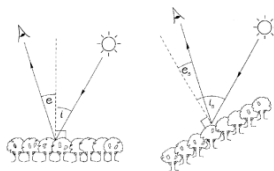
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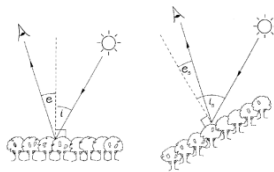
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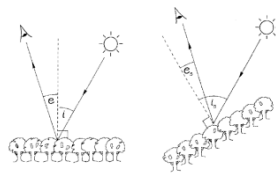
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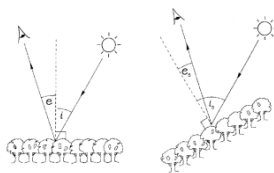
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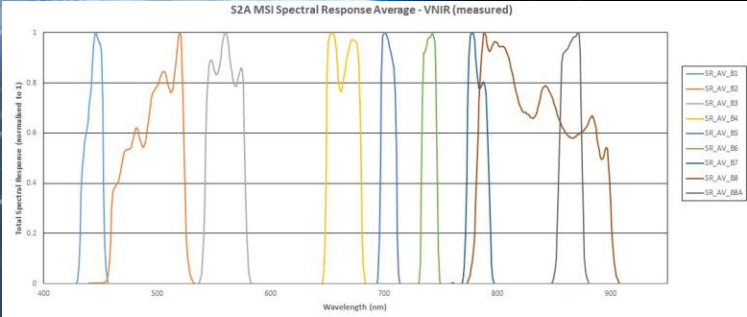
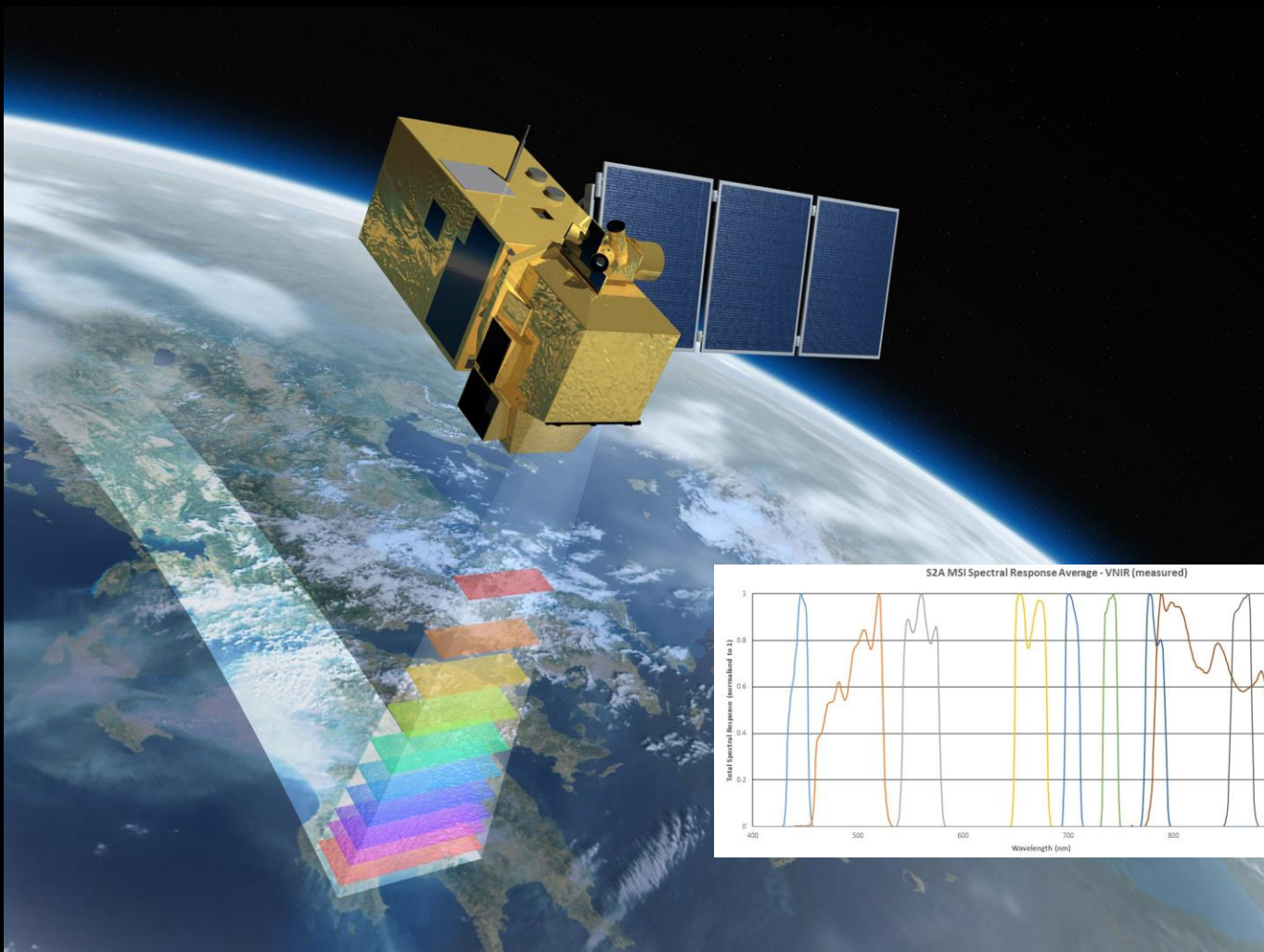
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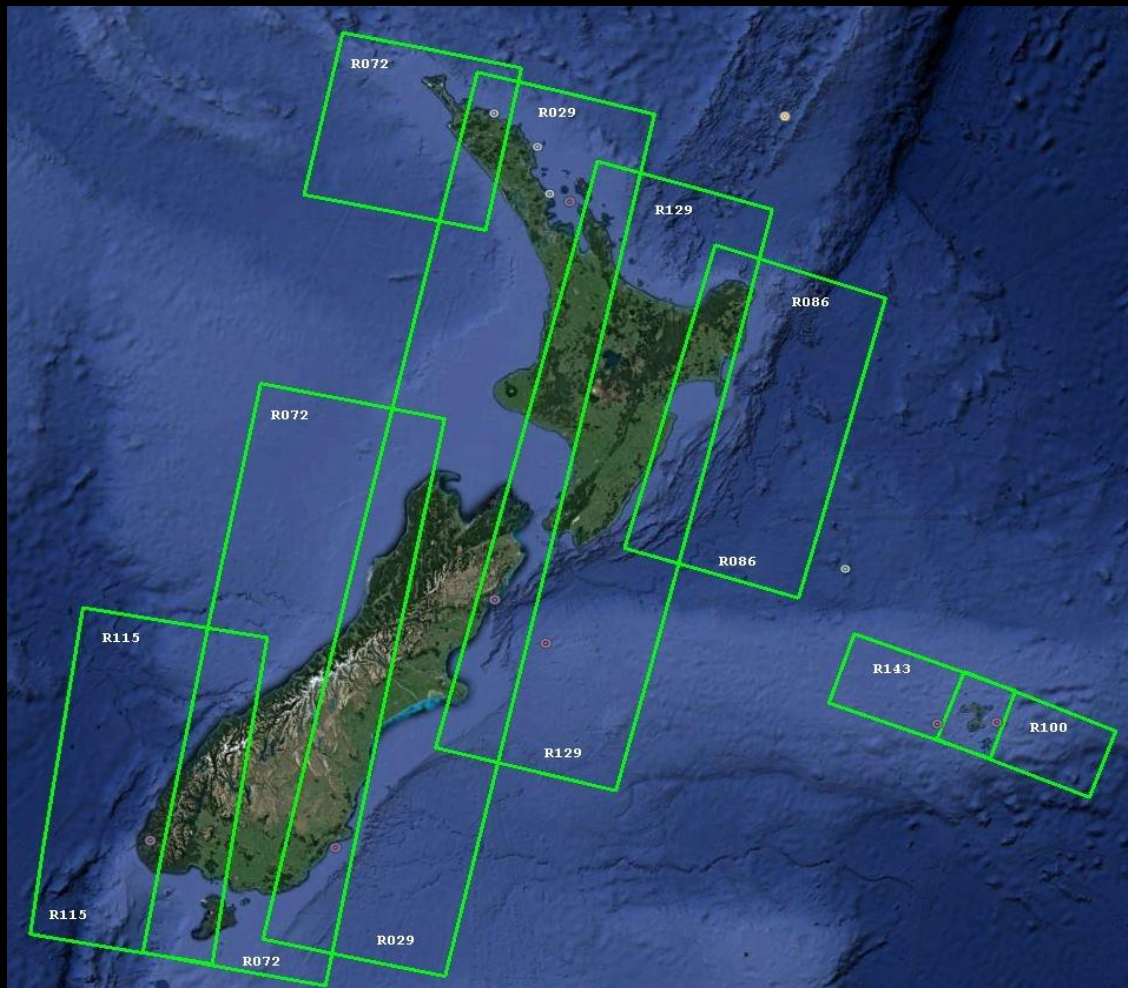
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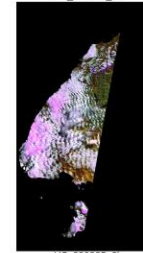
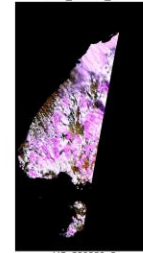
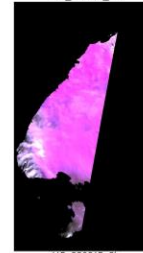
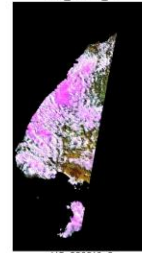
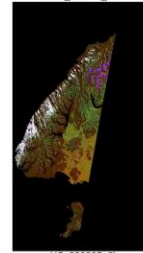
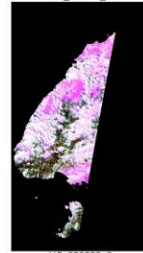
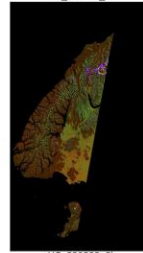
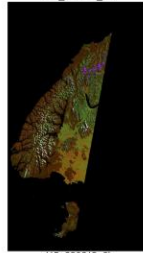
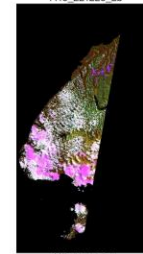
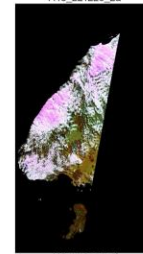
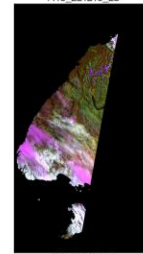
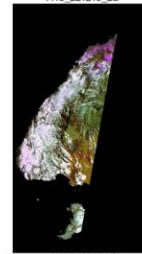
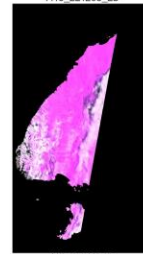
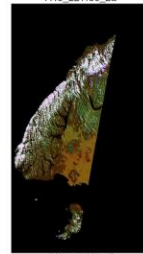
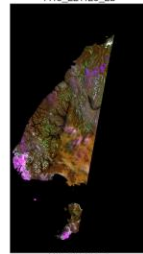
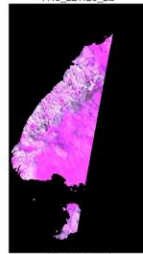
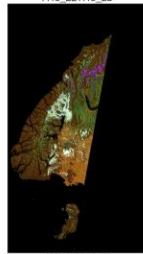
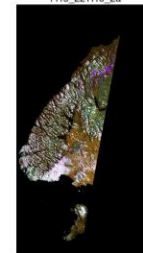
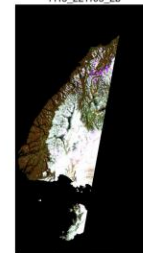
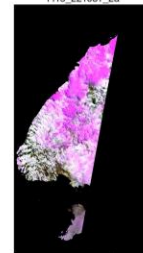
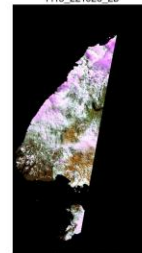
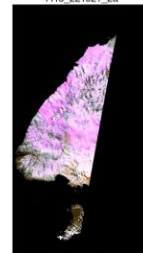
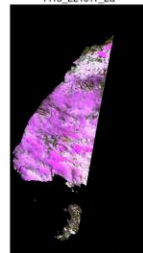
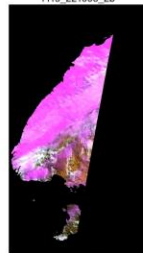
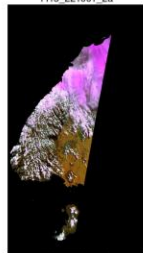
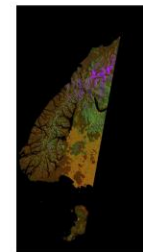
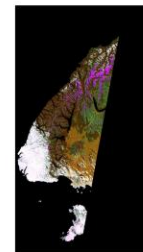
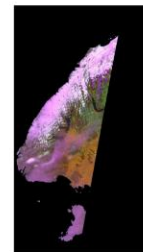
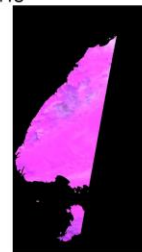
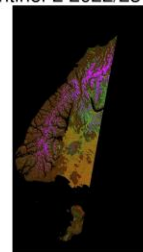
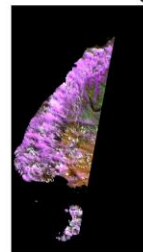
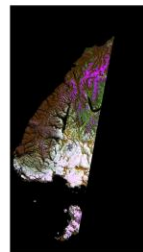
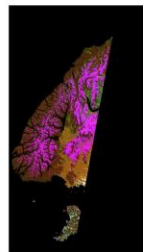
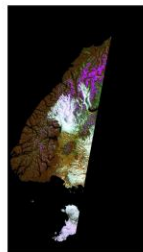






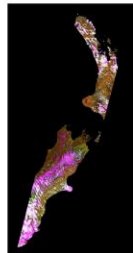


## Sentinel-2 2022/23 R115

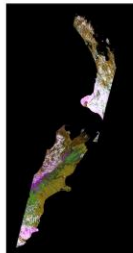




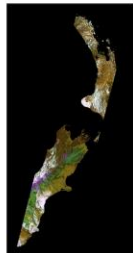
Sentinel-2 2022/23 R029



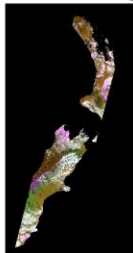
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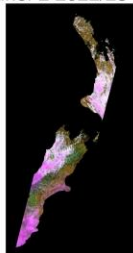
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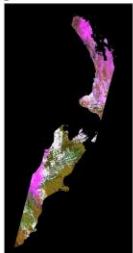
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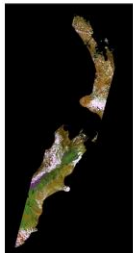
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r029\_221025\_2a



r029\_221030\_2b



r029\_221104\_2a



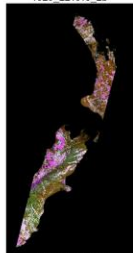
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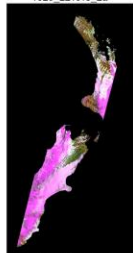
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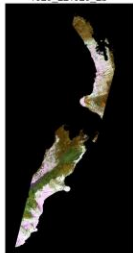
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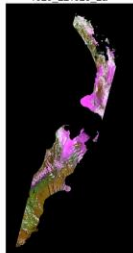
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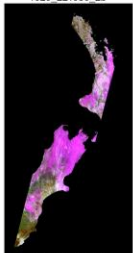
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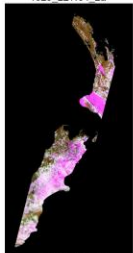
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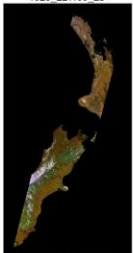
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r029\_221214\_2a



r029\_221219\_2b



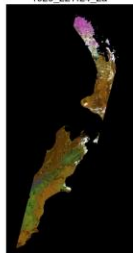
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r029\_230108\_2b



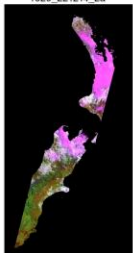
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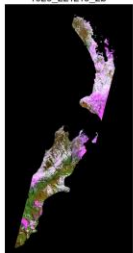
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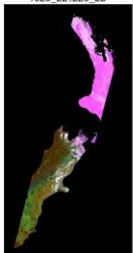
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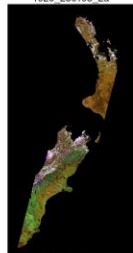
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r029\_230207\_2b



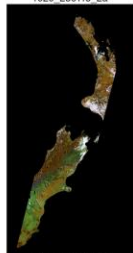
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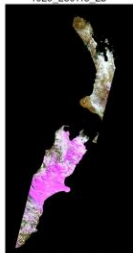
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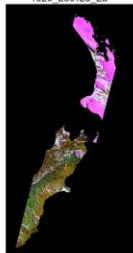
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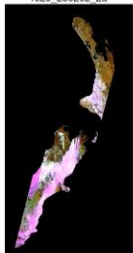
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r029\_230314\_2a



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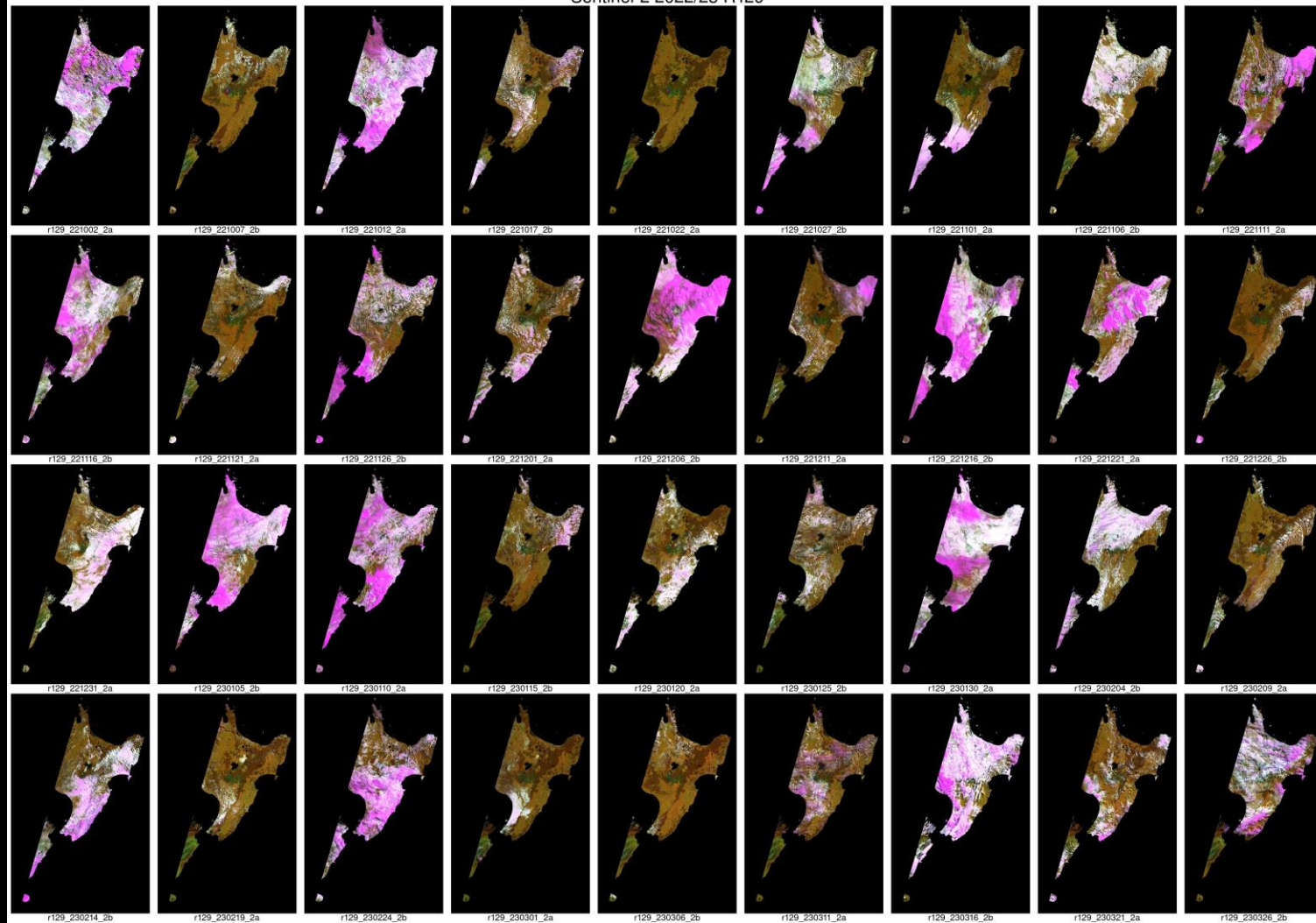


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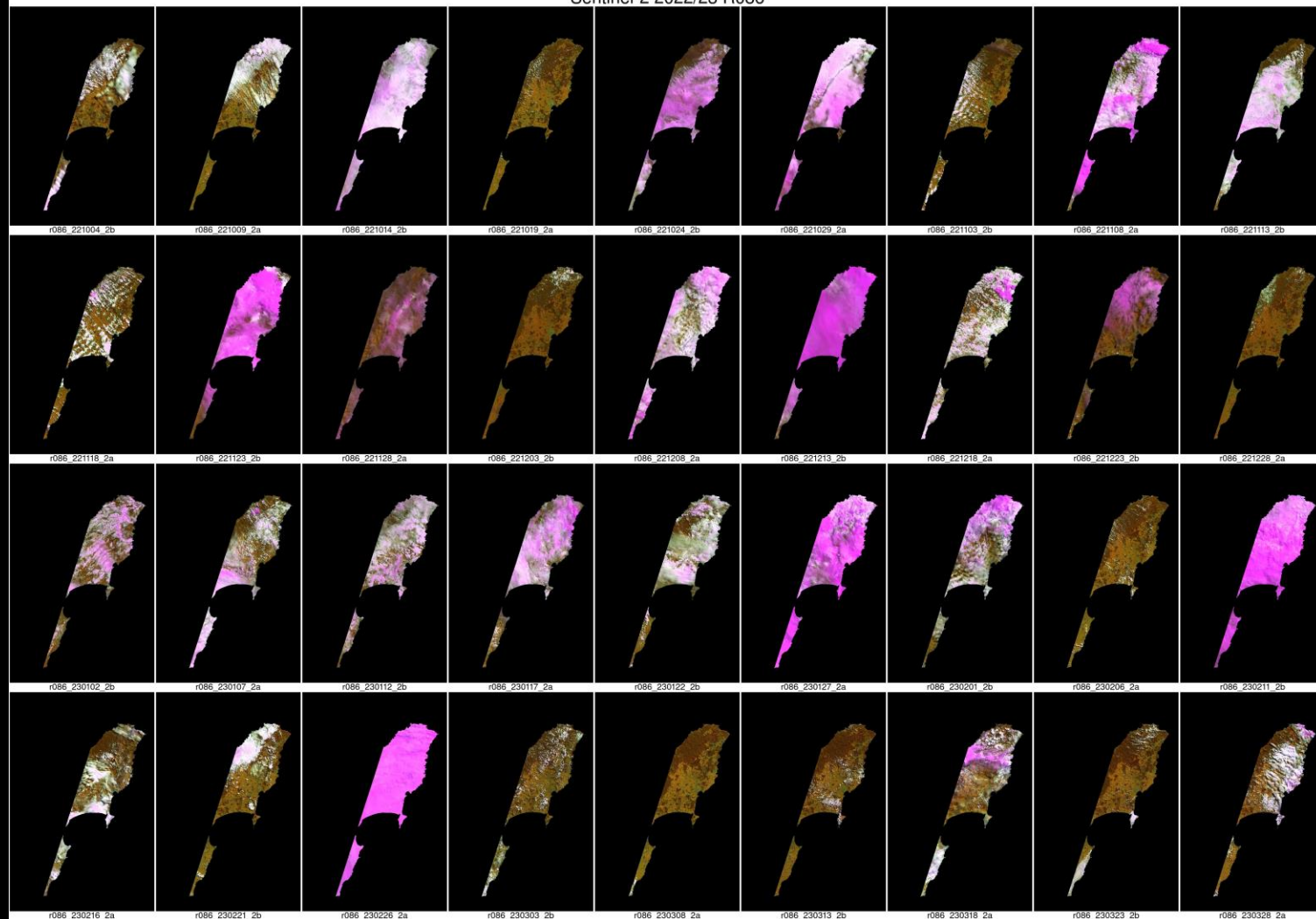
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Sentinel-2 2022/23 R129

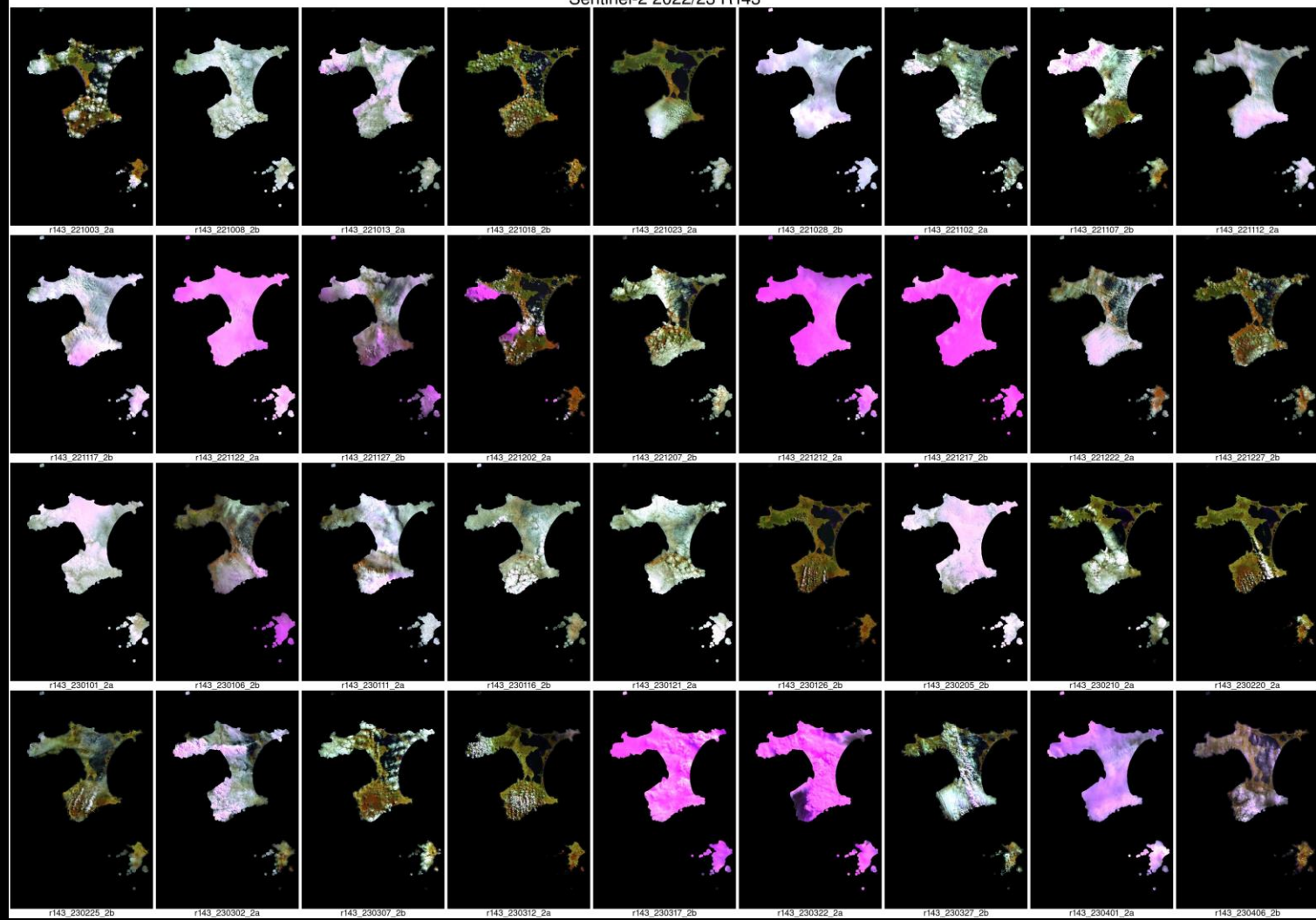




Sentinel-2 2022/23 R086

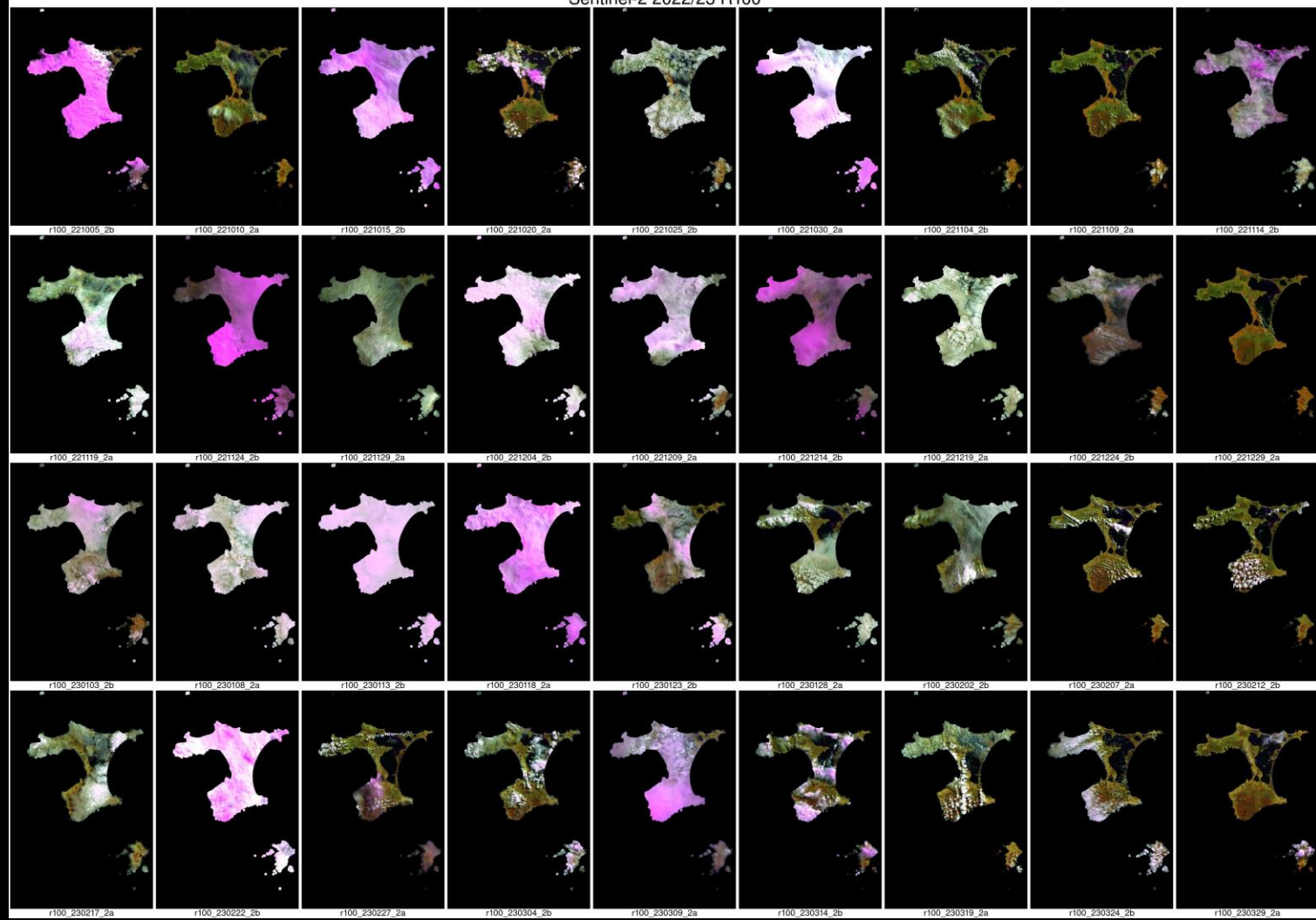


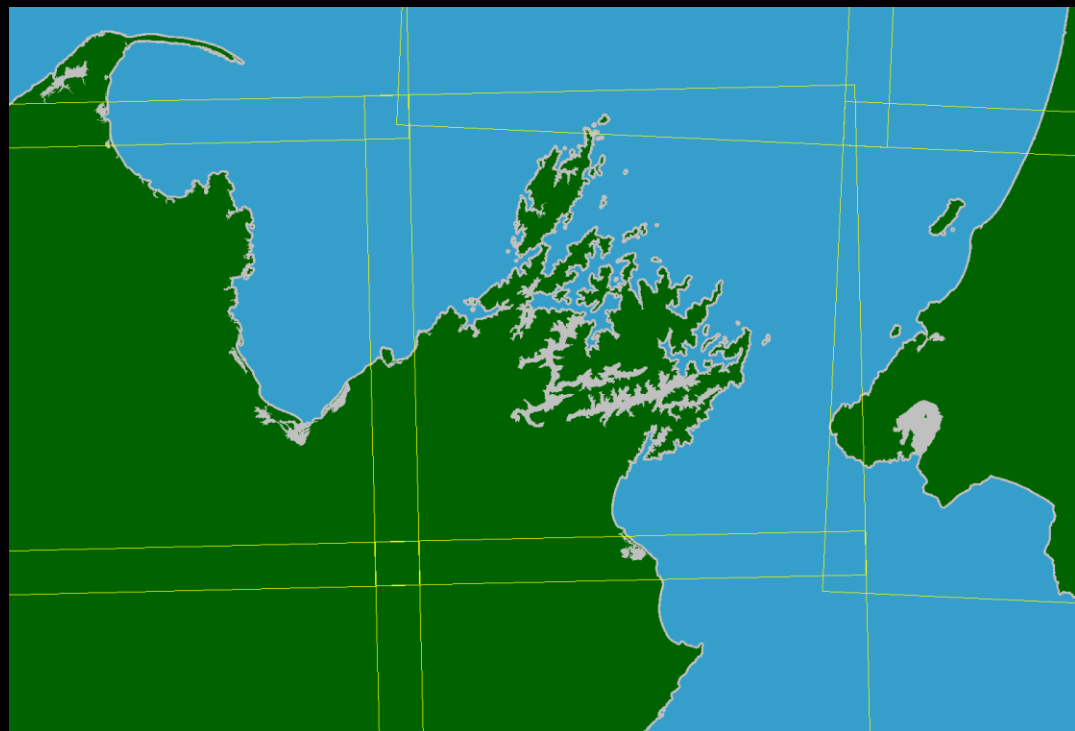
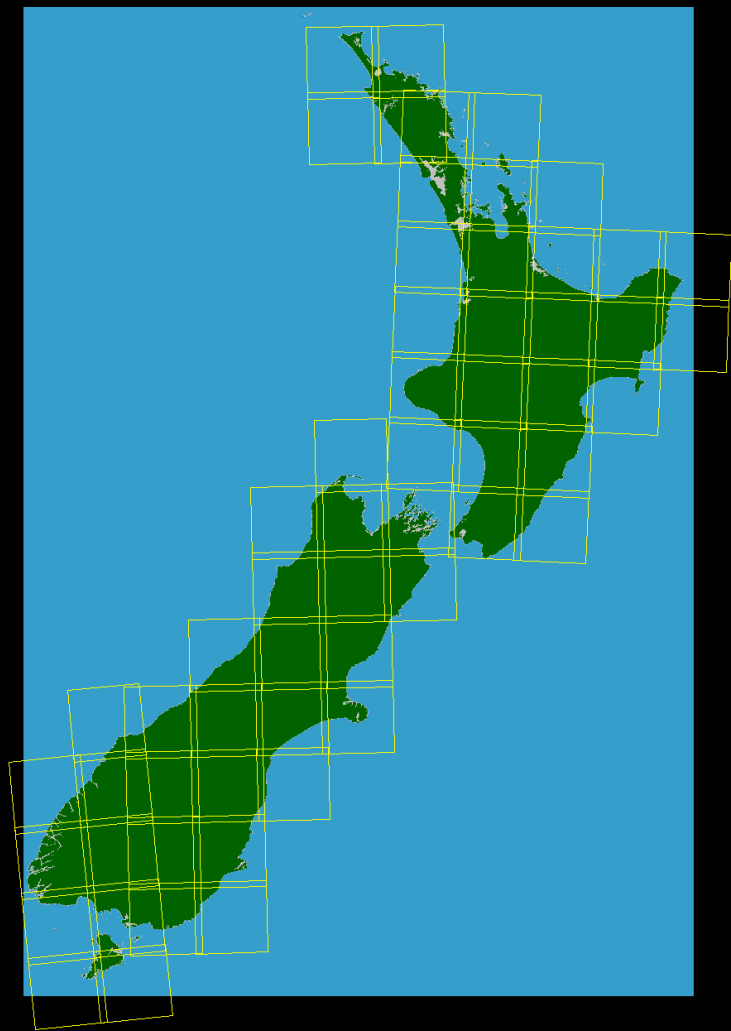
## Sentinel-2 2022/23 R143

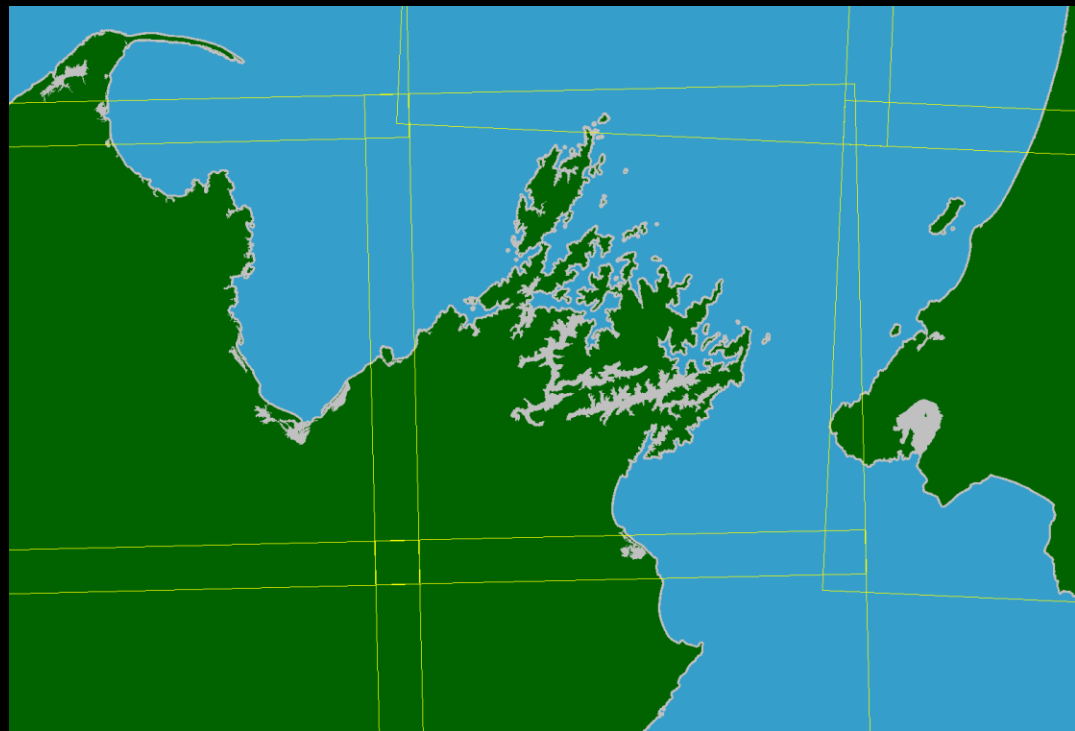
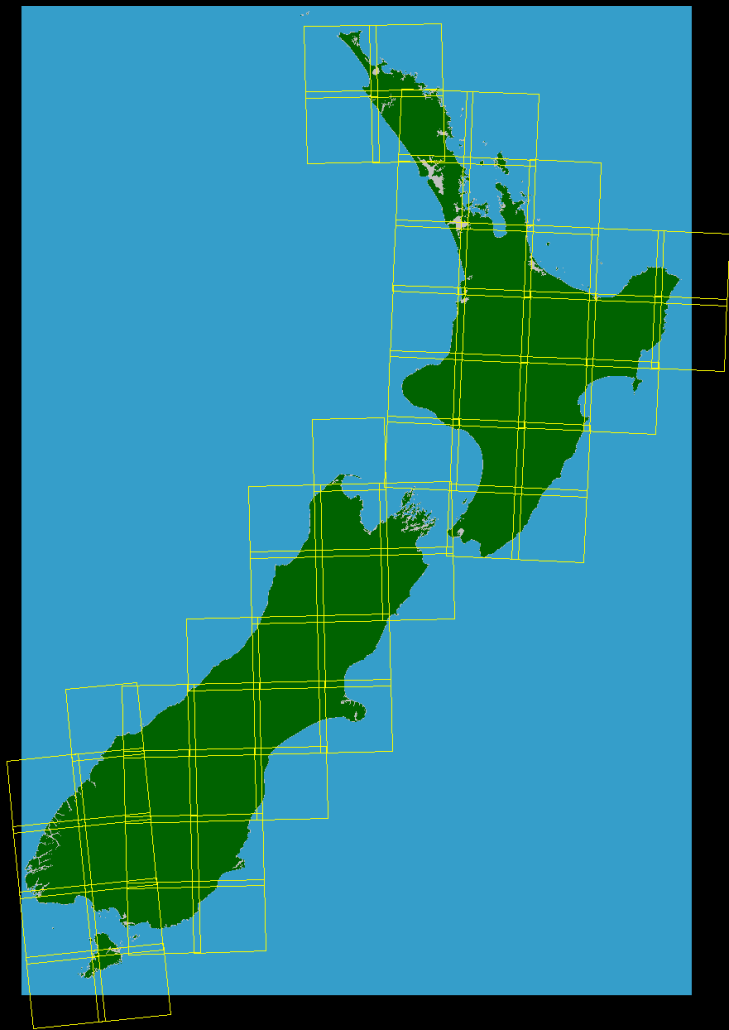




## Sentinel-2 2022/23 R100





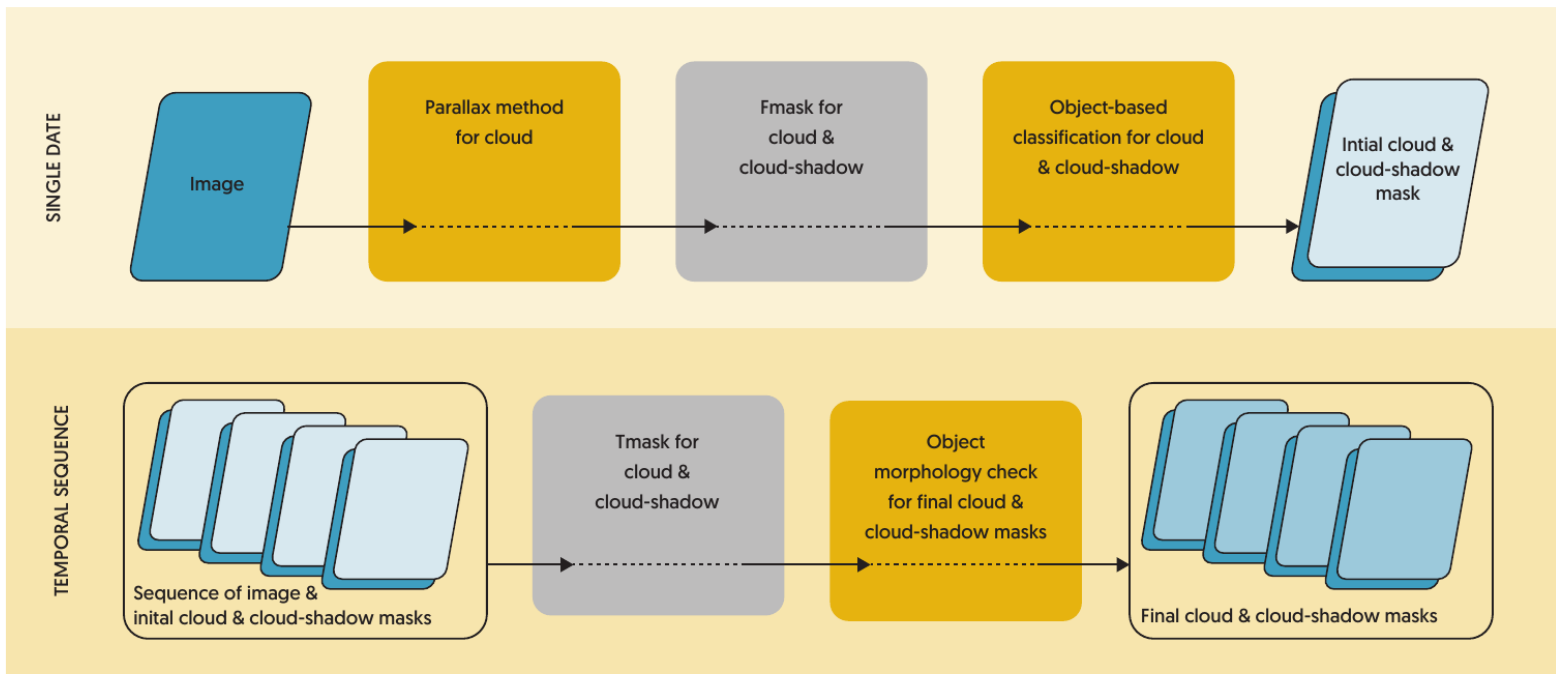


26T ESA zip archive

84T processed data

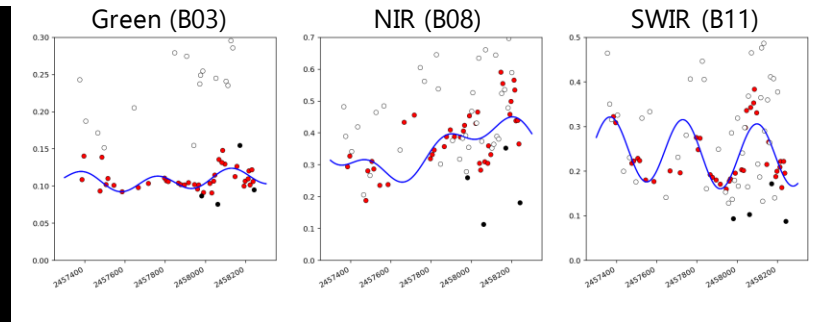
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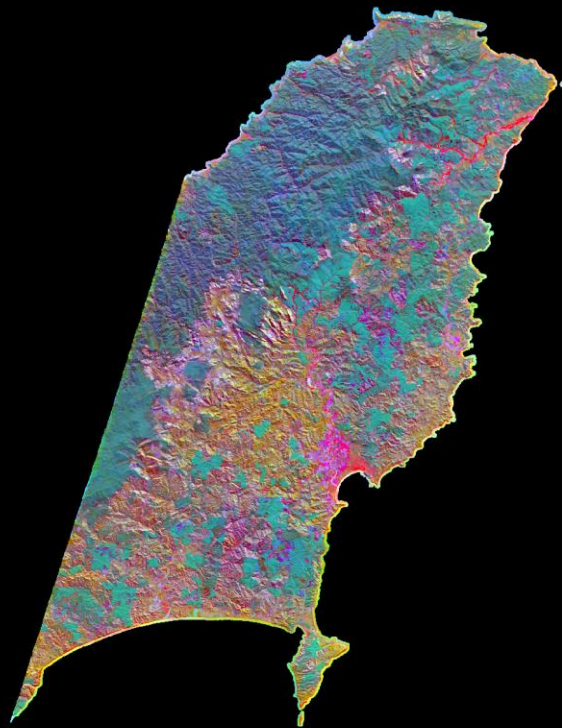
3311 strips



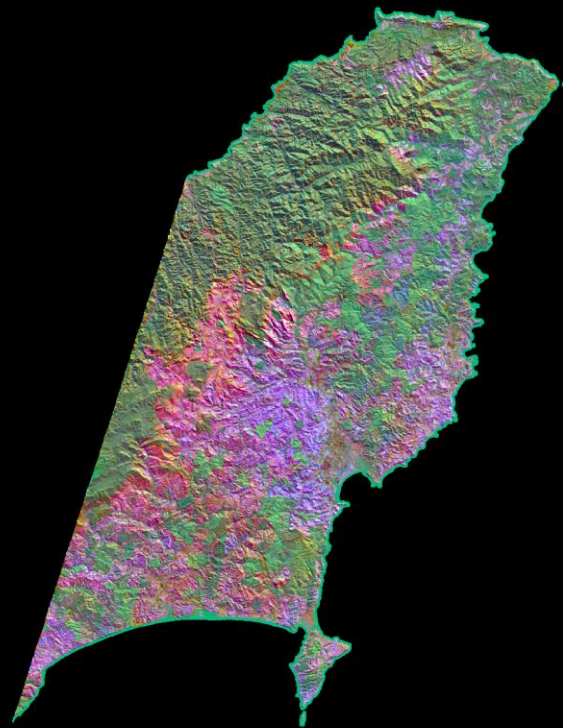
$$\rho_i(d) = a_{0,i} + a_{1,i} \cos\left(\frac{2\pi d}{T}\right) + b_{1,i} \sin\left(\frac{2\pi d}{T}\right) + a_{2,i} \cos\left(\frac{2\pi d}{NT}\right) + b_{2,i} \sin\left(\frac{2\pi d}{NT}\right)$$

$d$  is the julian date,  
 $T$  is the number of days per year (365),  
 $N$  is the number of years (integer, rounded up),  
 $a_{0,i}$  is the mean value for Sentinel band  $i$  TOA reflectance,  
 $a_{1,i}, b_{1,i}$  are coefficients that describe the intra-annual change of Sentinel band  $i$  TOA reflectance,  
 $a_{2,i}, b_{2,i}$  are coefficients that describe the inter-annual change of Sentinel band  $i$  TOA reflectance.

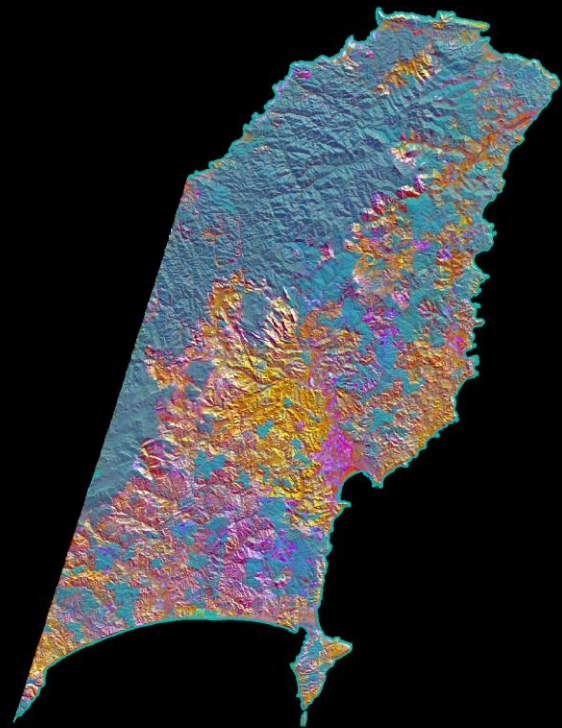




Green (B03)



NIR (B08)

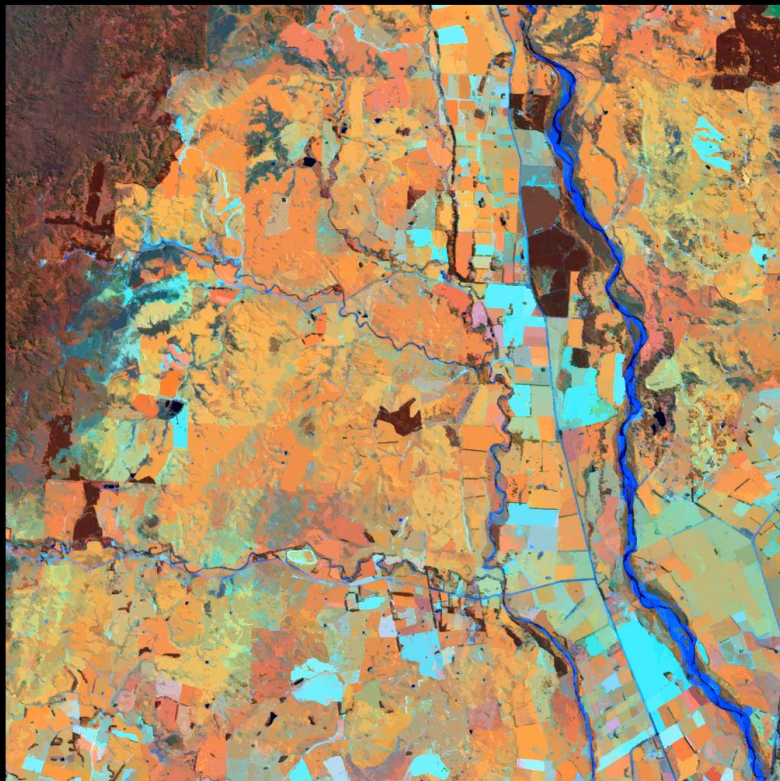


SWIR (B11)

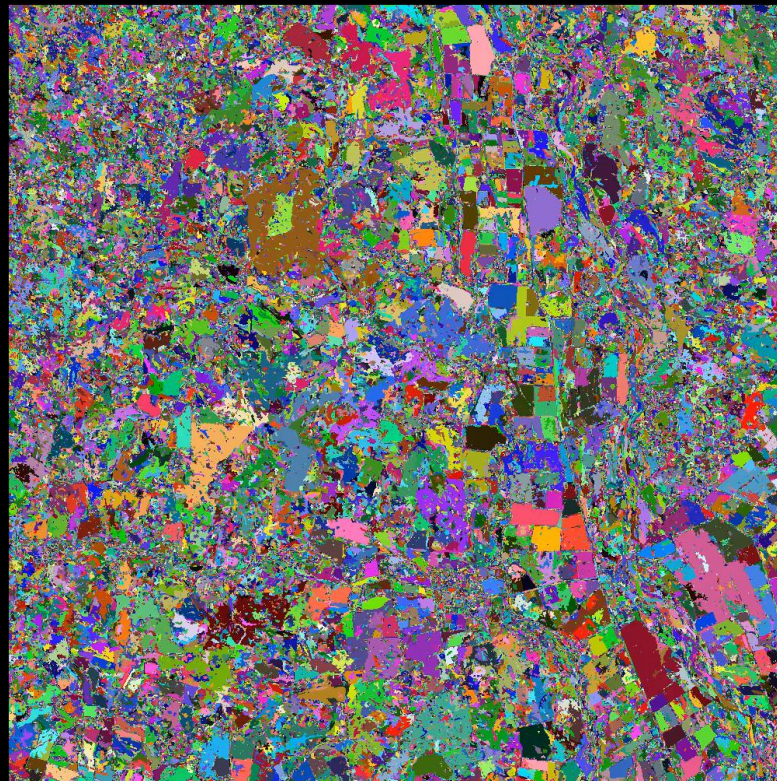


Article  
**Operational Large-Scale Segmentation of Imagery  
Based on Iterative Elimination**

James D. Shepherd <sup>1,\*</sup>, Pete Bunting <sup>2</sup> and John R. Dymond <sup>1</sup>

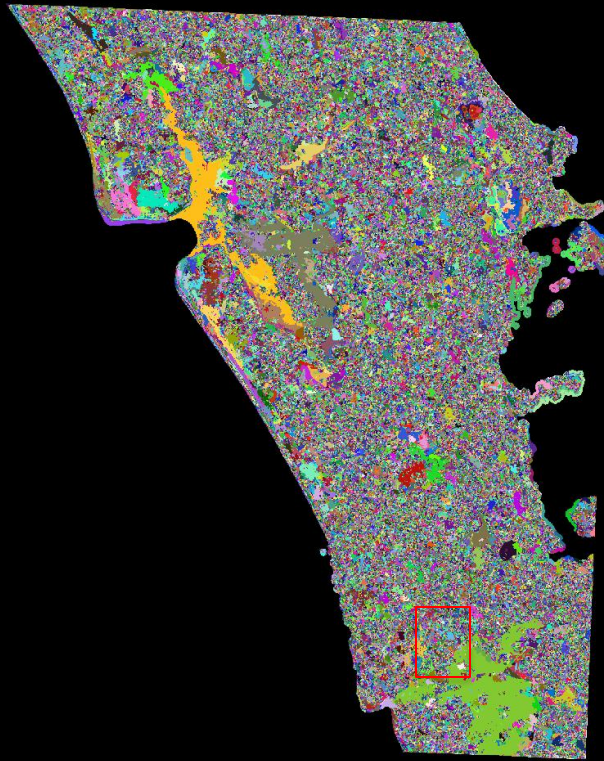
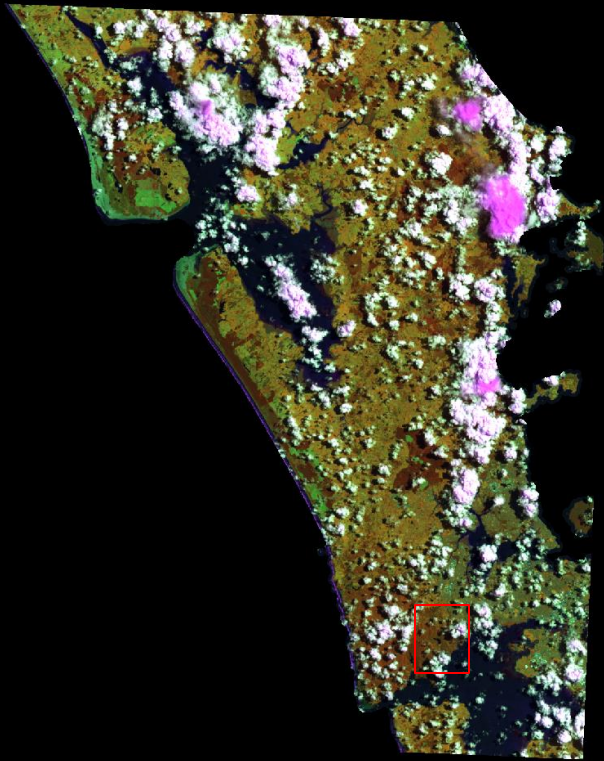


2012

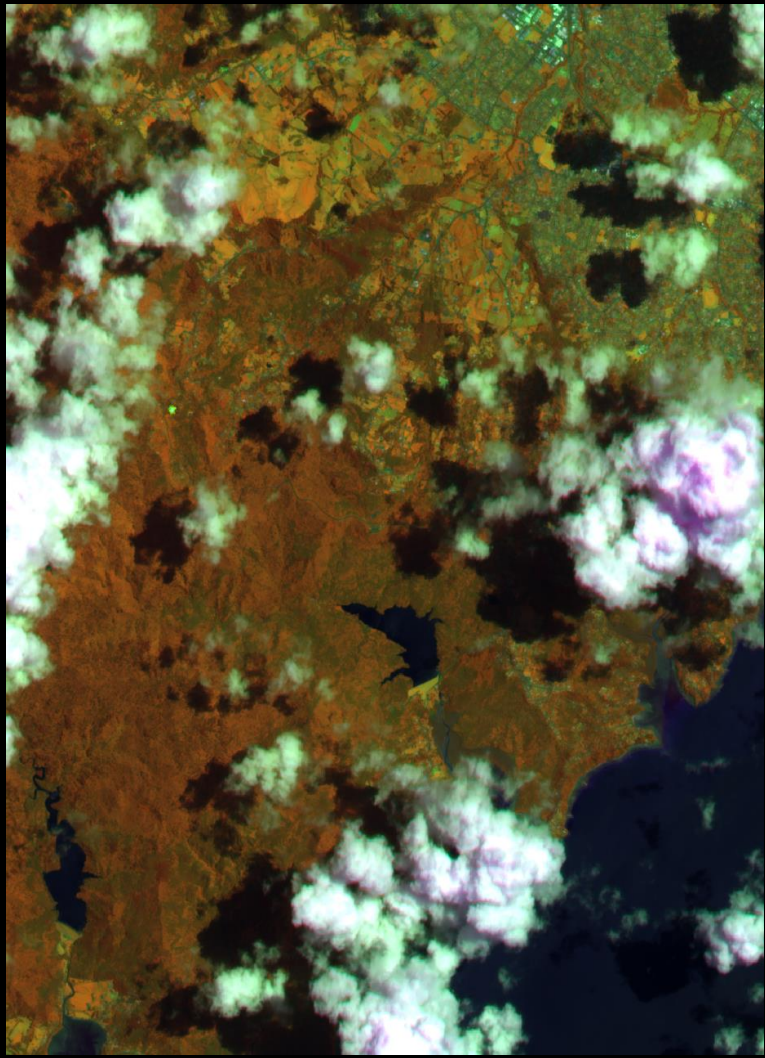


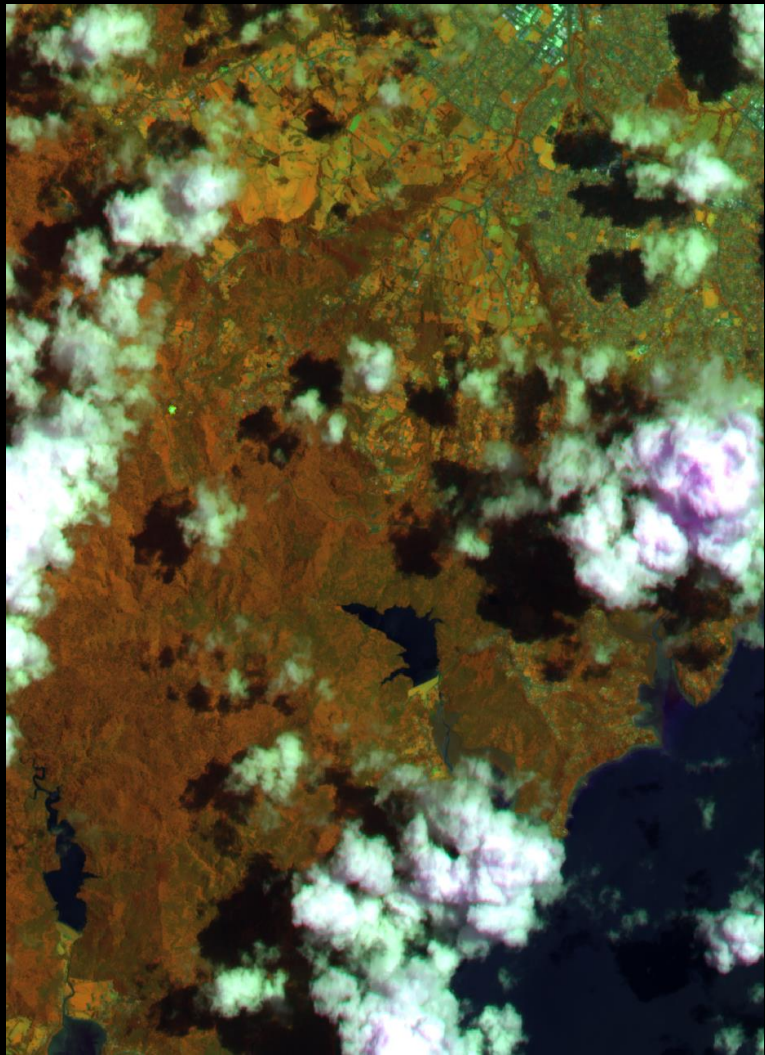
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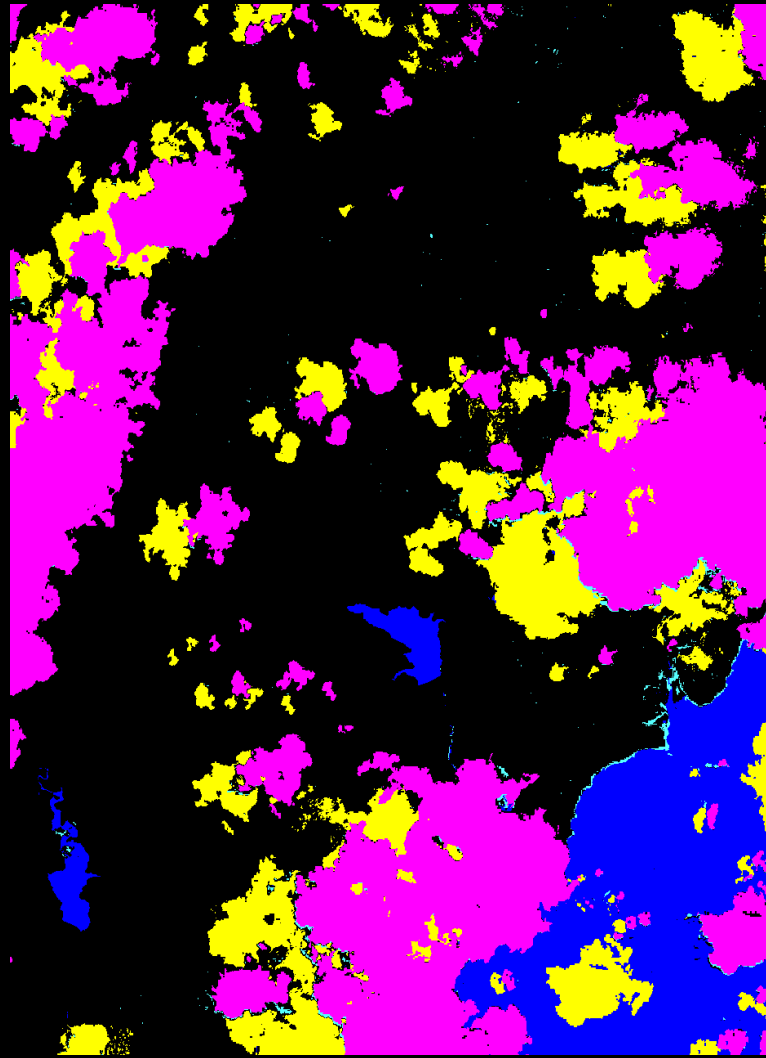
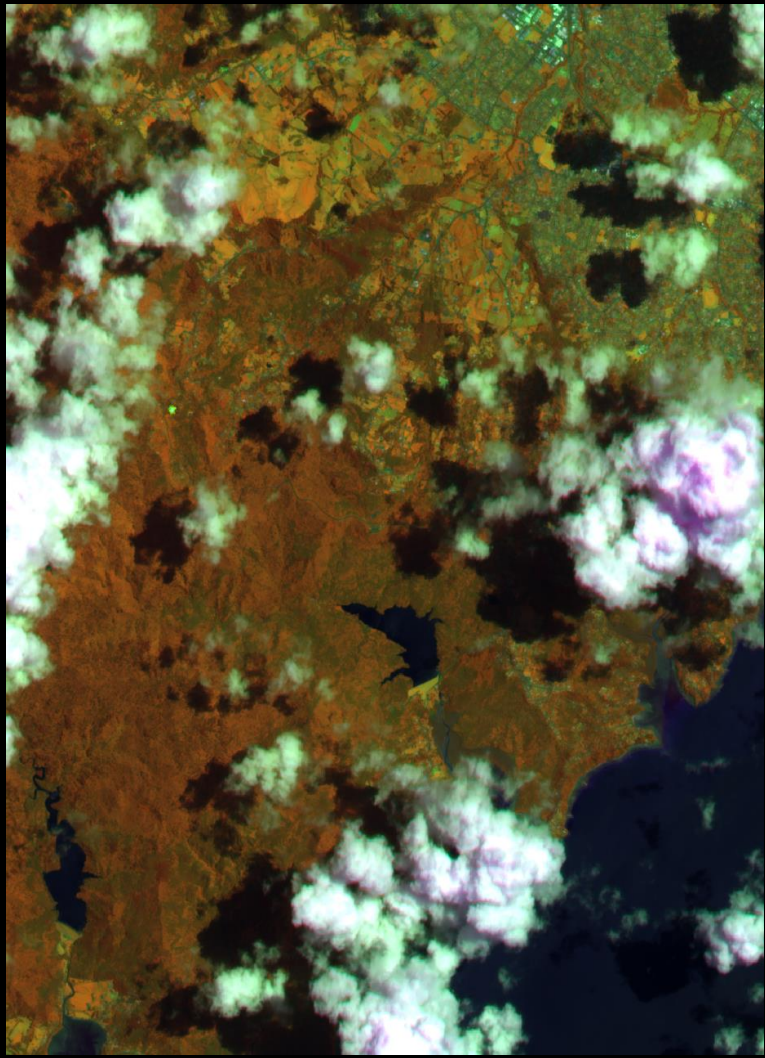


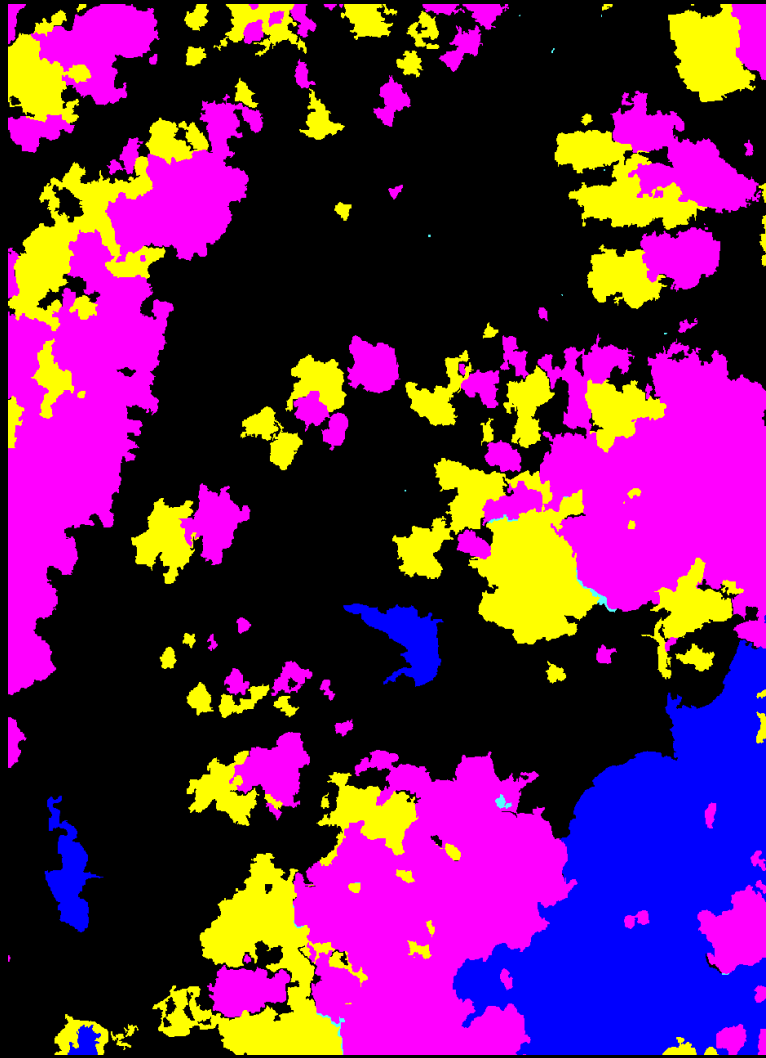
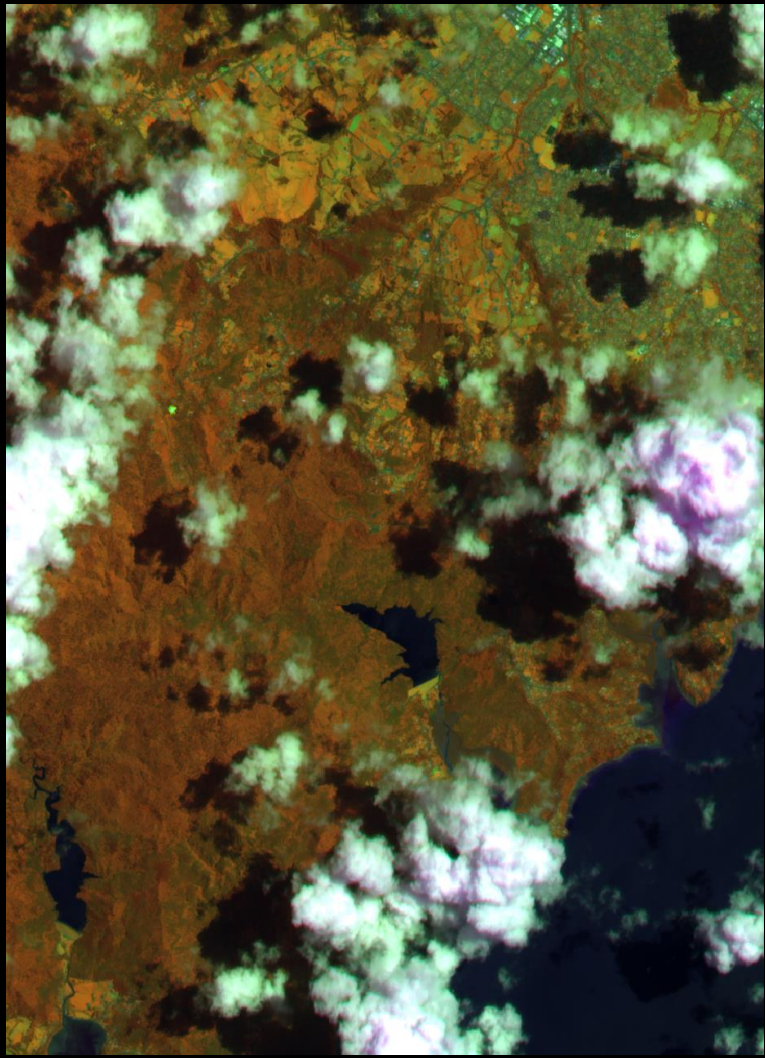










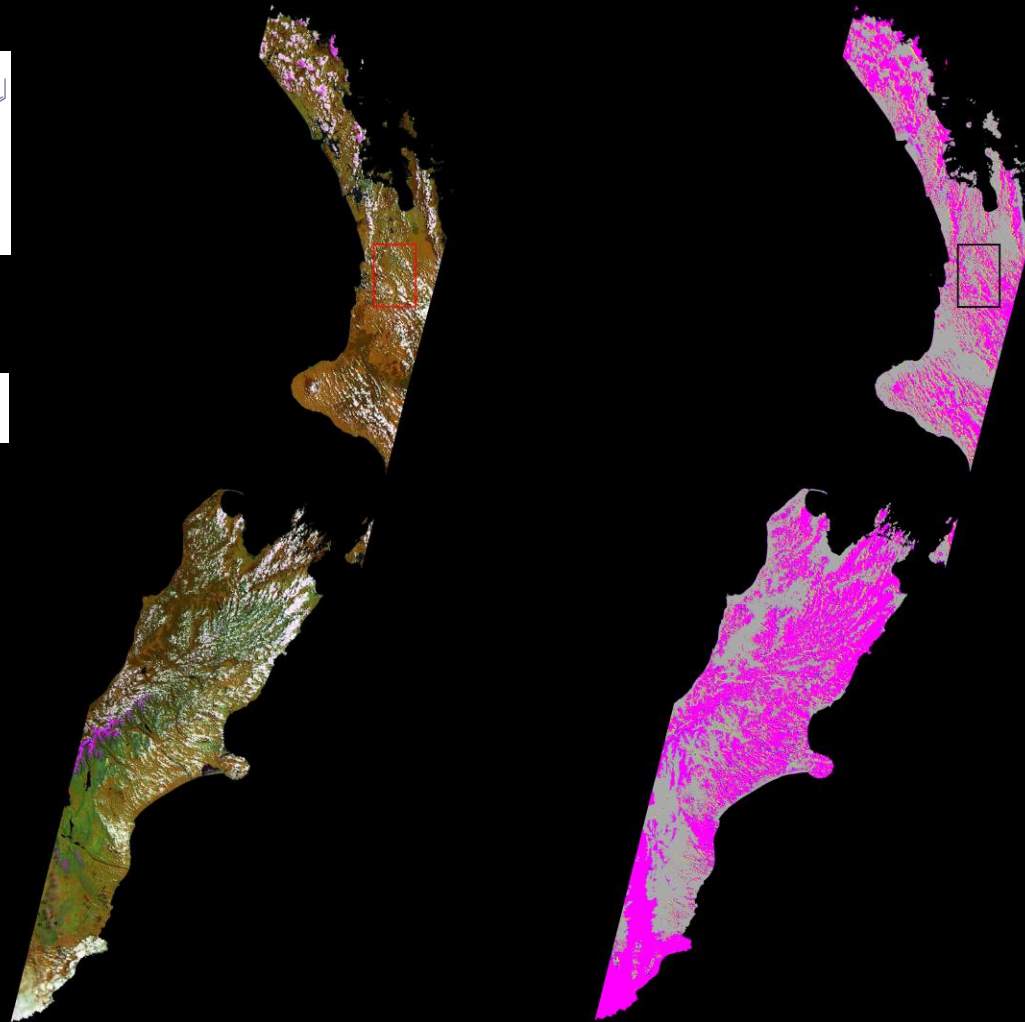


Article

## Automated Mosaicking of Sentinel-2 Satellite Imagery

James D. Shepherd <sup>1</sup>\*, Jan Schindler <sup>2</sup> and John R. Dymond <sup>1</sup>

R029 - 20 December 2019

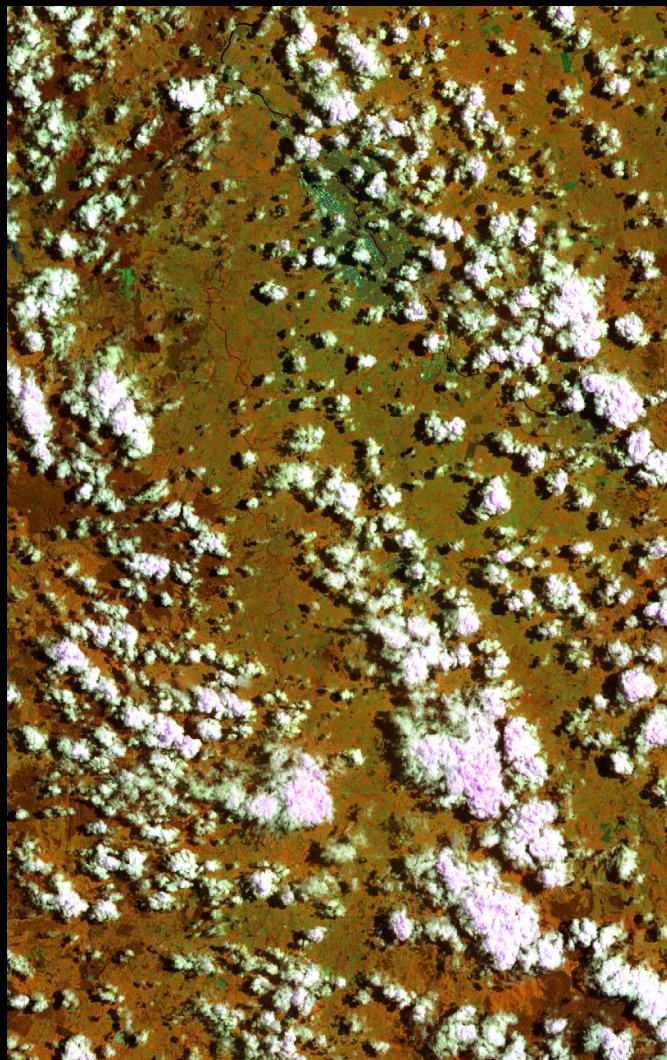




## Automated Mosaicking of Sentinel-2 Satellite Imagery

James D. Shepherd <sup>1</sup>\*, Jan Schindler <sup>2</sup> and John R. Dymond <sup>1</sup>

R029 - 20 December 2019

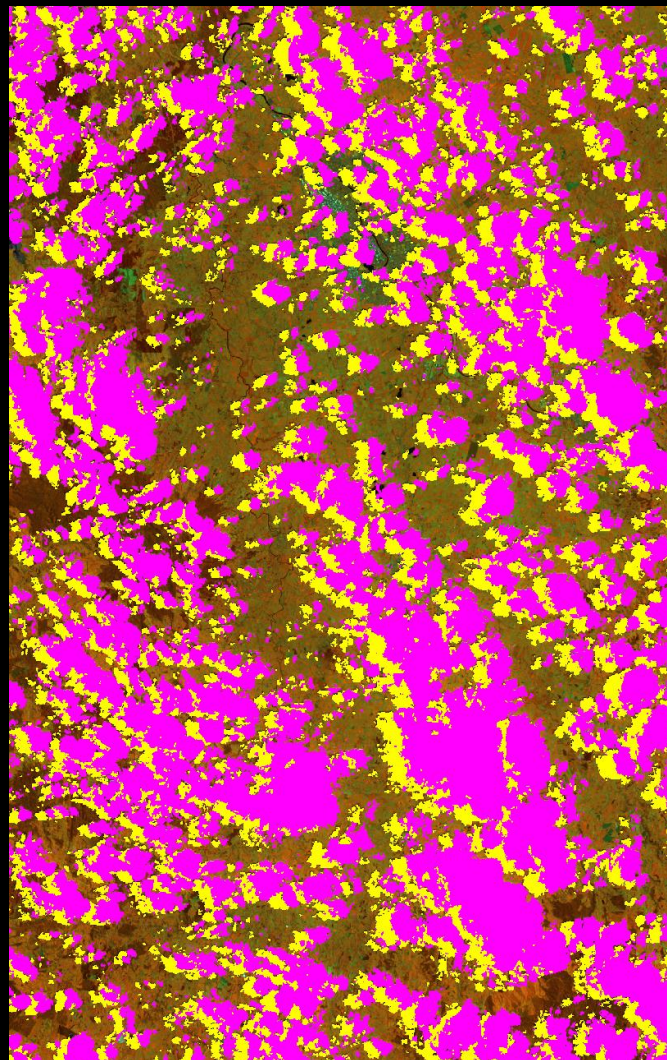


Article

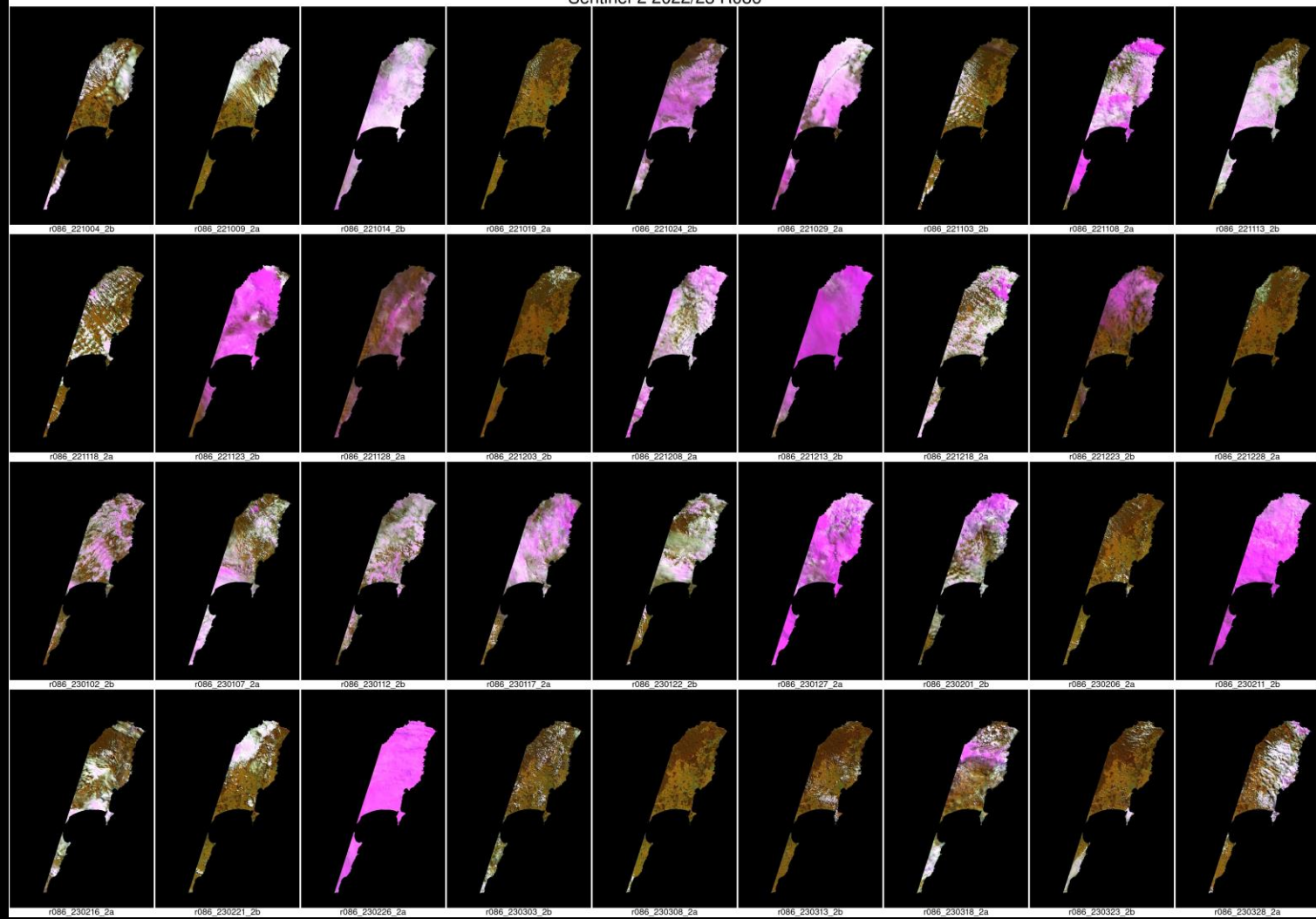
## Automated Mosaicking of Sentinel-2 Satellite Imagery

James D. Shepherd <sup>1</sup>\*, Jan Schindler <sup>2</sup> and John R. Dymond <sup>1</sup>

R029 - 20 December 2019



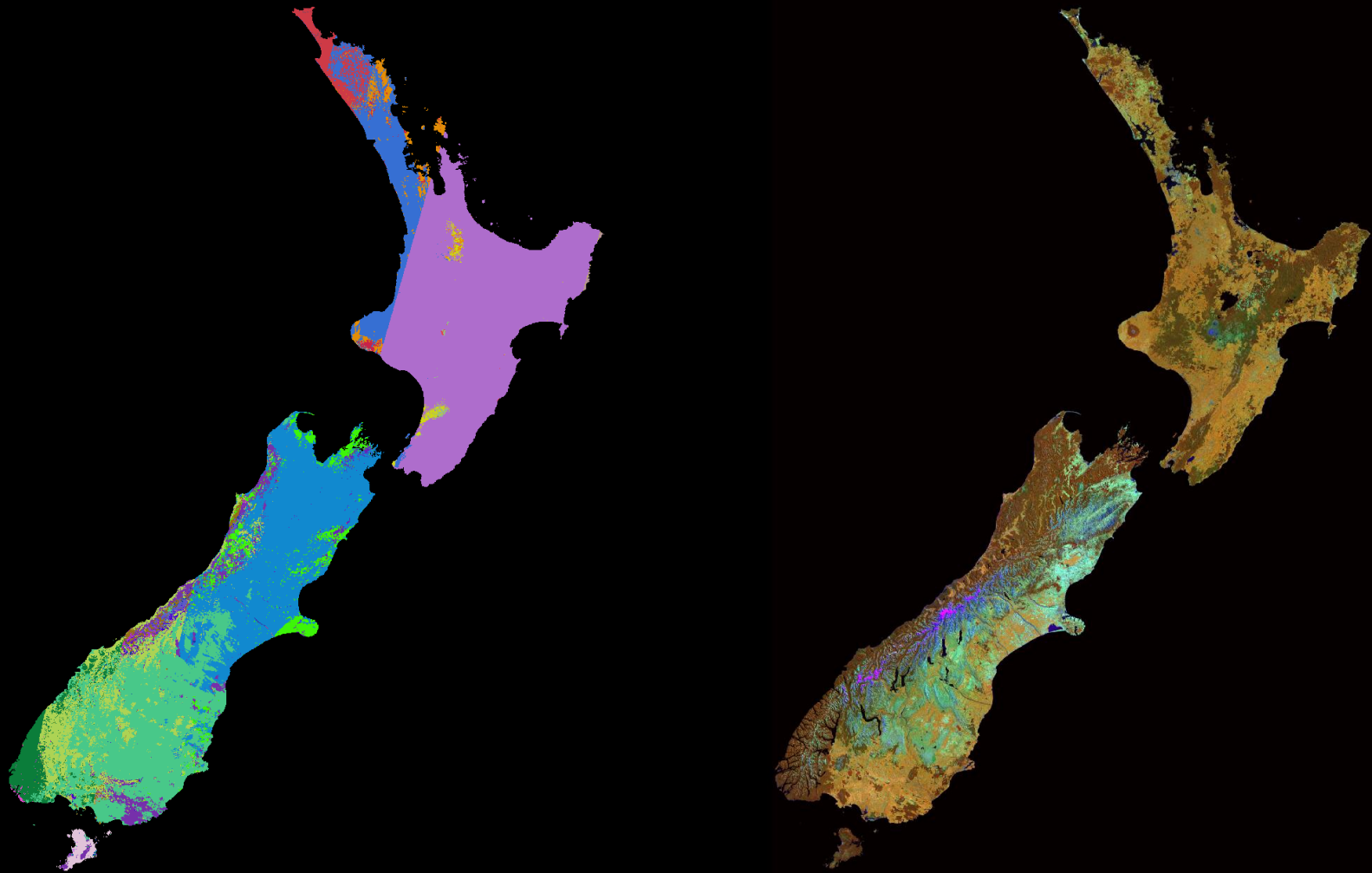
## Sentinel-2 2022/23 R086

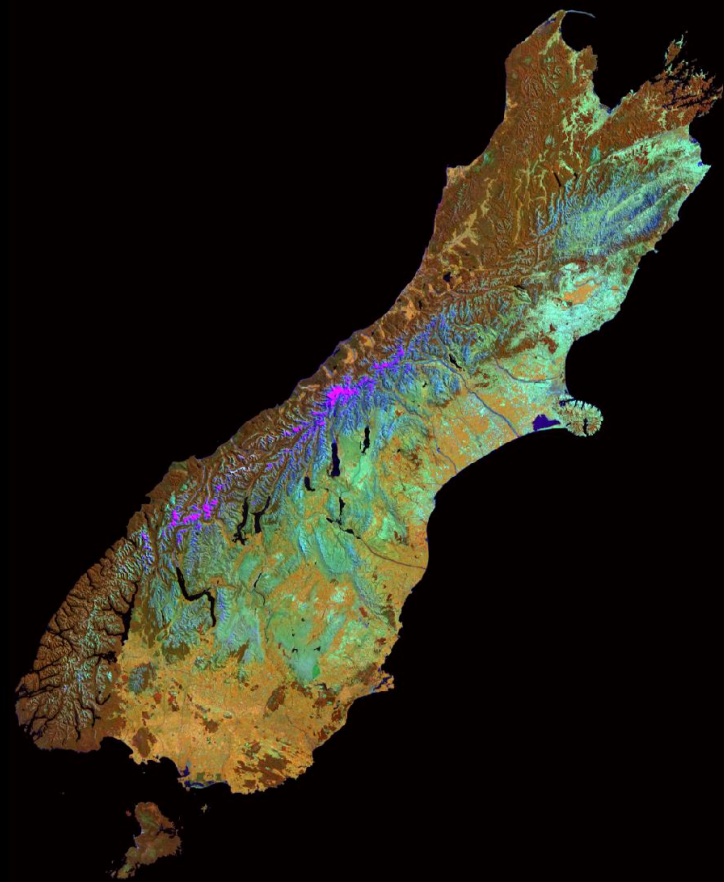
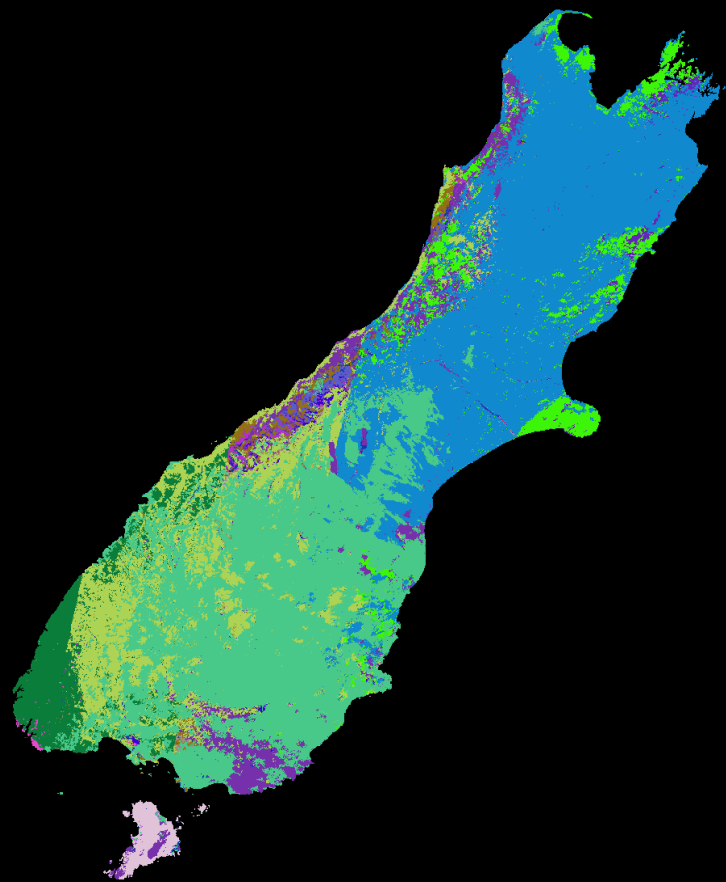




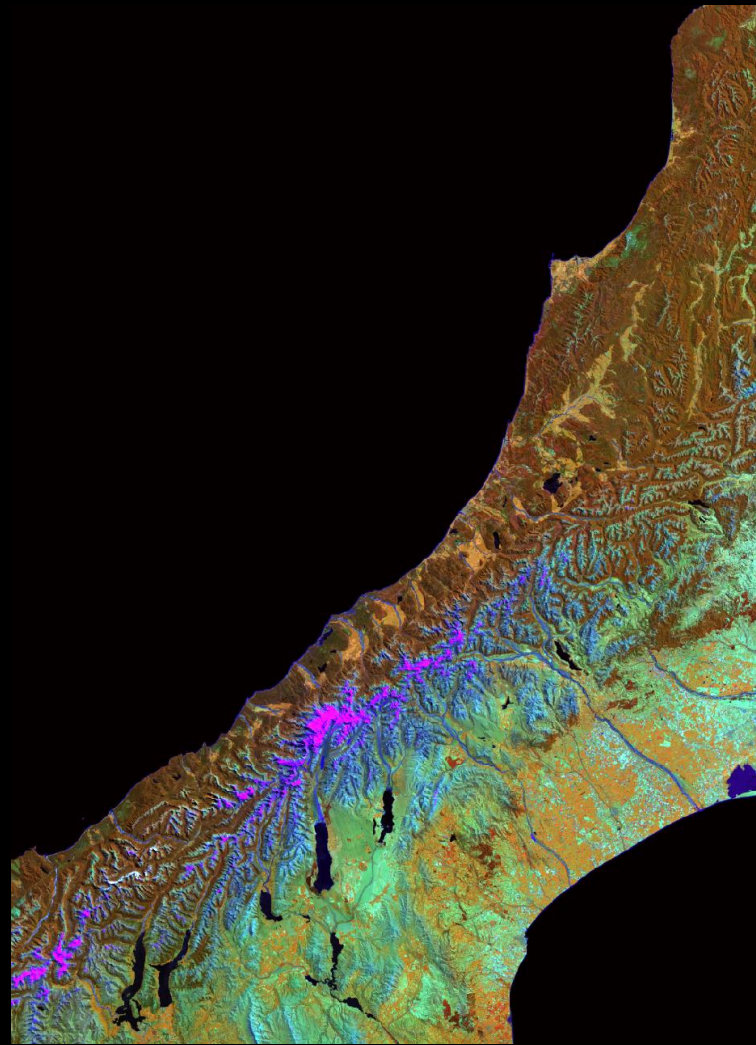
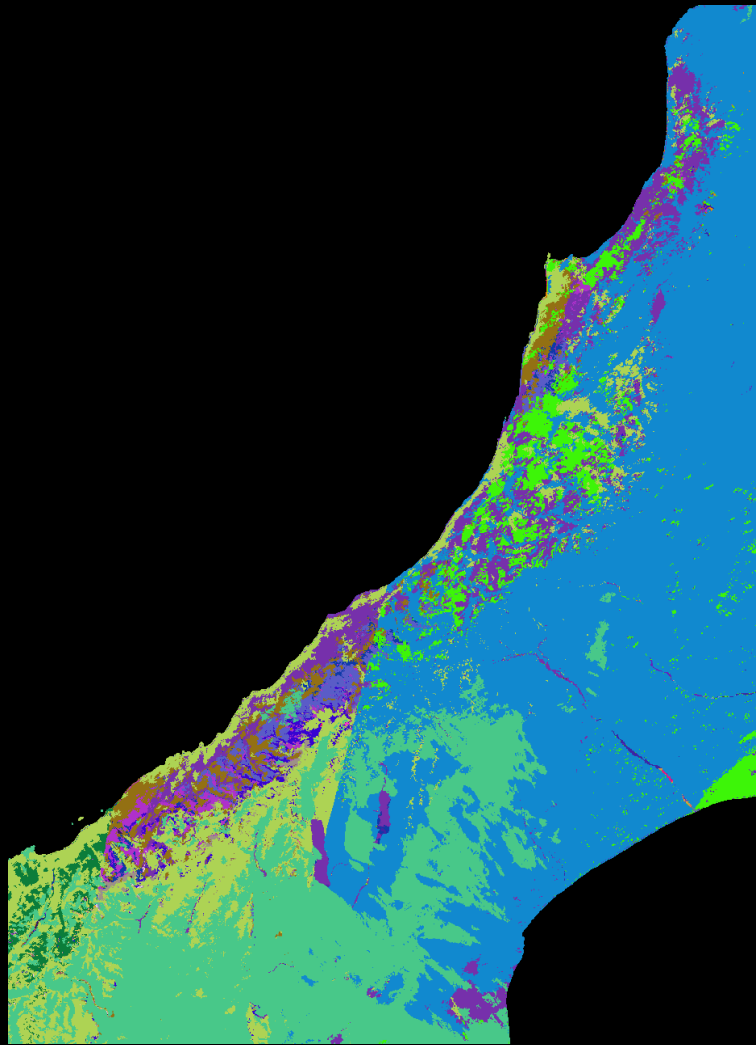
Sentinel-2 2022/23 R086

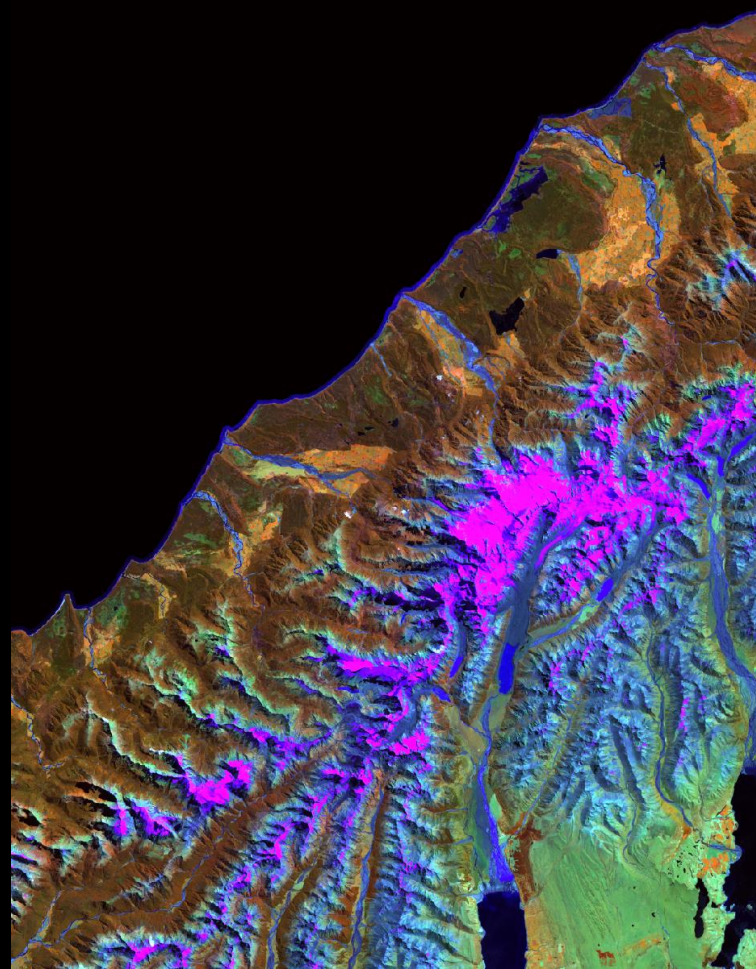
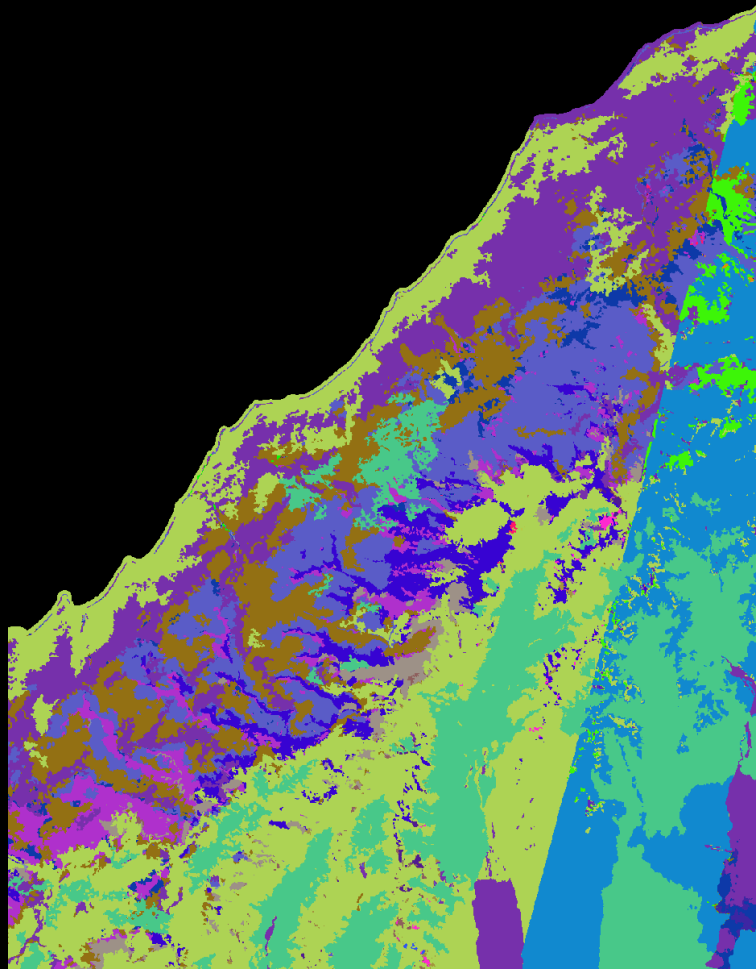


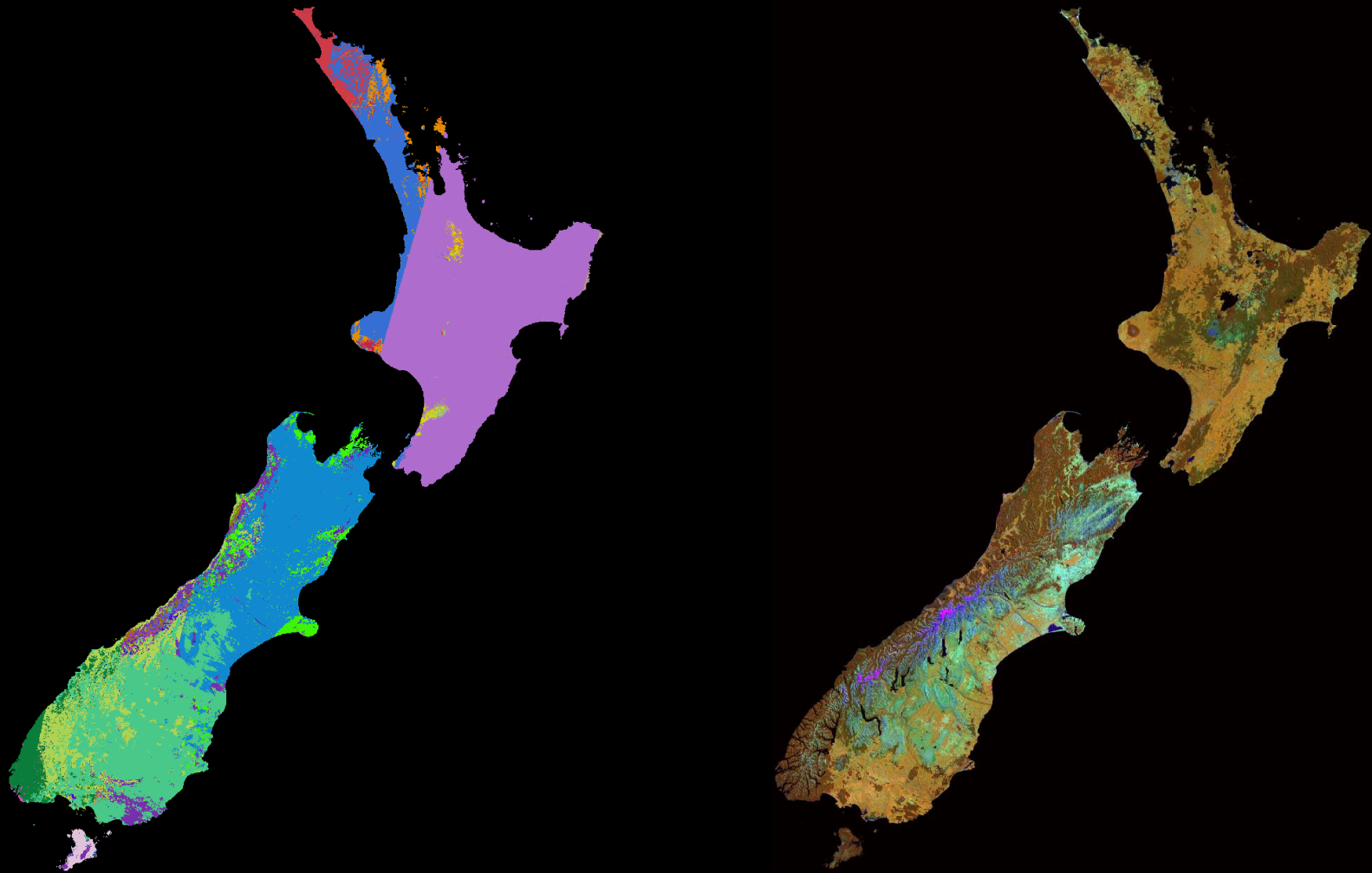




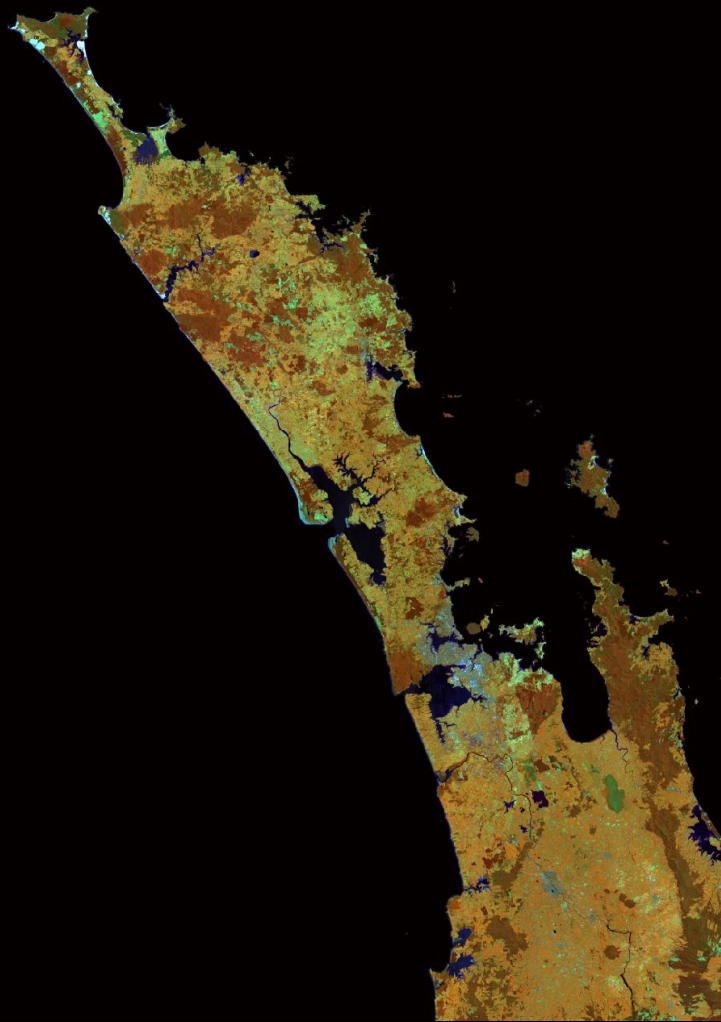
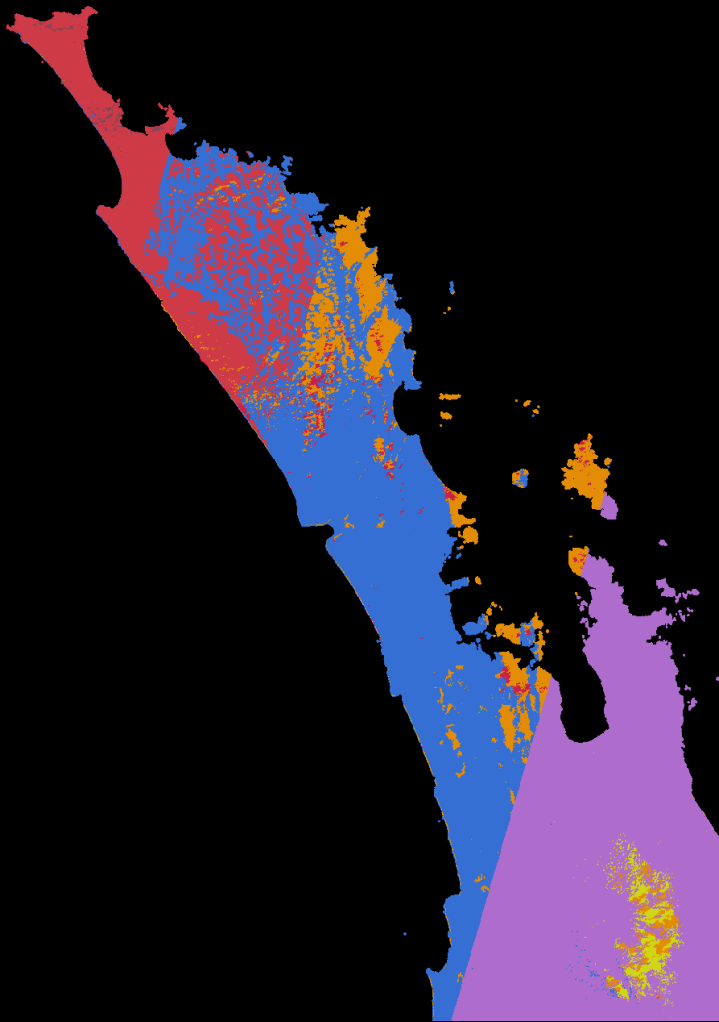


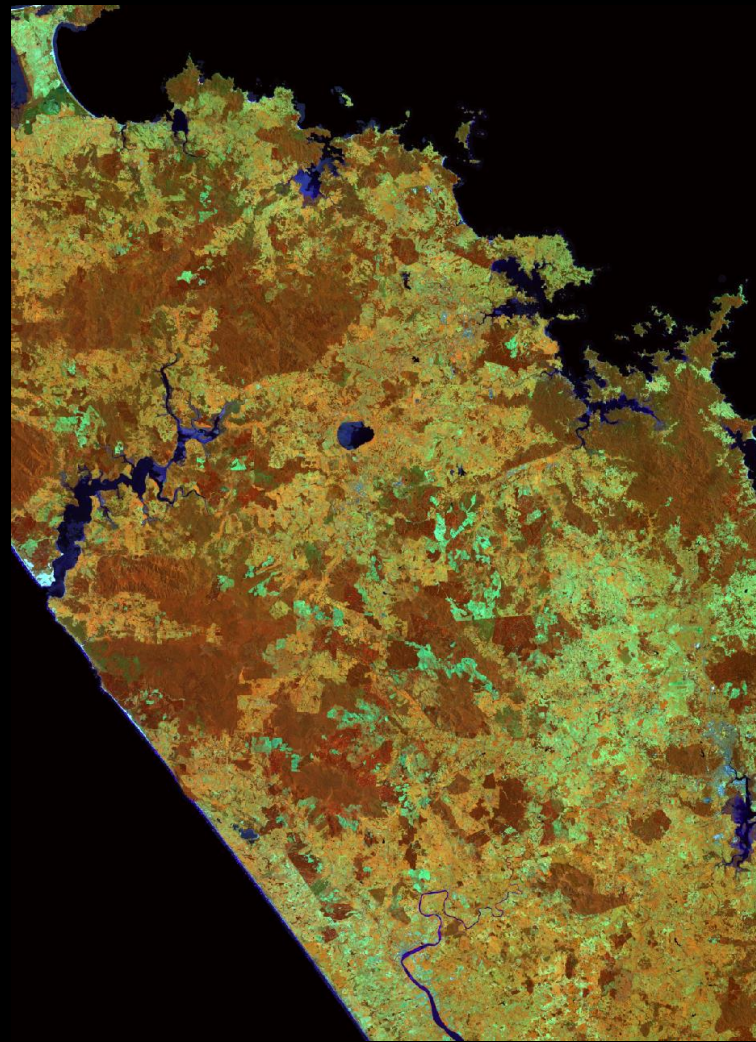
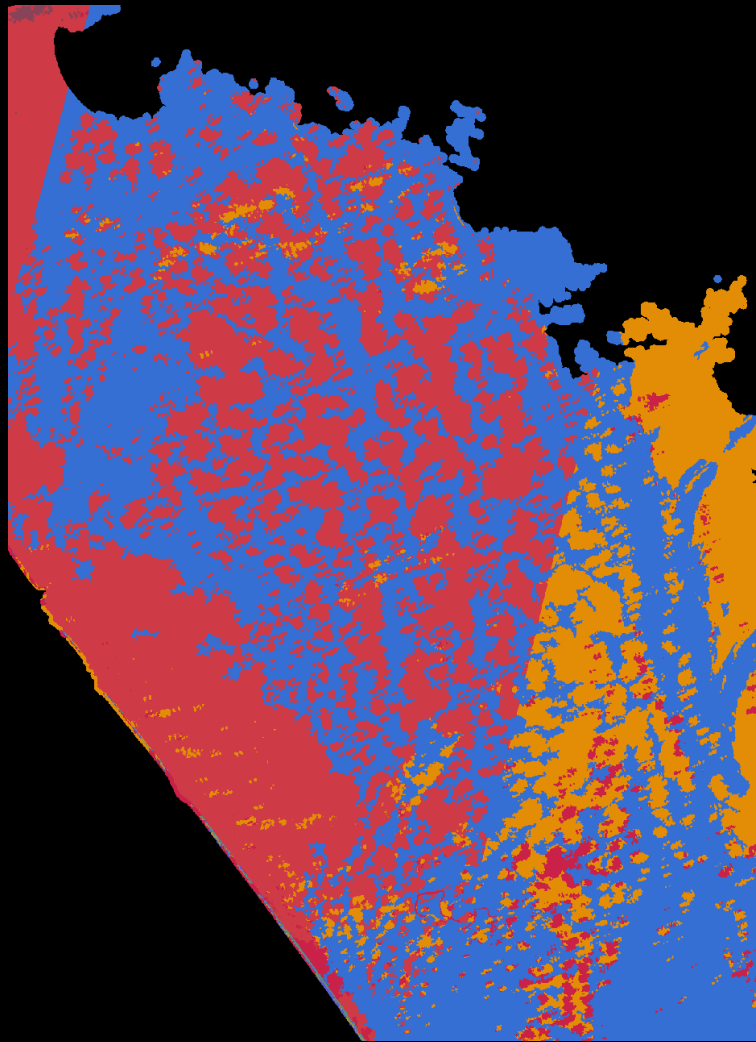


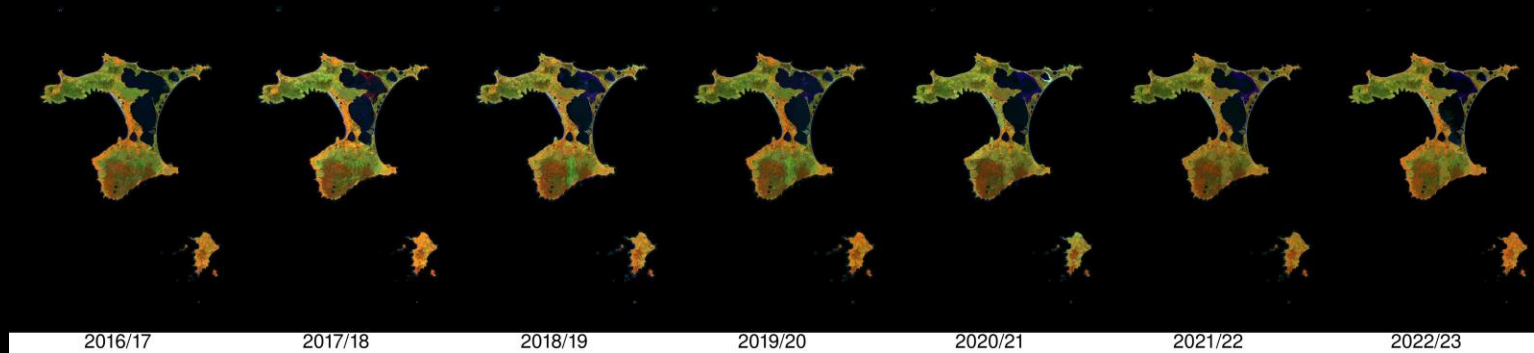
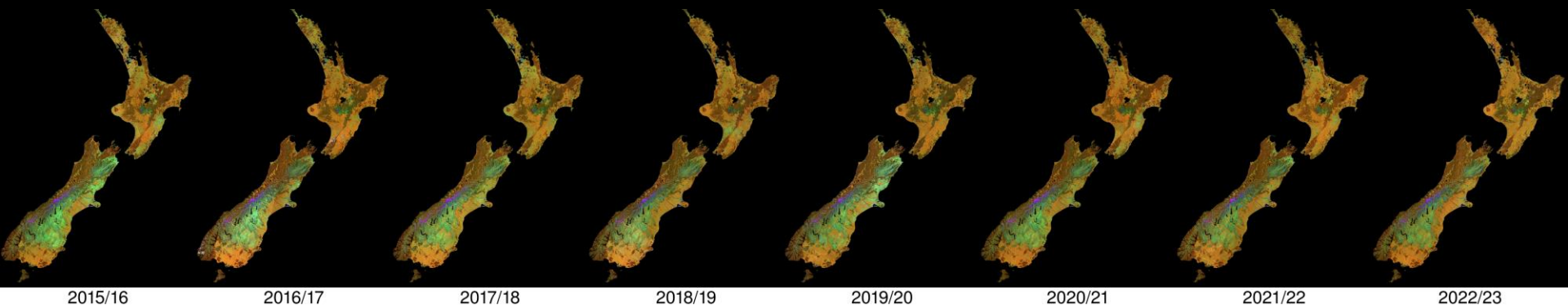




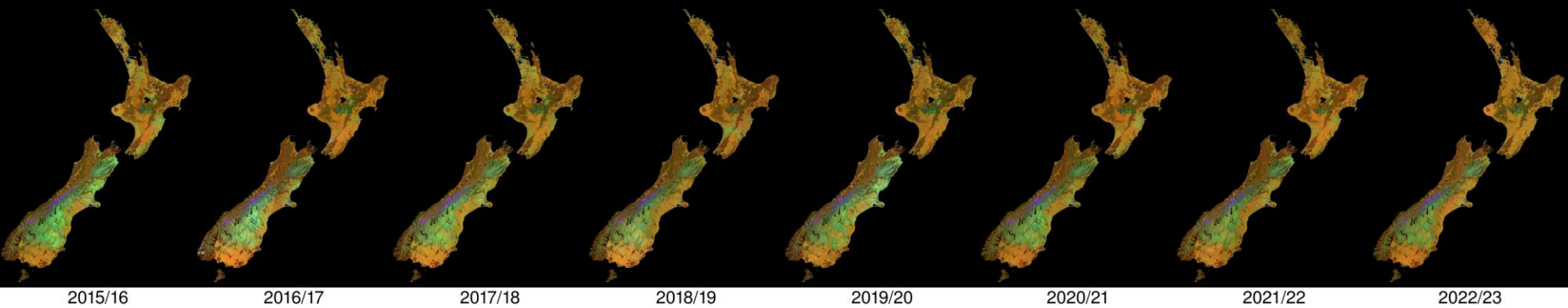












LUM 2016

LCDB 2018

LUM 2020

*LCDB 2022/3*

