ESCAP
Economic and Social Commission for Asia and the Pacific

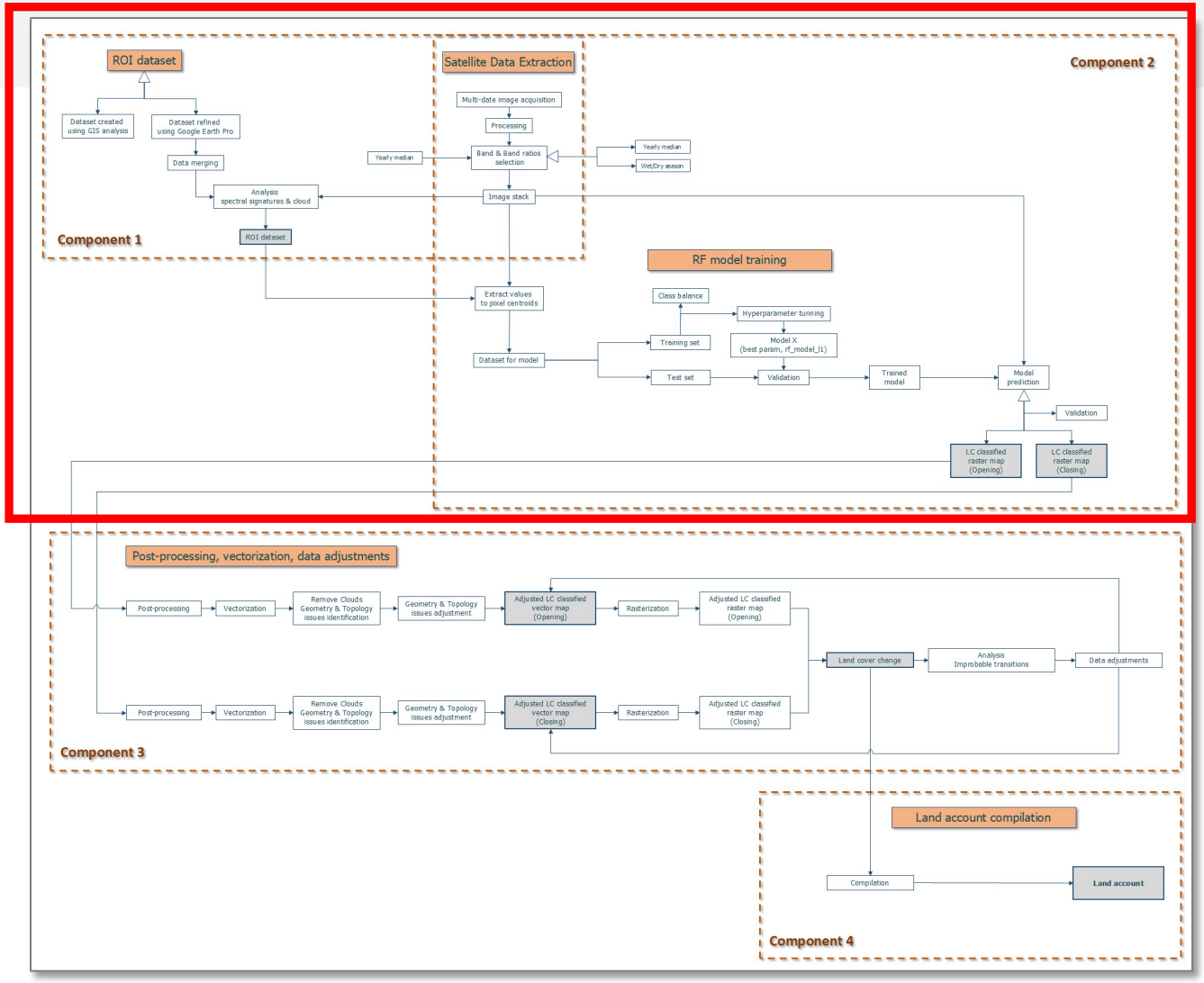
Land cover and land accounting in Vanuatu – Day 3

Components 1 (cont.) & 2 (cont.)

Blanca Perez-Lapena, PhD

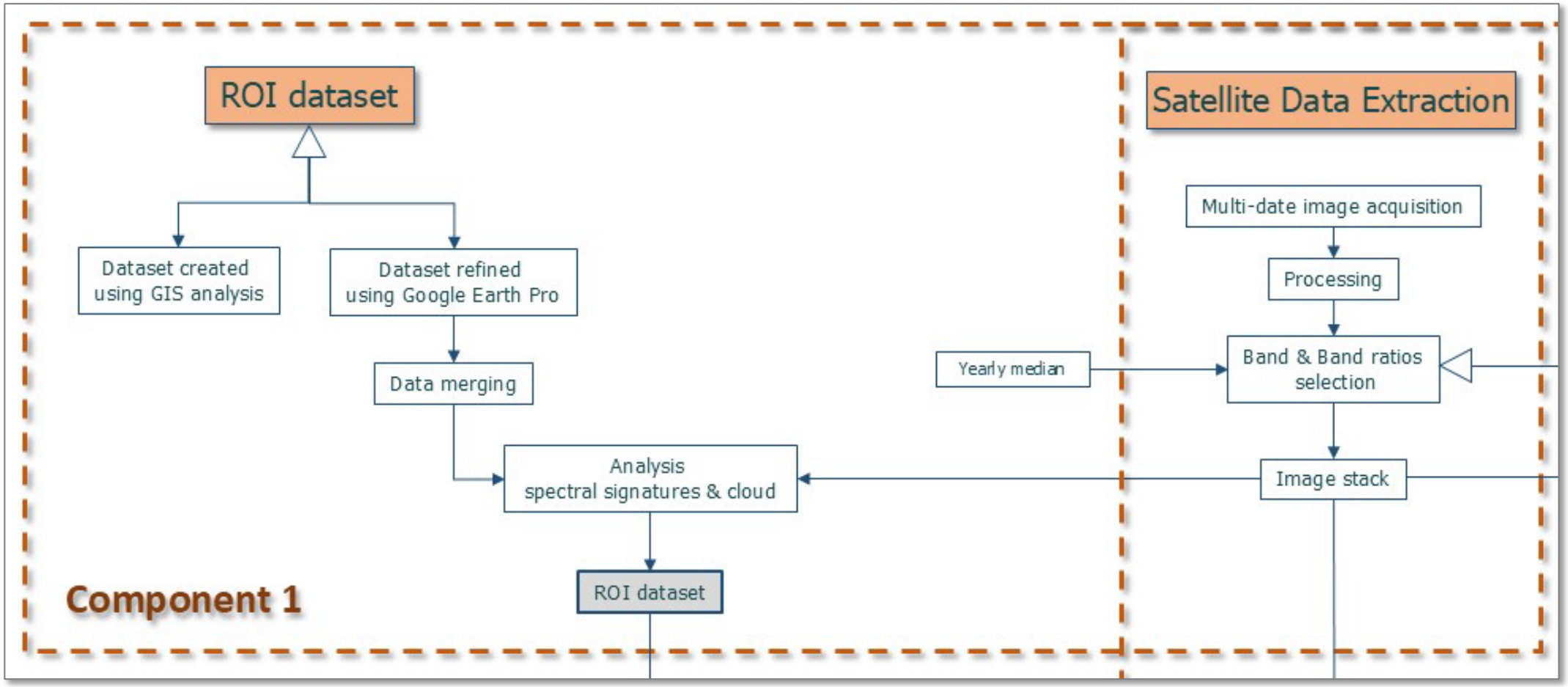
April 2, 2025

Pipeline for **A**gile **E**stimation of **L**and **A**ccounts (PAELA)



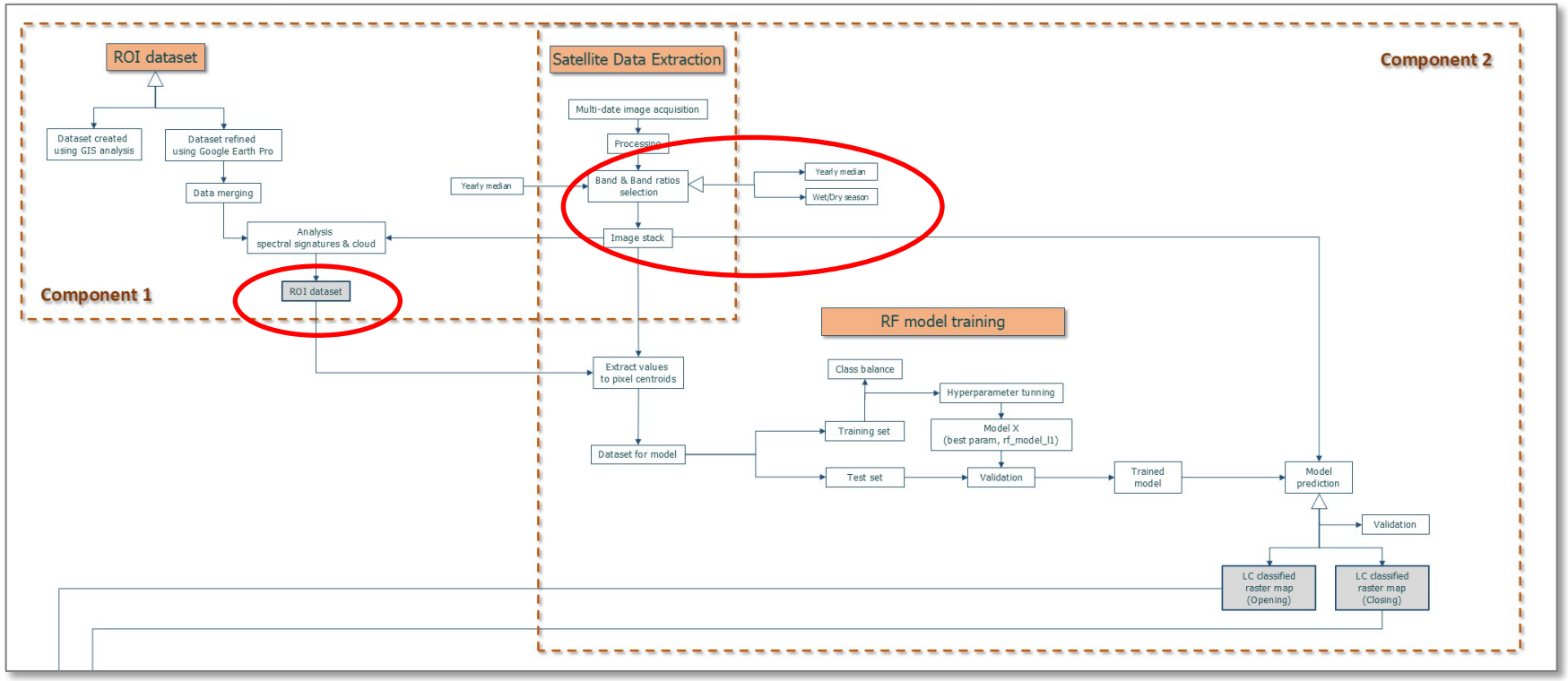
	Dense_Forest	Open_Forest	Forest_plantations	Mangroves	Agriculture	Coconut_Plantation	Grassland	Built-up_Infrastr	Water_body	Shrubs	Bareland	Total
Opening area	274316.9	13137.4	10666.8	752.5	375.6	60.0	1453.4	37753.4	16096.2	9720.2	20416.3	387577.9
Expansions	11301.9	24893.4	5267.3	652.0	173.9	69.1	865.7	12010.2	11082.0	10793.9	7446.6	86209.8
Regressions	18946.6	3582.7	4458.4	430.2	284.3	31.6	663.1	33856.4	9637.2	3494.5	9476.7	86209.8
Net change	7644.7	-21310.7	-808.9	-221.8	110.4	-37.5	-202.6	21846.1	-1444.8	-7299.3	1724.4	0.0
Closing area	266672.3	34448.1	11475.7	974.4	265.2	97.5	1656.1	15907.3	17541.0	17019.6	18691.9	387577.9

Component 1: ROIs dataset (2020)



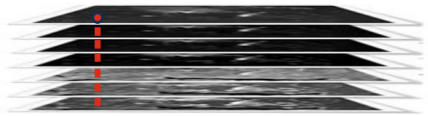
Component 2: Satellite data extraction & RF model training & prediction

- Input:
  - ROIs dataset
  - Imagery stack

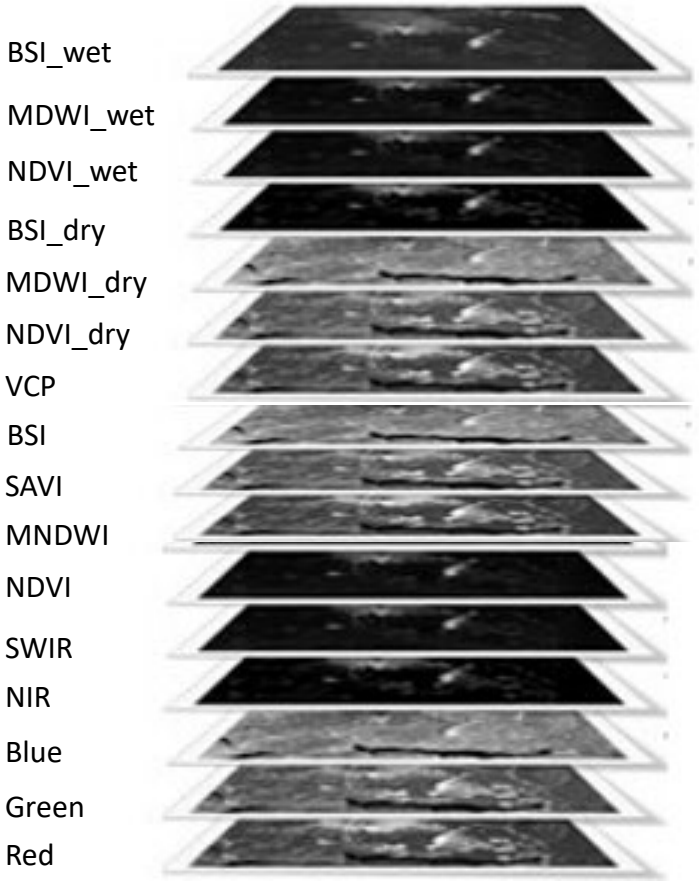


Dates over 2020

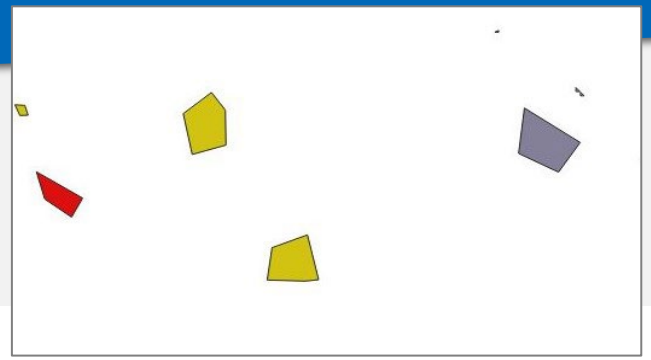
Red

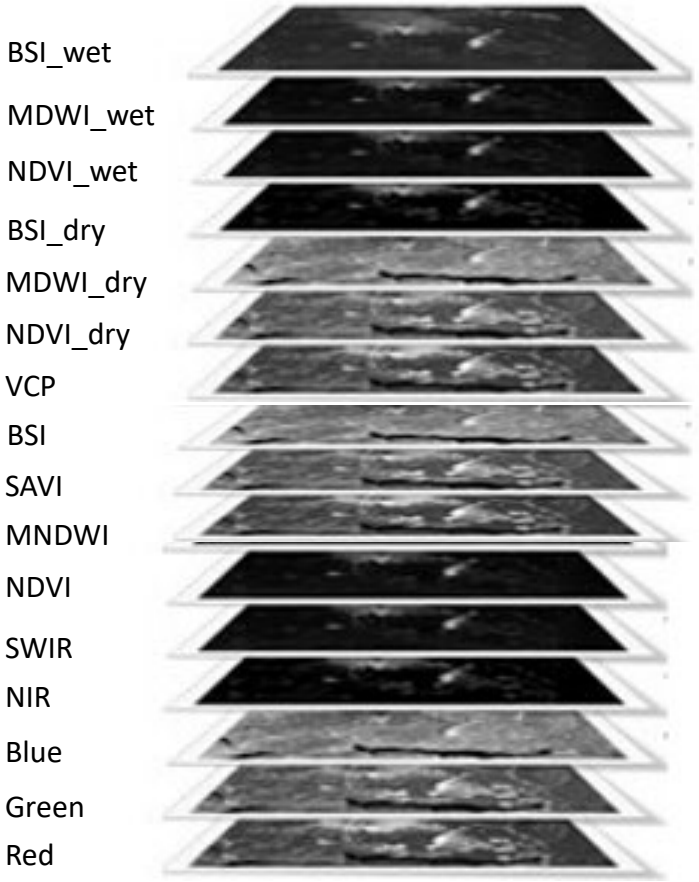


Median

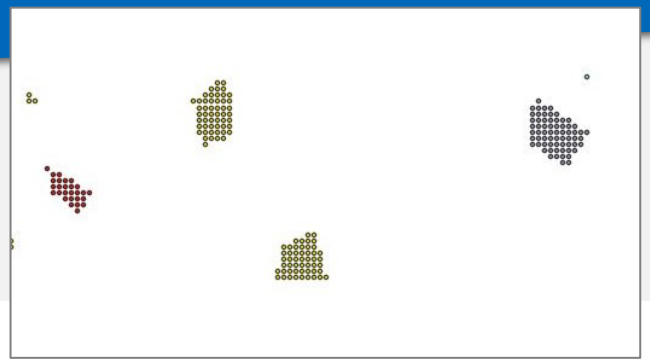

BSI_wet
MDWI_wet
NDVI_wet
BSI_dry
MDWI_dry
NDVI_dry
VCP
BSI
SAVI
MNDWI
NDVI
SWIR
NIR
Blue
Green
Red

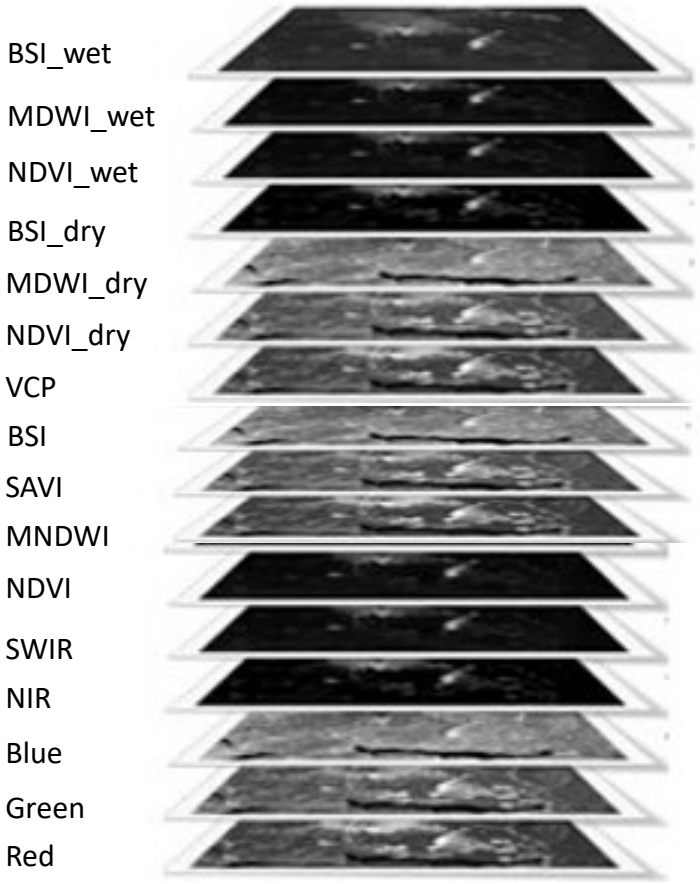
ROIs dataset
(2020)



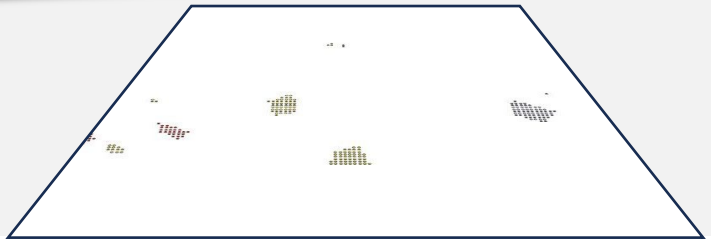


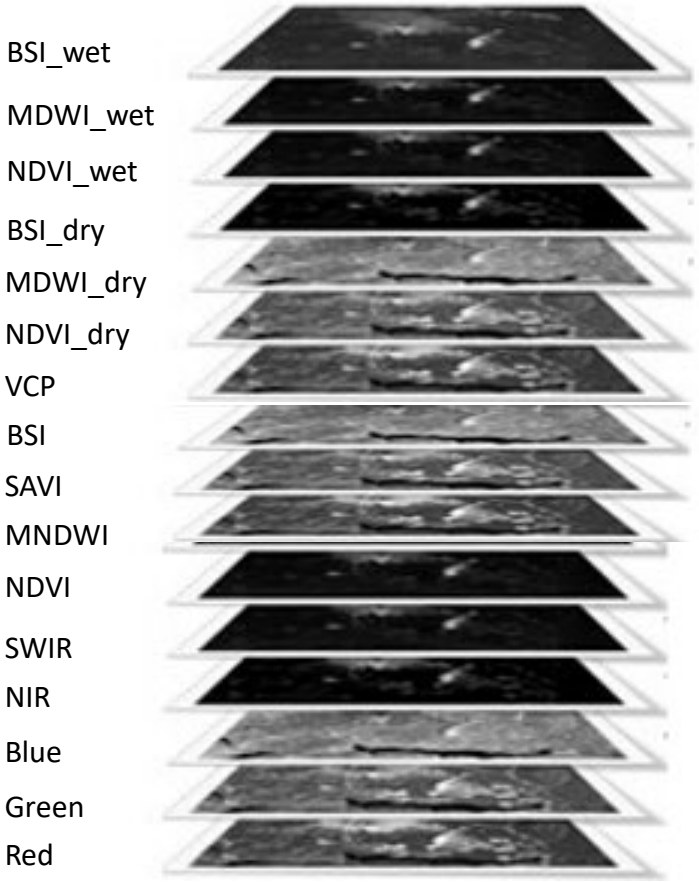
ROIs dataset
(2020)



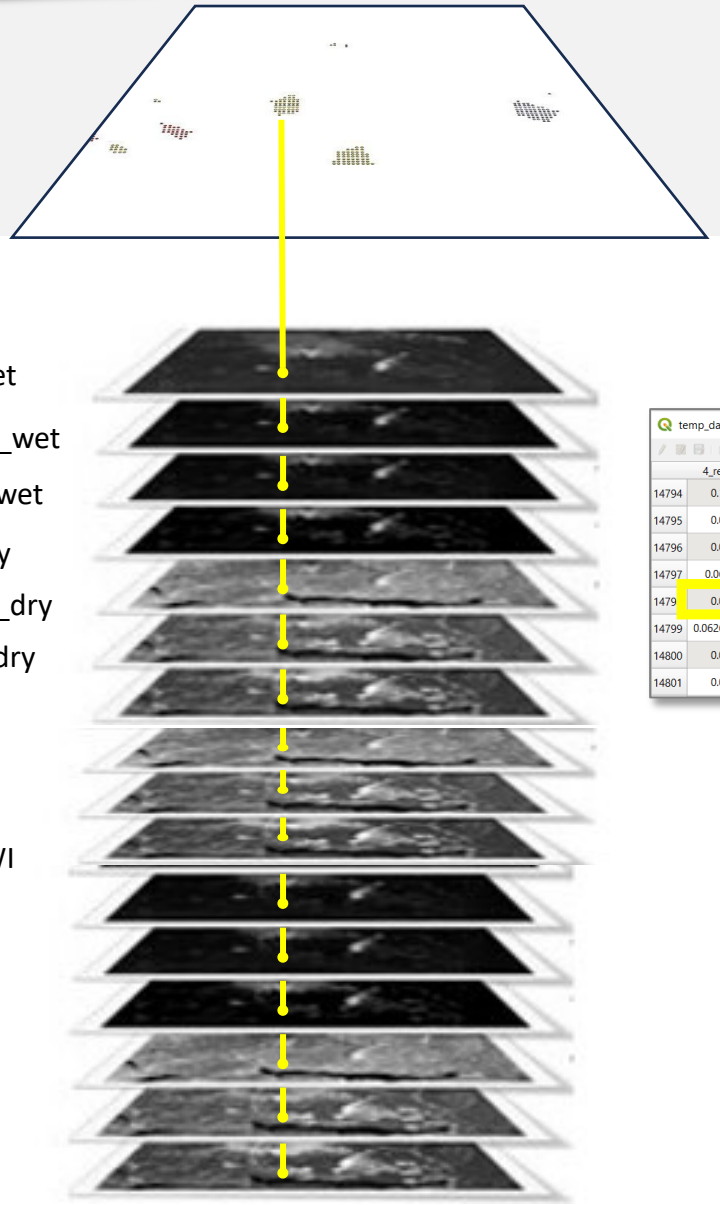


ROIs dataset
(2020)





ROIs dataset
(2020)



temp_data_extrValues_with_geom_crs — Features Total: 15992, Filtered: 15992, Selected: 0

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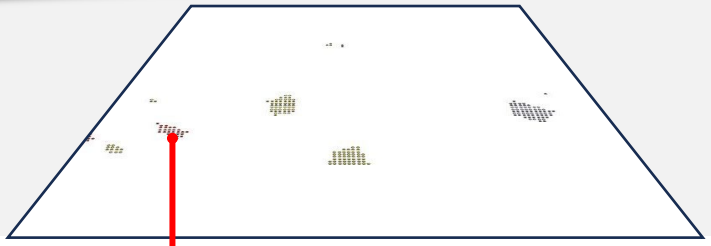
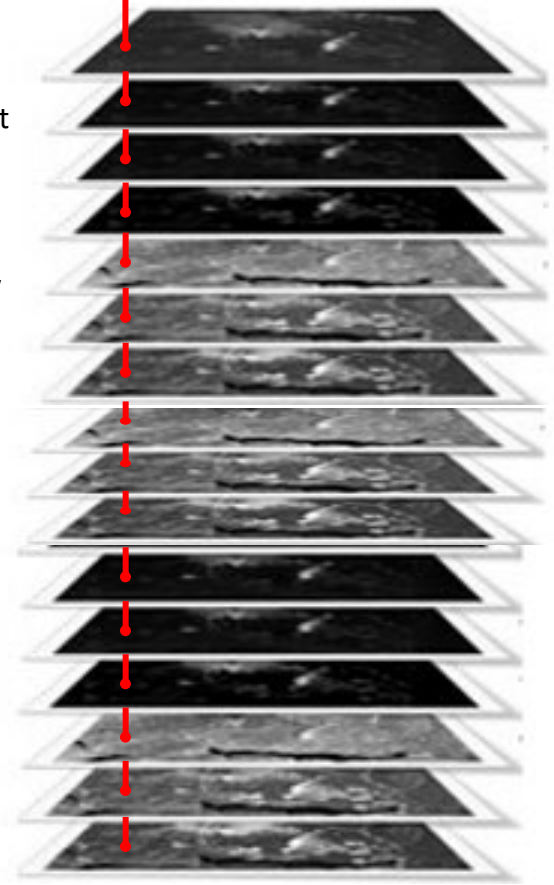
14794	0.1167	0.1167	0.106975	0.18215	0.172275	0.23614226	-0.19678457	0.132287	0.004127456	0.43905744	0.24043368	-0.2080089	0.010320284	0.23197994	-0.18466981	-0.000162...	852310	8039930	8	PROJCS["WGS 8...
14795	0.0638	0.1167333...	0.0903	0.0215	0.01715	-0.46666667	0.65	-0.09877532	-0.12123552	0.4103406	-0.49532825	0.7433173	-0.14008896	-0.37430167	0.53408533	-0.100034...	860070	8058130	13	PROJCS["WGS 8...
14796	0.0591	0.11675	0.0691	0.3946	0.2181	0.7773961	-0.44584545	0.46949944	-0.21757376	0.6717113	0.82653946	-0.56631577	-0.19196732	0.7274434	-0.37289366	-0.225295...	857510	8046550	12	PROJCS["WGS 8...
14797	0.06125	0.11675	0.086625	0.5512	0.274525	0.828825	-0.34714222	0.58305115	-0.33746243	0.8222809	0.8384536	-0.3813377	-0.35988587	0.82873374	-0.3474419	-0.3354453	859110	8044710	12	PROJCS["WGS 8...
1479	0.0835	0.1168	0.062	0.4758	0.2819	0.6784893	-0.43841186	0.5279837	-0.1966805	0.47529885	0.72944427	-0.44099936	-0.23728976	0.66805154	-0.43388134	-0.127860...	876330	8039010	5	PROJCS["WGS 8...
14799	0.0626625	0.11680417	0.08258	0.6329	0.308875	0.7818221	-0.38225034	0.63739717	-0.3114242	0.8377942	0.75006974	-0.38535354	-0.29319838	0.83616024	-0.4408558	-0.3239137	859430	8043470	12	PROJCS["WGS 8...
14800	0.0707	0.11685	0.061	0.5224	0.27423334	0.78253394	-0.42746565	0.6116445	-0.28085408	0.7875149	0.60217714	-0.46908233	-0.15895848	0.8066787	-0.41067916	-0.3212104	862030	8026730	7	PROJCS["WGS 8...
14801	0.0518	0.11685	0.05996	0.7092	0.3794	0.8271537	-0.45852605	0.7463383	-0.28492936	0.82205796	0.88317955	-0.55572784	-0.2924507	0.7948541	-0.4144751	-0.283105...	857510	8046470	12	PROJCS["WGS 8...

ROIs dataset
(2020)

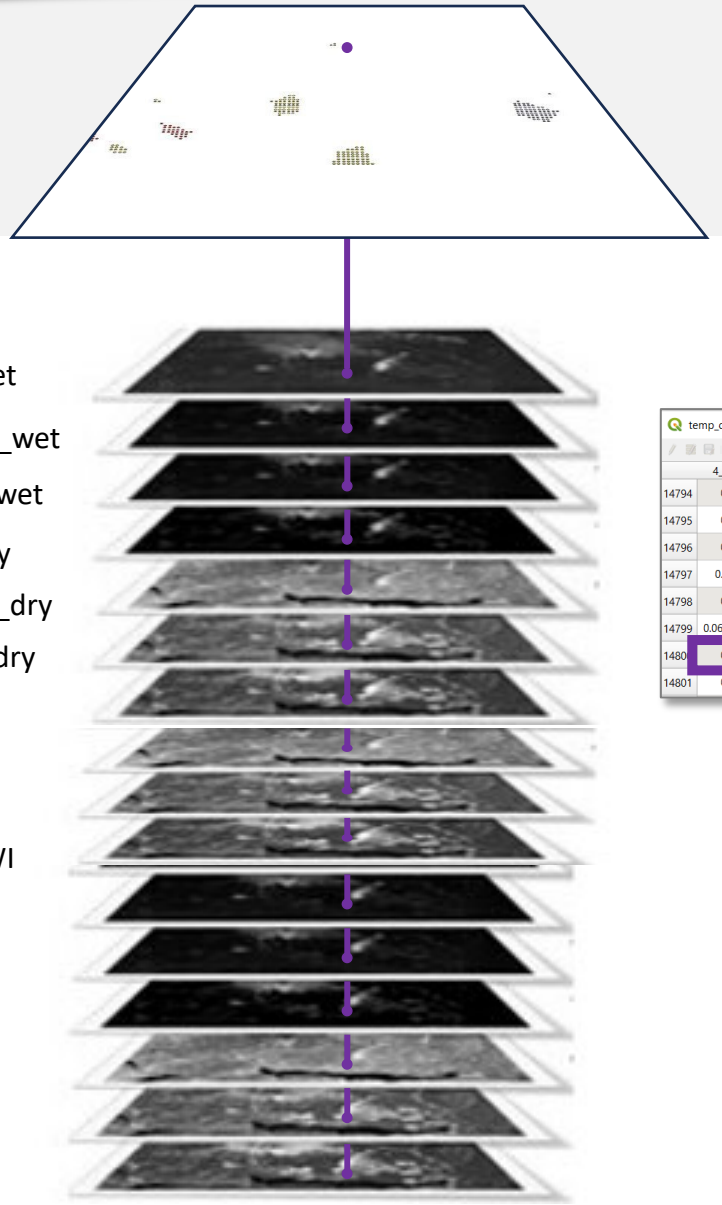




temp_data_extrValues_with_geom_crs — Features Total: 15992, Filtered: 15992, Selected: 0

	4_red	3_green	2_blue	8_nir	11_swir16	v_ndvi	v_mndwi	v_savi	v_bsi	v_vcp	dry_ndvi	dry_mndwi	dry_bsi	wet_ndvi	wet_mndwi	wet_bsi	x	y	class	crs
1479	0.1167	0.1167	0.106975	0.18215	0.172275	0.23614226	-0.19678457	0.132287	0.004127456	0.43905744	0.24043368	-0.2080089	0.010320284	0.23197994	-0.18466981	-0.000162...	852310	8039930	8	PROJCS["WGS 8...
14795	0.0638	0.1167333...	0.0903	0.0215	0.01715	-0.46666667	0.65	-0.09877532	-0.12123552	0.4103406	-0.49532825	0.7433173	-0.14008896	-0.37430167	0.53408533	-0.100034...	860070	8058130	13	PROJCS["WGS 8...
14796	0.0591	0.11675	0.0691	0.3946	0.2181	0.7773961	-0.44584545	0.46949944	-0.21757376	0.6717113	0.82653946	-0.56631577	-0.19196732	0.7274434	-0.37289366	-0.225295...	857510	8046550	12	PROJCS["WGS 8...
14797	0.06125	0.11675	0.086625	0.5512	0.274525	0.828825	-0.34714222	0.58305115	-0.33746243	0.8222809	0.8384536	-0.3813377	-0.35988587	0.82873374	-0.3474419	-0.3354453	859110	8044710	12	PROJCS["WGS 8...
14798	0.0835	0.1168	0.062	0.4758	0.2819	0.6784893	-0.43841186	0.5279837	-0.1966805	0.47529885	0.72944427	-0.44099936	-0.23728976	0.66805154	-0.43388134	-0.127860...	876330	8039010	5	PROJCS["WGS 8...
14799	0.0626625	0.11680417	0.08258	0.6329	0.308875	0.7818221	-0.38225034	0.63739717	-0.3114242	0.8377942	0.75006974	-0.38535354	-0.29319838	0.83616024	-0.4408558	-0.3239137	859430	8043470	12	PROJCS["WGS 8...
14800	0.0707	0.11685	0.061	0.5224	0.27423334	0.78253394	-0.42746565	0.6116445	-0.28085408	0.7875149	0.60217714	-0.46908233	-0.15895848	0.8066787	-0.41067916	-0.3212104	862030	8026730	7	PROJCS["WGS 8...
14801	0.0518	0.11685	0.05996	0.7092	0.3794	0.8271537	-0.45852605	0.7463383	-0.28492936	0.82205796	0.88317955	-0.55572784	-0.2924507	0.7948541	-0.4144751	-0.283105...	857510	8046470	12	PROJCS["WGS 8...

ROIs dataset
(2020)



temp_data_extrValues_with_geom_crs — Features Total: 15992, Filtered: 15992, Selected: 0

	4_red	3_green	2_blue	8_nir	11_swir16	y_ndvi	y_mndwi	y_savi	y_bsi	y_vcp	dry_ndvi	dry_mndwi	dry_bsi	wet_ndvi	wet_mndwi	wet_bsi	x	y	class	crs
14794	0.1167	0.1167	0.106975	0.18215	0.172275	0.23614226	-0.19678457	0.132287	0.004127456	0.43905744	0.24043368	-0.2080089	0.010320284	0.23197994	-0.18466981	-0.000162...	852310	8039930	8	PROJCS["WGS 8...
14795	0.0638	0.1167333...	0.0903	0.0215	0.01715	-0.46666667	0.65	-0.09877532	-0.12123552	0.4103406	-0.49532825	0.7433173	-0.14008896	-0.37430167	0.53408533	-0.100034...	860070	8058130	13	PROJCS["WGS 8...
14796	0.0591	0.11675	0.0691	0.3946	0.2181	0.7773961	-0.44584545	0.46949944	-0.21757376	0.6717113	0.82653946	-0.56631577	-0.19196732	0.7274434	-0.37289366	-0.225295...	857510	8046550	12	PROJCS["WGS 8...
14797	0.06125	0.11675	0.086625	0.5512	0.274525	0.828825	-0.34714222	0.58305115	-0.33746243	0.8222809	0.8384536	-0.3813377	-0.35988587	0.82873374	-0.3474419	-0.3354453	859110	8044710	12	PROJCS["WGS 8...
14798	0.0835	0.1168	0.062	0.4758	0.2819	0.6784893	-0.43841186	0.5279837	-0.1966805	0.47529885	0.72944427	-0.44099936	-0.23728976	0.66805154	-0.43388134	-0.127860...	876330	8039010	5	PROJCS["WGS 8...
14799	0.0626625	0.11680417	0.08258	0.6329	0.308875	0.7818221	-0.38225034	0.63739717	-0.3114242	0.8377942	0.75006974	-0.38535354	-0.29319838	0.83616024	-0.4408558	-0.3239137	859430	8043470	12	PROJCS["WGS 8...
1480	0.0707	0.11685	0.061	0.5224	0.27423334	0.78253394	-0.42746565	0.6116445	-0.28085408	0.7875149	0.60217714	-0.46908233	-0.15895848	0.8066787	-0.41067916	-0.3212104	862030	8026730	7	PROJCS["WGS 8...
14801	0.0518	0.11685	0.05996	0.7092	0.3794	0.8271537	-0.45852605	0.7463383	-0.28492936	0.82205796	0.88317955	-0.55572784	-0.2924507	0.7948541	-0.4144751	-0.283105...	857510	8046470	12	PROJCS["WGS 8...

data_extrVal_geom_crs_2020_vROIs2 — Features Total: 15992, Filtered: 15992, Selected: 0

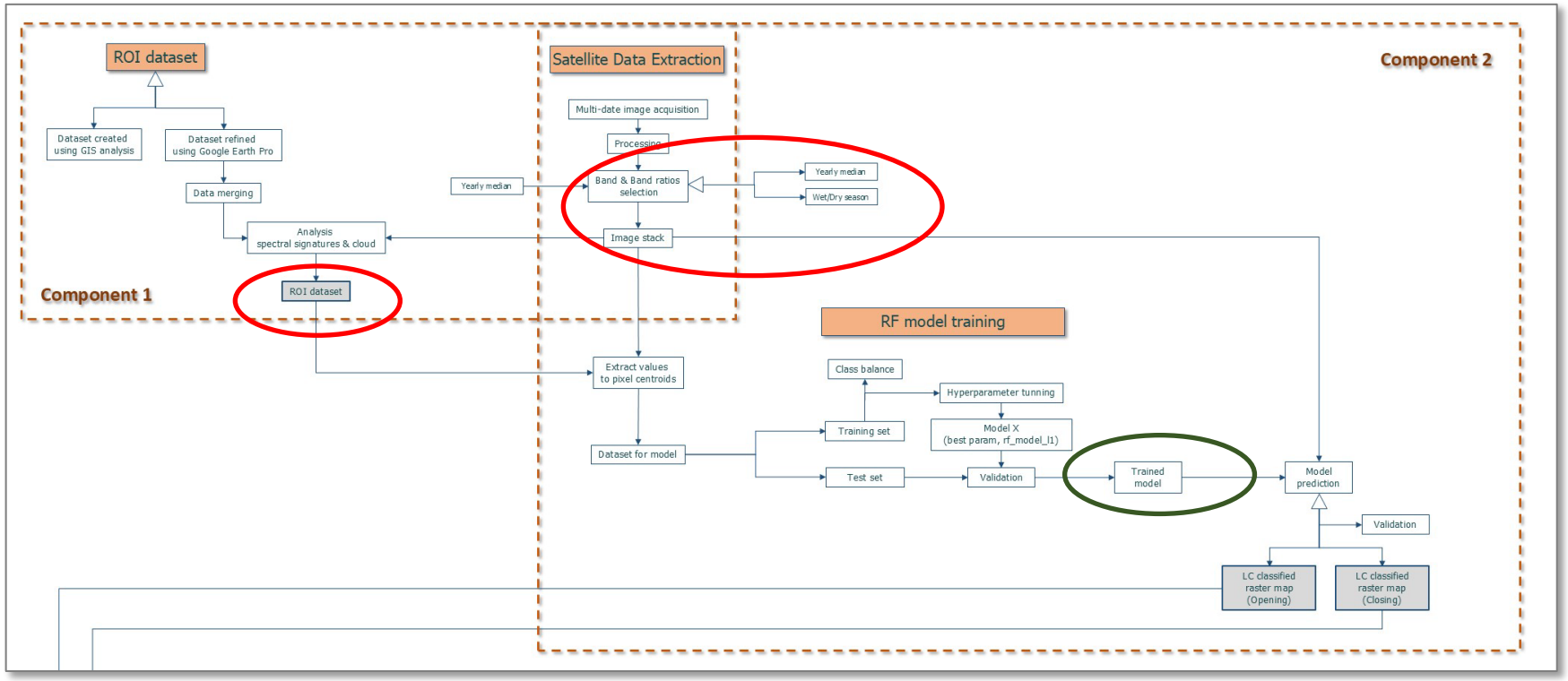
	4_red	3_green	2_blue	8_nir	11_swir16	y_ndvi	y_mndwi	y_savi	y_bsi	y_vcp	dry_ndvi	dry_mndwi	dry_bsi	wet_ndvi	wet_mndwi	wet_bsi	x	y	class	eomet	crs
384	0.052375	0.08785	0.045508...	0.44935	0.25903332	0.7736924	-0.49190855	0.57504684	-0.22361831	0.7371176	0.7446177	-0.47717187	-0.20206845	0.82191277	-0.5058284	-0.2823981	878570.0	8039450.0	5	POI...	PROJCS["WGS 84 / UTM
385	0.05005	0.0824	0.0459	0.437875	0.25715	0.7706664	-0.51540637	0.5552202	-0.20754814	0.7153296	0.7053502	-0.47242838	-0.1828272	0.8293326	-0.5276966	-0.2674832	878590.0	8039450.0	5	POI...	PROJCS["WGS 84 / UTM
386	0.0521	0.07735	0.0422	0.4205	0.2505	0.7714611	-0.54022855	0.5383003	-0.20665957	0.7132552	0.69241893	-0.45474246	-0.1696722	0.84	-0.5550779	-0.27637497	878610.0	8039450.0	5	POI...	PROJCS["WGS 84 / UTM
387	0.0504	0.087	0.0472	0.4531	0.27445	0.7835421	-0.5245554	0.58787954	-0.22974211	0.76854247	0.7269698	-0.5067155	-0.19049355	0.79876035	-0.5249879	-0.2743818	878590.0	8039430.0	5	POI...	PROJCS["WGS 84 / UTM
388	0.05265	0.0894	0.0509625	0.4446	0.2729	0.7743145	-0.49979544	0.56318027	-0.22630087	0.7231481	0.69840574	-0.4438586	-0.16827111	0.8080007	-0.5253132	-0.25451207	878610.0	8039430.0	5	POI...	PROJCS["WGS 84 / UTM
389	0.05175	0.09295	0.0477	0.463	0.24665	0.80073386	-0.44857118	0.5721927	-0.2814056	0.6972896	0.8213822	-0.4438743	-0.33303666	0.7890923	-0.45354357	-0.24045399	873870.0	8039270.0	5	POI...	PROJCS["WGS 84 / UTM
390	0.0547	0.09525	0.0502	0.45825	0.24235	0.79595315	-0.43586686	0.5662876	-0.27857447	0.77987957	0.80338985	-0.4404332	-0.32804894	0.7662971	-0.43443263	-0.27284968	873890.0	8039270.0	5	POI...	PROJCS["WGS 84 / UTM
391	0.05215	0.1012	0.0492	0.45545	0.23105	0.79209846	-0.41121092	0.5713765	-0.2815159	0.7917523	0.7936852	-0.39421088	-0.33142948	0.7920899	-0.41897964	-0.2615526	873910.0	8039270.0	5	POI...	PROJCS["WGS 84 / UTM
392	0.0518	0.1039	0.0481	0.43395	0.23715	0.7937078	-0.4020597	0.5819202	-0.25014156	0.7896532	0.8040865	-0.39466476	-0.36365464	0.75364643	-0.40957466	-0.23687384	873930.0	8039270.0	5	POI...	PROJCS["WGS 84 / UTM
393	0.04995	0.0984	0.0479	0.4373	0.23815	0.7989785	-0.4205038	0.558335	-0.27341297	0.801412	0.8023135	-0.41732296	-0.36972666	0.79564756	-0.42433658	-0.22237581	873950.0	8039270.0	5	POI...	PROJCS["WGS 84 / UTM

Model training & validation

(2020)

Component 2: Satellite data extraction & RF model training & prediction

- Input:
  - ROIs dataset
  - Imagery stack



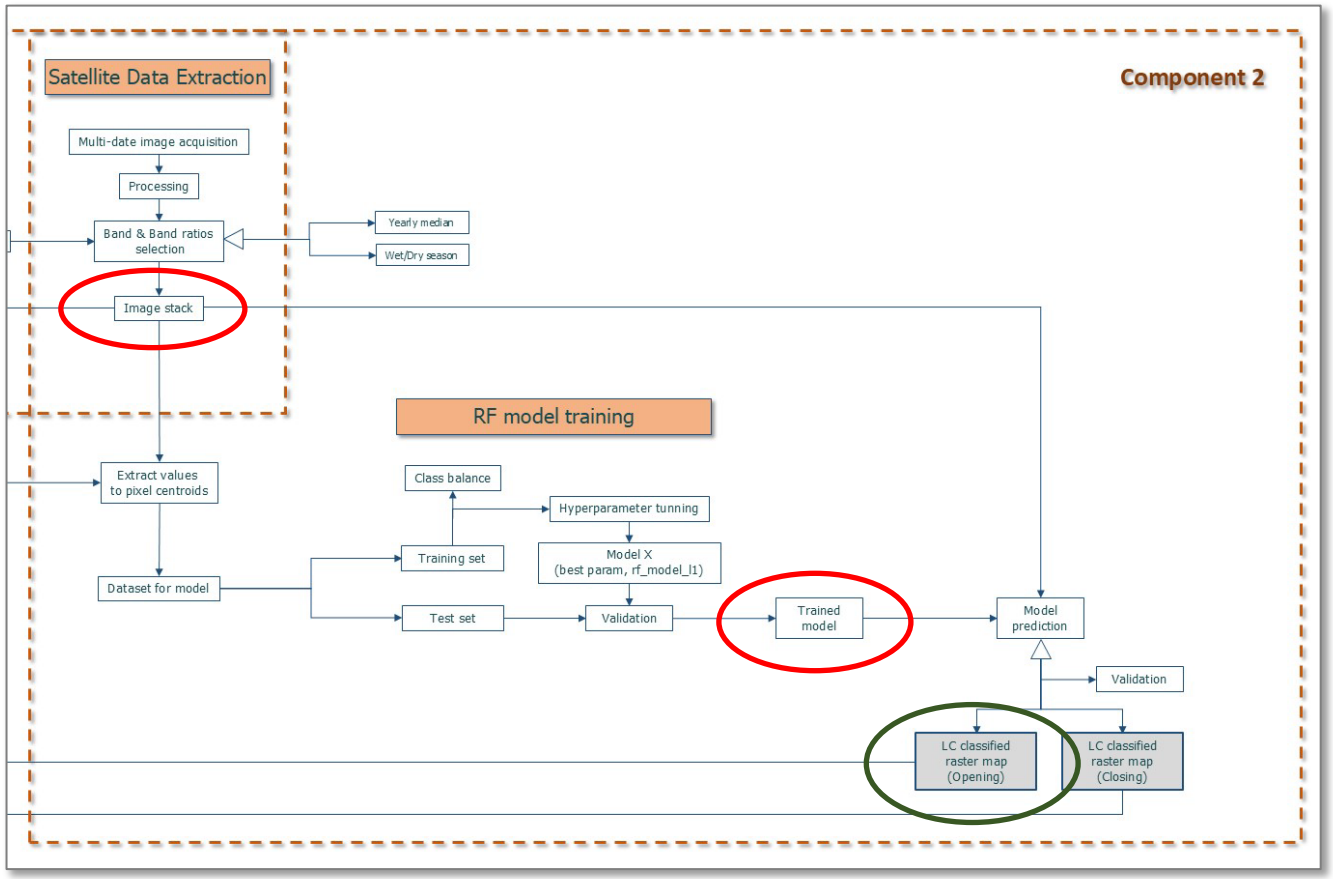
- Output:
  - Trained Random Forest model

    (e.g., Opening year)

Component 2: Satellite data extraction & RF model training & prediction

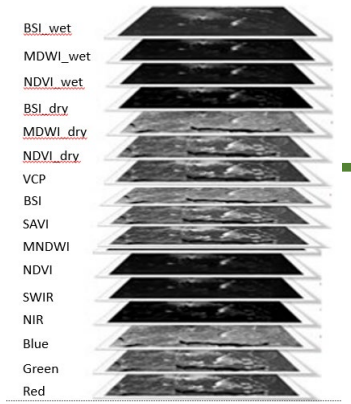
- Input:
  - Trained Random Forest model
  - Imagery stack (e.g., Opening year)

- Output:
  - Land cover classified raster map (e.g., Opening year)

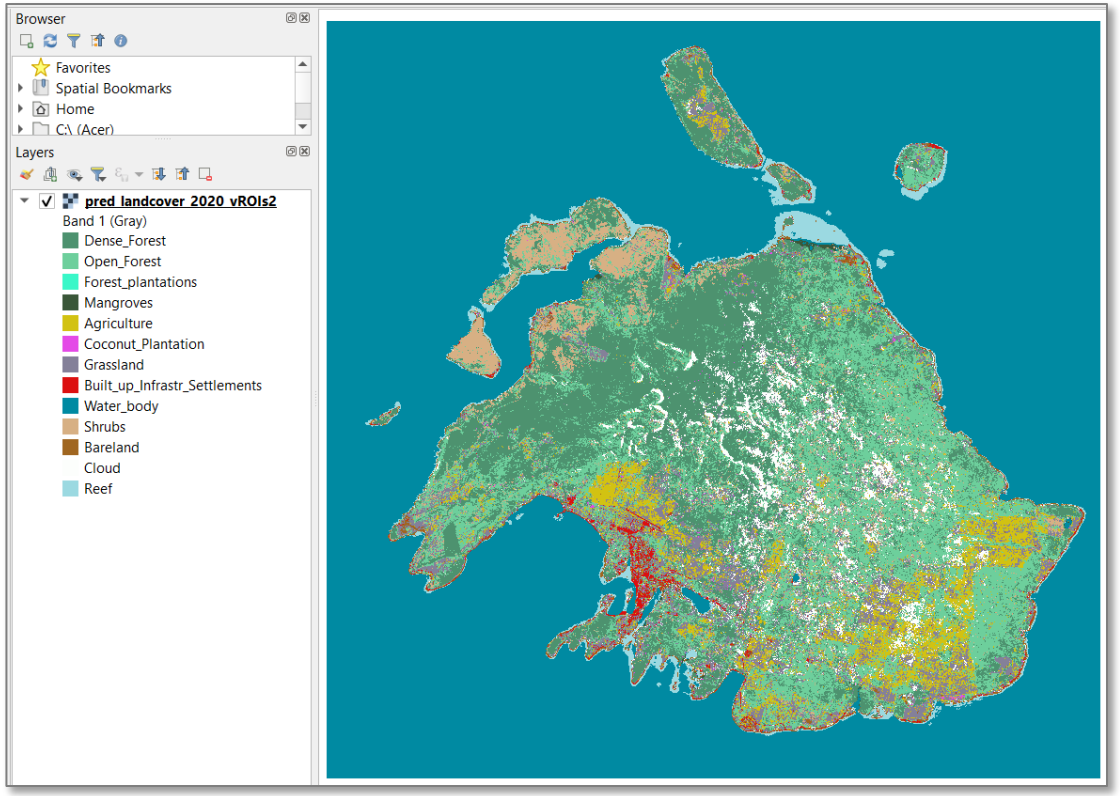


Component 2: Output

Trained RF Model

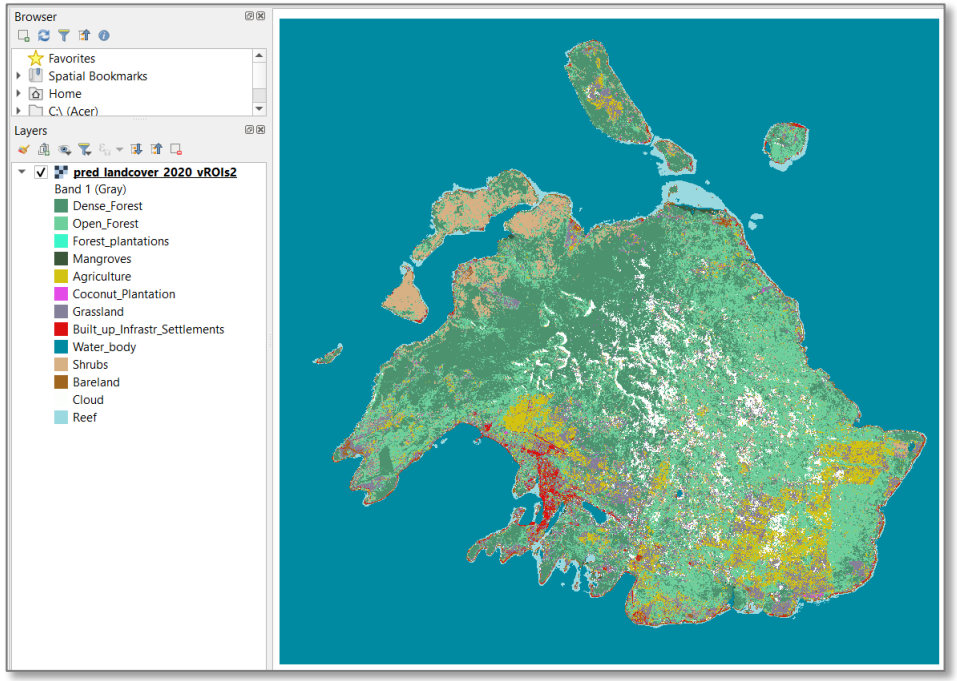


LC prediction (2020)

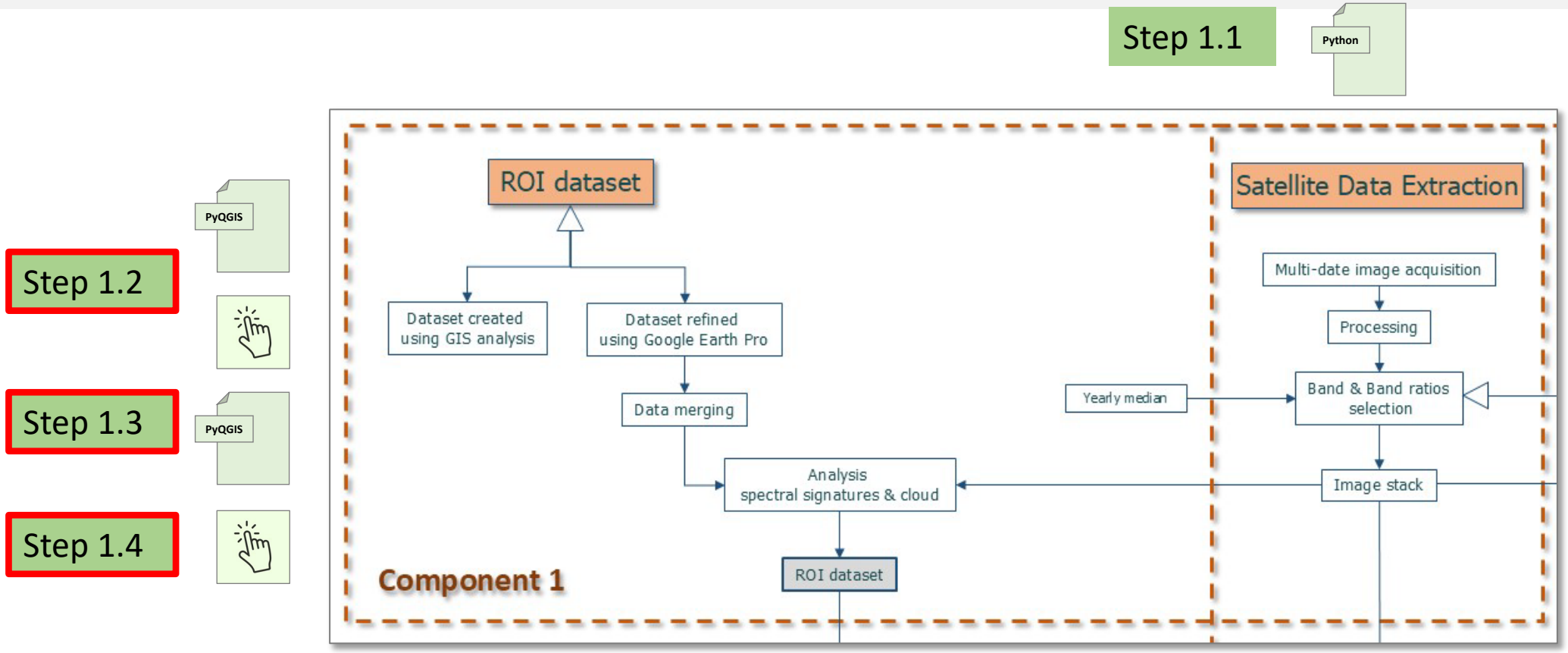


Yesterday – Component 1 & 2 (2020)

- You used the already provided ROIs dataset for 2020 (vROIs2)
- You ran Component 2 (Colab) to create the Land cover classified raster for 2020



Today – Component 1 (2023)

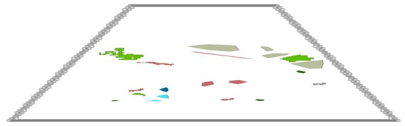


Today – Component 1: From vROIs2 (2020) to vROIs1 (2023)

ROIs dataset

Step 1.2

Step 1.3



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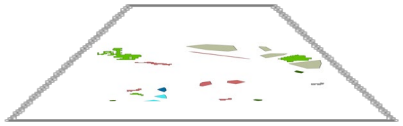
Step 1.1

Step 1.4

=

ROIs dataset

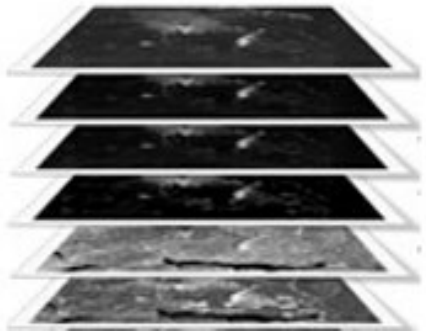
With 2023 cloud ROIs



Imagery

Step 1.1

2023

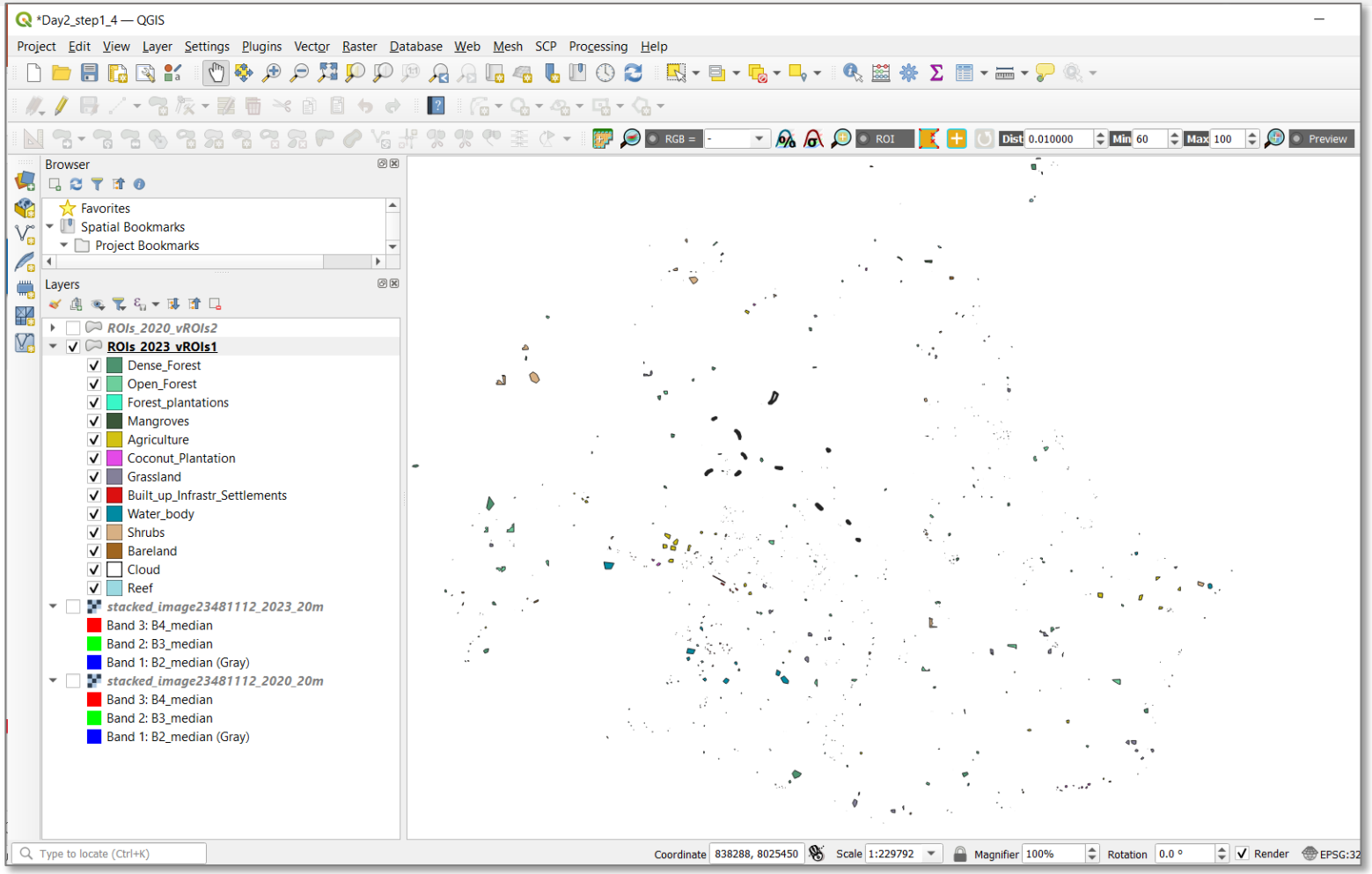


Yearly

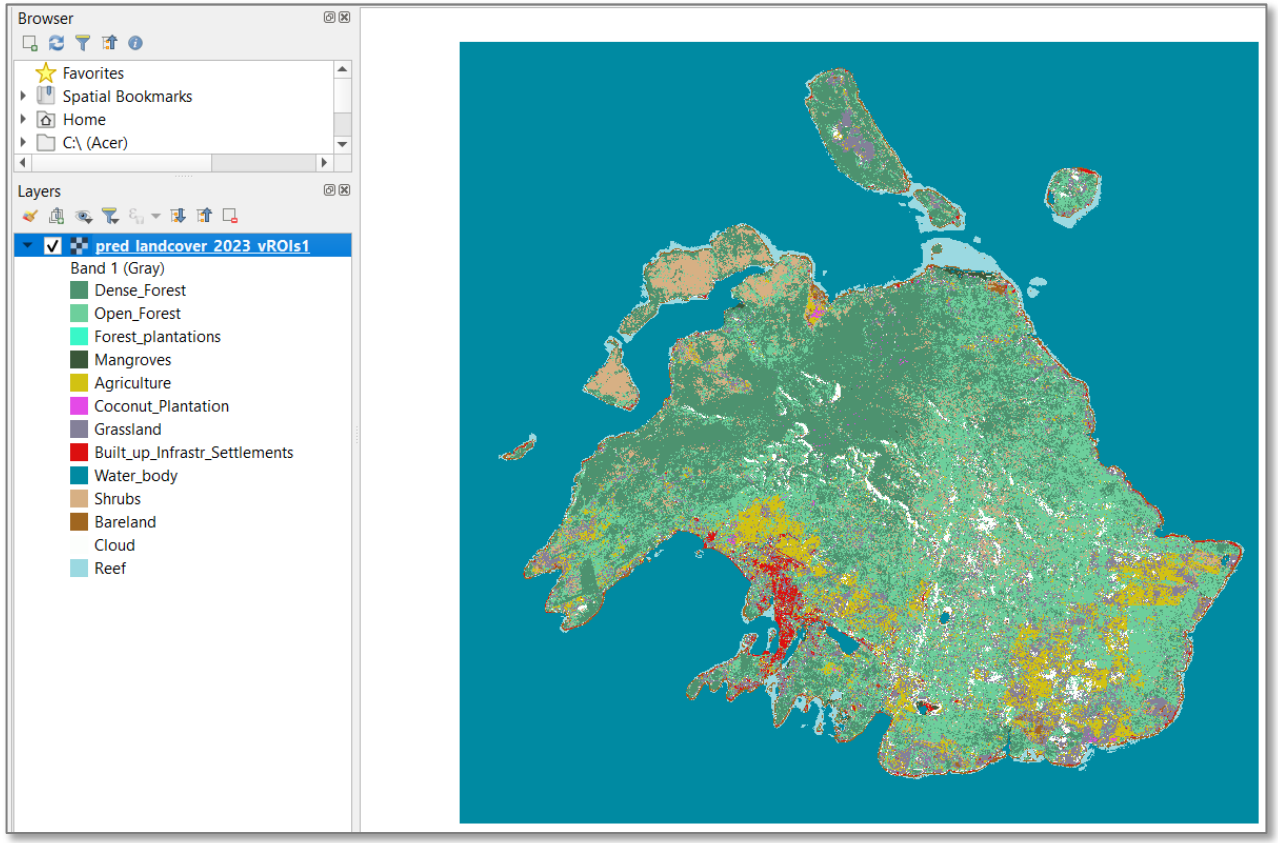
Median Single bands

- Red
- Green
- Blue
- NIR
- SWIR

Today – Component 1: Output ROIs (2023)



Today – Component 2 (2023)



Today – Your turn

1) Component 1: Create the ROIs dataset for 2023

- Go through Step 1.2 to copy the files:
  - FROM 'Z_Visit_Vanuatu_April2025\Component_1\output\2020\vROIs2'
  - TO 'D:\Z_Visit_Vanuatu_April2025\Component_1\output\2023\vROIs1'
- Do not edit the kml in Google Earth Pro
- Go through Step 1.3
- Go through Step 1.4

(use the provided stack in Component 1 for 2023 to delineate clouds)

2) Run Component 2 to obtain the land cover classified map for 2023 (Step 2.1, Step 2.2, Step 2.3)