

A satellite image of a coastal region, likely the Great Barrier Reef area, showing islands and surrounding waters. The image is partially obscured by a semi-transparent white rounded rectangle containing text. Two islands are labeled: 'Mornington Island' in the upper left and 'Bentinck Island' in the lower right. The text 'CloudS2Mask' is prominently displayed in the center of the white box.

CloudS2Mask

Sentinel-2 cloud and shadow masking

Nick Wright

Sentinel-2

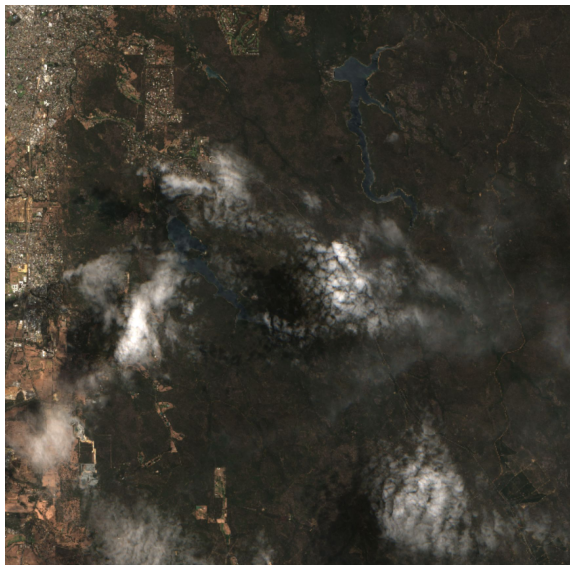
Launch date 2015

Resolution 10m

5 day revisit



The Problem

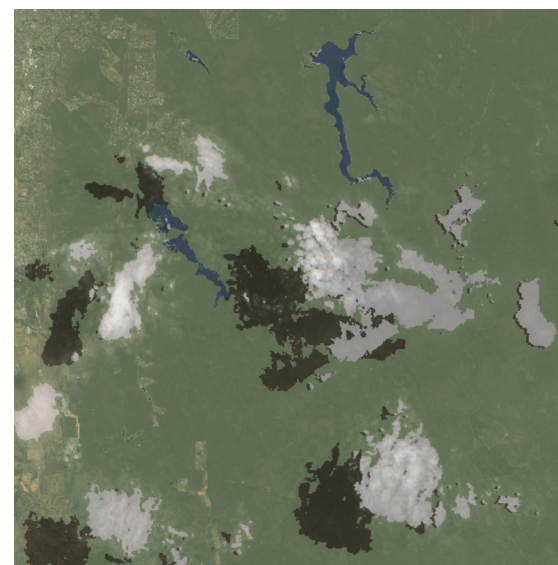


<https://maps.dea.ga.gov.au/>

Sentinel 2 RGB



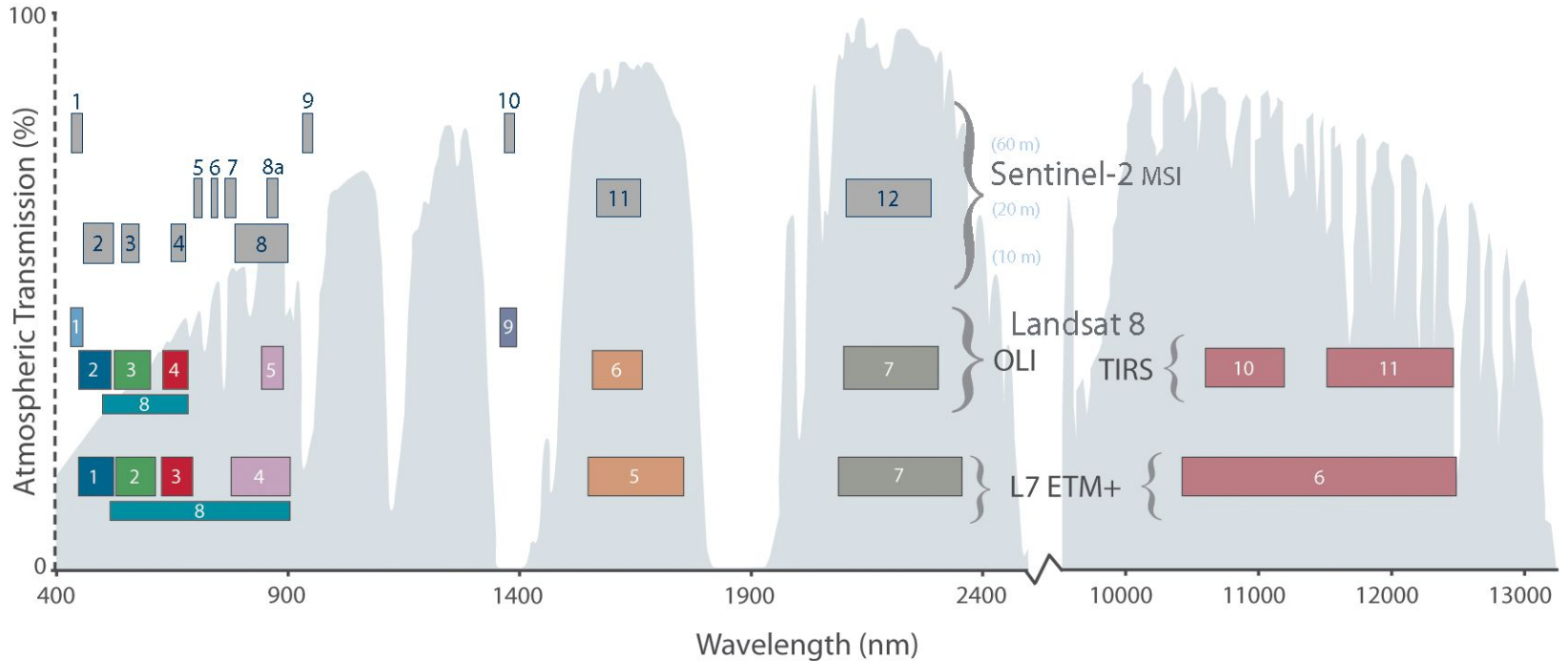
s2cloudless



Fmask

The Reason

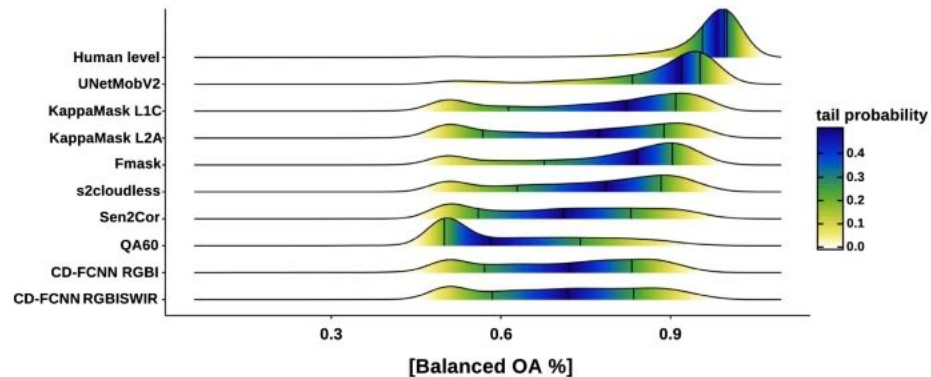
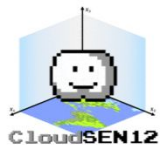
Comparison of Landsat 7 and 8 bands with Sentinel-2



The Solution?

KappaSet -> KappaMask

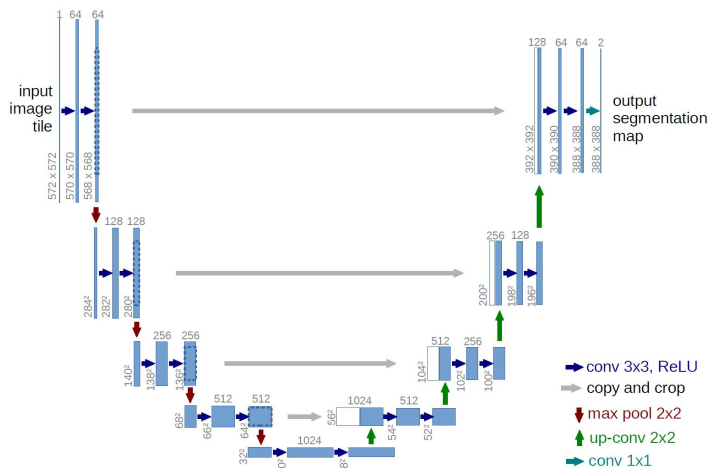
CloudSEN12 -> UnetMobv2



<https://www.nature.com/articles/s41597-022-01878-2>

	Cloud-free (0%)	Almost-clear (0-25%)	Low-cloudy (25-45%)	Mid-cloudy (45-65%)	Cloudy (65%>)
a)					
ROI 0827					
	high-quality				

<https://www.nature.com/articles/s41597-022-01878-2>



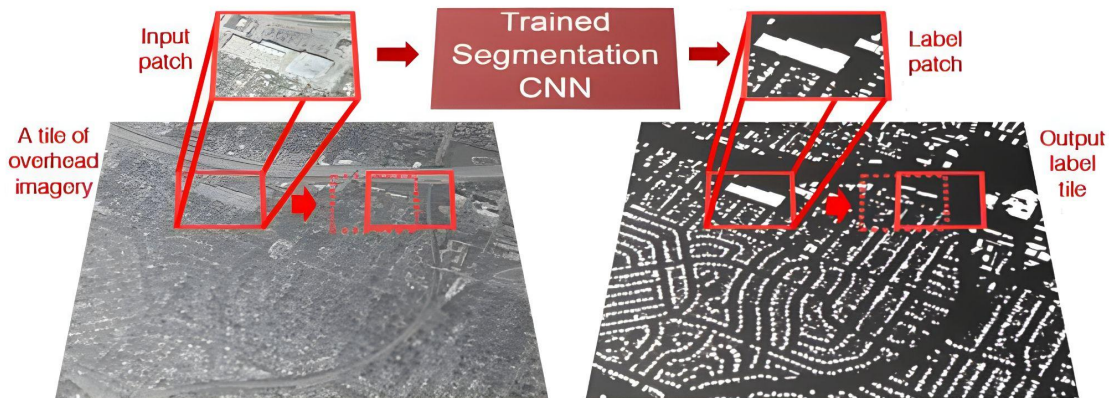
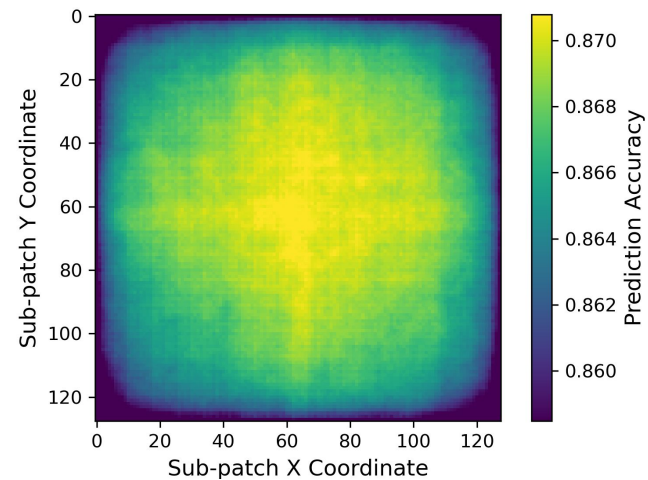
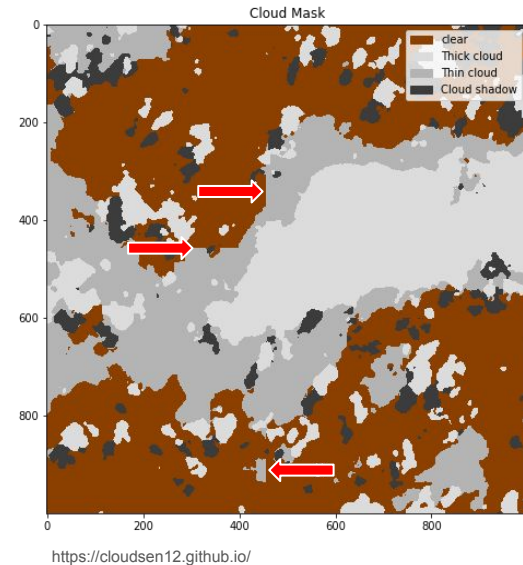
<https://arxiv.org/pdf/1505.04597.pdf>

More Problems

GPU RAM / patches

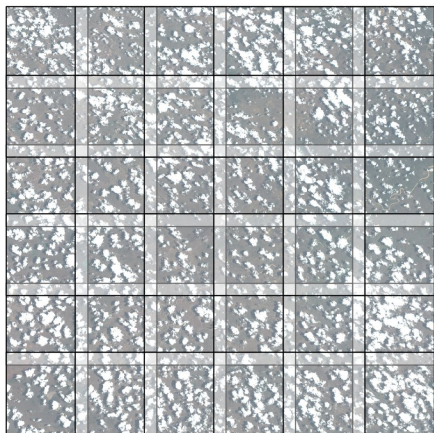
13x10980x10980

Computations efficiency

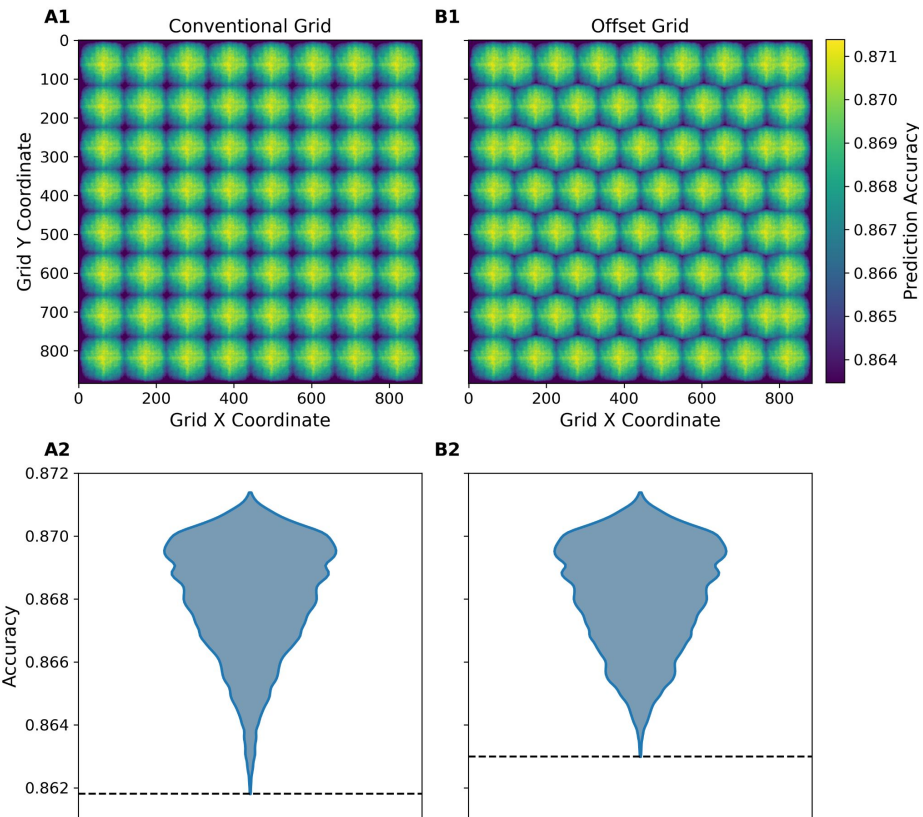
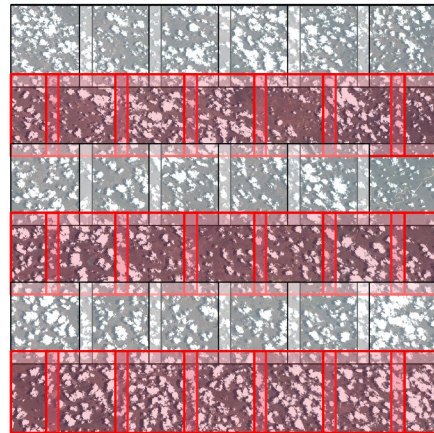


Patch Optimisations

Conventional Grid Approach

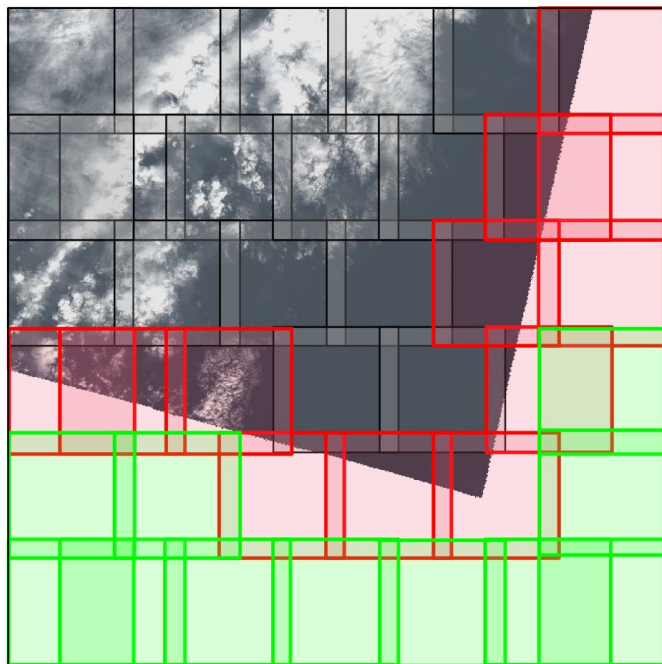


Offset Grid Approach

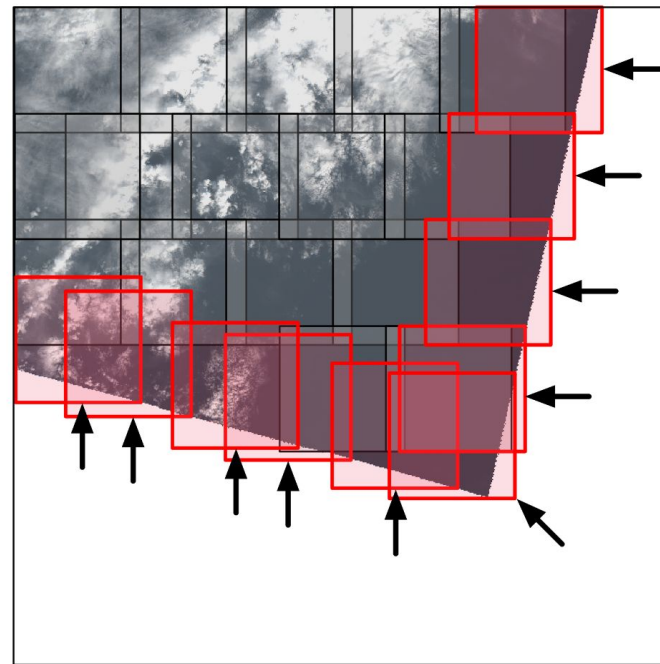


Patch Optimisations

Unoptimised Patches



Optimised Patches

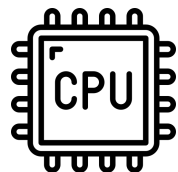


Inference Pipeline

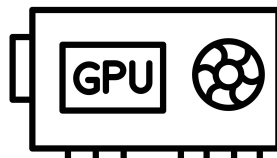
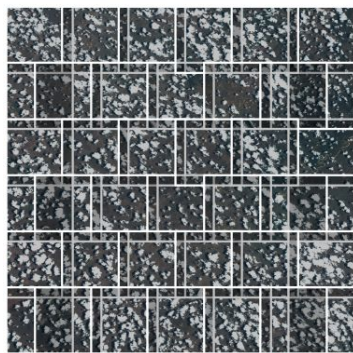
10m and 20m

Async patch creations and merging

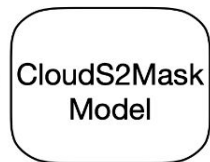
2 seconds



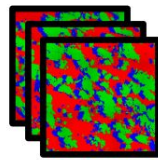
Create patches



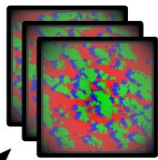
Run model



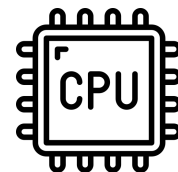
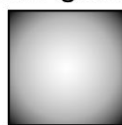
Get predictions



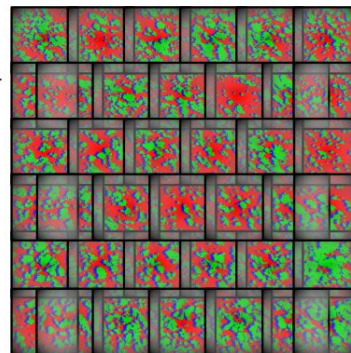
Apply gradient



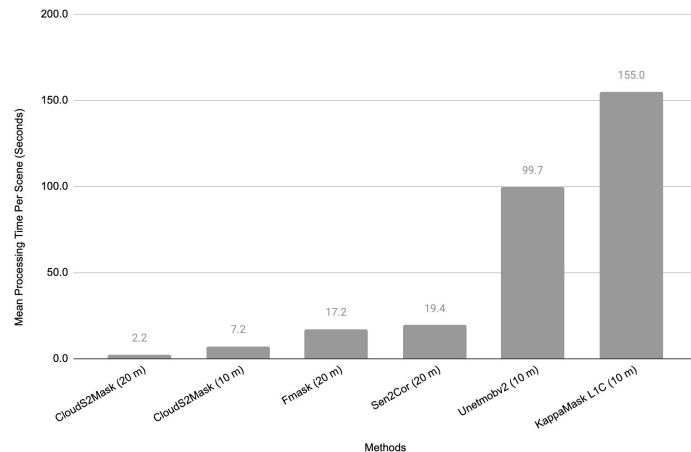
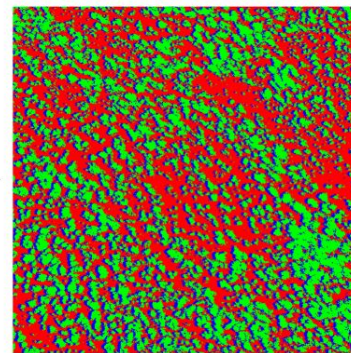
Create gradient



Overlap predictions



Merge predictions



Usage

<https://github.com/DPIRD-DMA/CloudS2Mask>

pip install clouds2mask

```
from pathlib import Path
from clouds2mask import (
    create_settings,
    batch_process_scenes,
)

output_dir = Path("./outputs")
l1c_folders_path = Path("/path/to/your/S2_l1c_SAFE/folders")
l1c_folders = list(l1c_folders_path.glob("*.SAFE"))

scene_settings = create_settings(
    sent_safe_dirs=l1c_folders,
    output_dir=output_dir,
    processing_res=20,
)

paths_to_masks = batch_process_scenes(scene_settings)
```

Funding

Australian Government's Research Training Program

Department of Primary Industries and Regional Development

Australian Government Department of Agriculture Fisheries and Forestry Future Drought Fund

