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Supplementary Information

Complementarity of Two Rice Mapping Approaches: Characterizing Strata Mapped by Hypertemporal MODIS and Rice Paddy Identification Using Multitemporal SAR. *Remote Sens.* 2014, *6*, 12789–12814

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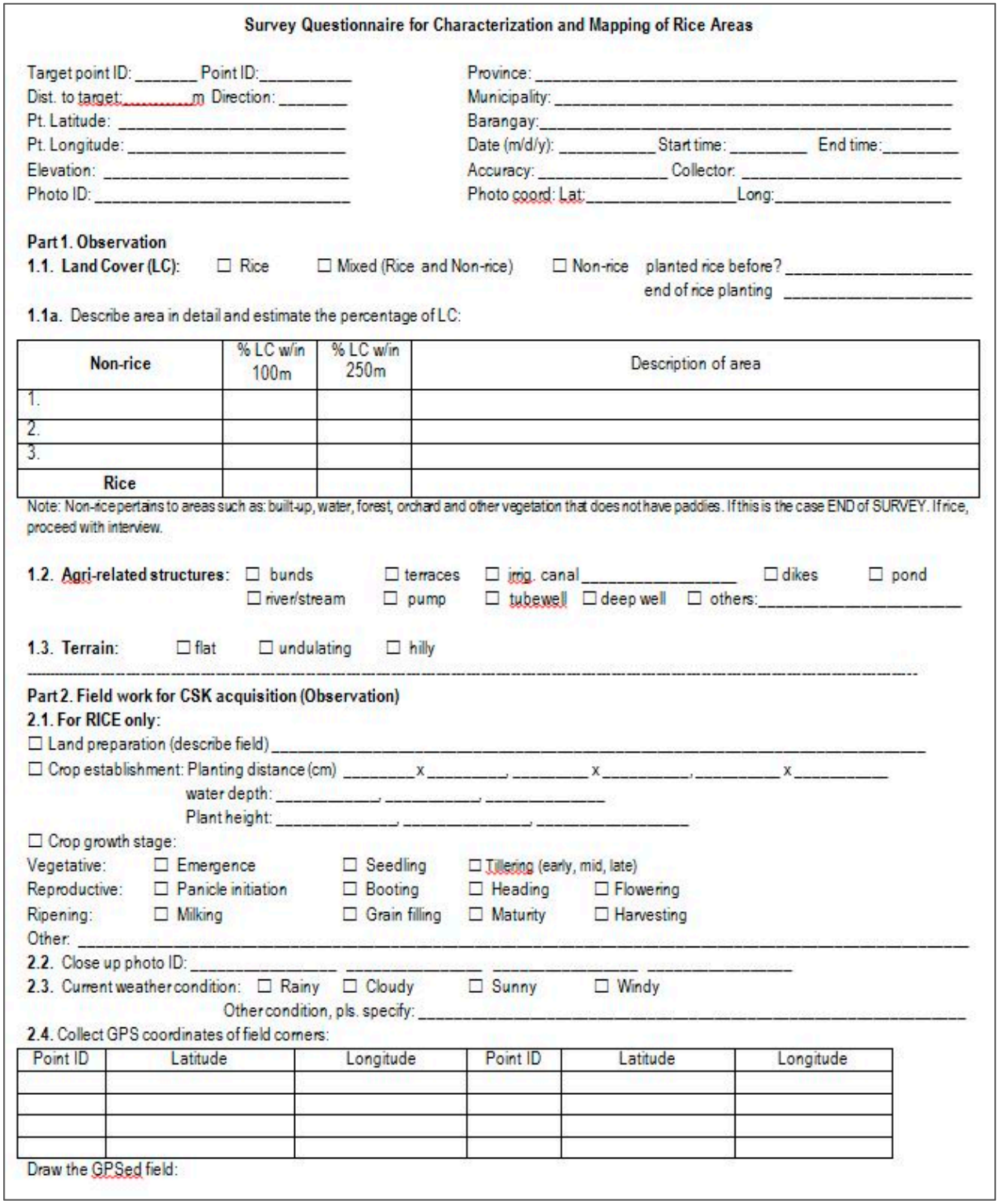
Supplementary Material

Figure S1. Farmers' interview and field observation questionnaire.



Survey Questionnaire for Characterization and Mapping of Rice Areas

Target point ID: _____ Point ID: _____
Dist. to target: _____ m Direction: _____
Pt. Latitude: _____
Pt. Longitude: _____
Elevation: _____
Photo ID: _____

Province: _____
Municipality: _____
Barangay: _____
Date (m/d/y): _____ Start time: _____ End time: _____
Accuracy: _____ Collector: _____
Photo coord: Lat: _____ Long: _____

Part 1. Observation

1.1. Land Cover (LC): ☐ Rice ☐ Mixed (Rice and Non-rice) ☐ Non-rice planted rice before? _____
end of rice planting _____

1.1a. Describe area in detail and estimate the percentage of LC:

Non-rice	% LC w/in 100m	% LC w/in 250m	Description of area
1.			
2.			
3.			
Rice			

Note: Non-rice pertains to areas such as: built-up, water, forest, orchard and other vegetation that does not have paddies. If this is the case END of SURVEY. If rice, proceed with interview.

1.2. Agri-related structures: ☐ bunds ☐ terraces ☐ irrig. canal _____ ☐ dikes ☐ pond
☐ river/stream ☐ pump ☐ tubewell ☐ deep well ☐ others: _____

1.3. Terrain: ☐ flat ☐ undulating ☐ hilly

Part 2. Field work for CSK acquisition (Observation)

2.1. For RICE only:

☐ Land preparation (describe field) _____
☐ Crop establishment: Planting distance (cm) _____ x _____, _____ x _____, _____ x _____
water depth: _____, _____, _____
Plant height: _____, _____, _____
☐ Crop growth stage:
Vegetative: ☐ Emergence ☐ Seedling ☐ Tillering (early, mid, late)
Reproductive: ☐ Panicle initiation ☐ Booting ☐ Heading ☐ Flowering
Ripening: ☐ Milking ☐ Grain filling ☐ Maturity ☐ Harvesting
Other: _____

2.2. Close up photo ID: _____ _____ _____ _____

2.3. Current weather condition: ☐ Rainy ☐ Cloudy ☐ Sunny ☐ Windy
Other condition, pls. specify: _____

2.4. Collect GPS coordinates of field corners:

Point ID	Latitude	Longitude	Point ID	Latitude	Longitude

Draw the GPSed field:

Figure S1. *Cont.*

Part 3. Farmer's interview

3.3. Planted crops (will serve as a check if we still need to proceed. If NON-RICE, stop! End of interview)

Crop	2009	2010	2011
1st crop (WS)			
2nd crop			
3rd crop			
4th crop			

Note: If no rice is planted, end of survey. We are only interested in rice-based ecosystem that is still rice area at present. For areas that planted rice before, ask when was the last time they planted rice.

If RICE-based:

3.1. Ecosystem: ☐ Irrigated ☐ Rainfed lowland ☐ Rainfed Upland

3.2. If irrigated, water in the field (2011):

Cropping	Water source			Is irrigation water available?		If No	
	Surface water	Ground water	Rain	Yes	No	When	Why
1st crop (WS)							
2nd crop							
3rd crop							
4th crop							

3.2a. Was there a time that you didn't receive irrigation water (from 2010 backwards)? ☐ Yes when:_____ ☐ No

3.3. Crop establishment (2011)

Cropping	Crop establishment			Age of seedling at transplanting (days)	Rice variety planted (2011)
	Transplanting	Direct seeding	Dry seeding		
1st crop (WS)					
2nd crop					
3rd crop					
4th crop					

3.4. Cropping calendar

Crops	flooding date	planting date	harvesting date
1st crop (WS)			
2nd crop			
3rd crop			
4th crop			

3.5. Standing water in the field (2011)

Cropping	Do you have standing water all season?		If No, when do you drain your field?
	Yes	No	
1st crop (WS)			
2nd crop			
3rd crop			
4th crop			

3.6. Farmer's field:

Actual farm size: _____ sqm (from farmer)

Actual field size: _____ sqm (GPS)

Figure S2. Example NDVI profiles showing the temporal signature before (red) and after (blue) application of Savitzsky-Golay filter.

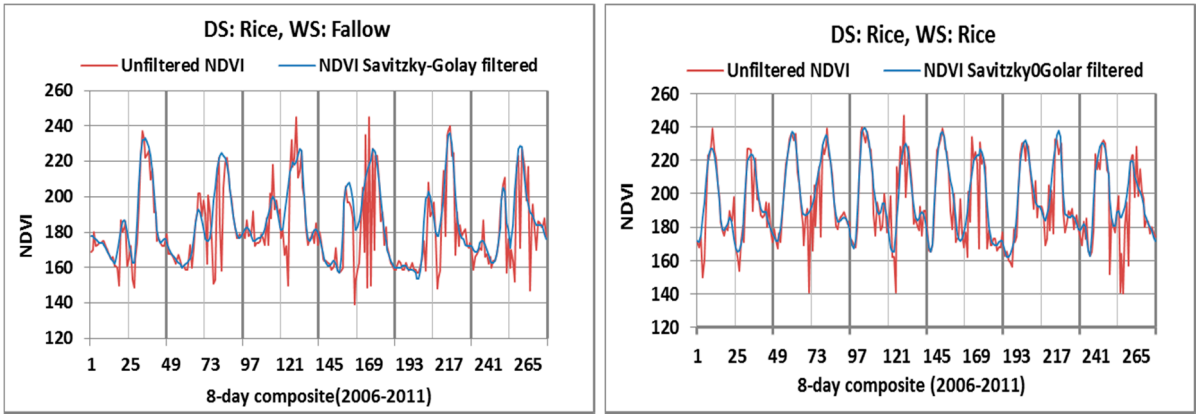


Figure S3. Mean NDVI temporal signature derived from MODIS (2006 to 2011) for DS and WS showing the cropping sequence in each class: (**a**) rice-fallow, (**b**) fallow-rice, (**c**) rice-rice and (**d**) other-rice.

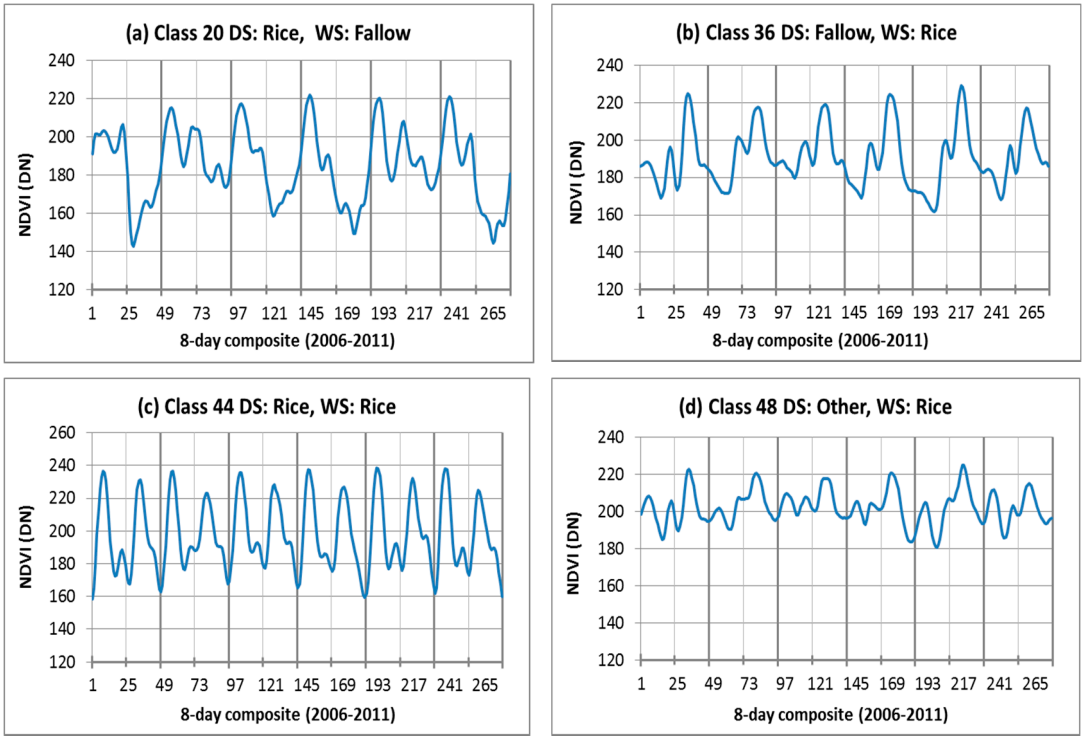


Table S1. Confusion matrix for the accuracy assessment of rice/non-rice areas.

Class	Ground Truth (Pixels)		
	Non-rice	Rice	Total
Unclassified	0	1	1
Non-rice	17	8	25
Rice	5	78	83
Total	22	87	109
Overall accuracy	87.2%		
Kappa coefficient	0.63		

Tables S2. Confusion matrix for the accuracy assessment rice cropping intensity.

Class	Ground Truth Pixels			
	Double Rice	**Single Rice**	**Non-rice**	**Total**
Unclassified	0	1	0	1
Double Rice	29	9	1	39
Single Rice	0	17	4	21
Non-rice	1	2	17	20
Total	30	29	22	81
Overall accuracy	77.8%			
Kappa coefficient	0.66			

Tables S3. Confusion matrix for the accuracy assessment cropping intensity (regardless if it rice or other crop).

Class	Ground Truth (Pixels)			
	Non-rice	**Double Crop**	**Single crop**	**Total**
Unclassified	0	0	1	1
Non-rice	17	1	2	20
Double crop	1	39	2	42
Single crop	4	3	11	18
Total	22	43	16	81
Overall accuracy	82.7%			
Kappa coefficeint	0.72			

Tables S4. Confusion matrix for the accuracy assessment Cropping pattern.

Class	Ground Truth (Pixels)					
	Non-rice	**Fallow-Rice**	**Rice-Fallow**	**Rice-Other crop**	**Rice-Rice**	**Total**
Unclassified	0	1	0	0	0	1
Non-rice	17	1	1	0	1	20
Fallow - Rice	0	4	0	0	0	4
Rice-Fallow	4	0	7	3	0	14
Rice-Other crop	0	0	0	10	4	14
Rice-Rice	1	2	0	0	25	28
Total	22	8	8	13	30	81
Overall accuracy	77.8%					
Kappa coefficient	0.71					

Tables S5. Confusion matrix for the accuracy assessment rice ecosystem.

Class	Ground Truth (Pixels)			
	Non-rice	**Irrigated**	**Rainfed**	**Total**
Unclassified	0	0	1	1
Non-rice	17	2	1	20
Irrigated	1	30	8	39
Rainfed	4	4	13	21

Table S5. *Cont.*

Class	Ground Truth (Pixels)			
	Non-rice	**Irrigated**	**Rainfed**	**Total**
Total	22	36	23	81
Overall accuracy		74%		
Kappa coefficient		0.60		

Tables S6. Confusion matrix for the accuracy assessment Crop Calendar for WS.

Class	Ground Truth (Pixels)					
	Non-rice	**Jun-Jul**	**Fallow**	**May**	**Aug**	**Total**
Unclassified	0	0	1	0	0	1
Non-rice	17	1	1	0	1	20
Jun-Jul	4	37	2	1	4	48
Fallow	0	0	4	0	0	4
May-Jun	1	2	0	1	0	4
Jul-Aug	0	2	0	0	2	4
Total	22	42	8	2	7	81
Overall accuracy	75.3%					
Kappa coefficient	0.60					

Tables S7. Confusion matrix for the accuracy assessment Crop Calendar for DS.

Class	Ground Truth (Pixels)					
	Non-rice	**Dec-Jan**	**Fallow**	**Other**	**Oct-Nov**	**Total**
Unclassified	0	1	0	0	0	1
Non-rice	17	2	1	0	0	20
Dec-Jan	1	15	0	0	0	16
Fallow	4	0	7	1	2	14
Other	0	3	0	10	1	14
Oct-Nov	0	15	0	0	1	16
Total	22	36	8	11	4	81
Overall accuracy	61.7%					
Kappa coefficient	0.52					

Tables S8. Confusion matrix for the accuracy assessment SAR-derived rice area.

Class	Ground Truth (Pixels)		
	Rice	**Non-rice**	**Total**
Unclassified	0	0	0
Rice	176	5	181
Non-rice	18	41	59
Total	194	46	240
Overall accuracy	90.4%		
Kappa coefficient	0.72		

Figure S4. The Terra SAR-X image on the left was acquired on 6 July 2013. It contains the assumed intense localized clouds and rain. The image on the right was acquired on 23 September 2013. It shows what the image looks like without the intense localized weather events. The affected images were corrected and used afterward.