Supplementary Information for

CIrrMap250: Annual time-series of China's irrigated cropland maps from 2000 to 2020 developed through multisource data integration

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Introduction

This supplementary information includes 7 figures and 5 tables, which provide supplements to the descriptions of the data sets, methods, and results given in the main paper.

1 Supplementary Figures

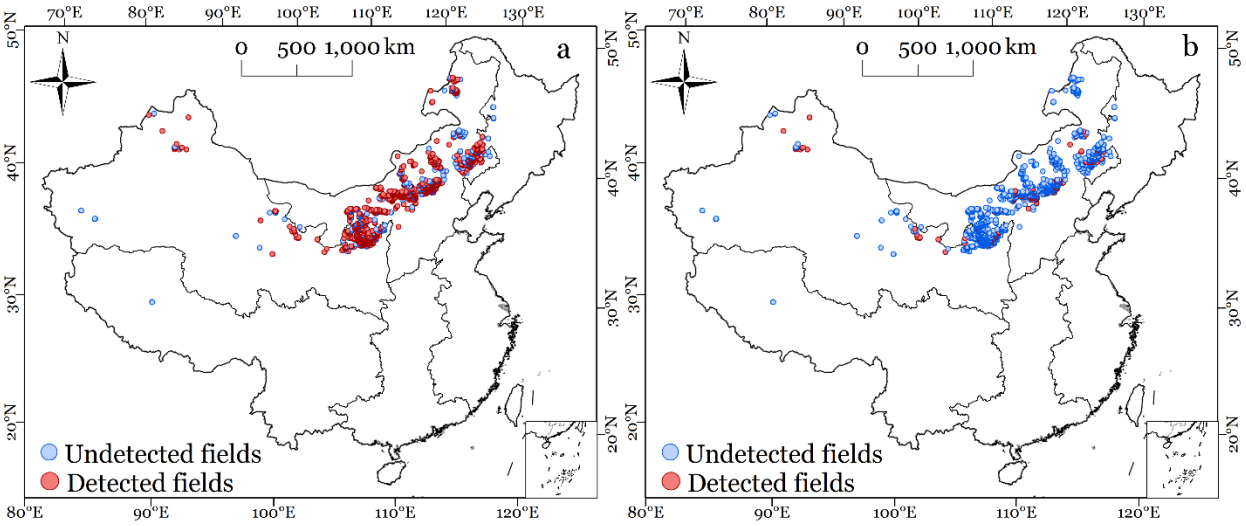

Figure S1. Spatial distribution of the detected and undetected fields with center pivot irrigation systems for the year 2020. Panels a and b show the results of CIrrMap250 and IrriMap_CN, respectively.

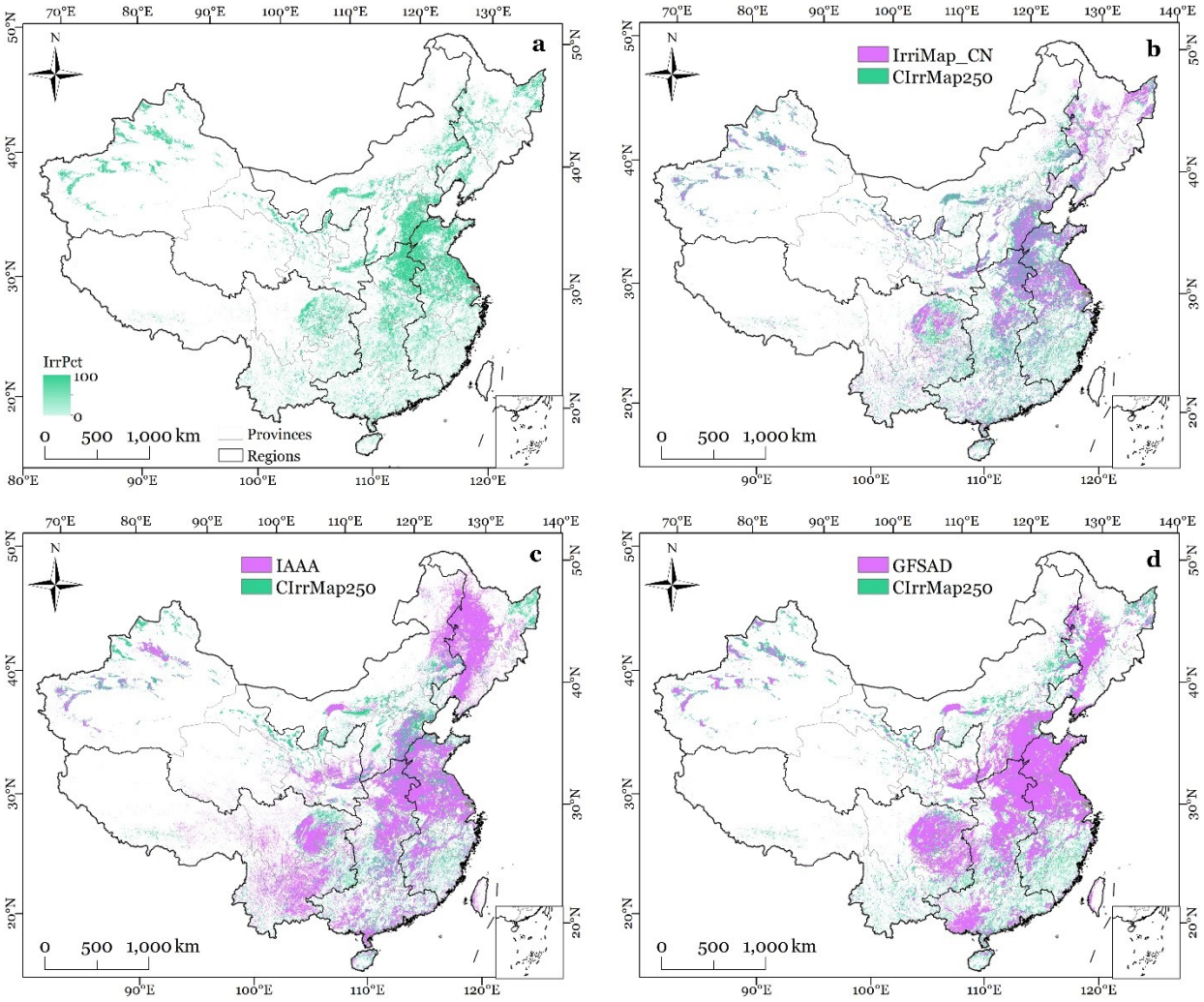

Figure S2. Comparison of the distributions of irrigated cropland in CIrrMap250 with the existing products (IrriMap_CN, IAAA, GFSAD). Panel (a) shows the distribution of irrigated cropland in CIrrMap250, while the panels b, c and d display the comparison of irrigated cropland distribution.

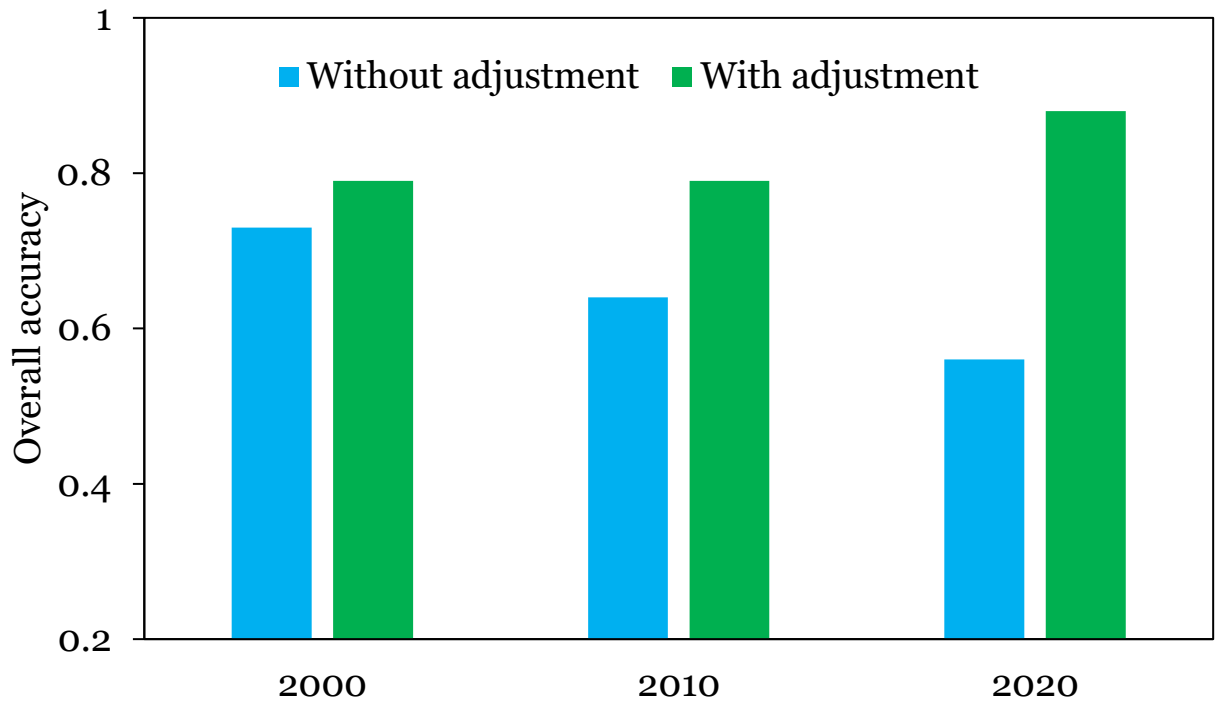

Figure S3. Comparison of irrigated ratio estimates of CIrrMap250 and IrrMap_CN in China, Northern China, Xinjiang Uygur Autonomous Region

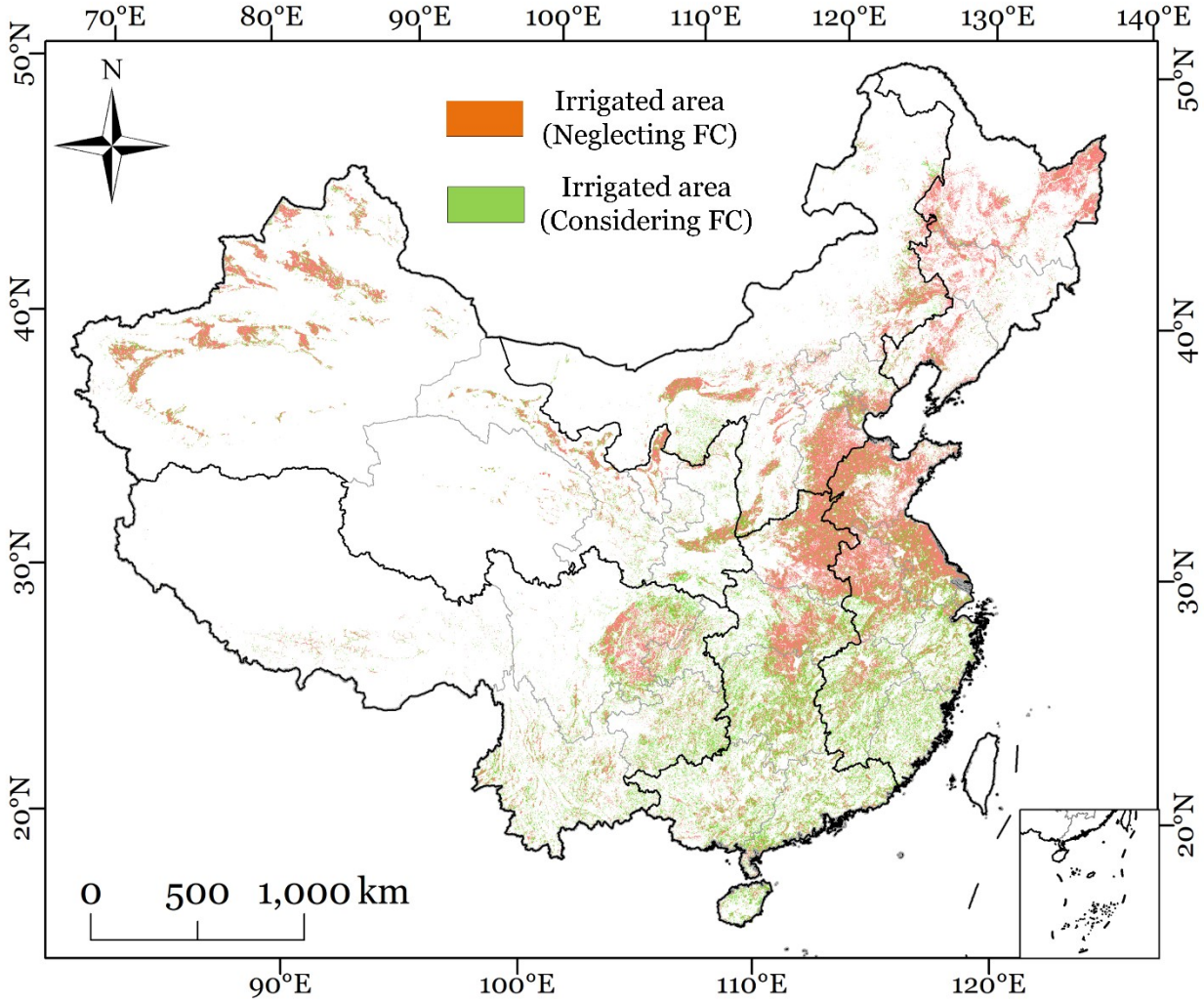

Figure S4. Comparison of the performance of irrigated cropland maps developed based on the original irrigated area statistics (without adjustment) and the harmonized and reconciled irrigated areas (with adjustment, CIrrMap250)

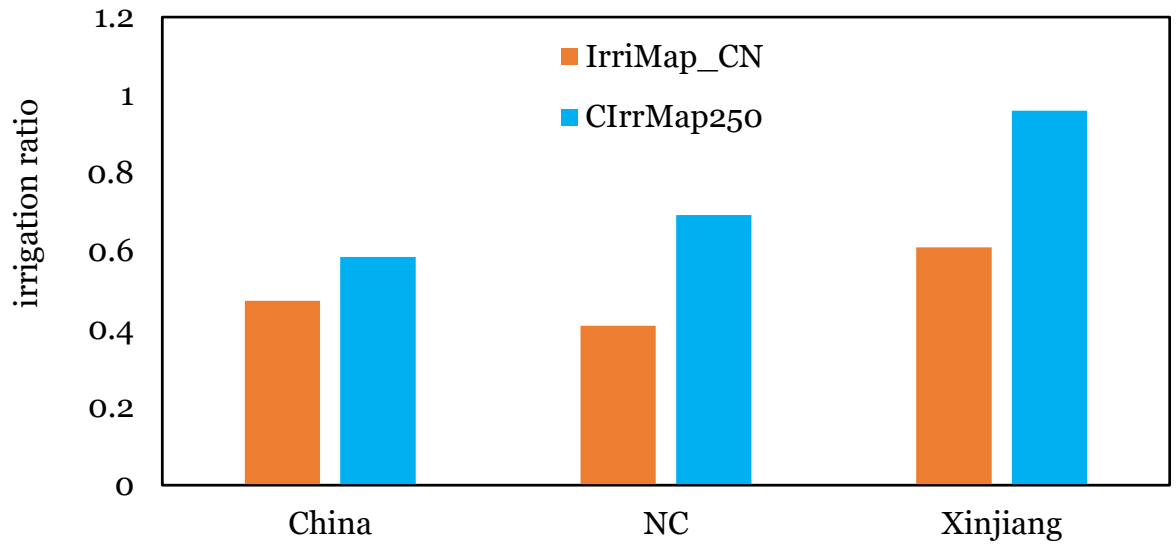

Figure S5. Comparison of irrigated area distribution in the scenarios of considering fractional coverage (FC) of irrigated cropland (this study) and neglecting FC of irrigated cropland.

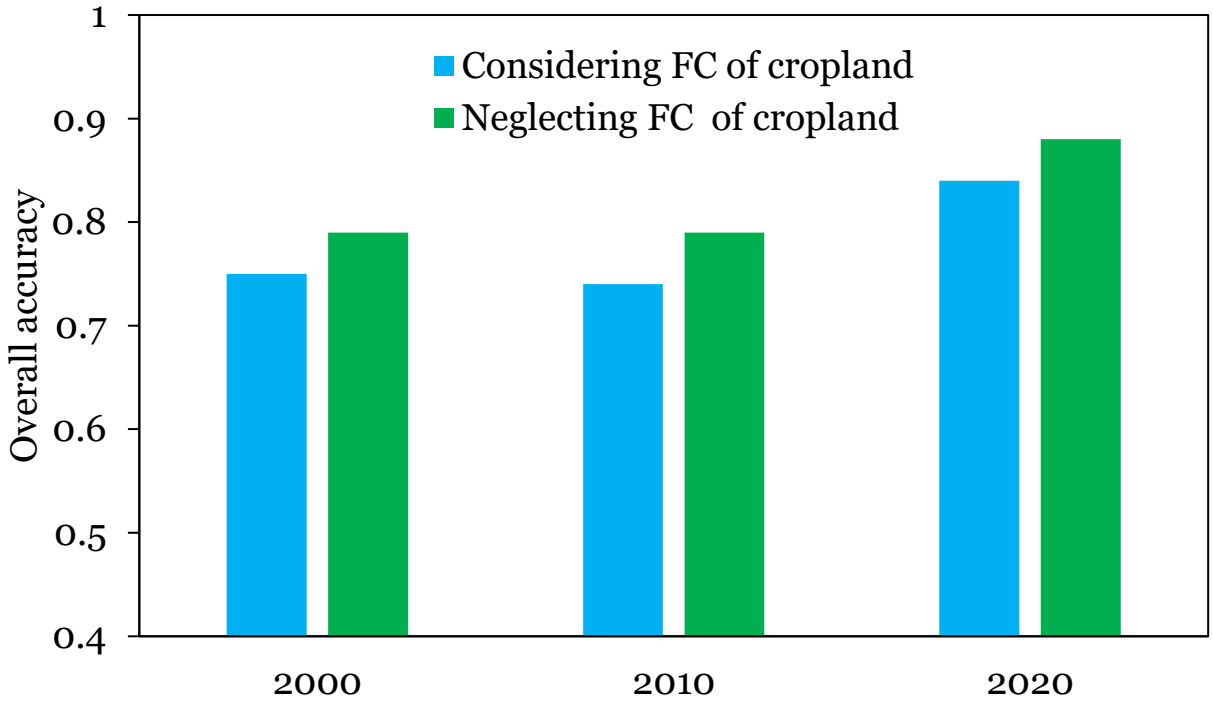

Figure S6. Comparison of performance of irrigated area maps in the scenarios of considering fractional coverage (FC) of irrigated cropland (this study) and neglecting FC of irrigated cropland.

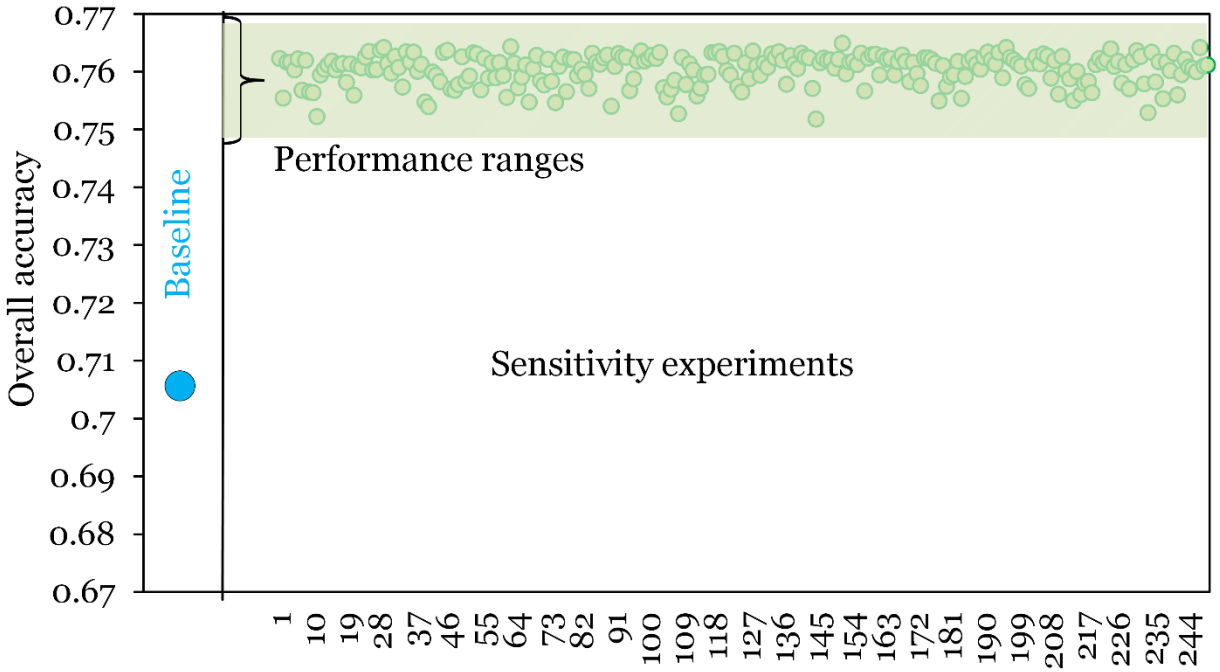

Figure S7. Sensitivity analysis of the performance of irrigated cropland maps to the use of different irrigation suitability maps. The performance of these irrigation maps was compared with the baseline irrigation map that was created by the method in our study while excluding irrigation suitability in the mapping process.

2 Supplementary Tables

Table S1. Summary of the MODIS-derived vegetation indices used in this study

Vegetation indices	Formula	MODIS bands	Resolution
NDVI	(NIR - Red) / (NIR + Red)	Bands 01, 02	250 m/16day
EVI	2.5*(NIR-Red) / (NIR+ 6*Red–7.5*Blue+1)	Bands 01, 02, 03	250 m/16day
GI	NIR/Green	Bands 01, 04	250 m/8day

Red: band 01, Blue: band 03, near-infrared (NIR): band 02, Green: band 04

Table S2. Reclassification of irrigation suitability factors and their suitability values

Irrigation suitability factors	Reclassification	Suitability value
elevation	S1: < min+100 S2: [min+100, min+300] S3: [min+300, min+500] S4: > min+500	S1=4 S2=3 S3=2 S4=2
slope	S1: <2% S2: [2%, 4%] S3: [4%, 8%] S4: > 8%	S1=4 S2=3 S3=2 S4=2
aridity index	S1: <0.1; S2: [0.1, 0.2]; S3: [0.2, 0.3]; S4: [0.3, 0.4] S5: [0.4, 0.5]; S6: [0.5, 0.6] S7: [0.6, 0.7]; S8: [0.7, 0.8] S9: [0.8, 0.9]; S10: >0.9	S1=10; S2= 9 S3=8; S4= 7 S5=6; S6= 5 S7=4; S8= 3 S9=2; S10= 1

Note: min is minimum elevation of the mapping unit

Table S3. Optimized hyperparameters of the RF algorithm

Hyperparameters	Descriptions	values
Ntree	Number of trees	200
MinObs	Minimum number of observations per node	10
Nsplit	Number of variables randomly sampled at each decision split	7

Table S4. Definitions of the performance metrics

Metrics	Formula	Variables
Overall accuracy	$\frac{\sum_{i=1}^{n} P_{ii}}{N}$	n is the number of classes; P_{ii} is the number of pixels on row i and column i in the confusion matrix, which represent the total number of pixels correctly classified; N is total number of pixels used for accuracy evaluation; P_{i+} and P_{+i} are the total number of pixels on row i (observations) and column i (predictions), respectively.
F1-score	$2\frac{\frac{P_{ii}}{P_{+i}} \times \frac{P_{ii}}{P_{i+}}}{\frac{P_{ii}}{P_{+i}} + \frac{P_{ii}}{P_{i+}}}$	
Producer's accuracy	$\frac{P_{ii}}{P_{+i}}$	
User's accuracy	$\frac{P_{ii}}{P_{i+}}$	

https://blog.csdn.net/lovefreewind/article/details/42672085

Table S5. Performance metric values of CIrrMap250 and the existing maps (IrriMap_CN, IAAA, GFSAD). OA, PU, UA represent overall accuracy, producer's accuracy, and user's accuracy, respectively.

Year	Products	OA	F1-score	Irr PA	Irr UA	NIrr PA	Nirr UA
2000	CIrrMap250	0.79	0.78	0.80	0.78	0.77	0.79
	IrriMap_CN	0.68	0.73	0.51	0.80	0.87	0.63
	IAAA	0.55	0.50	0.66	0.56	0.45	0.55
2010	CIrrMap250	0.79	0.71	0.83	0.83	0.71	0.71
	IrriMap_CN	0.66	0.62	0.61	0.81	0.75	0.53
	IAAA	0.61	0.50	0.64	0.71	0.54	0.46
	GFSAD	0.59	0.51	0.60	0.71	0.58	0.46
2020	CIrrMap250	0.88	-	0.88	1	-	-
	IrriMap_CN	0.20	-	0.20	1	-	-