Fast and Automatic Data-Driven Thresholding for Inundation Mapping with Sentinel-2 Data

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This supplementary material supports the main text as follows:

Supplementary 3. Confusion Matrices.

This supplementary contains the confusion matrices based on which the accuracy assessment results in Tables 4-8 of the main manuscript and Tables 1-5 of the Supplementary 2 (Sup2) were produced.

1. Results for Complete Area

The following table contains the confusion matrices used to generate the results given in Table 4 of main manuscript and Table 1 of Sup2. The confusion matrices of both Table 4 and Table 1, are given in the same cells, with the results used to produce Table 1 given into parentheses. The results that are finally transferred to Table 4 and Table 1 are denoted with bold. In the first row is given the applied approach and the considered study area and in the left column the date.

			Unsupervised – Complete area						Supervised – Complete area			
			Landsat Reference			User's Accuracy			Landsat Reference			User's Accuracy
		# pixels	Water	Non-water	Overalls			# pixels	Water	Non-water	Overalls	
29/12/2015	S2 Result	Water	2689871 (2785051)	189766 (306038)	2879637 (3091089)	**93.41% (90.10%)**	S2 Result	Water	2923231 (3087697)	268930 (557281)	3192161 (3644978)	**91.58% (84.71%)**
		Non-water	255097 (405860)	23543953 (24070686)	23799050 (24476546)	**98.93% (98.34%)**		Non-water	21737 (103214)	23464789 (23819443)	23486526 (23922657)	**99.91% (99.57%)**
		Overalls	2944968 (3190911)	23733719 (24376724)	26678687 (27567635)			Overalls	2944968 (3190911)	23733719 (24376724)	26678687 (27567635)	
		Producer's Accuracy	**91.34% (87.28%)**	**99.20% (98.74%)**		Overall: **98.33% (97.42%)**		Producer's Accuracy	**99.26% (96.77%)**	**98.87% (97.71%)**		Overall: **98.91% (97.60%)**
			Landsat Reference			User's Accuracy			Landsat Reference			User's Accuracy
		# pixels	Water	Non-water	Overalls			# pixels	Water	Non-water	Overalls	
06/06/2016	S2 Result	Water	2503635 (2732019)	146744 (308357)	2650379 (3040376)	**94.46% (89.86%)**	S2 Result	Water	2660458 (2997349)	204828 (531073)	2865286 (3528422)	**92.85% (84.95%)**
		Non-water	182466 (393828)	23444660 (24133436)	23627126 (24527264)	**99.23% (98.39%)**		Non-water	25643 (128498)	23386576 (23910720)	23412219 (24039218)	**99.89% (99.47%)**
		Overalls	2686101 (3125847)	23591404 (24441793)	26277505 (27567640)			Overalls	2686101 (3125847)	23591404 (24441793)	26277505 (27567640)	
		Producer's Accuracy	**93.21% (87.40%)**	**99.38% (98.74%)**		Overall: **98.75% (97.45%)**		Producer's Accuracy	**99.05% (95.89%)**	**99.13% (97.83%)**		Overall: **99.12% (97.61%)**
			Landsat Reference			User's Accuracy			Landsat Reference			User's Accuracy
		# pixels	Water	Non-water	Overalls			# pixels	Water	Non-water	Overalls	
16/07/2016	S2 Result	Water	1744229 (2002915)	784510 (1099220)	2528739 (3102135)	**68.98% (64.57%)**	S2 Result	Water	1914177 (2222215)	143662 (449245)	2057839 (2671460)	**93.02% (83.18%)**
		Non-water	193079 (355186)	23677073 (24110319)	23870152 (24465505)	**99.19% (98.55%)**		Non-water	23131 (135886)	24317921 (24760294)	24341052 (24896180)	**99.90% (99.45%)**

			Landsat Reference			User's Accuracy			Landsat Reference			User's Accuracy
		Overalls	1937308 (2358101)	24461583 (25209539)	26398891 (27567640)			Overalls	1937308 (2358101)	24461583 (25209539)	26398891 (27567640)	
		Producer's Accuracy	**90.03% (84.94%)**	**96.79% (95.64%)**		Overall: **96.30% (94.72%)**		Producer's Accuracy	**98.81% (94.24%)**	**99.41% (98.22%)**		Overall: **99.37% (97.88%)**
25/08/2016	S2 Result	# pixels	Water	Non-water	Overalls			# pixels	Water	Non-water	Overalls	
		Water	1739924 (2133943)	718031 (1244784)	2457955 (3378727)	**70.79% (63.16%)**	S2 Result	Water	1803622 (2223138)	320690 (847698)	2124312 (3070836)	**84.90% (72.40%)**
		Non-water	95930 (217176)	23618414 (23971737)	23714344 (24188913)	**99.60% (99.10%)**		Non-water	32232 (127981)	24015755 (24368823)	24047987 (24496804)	**99.87% (99.48%)**
		Overalls	1835854 (2351119)	24336445 (25216521)	26172299 (27567640)			Overalls	1835854 (2351119)	24336445 (25216521)	26172299 (27567640)	
		Producer's Accuracy	**94.77% (90.76%)**	**97.05% (95.06%)**		Overall: **96.89% (94.70%)**		Producer's Accuracy	**98.24% (94.56%)**	**98.68% (96.64%)**		Overall: **98.65% (96.46%)**
04/10/2016	S2 Result	# pixels	Water	Non-water	Overalls			# pixels	Water	Non-water	Overalls	
		Water	655814 (709941)	19198 (49273)	675012 (759214)	**97.16% (93.51%)**	S2 Result	Water	710334 (806956)	31294 (112776)	741628 (919732)	**95.78% (87.74%)**
		Non-water	66779 (179290)	26335218 (26629136)	26401997 (26808426)	**99.75% (99.33%)**		Non-water	12259 (82275)	26323122 (26565633)	26335381 (26647908)	**99.95% (99.69%)**
		Overalls	722593 (889231)	26354416 (26678409)	27077009 (27567640)			Overalls	722593 (889231)	26354416 (26678409)	27077009 (27567640)	
		Producer's Accuracy	**90.76% (79.84%)**	**99.93% (99.82%)**		Overall: **99.68% (99.17%)**		Producer's Accuracy	**98.30% (90.95%)**	**99.88% (99.58%)**		Overall: **99.84% (99.29%)**
23/12/2016	S2 Result	# pixels	Water	Non-water	Overalls			# pixels	Water	Non-water	Overalls	
		Water	4870350 (4975069)	212395 (372538)	5082745 (5347607)	**95.82% (93.03%)**	S2 Result	Water	5643309 (5924871)	475522 (1135457)	6118831 (7060328)	**92.23% (83.92%)**
		Non-water	852458 (1152975)	19755316 (21061363)	20607774 (22214338)	**95.86% (94.81%)**		Non-water	79499 (203173)	19492189 (20298444)	19571688 (20501617)	**99.59% (99.01%)**
		Overalls	5722808 (6128044)	19967711 (21433901)	25690519 (27561945)			Overalls	5722808 (6128044)	19967711 (21433901)	25690519 (27561945)	
		Producer's Accuracy	**85.10% (81.19%)**	**98.94% (98.26%)**		Overall: **95.86% (94.47%)**		Producer's Accuracy	**98.61% (96.68%)**	**97.62% (94.70%)**		Overall: **97.84% (95.14%)**
01/06/2017	S2 Result	# pixels	Water	Non-water	Overalls			# pixels	Water	Non-water	Overalls	
		Water	3976759 (4126523)	199999 (343467)	4176758 (4469990)	**95.21% (92.32%)**	S2 Result	Water	4273009 (4529417)	273866 (599516)	4546875 (5128933)	**93.98% (88.31%)**
		Non-water	322836 (521368)	21967110 (22576282)	22289946 (23097650)	**98.55% (97.74%)**		Non-water	26586 (118474)	21893243 (22320233)	21919829 (22438707)	**99.88% (99.47%)**
		Overalls	4299595 (4647891)	22167109 (22919749)	26466704 (27567640)			Overalls	4299595 (4647891)	22167109 (22919749)	26466704 (27567640)	
		Producer's Accuracy	**92.49% (88.78%)**	**99.10% (98.50%)**		Overall: **98.02% (96.86%)**		Producer's Accuracy	**99.38% (97.45%)**	**98.76% (97.38%)**		Overall: **98.86% (97.40%)**

2. Results for Marshland

The following table contains the confusion matrices used to generate the results given in Table 5 of main manuscript and Table 2 of Sup2. The confusion matrices of both Table 5 and Table 2, are given in the same cells, with the results used to produce Table 2 given into parentheses. The results that are finally transferred to Table 5 and Table 2 are denoted with bold. In the first row is given the applied approach and the considered study area and in the left column the date.

Unsupervised – Marshland / Supervised – Marshland

29/12/2015

		Landsat Reference			User's Accuracy			Landsat Reference			User's Accuracy
# pixels		Water	Non-water	Overalls		# pixels		Water	Non-water	Overalls	
S2 Result	Water	82023 (95612)	525 (9952)	82548 (105564)	**99.36% (90.57%)**	S2 Result	Water	88407 (110641)	6897 (30391)	95304 (141032)	**92.76% (78.45%)**
	Non-water	7644 (24872)	3014906 (3066881)	3022550 (3091753)	**99.75% (99.20%)**		Non-water	1260 (9843)	3008534 (3046442)	3009794 (3056285)	**99.96% (99.68%)**
	Overalls	89667 (120484)	3015431 (3076833)	3105098 (3197317)			Overalls	89667 (120484)	3015431 (3076833)	3105098 (3197317)	
	Producer's Accuracy	**91.48% (79.36%)**	**99.98% (99.68%)**		Overall: **99.74% (98.91%)**		Producer's Accuracy	**98.59% (91.83%)**	**99.77% (99.01%)**		Overall: **99.74% (98.74%)**

06/06/2016

		Landsat Reference			User's Accuracy			Landsat Reference			User's Accuracy
# pixels		Water	Non-water	Overalls		# pixels		Water	Non-water	Overalls	
S2 Result	Water	599440 (666860)	1599 (36654)	601039 (703514)	**99.73% (94.79%)**	S2 Result	Water	653288 (759851)	13661 (100650)	666949 (860501)	**97.95% (88.30%)**
	Non-water	58744 (128206)	2152846 (2365601)	2211590 (2493807)	**97.34% (94.86%)**		Non-water	4896 (35215)	2140784 (2301605)	2145680 (2336820)	**99.77% (98.49%)**
	Overalls	658184 (795066)	2154445 (2402255)	2812629 (3197321)			Overalls	658184 (795066)	2154445 (2402255)	2812629 (3197321)	
	Producer's Accuracy	**91.07% (83.87%)**	**99.93% (98.47%)**		Overall: **97.85% (94.84%)**		Producer's Accuracy	**99.26% (95.57%)**	**99.37% (95.81%)**		Overall: **99.34% (95.75%)**

16/07/2016

		Landsat Reference			User's Accuracy			Landsat Reference			User's Accuracy
# pixels		Water	Non-water	Overalls		# pixels		Water	Non-water	Overalls	
S2 Result	Water	11893 (15939)	2538 (5384)	14431 (21323)	**82.41% (74.75%)**	S2 Result	Water	12937 (18153)	575 (4575)	13512 (22728)	**95.74% (79.87%)**
	Non-water	1509 (5625)	3157810 (3170373)	3159319 (3175998)	**99.95% (99.82%)**		Non-water	465 (3411)	3159773 (3171182)	3160238 (3174593)	**99.99% (99.89%)**
	Overalls	13402 (21564)	3160348 (3175757)	3173750 (3197321)			Overalls	13402 (21564)	3160348 (3175757)	3173750 (3197321)	
	Producer's Accuracy	**88.74% (73.91%)**	**99.92% (99.83%)**		Overall: **99.87% (99.66%)**		Producer's Accuracy	**96.53% (84.18%)**	**99.98% (99.86%)**		Overall: **99.97% (99.75%)**

25/08/2016

		Landsat Reference			User's Accuracy			Landsat Reference			User's Accuracy
# pixels		Water	Non-water	Overalls		# pixels		Water	Non-water	Overalls	
S2 Result	Water	3802 (6471)	3151 (5612)	6953 (12083)	**54.68% (53.55%)**	S2 Result	Water	4114 (7682)	601 (3944)	4715 (11626)	**87.25% (66.08%)**
	Non-water	415 (3273)	3174630 (3181965)	3175045 (3185238)	**99.99% (99.90%)**		Non-water	103 (2062)	3177180 (3183633)	3177283 (3185695)	**99.99% (99.94%)**
	Overalls	4217 (9744)	3177781 (3187577)	3181998 (3197321)			Overalls	4217 (9744)	3177781 (3187577)	3181998 (3197321)	
	Producer's Accuracy	**90.16% (66.41%)**	**99.90% (99.82%)**		Overall: **99.89% (99.72%)**		Producer's Accuracy	**97.56% (78.84%)**	**99.98% (99.88%)**		Overall: **99.98% (99.81%)**

04/10/2016

		Landsat Reference			User's Accuracy			Landsat Reference			User's Accuracy
# pixels		Water	Non-water	Overalls		# pixels		Water	Non-water	Overalls	
Result	Water	1788 (3366)	75 (1870)	1863 (5236)	**95.97% (64.29%)**	S2 Result	Water	1900 (4527)	542 (3447)	2442 (7974)	**77.81% (56.77%)**
	Non-water	138 (3007)	3181653 (3189078)	3181791 (3192085)	**99.99% (99.91%)**		Non-water	26 (1846)	3181186 (3187501)	3181212 (3189347)	**99.99% (99.94%)**

			1926 (6373)	3181728 (3190948)	3183654 (3197321)					1926 (6373)	3181728 (3190948)	3183654 (3197321)	
		Overalls	1926 (6373)	3181728 (3190948)	3183654 (3197321)				Overalls	1926 (6373)	3181728 (3190948)	3183654 (3197321)	
		Producer's Accuracy	**92.83%** (52.82%)	**99.99%** (99.94%)		Overall: **99.99%** (99.85%)			Producer's Accuracy	**98.65%** (71.03%)	**99.98%** (99.89%)		Overall: **99.98%** (99.83%)

			Landsat Reference			User's Accuracy				Landsat Reference			User's Accuracy
23/12/2016		# pixels	Water	Non-water	Overalls	Accuracy		# pixels	Water	Non-water	Overalls	Accuracy	
	S2 Result	Water	2008815 (2034546)	355 (25181)	2009170 (2059727)	**99.98%** (98.78%)	S2 Result	Water	2142465 (2213602)	32293 (167590)	2174758 (2381192)	**98.52%** (92.96%)	
		Non-water	154967 (219912)	611901 (917682)	766868 (1137594)	**79.79%** (80.67%)		Non-water	21317 (40856)	579963 (775273)	601280 (816129)	**96.45%** (94.99%)	
		Overalls	2163782 (2254458)	612256 (942863)	2776038 (3197321)			Overalls	2163782 (2254458)	612256 (942863)	2776038 (3197321)	
		Producer's Accuracy	**92.84%** (90.25%)	**99.94%** (97.33%)		Overall: **94.40%** (92.33%)		Producer's Accuracy	**99.01%** (98.19%)	**94.73%** (82.23%)		Overall: **98.07%** (93.48%)

			Landsat Reference			User's Accuracy				Landsat Reference			User's Accuracy
01/06/2017		# pixels	Water	Non-water	Overalls	Accuracy		# pixels	Water	Non-water	Overalls	Accuracy	
	S2 Result	Water	1138689 (1193504)	793 (33548)	1139482 (1227052)	**99.93%** (97.27%)	S2 Result	Water	1279534 (1382705)	16855 (116316)	1296389 (1499021)	**98.70%** (92.24%)	
		Non-water	150583 (230030)	1508216 (1740239)	1658799 (1970269)	**90.92%** (88.32%)		Non-water	9738 (40829)	1492154 (1657471)	1501892 (1698300)	**99.35%** (97.60%)	
		Overalls	1289272 (1423534)	1509009 (1773787)	2798281 (3197321)			Overalls	1289272 (1423534)	1509009 (1773787)	2798281 (3197321)	
		Producer's Accuracy	**88.32%** (83.84%)	**99.95%** (98.11%)		Overall: **94.59%** (91.76%)		Producer's Accuracy	**99.24%** (97.13%)	**98.88%** (93.44%)		Overall: **99.05%** (95.09%)

3. Results for Rice-paddies

The following table contains the confusion matrices used to generate the results given in Table 6 of main manuscript and Table 3 of Sup2. The confusion matrices of both Table 6 and Table 3, are given in the same cells, with the results used to produce Table 3 given into parentheses. The results that are finally transferred to Table 6 and Table 3 are denoted with bold. In the first row is given the applied approach and the considered study area and in the left column the date.

		Unsupervised – Rice-paddies						**Supervised – Rice-paddies**					
			Landsat Reference			User's Accuracy				Landsat Reference			User's Accuracy
29/12/2015		# pixels	Water	Non-water	Overalls	Accuracy		# pixels	Water	Non-water	Overalls	Accuracy	
	S2 Result	Water	1240440 (1254359)	370 (33349)	1240810 (1287708)	**99.97%** (97.41%)	S2 Result	Water	1342242 (1365620)	13832 (101222)	1356074 (1466842)	**98.98%** (93.10%)	
		Non-water	106746 (122078)	683393 (780580)	790139 (902658)	**86.49%** (86.48%)		Non-water	4944 (10817)	669931 (712707)	674875 (723524)	**99.27%** (98.50%)	
		Overalls	1347186 (1376437)	683763 (813929)	2030949 (2190366)			Overalls	1347186 (1376437)	683763 (813929)	2030949 (2190366)	
		Producer's Accuracy	**92.08%** (91.13%)	**99.95%** (95.90%)		Overall: **94.73%** (92.90%)		Producer's Accuracy	**99.63%** (99.21%)	**97.98%** (87.56%)		Overall: **99.08%** (94.88%)
			Landsat Reference			User's Accuracy				Landsat Reference			User's Accuracy
06/06/2016		# pixels	Water	Non-water	Overalls	Accuracy		# pixels	Water	Non-water	Overalls	Accuracy	
	S2 Result	Water	671776 (734720)	2856 (53484)	674632 (788204)	**99.58%** (93.21%)	S2 Result	Water	703332 (788538)	15549 (106024)	718881 (894562)	**97.84%** (88.15%)	
		Non-water	38162 (79961)	1154279 (1322201)	1192441 (1402162)	**96.80%** (94.30%)		Non-water	6606 (26143)	1141586 (1269661)	1148192 (1295804)	**99.42%** (97.98%)	
		Overalls	709938 (814681)	1157135 (1375685)	1867073 (2190366)			Overalls	709938 (814681)	1157135 (1375685)	1867073 (2190366)	
		Producer's Accuracy	**94.62%** (90.18%)	**99.75%** (96.11%)		Overall: **97.80%** (93.91%)		Producer's Accuracy	**99.07%** (96.79%)	**98.66%** (92.29%)		Overall: **98.81%** (93.97%)
1			Landsat Reference			User's				Landsat Reference			User's

Top block (left)

S2 Result	# pixels	Water	Non-water	Overalls	Accuracy
S2 Result	Water	656258 (767759)	275430 (428599)	931688 (1196358)	**70.44% (64.17%)**
	Non-water	103867 (160667)	688859 (833341)	792726 (994008)	**86.90% (83.84%)**
	Overalls	760125 (928426)	964289 (1261940)	1724414 (2190366)	
	Producer's Accuracy	**86.34% (82.69%)**	**71.44% (66.04%)**		Overall: **78.00% (73.10%)**

Top block (right)

S2 Result	# pixels	Water	Non-water	Overalls	Accuracy
S2 Result	Water	751544 (880648)	15348 (152646)	766892 (1033294)	**98.00% (85.23%)**
	Non-water	8581 (47778)	948941 (1109294)	957522 (1157072)	**99.10% (95.87%)**
	Overalls	760125 (928426)	964289 (1261940)	1724414 (2190366)	
	Producer's Accuracy	**98.87% (94.85%)**	**98.41% (87.90%)**		Overall: **98.61% (90.85%)**

25/08/2016 (left) — Landsat Reference

S2 Result	# pixels	Water	Non-water	Overalls	User's Accuracy
S2 Result	Water	683781 (879145)	213237 (498087)	897018 (1377232)	**76.23% (63.83%)**
	Non-water	29269 (58643)	652040 (754491)	681309 (813134)	**95.70% (92.79%)**
	Overalls	713050 (937788)	865277 (1252578)	1578327 (2190366)	
	Producer's Accuracy	**95.90% (93.75%)**	**75.36% (60.24%)**		Overall: **84.64% (74.58%)**

25/08/2016 (right) — Landsat Reference

S2 Result	# pixels	Water	Non-water	Overalls	User's Accuracy
S2 Result	Water	697744 (892237)	102181 (374488)	799925 (1266725)	**87.23% (70.44%)**
	Non-water	15306 (45551)	763096 (878090)	778402 (923641)	**98.03% (95.07%)**
	Overalls	713050 (937788)	865277 (1252578)	1578327 (2190366)	
	Producer's Accuracy	**97.85% (95.14%)**	**88.19% (70.10%)**		Overall: **92.56% (80.82%)**

04/10/2016 (left) — Landsat Reference

S2 Result	# pixels	Water	Non-water	Overalls	User's Accuracy
S2 Result	Water	6001 (9499)	73 (2490)	6074 (11989)	**98.80% (79.23%)**
	Non-water	6685 (17795)	2133125 (2160582)	2139810 (2178377)	**99.69% (99.18%)**
	Overalls	12686 (27294)	2133198 (2163072)	2145884 (2190366)	
	Producer's Accuracy	**47.30% (34.80%)**	**99.99% (99.88%)**		Overall: **99.69% (99.07%)**

04/10/2016 (right) — Landsat Reference

S2 Result	# pixels	Water	Non-water	Overalls	User's Accuracy
S2 Result	Water	11313 (19058)	3955 (11099)	15268 (30157)	**74.10% (63.20%)**
	Non-water	1373 (8236)	2129243 (2151973)	2130616 (2160209)	**99.94% (99.62%)**
	Overalls	12686 (27294)	2133198 (2163072)	2145884 (2190366)	
	Producer's Accuracy	**89.18% (69.82%)**	**99.81% (99.49%)**		Overall: **99.75% (99.12%)**

23/12/2016 (left) — Landsat Reference

S2 Result	# pixels	Water	Non-water	Overalls	User's Accuracy
S2 Result	Water	1146044 (1154328)	252 (44081)	1146296 (1198409)	**99.98% (96.32%)**
	Non-water	247072 (277664)	476288 (714293)	723360 (991957)	**65.84% (72.01%)**
	Overalls	1393116 (1431992)	476540 (758374)	1869656 (2190366)	
	Producer's Accuracy	**82.26% (80.61%)**	**99.95% (94.19%)**		Overall: **86.77% (85.31%)**

23/12/2016 (right) — Landsat Reference

S2 Result	# pixels	Water	Non-water	Overalls	User's Accuracy
S2 Result	Water	1375214 (1402882)	22525 (186146)	1397739 (1589028)	**98.39% (88.29%)**
	Non-water	17902 (29110)	454015 (572228)	471917 (601338)	**96.21% (95.16%)**
	Overalls	1393116 (1431992)	476540 (758374)	1869656 (2190366)	
	Producer's Accuracy	**98.71% (97.97%)**	**95.27% (75.45%)**		Overall: **97.84% (90.17%)**

01/06/2017 (left) — Landsat Reference

S2 Result	# pixels	Water	Non-water	Overalls	User's Accuracy
S2 Result	Water	1338181 (1356166)	802 (33328)	1338983 (1389494)	**99.94% (97.60%)**
	Non-water	68265 (86004)	637650 (714293)	705915 (800872)	**90.33% (89.26%)**
	Overalls	1406446 (1442170)	638452 (748196)	2044898 (2190366)	
	Producer's Accuracy	**95.15% (94.04%)**	**99.87% (95.55%)**		Overall: **96.62% (94.55%)**

01/06/2017 (right) — Landsat Reference

S2 Result	# pixels	Water	Non-water	Overalls	User's Accuracy
S2 Result	Water	1402071 (1428617)	6901 (68236)	1408972 (1496853)	**99.51% (95.44%)**
	Non-water	4375 (13553)	631551 (679960)	635926 (693513)	**99.31% (98.05%)**
	Overalls	1406446 (1442170)	638452 (748196)	2044898 (2190366)	
	Producer's Accuracy	**99.69% (99.06%)**	**98.92% (90.88%)**		Overall: **99.45% (96.27%)**

4. Results for Temporary Ponds

The following table contains the confusion matrices used to generate the results given in Table 7 of main manuscript and Table 4 of Sup2. The confusion matrices of both Table 7 and Table 4, are given in the same cells, with the results used to produce Table 4 given into parentheses. The results that are finally transferred to Table 7 and Table 4 are denoted with bold. In the first row is given the applied approach and the considered study area and in the left column the date.

	Unsupervised – Temporary Ponds						Supervised – Temporary Ponds				
29/12/2015		Landsat Reference			User's Accuracy			Landsat Reference			User's Accuracy
	# pixels	Water	Non-water	Overalls		# pixels	Water	Non-water	Overalls	
S2 Result — Water	1616 (2507)	326 (887)	1942 (3394)	83.21% (73.87%)	S2 Result — Water	1678 (2739)	1328 (2204)	3006 (4943)	55.82% (55.41%)		
Non-water	121 (1979)	2744656 (2753183)	2744777 (2755162)	99.99% (99.93%)	Non-water	59 (1747)	2743654 (2751866)	2743713 (2753613)	99.99% (99.94%)		
Overalls	1737 (4486)	2744982 (2754070)	2746719 (2758556)		Overalls	1737 (4486)	2744982 (2754070)	2746719 (2758556)			
Producer's Accuracy	93.03% (55.88%)	99.99% (99.97%)		Overall: 99.98% (99.90%)	Producer's Accuracy	96.60% (61.06%)	99.95% (99.92%)		Overall: 99.95% (99.86%)		
06/06/2016		Landsat Reference			User's Accuracy			Landsat Reference			User's Accuracy
	# pixels	Water	Non-water	Overalls		# pixels	Water	Non-water	Overalls	
S2 Result — Water	2426 (3973)	1276 (2119)	3702 (6092)	65.53% (65.22%)	S2 Result — Water	2455 (4182)	1629 (2840)	4084 (7022)	60.11% (59.56%)		
Non-water	148 (1445)	2745986 (2751019)	2746134 (2752464)	99.99% (99.95%)	Non-water	119 (1236)	2745633 (2750298)	2745752 (2751534)	99.99% (99.96%)		
Overalls	2574 (5418)	2747262 (2753138)	2749836 (2758556)		Overalls	2574 (5418)	2747262 (2753138)	2749836 (2758556)			
Producer's Accuracy	94.25% (73.33%)	99.95% (99.92%)		Overall: 99.95% (99.87%)	Producer's Accuracy	95.38% (77.19%)	99.94% (99.90%)		Overall: 99.94% (99.85%)		
16/07/2016		Landsat Reference			User's Accuracy			Landsat Reference			User's Accuracy
	# pixels	Water	Non-water	Overalls		# pixels	Water	Non-water	Overalls	
S2 Result — Water	1382 (2176)	2733 (3000)	4115 (5176)	33.58% (42.04%)	S2 Result — Water	1418 (2319)	2837 (3262)	4255 (5581)	33.33% (41.55%)		
Non-water	49 (695)	2750254 (2752685)	2750303 (2753380)	99.99% (99.97%)	Non-water	13 (552)	2750150 (2752423)	2750163 (2752975)	99.99% (99.98%)		
Overalls	1431 (2871)	2752987 (2755685)	2754418 (2758556)		Overalls	1431 (2871)	2752987 (2755685)	2754418 (2758556)			
Producer's Accuracy	96.58% (75.79%)	99.90% (99.89%)		Overall: 99.90% (99.87%)	Producer's Accuracy	99.09% (80.77%)	99.90% (99.88%)		Overall: 99.90% (99.86%)		
25/08/2016		Landsat Reference			User's Accuracy			Landsat Reference			User's Accuracy
	# pixels	Water	Non-water	Overalls		# pixels	Water	Non-water	Overalls	
S2 Result — Water	597 (1008)	1954 (2224)	2551 (3232)	23.40% (31.19%)	S2 Result — Water	626 (1121)	2305 (2593)	2931 (3714)	21.36% (30.18%)		
Non-water	33 (396)	2753614 (2754928)	2753647 (2755324)	99.99% (99.99%)	Non-water	4 (283)	2753263 (2754559)	2753267 (2754842)	99.99% (99.99%)		
Overalls	630 (1404)	2755568 (2757152)	2756198 (2758556)		Overalls	630 (1404)	2755568 (2757152)	2756198 (2758556)			
Producer's Accuracy	94.76% (71.79%)	99.93% (99.92%)		Overall: 99.93% (99.91%)	Producer's Accuracy	99.37% (79.84%)	99.92% (99.91%)		Overall: 99.92% (99.90%)		
04/10/2016		Landsat Reference			User's Accuracy			Landsat Reference			User's Accuracy
	# pixels	Water	Non-water	Overalls		# pixels	Water	Non-water	Overalls	
S2 Result — Water	301 (529)	2156 (2251)	2457 (2780)	12.25% (19.03%)	S2 Result — Water	306 (547)	2669 (2830)	2975 (3377)	10.29% (16.20%)		
Non-water	5 (353)	2753575 (2755423)	2753580 (2755776)	99.99% (99.99%)	Non-water	0 (335)	2753062 (2754844)	2753062 (2755179)	100.00% (99.99%)		
Overalls	306 (882)	2755731 (2757674)	2756037 (2758556)		Overalls	306 (882)	2755731 (2757674)	2756037 (2758556)			
Producer's Accuracy	98.37% (59.98%)	99.92% (99.92%)		Overall: 99.92% (99.91%)	Producer's Accuracy	100.00% (62.02%)	99.90% (99.90%)		Overall: 99.90% (99.89%)		
23/12/2016		Landsat Reference			User's Accuracy			Landsat Reference			User's Accuracy
	# pixels	Water	Non-water	Overalls		# pixels	Water	Non-water	Overalls	
S2 Result — Water	3183 (5133)	387 (1187)	3570 (6320)	89.16% (81.22%)	S2 Result — Water	3635 (6756)	2621 (4902)	6256 (11658)	58.10% (57.95%)		
Non-water	840 (7615)	2720151 (2744621)	2720991 (2752236)	99.97% (99.72%)	Non-water	388 (5992)	2717917 (2740906)	2718305 (2746898)	99.99% (99.78%)		

Top table (continuation) — left approach

	Water	Non-water	Overalls	
Overalls	4023 (12748)	2720538 (2745808)	2724561 (2758556)	
Producer's Accuracy	**79.12%** **(40.27%)**	**99.99%** **(99.96%)**		Overall: **99.95%** **(99.68%)**

Top table (continuation) — right approach

	Water	Non-water	Overalls	
Overalls	4023 (12748)	2720538 (2745808)	2724561 (2758556)	
Producer's Accuracy	**90.36%** **(53.00%)**	**99.90%** **(99.82%)**		Overall: **99.89%** **(99.61%)**

01/06/2017 — left approach, S2 Result

# pixels	Landsat Reference Water	Non-water	Overalls	User's Accuracy
Water	3279 (4943)	2695 (3541)	5974 (8484)	**54.89%** **(58.26%)**
Non-water	276 (2212)	2741119 (2747860)	2741395 (2750072)	**99.99%** **(99.92%)**
Overalls	3555 (7155)	2743814 (2751401)	2747369 (2758556)	
Producer's Accuracy	**92.24%** **(69.08%)**	**99.90%** **(99.87%)**		Overall: **99.89%** **(99.79%)**

01/06/2017 — right approach, S2 Result

# pixels	Landsat Reference Water	Non-water	Overalls	User's Accuracy
Water	3431 (5571)	2316 (3849)	5747 (9420)	**59.70%** **(59.14%)**
Non-water	124 (1584)	2741498 (2747552)	2741622 (2749136)	**99.99%** **(99.94%)**
Overalls	3555 (7155)	2743814 (2751401)	2747369 (2758556)	
Producer's Accuracy	**96.51%** **(77.86%)**	**99.92%** **(99.86%)**		Overall: **99.91%** **(99.80%)**

5. Combined Accuracy Results

The following table contains the confusion matrices used to generate the results given in Table 8 of main manuscript and Table 5 of Sup2. The confusion matrices of both Table 8 and Table 5, are given in the same cells, with the results used to produce Table 5 given into parentheses. The results that are finally transferred to Table 8 and Table 5 are denoted with bold. In the first row is given the applied approach and in the left column the considered study area.

Complete Area (Unsupervised results are for the case of using MCET)

Unsupervised — S2 Result

# pixels	Landsat Reference Water	Non-water	Overalls	User's Accuracy
Water	18180582 (19465461)	2270643 (3723677)	20451225 (23189138)	**88.90%** **(83.94%)**
Non-water	1968645 (3225683)	162341744 (166552959)	164310389 (169778642)	**98.80%** **(98.10%)**
Overalls	20149227 (22691144)	164612387 (170276636)	184761614 (192967780)	
Producer's Accuracy	**90.23%** **(85.78%)**	**98.62%** **(97.81%)**		Overall: **97.71%** **(96.40%)**

Supervised — S2 Result

# pixels	Landsat Reference Water	Non-water	Overalls	User's Accuracy
Water	19928140 (21791643)	1718792 (4233046)	21646932 (26024689)	**92.06%** **(83.73%)**
Non-water	221087 (899501)	162893595 (166043590)	163114682 (166943091)	**99.86%** **(99.46%)**
Overalls	20149227 (22691144)	164612387 (170276636)	184761614 (192967780)	
Producer's Accuracy	**98.90%** **(96.04%)**	**98.96%** **(97.51%)**		Overall: **98.95%** **(97.34%)**

Marshland

Unsupervised — S2 Result

# pixels	Landsat Reference Water	Non-water	Overalls	User's Accuracy
Water	3846450 (4016298)	9036 (118201)	3855486 (4134499)	**99.77%** **(97.14%)**
Non-water	374000 (614925)	16801962 (17631819)	17175962 (18246744)	**97.82%** **(96.63%)**
Overalls	4220450 (4631223)	16810998 (17750020)	21031448 (22381243)	
Producer's Accuracy	**91.14%** **(86.72%)**	**99.95%** **(99.33%)**		Overall: **98.18%** **(96.72%)**

Supervised — S2 Result

# pixels	Landsat Reference Water	Non-water	Overalls	User's Accuracy
Water	4182645 (4497161)	71424 (426913)	4254069 (4924074)	**98.32%** **(91.33%)**
Non-water	37805 (134062)	16739574 (17323107)	16777379 (17457169)	**99.77%** **(99.23%)**
Overalls	4220450 (4631223)	16810998 (17750020)	21031448 (22381243)	
Producer's Accuracy	**99.10%** **(97.11%)**	**99.58%** **(97.59%)**		Overall: **99.48%** **(97.49%)**

Rice-paddies

Unsupervised — S2 Result

# pixels	Landsat Reference Water	Non-water	Overalls	User's Accuracy
Water	5742481 (6155976)	493020 (1093418)	6235501 (7249394)	**92.09%** **(84.92%)**
Non-water	600066 (802812)	6425634 (7280356)	7025700 (8083168)	**91.46%** **(90.07%)**
Overalls	6342547 (6958788)	6918654 (8373774)	13261201 (15332562)	

Supervised — S2 Result

# pixels	Landsat Reference Water	Non-water	Overalls	User's Accuracy
Water	6283460 (6777600)	180291 (999861)	6463751 (7777461)	**97.21%** **(87.14%)**
Non-water	59087 (181188)	6738363 (7373913)	6797450 (7555101)	**99.13%** **(97.60%)**
Overalls	6342547 (6958788)	6918654 (8373774)	13261201 (15332562)	

			90.54% (88.46%)	92.87% (86.94%)		Overall: 91.76% (87.63%)			99.07% (97.40%)	97.39% (88.06%)		Overall: 98.19% (92.30%)
		Producer's Accuracy						Producer's Accuracy				

Temporary Ponds

# pixels	Water	Non-water	Overalls	User's Accuracy
S2 Result — Water	12784 (20269)	11527 (15209)	24311 (35478)	52.59% (57.13%)
Non-water	1472 (14695)	19209355 (19259719)	19210827 (19274414)	99.99% (99.92%)
Overalls	14256 (34964)	19220882 (19274928)	19235138 (19309892)	
Producer's Accuracy	89.67% (57.97%)	99.94% (99.92%)		Overall: 99.93 % (99.85%)

# pixels	Water	Non-water	Overalls	User's Accuracy
S2 Result — Water	13549 (23235)	15705 (22480)	29254 (45715)	46.32% (50.83%)
Non-water	707 (11729)	19205177 (19252448)	19205884 (19264177)	99.99% (99.94%)
Overalls	14256 (34964)	19220882 (19274928)	19235138 (19309892)	
Producer's Accuracy	95.04% (66.45%)	99.92% (99.88%)		Overall: 99.91% (99.82%)

Complete Area (Unsupervised results are for the case of using Otsu)

# pixels	Water	Non-water	Overalls	User's Accuracy
S2 Result — Water	18979790 (20610963)	5832828 (7923528)	24812618 (28534491)	76.49% (72.23%)
Non-water	1169437 (2080181)	158779559 (162353108)	159948996 (164433289)	99.27% (98.73%)
Overalls	20149227 (22691144)	164612387 (170276636)	184761614 (192967780)	
Producer's Accuracy	94.20% (90.83%)	96.46% (95.35%)		Overall: 96.21% (94.82%)