Supplementary Materials

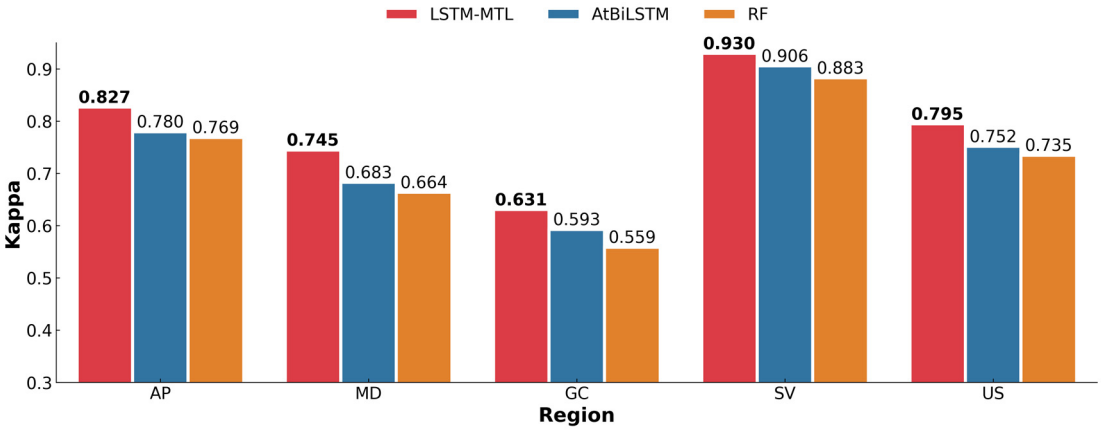

Figure S1. Rice classification performance (Cohen's kappa coefficient) of LSTM-MTL, AtBiLSTM (global), and RF (global). All three models were trained and tested globally based on data from the entire study area. The bold values stand for the highest score of the three models.

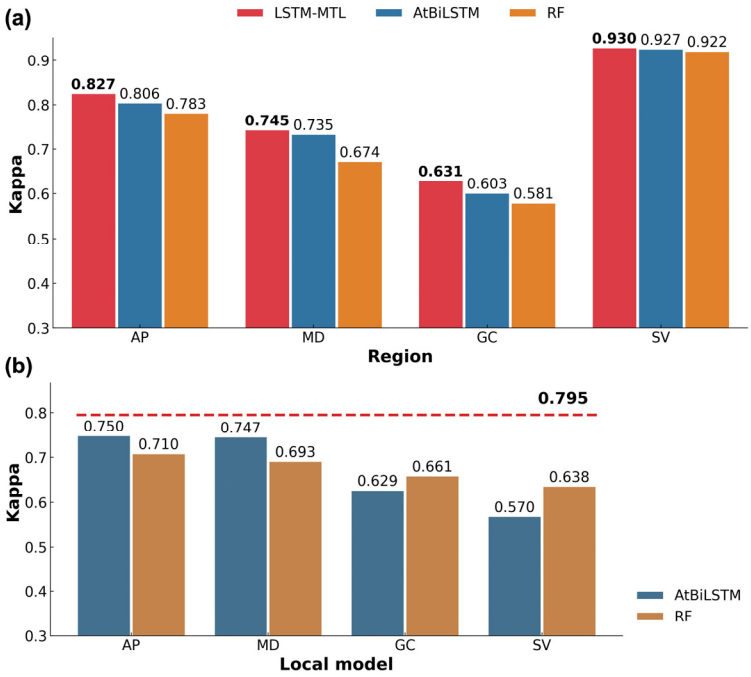

Figure S2. Performance comparison with local baseline models: (a) local rice classification

performance (Cohen's kappa coefficient) of LSTM-MTL, AtBiLSTM (local), and RF (local). The LSTM-MTL model was trained globally. The AtBiLSTM and RF models were trained only based on local data. The bold values stand for the best score of the three models (b) Rice classification performance (Cohen's kappa coefficient), all local baseline models were tested in the U.S. The red dotted line represents the performance of the LSTM-MTL model in the U.S.

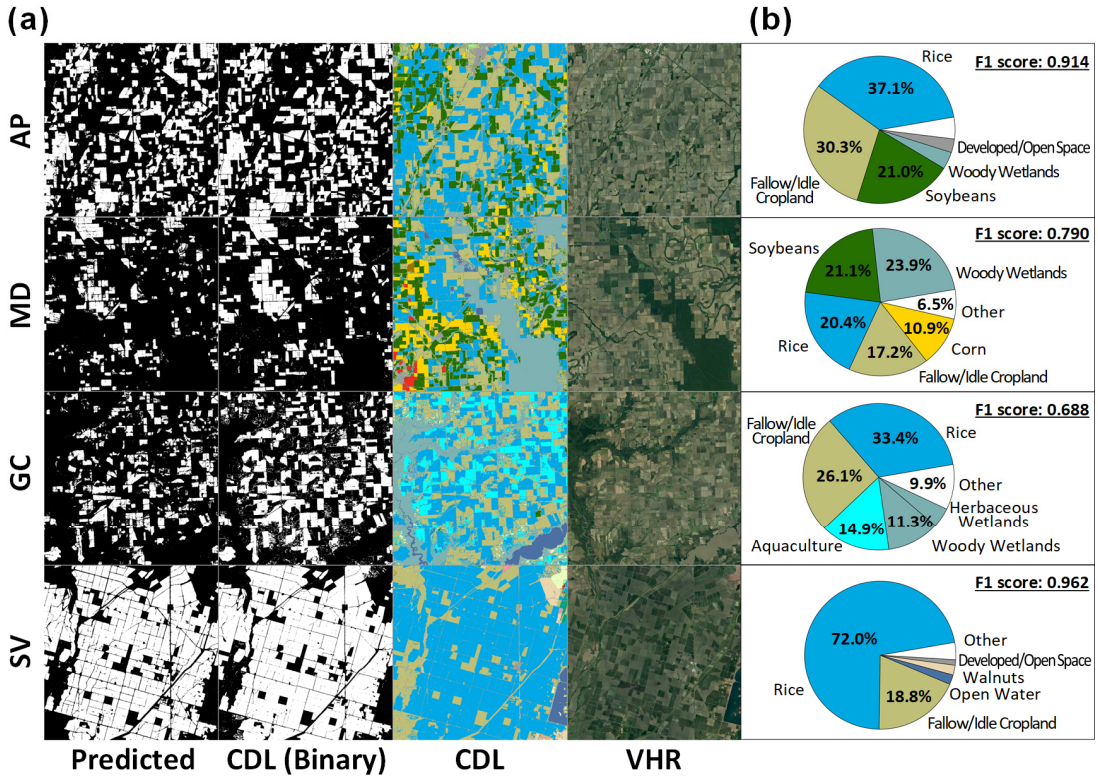

Figure S3. Representative blocks in the four rice production regions of the U.S. (a) The predicted rice results generated by the LSTM-MTL model; the binary reference of rice land from the CDL; the cropland type maps from the CDL; and the very-high-resolution (VHR) remotely sensed imagery of the four blocks. (b) The ratios of the major cropland types in corresponding blocks.

Figure S4. Confusion matrices of the test set by the LSTM-MTL model. Values in confusion matrices represent the number of samples. Diagonal values stand for the number of correctly classified samples.

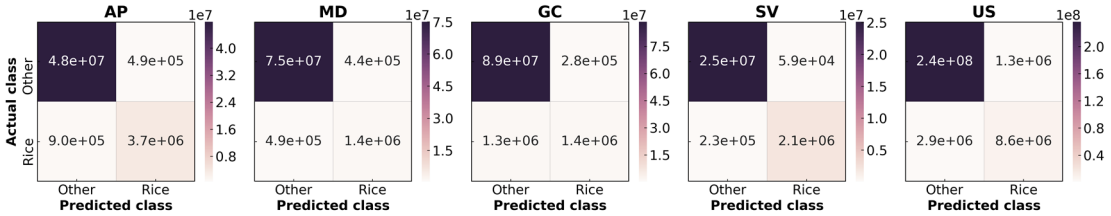

Table S1. Transfer performance (F1 score) of local baseline models.

Model		Test region (F1 score)				
		AP	**MD**	**GC**	**SV**	**CONUS**
AtBiLSTM	**AP**	**0.823**	0.810	0.691	0.640	0.761
	MD	0.715	**0.742**	0.546	0.361	0.758
	GC	0.546	0.543	**0.613**	0.459	0.644
	SV	0.898	0.876	0.670	**0.933**	0.592
RF	**AP**	**0.801**	0.782	0.696	0.597	0.722
	MD	0.669	**0.681**	0.589	0.363	0.705
	GC	0.523	0.501	**0.590**	0.423	0.674
	SV	0.811	0.678	0.431	**0.928**	0.652

Table S2. Comparison between the rice area of the CDL estimation and USDA statistics at state level in 2019.

State	year	CDL (km^2)	USDA Harvest (km^2)	Difference ratio
Missouri	2019	657.64	700.11	-6%
Mississippi	2019	441.05	457.3	-4%
Louisiana	2019	1,963.95	1,675.40	17%
Texas	2019	788.95	607.03	30%
Arkansas	2019	4,461.72	4,556.76	-2%
California	2019	2,133.13	2,007.24	6%