Evaluation of Inconsistency and Accuracy of Global and Regional Cropland Maps for Cropland Mapping in Cambodia

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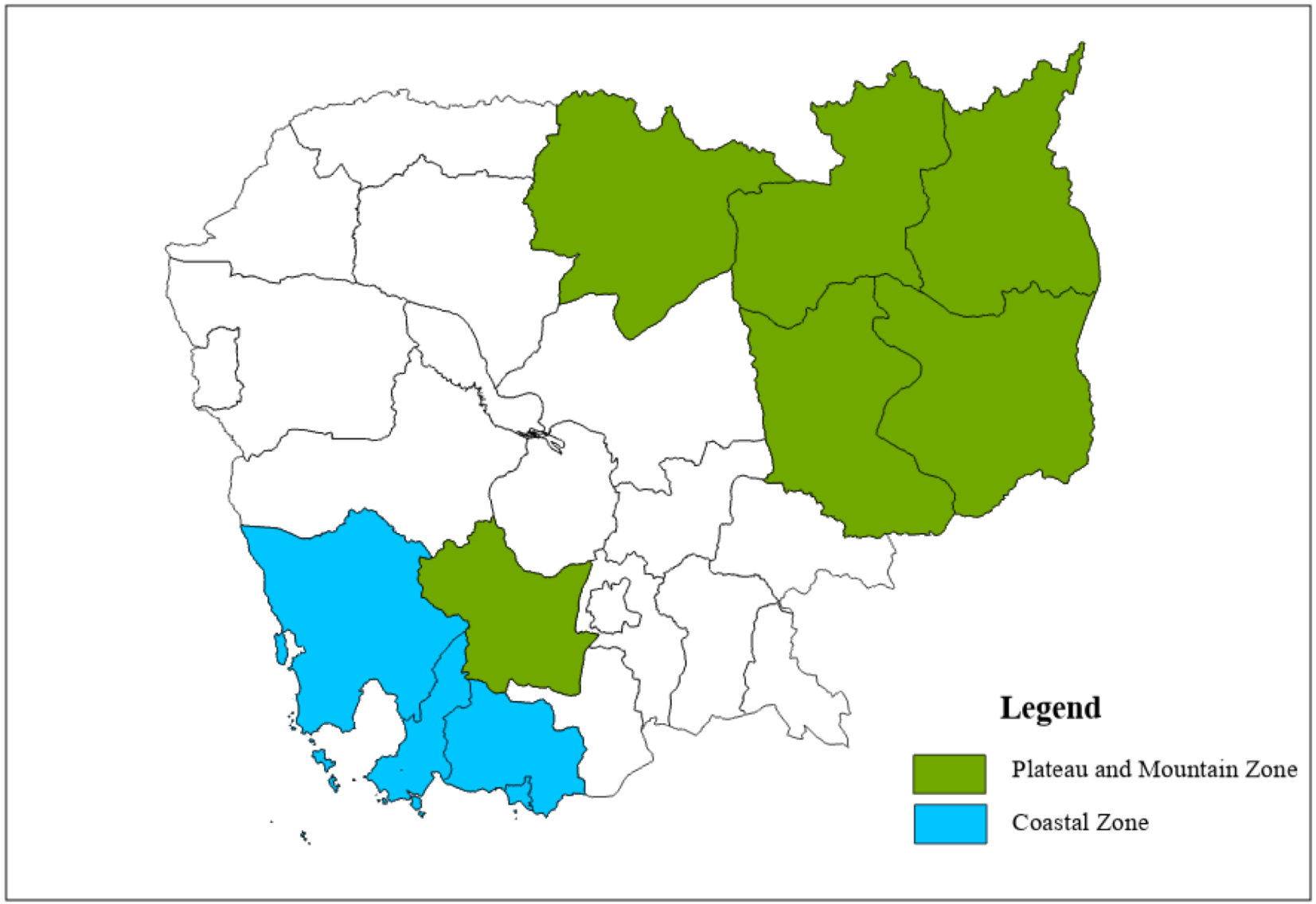
1. Introduction

- Accurate cropland information is critical for agricultural planning and production, especially in countries that are heavily dependent on agriculture, like Cambodia.
- Although widely used medium-to-high-resolution satellite-based cropland maps have been developed from various remotely sensed data sources over the past few decades, considerable discrepancies exist among these products both in total area and in the spatial distribution of croplands, hindering further applications of these datasets.
- The factors influencing their inconsistency are also unknown.
- In this study, we evaluated the Inconsistency and accuracy of four widely used cropland maps in Cambodia during 2023.

2. Objective

- To evaluate inconsistency and accuracy of cropland maps from four land cover products: ESRI, Dynamic World, RLCMS and GLC_FCS10

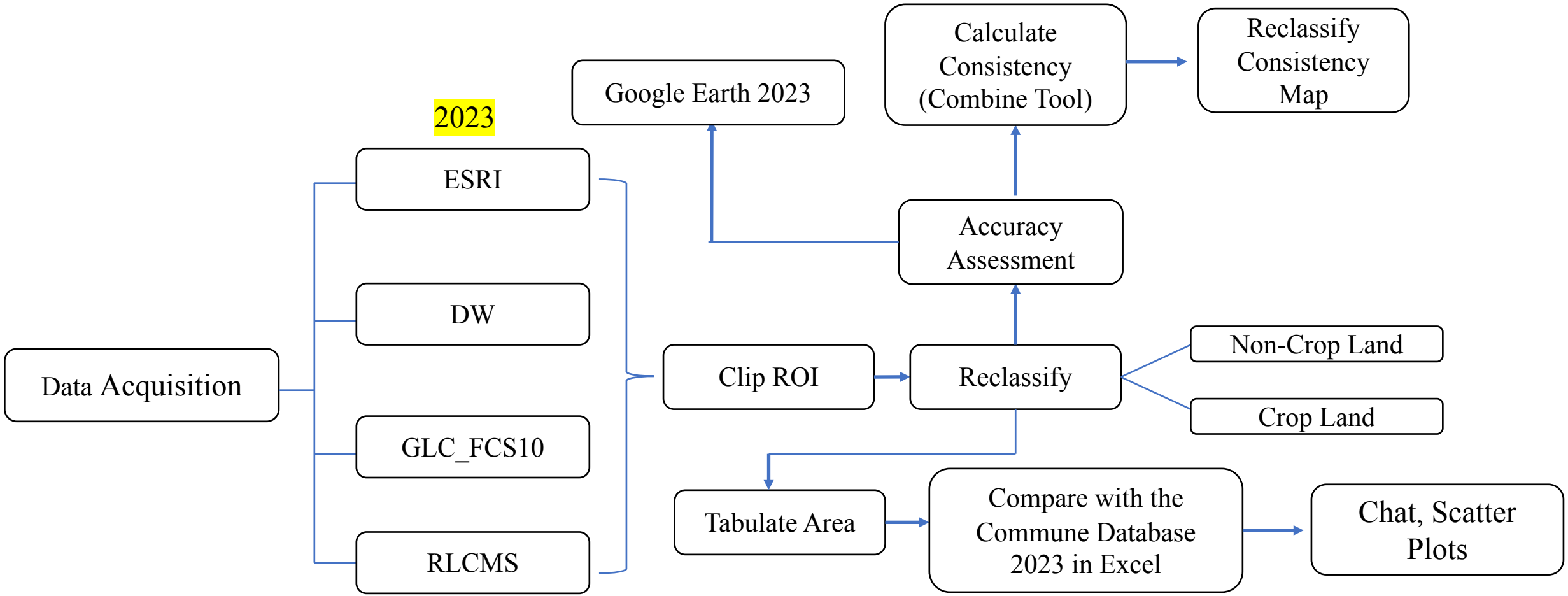
3. Study Area



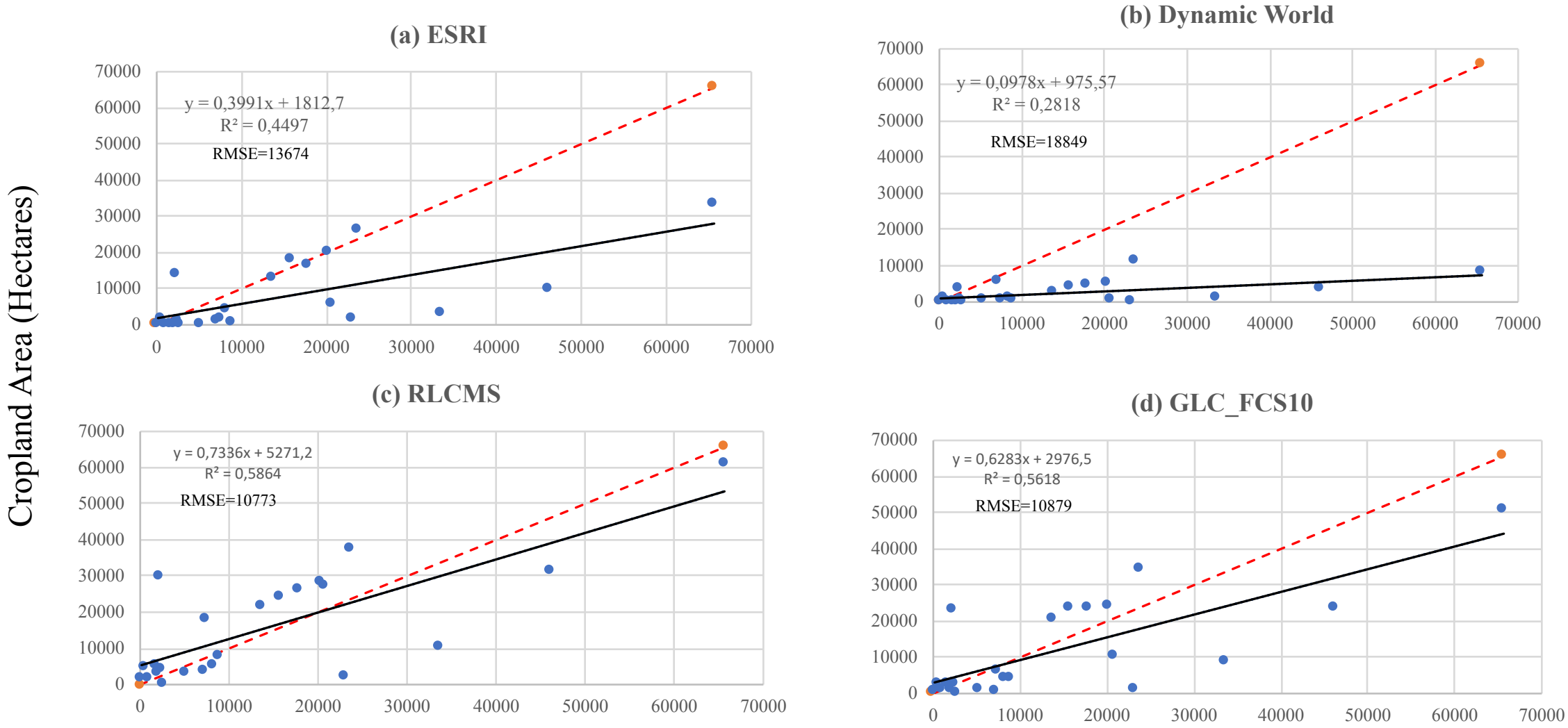
4. Data

Datasets	Data Source	Spatial Resolution	Declared Overall Accuracy (%)	Cropland Definition	Time Range	Release Time	Update Frequency
ESRI	Sentinel 2	10 m	85.96	Human planted or plotted cereals, grasses, and crops not at tree height; Example: Corn, Wheat, soy, fallow plots of structured land.	2017-2024	2024	Annual
DW	Sentinel 1,2	10 m	85	Human planted or plotted cereals, grasses, and crops.	2015-Present	2025	Near Real-time
GLC_FCS10	Sentinel 1,2	10 m	83.16	Rainfed/irrigated cropland, herbaceous cover, tree or shrub cover	2023	2023	Annual
RLCMS	Landsat 5,7,8,9	30 m	NA	Cropland, Crop Plantation, Rice, Rubber	2000-2023	2023	Annual

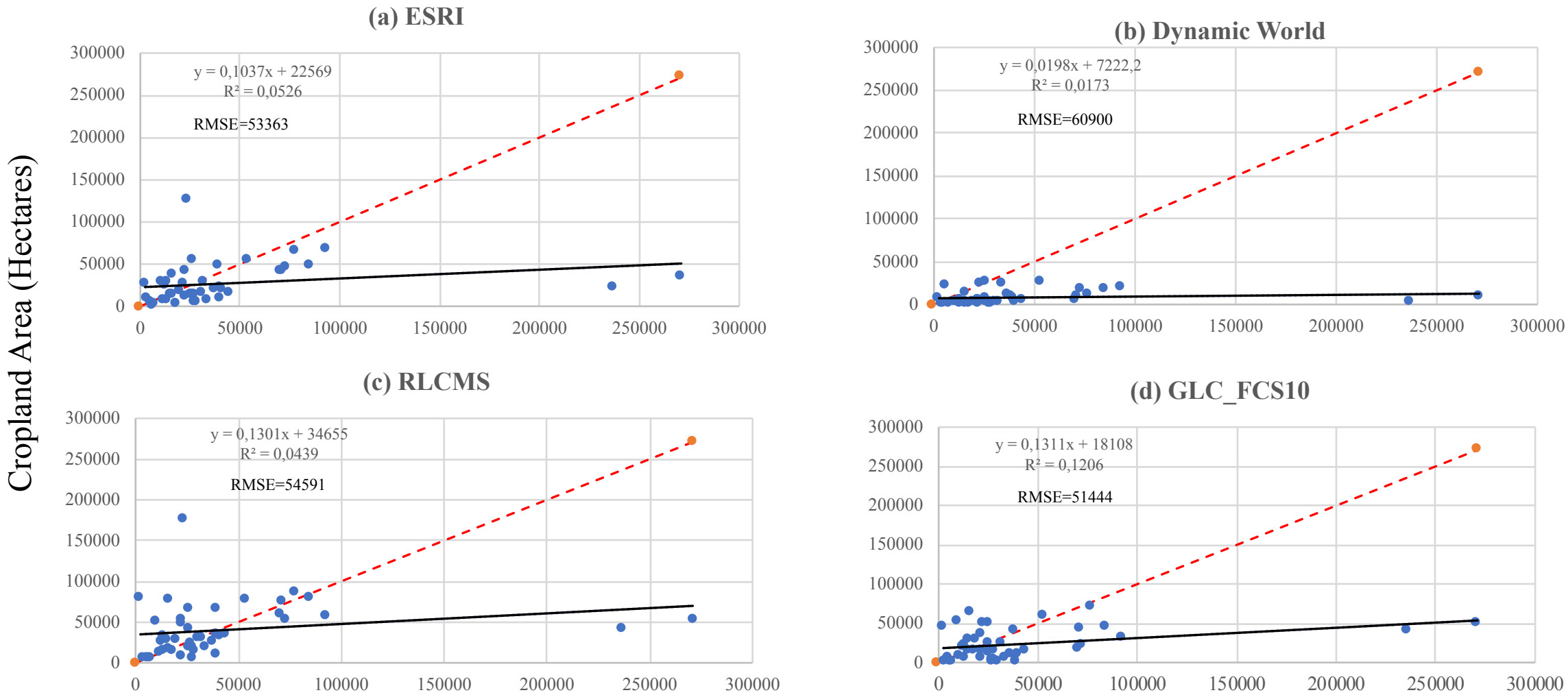
4. Research Method



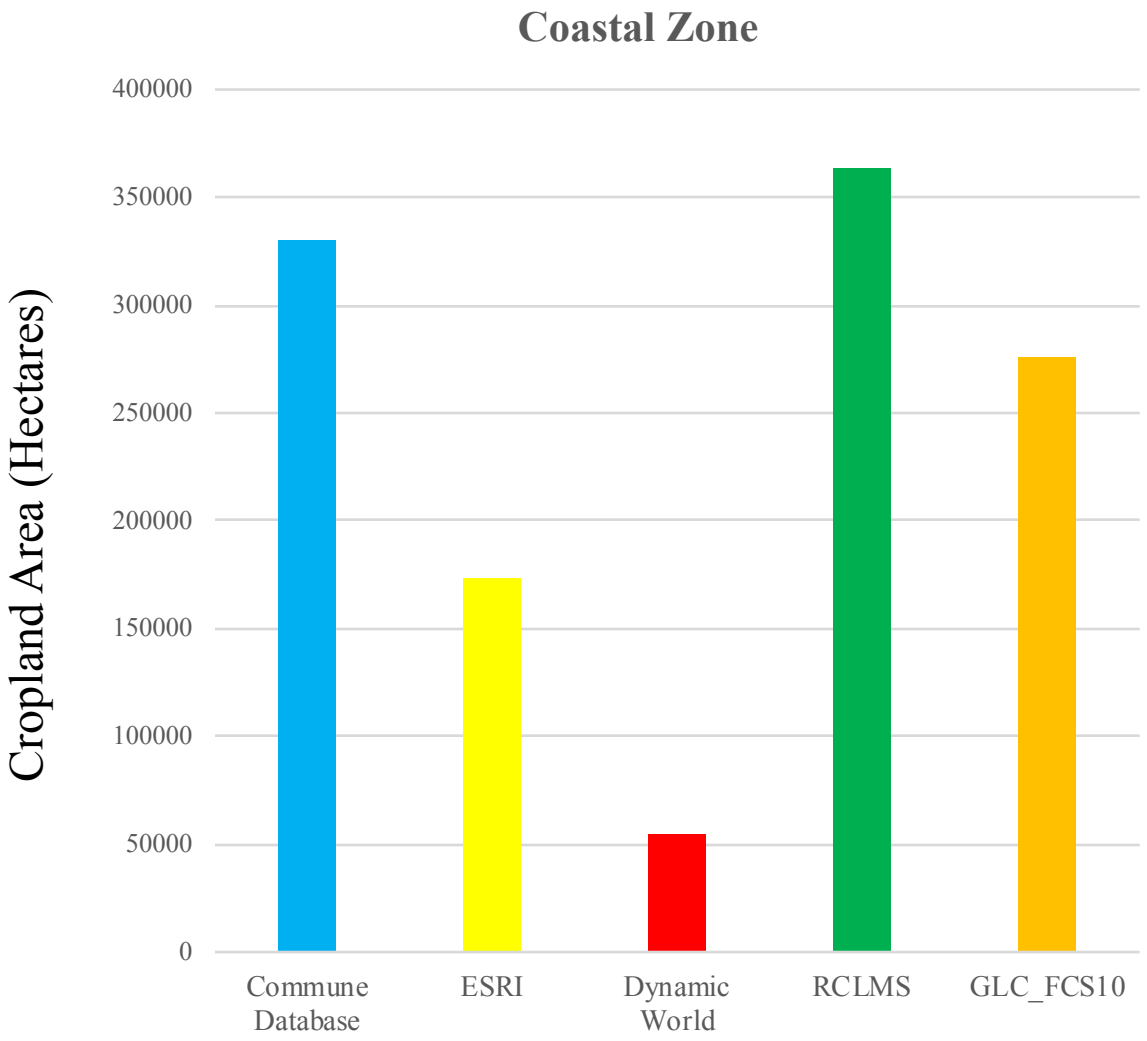
5. Results of Coastal Zone

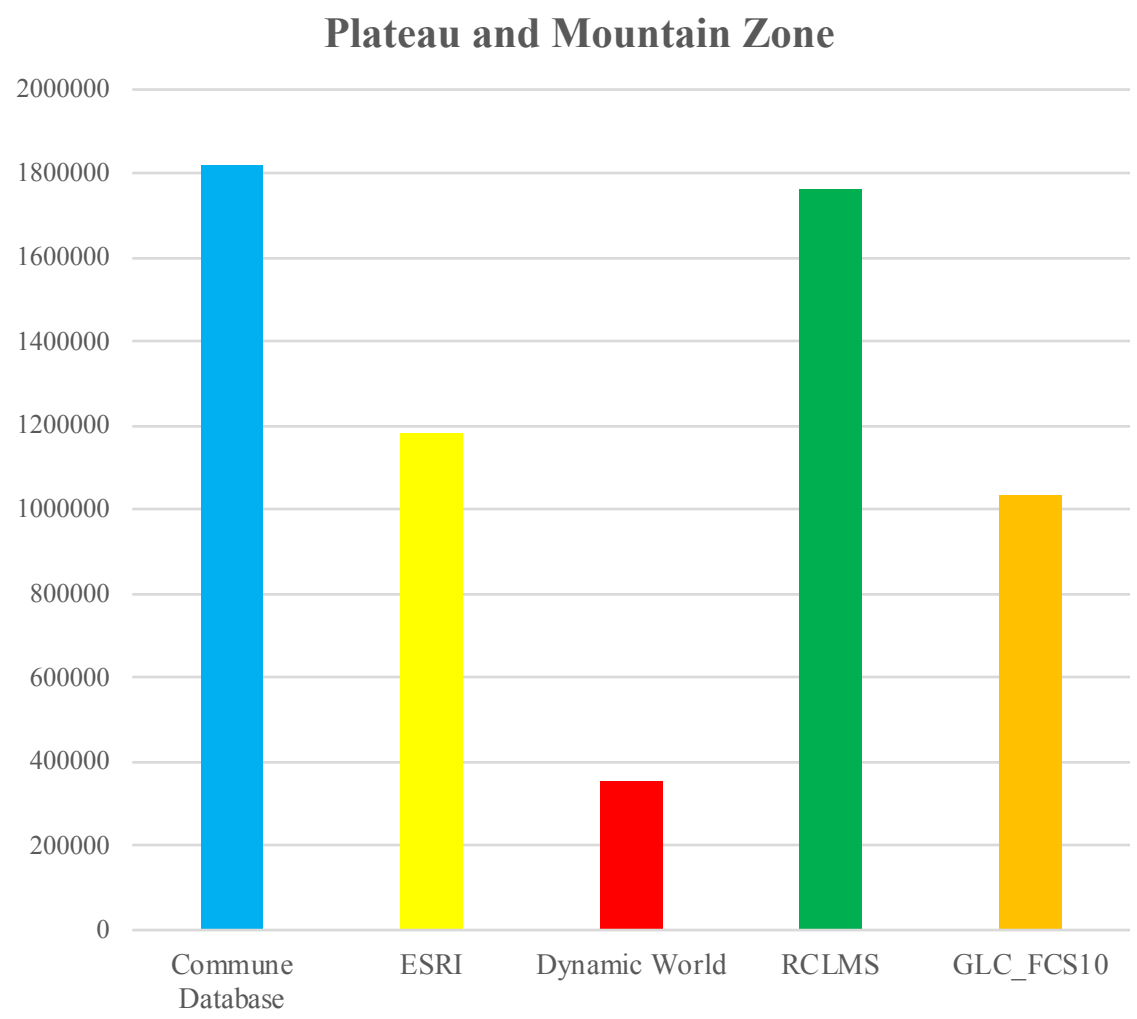


5. Result of Plateau and Mountain Zone



5. Comparison of the 4 Cropland Maps with Cropland Statistics





5. Spatial Consistency Comparison

Coastal Zone

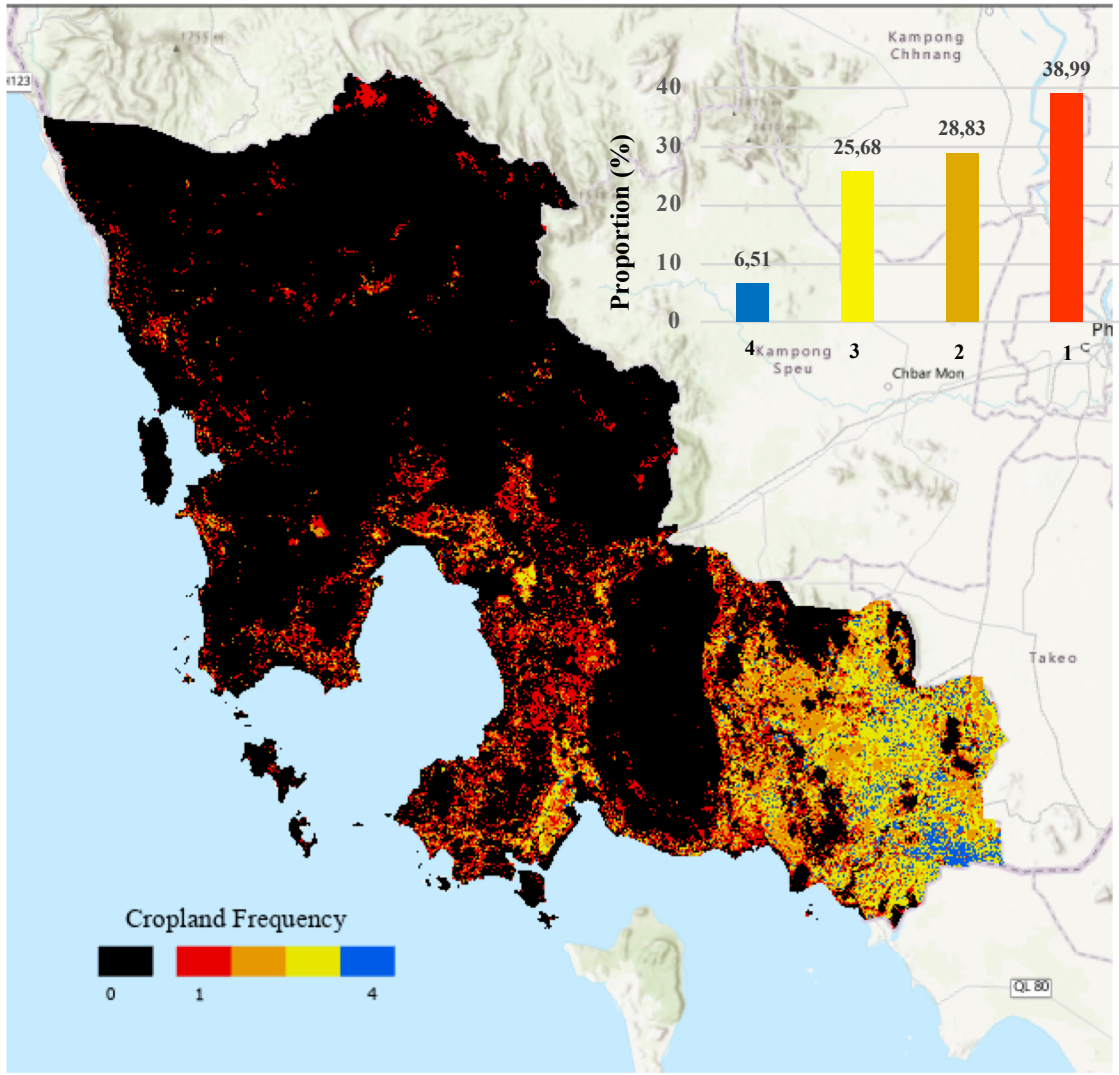
	ESRI	DW	RLCMS	GLC_FCS10
GLC_FCS10	49.50%	13.97%	83.55%	100%
RLCMS	40.80%	11.30%	100%	63.42%
DW	60.10%	100%	75.05%	70.43%
ESRI	100%	18.96%	85.49%	78.74%

Plateau and Mountain Zone

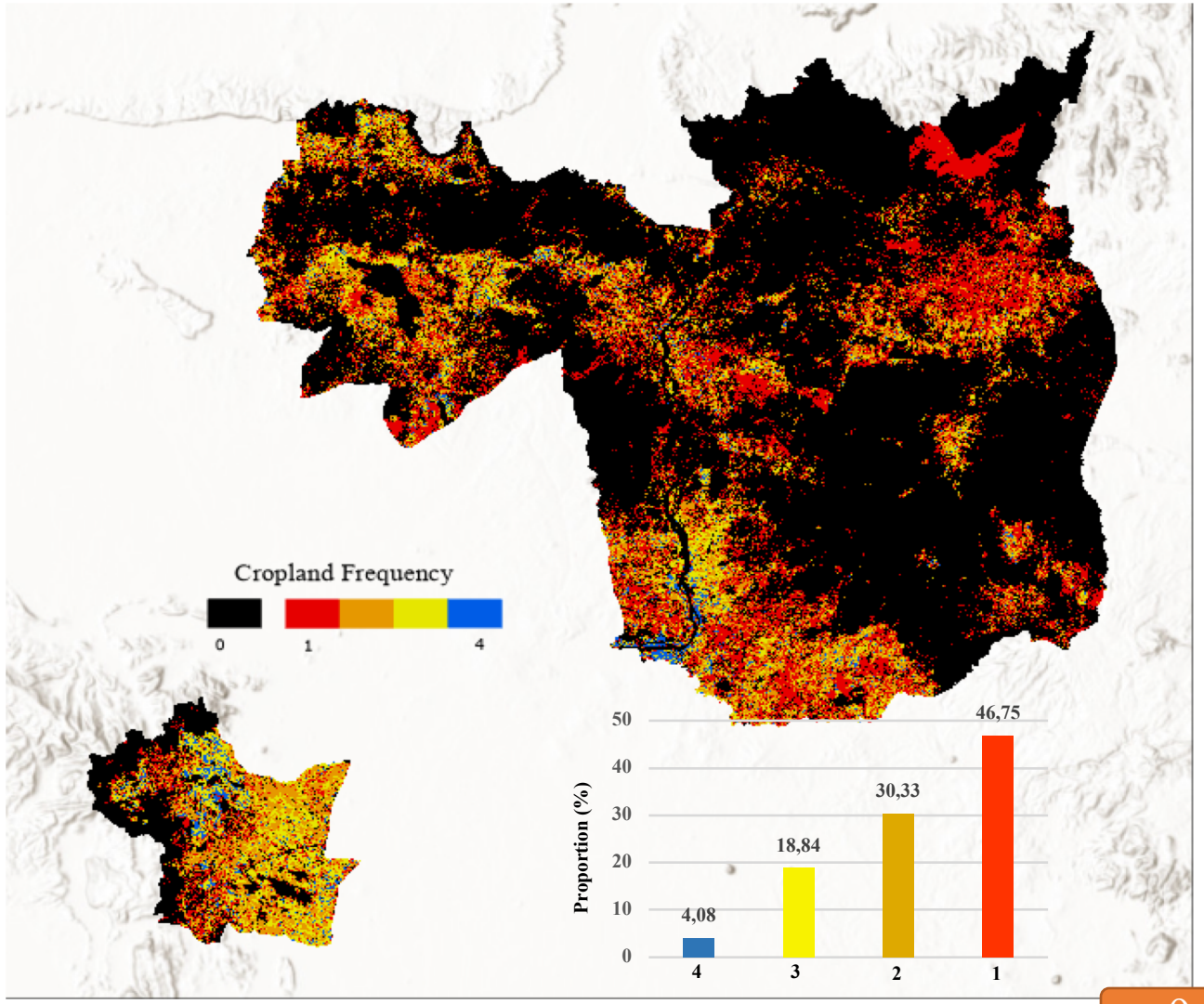
	ESRI	DW	RLCMS	GLC_FCS10
GLC_FCS10	53.02%	14.36%	76.76%	100%
RLCMS	44.85%	10.94%	100%	45.10%
DW	55.46%	100%	54.47%	41.99%
ESRI	100%	16.61%	66.86%	46.45%

5. Spatial Consistency among cropland maps

Coastal Zone



Plateau and Mountain Zone



5. Map Accuracies

Coastal Zone

Cell Size	Products	UA (%)	PA (%)	OA (%)	Kappa	F1	MCC	OA declared (%)	OA Difference (%)
10	ESRI	86.13	43.93	79.16	0.46	0.58	0.5	85.96	-6.8
10	DW	64.61	10.6	68.58	0.09	0.18	0.16	85	-16.42
10	GLC_FCS 10	83.61	37.37	76.91	0.39	0.51	0.44	83.16	-6.25
30	RLCMS	78.48	62.62	82	0.57	0.69	0.57	NA	

Plateau and Mountain Zone

Cell Size	Products	UA (%)	PA (%)	OA (%)	Kappa	F1	MCC	OA declared (%)	OA Difference (%)
10	ESRI	86.84	37.07	84.75	0.44	0.51	0.5	85.96	-1.21
10	DW	72.41	11.79	79.37	0.15	0.2	0.23	85	-5.63
10	GLC_FCS 10	78.81	52.24	86.25	0.55	0.62	0.56	83.16	3.09
30	RLCMS	65.14	64.04	84.37	0.54	0.64	0.54	NA	

6. Conclusions

- ❑ We evaluated the consistency and accuracy of cropland maps of 4 regional and global products for Coastal Zone and Plateau and Mountain Zone.
- ❖ Consistency of cropland maps
  - For the Coastal Zone
    - ➢ The 4 products have only 6.51% of cropland pixels in agreement (frequency = 4).
    - ➢ The cropland pixels with the worst consistency were 38.99% (frequency = 1)
  - The Plateau and Mountain Zone
    - ➢ The 4 products have only 4.08% of cropland pixels in agreement (frequency = 4)
    - ➢ The cropland pixels with the worst consistency was 46.75% (frequency =1).
- ❖ Accuracy of cropland maps
  - The coastal Zone: The highest accuracy is RLCMS (82%), and the lowest accuracy is DW (68.58%).
  - The Plateau and Mountain Zone: The highest accuracy is GLC_FCS10 (86.25%), and the lowest accuracy is DW (79.37%).
- ❑ Although we found these results, it's still difficult to choose the best product for cropland map in these two zones.

7. Next steps

- Analyze the factors affecting the inconsistency of cropland maps.

Thank you for your attention!