Figure S1. The reference and modeled inundation area of the 2013, 2014, 2015, and 2016 flood events
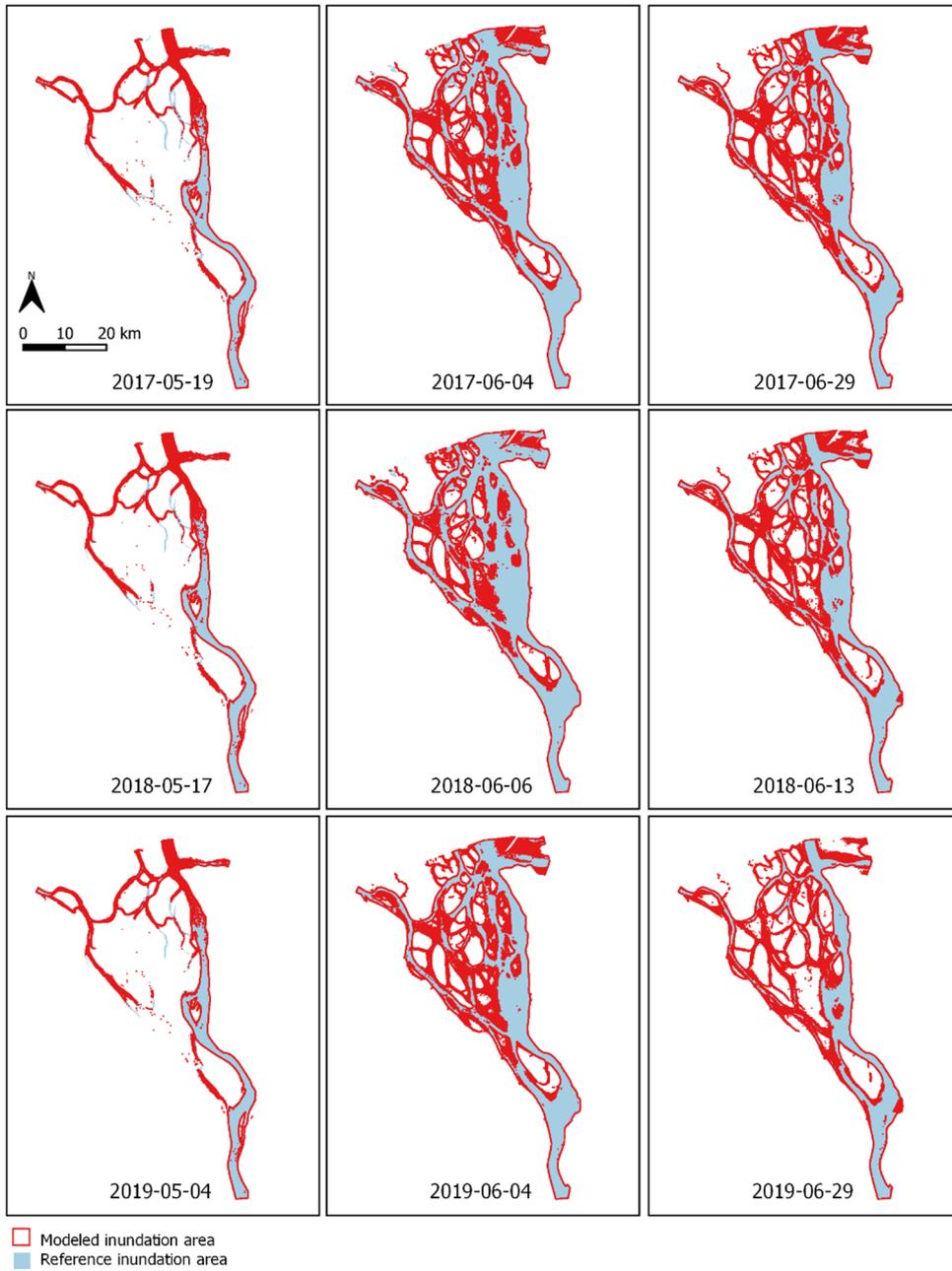
**Figure S2.** The reference and modeled inundation area of the 2017, 2018, and 2019 flood events
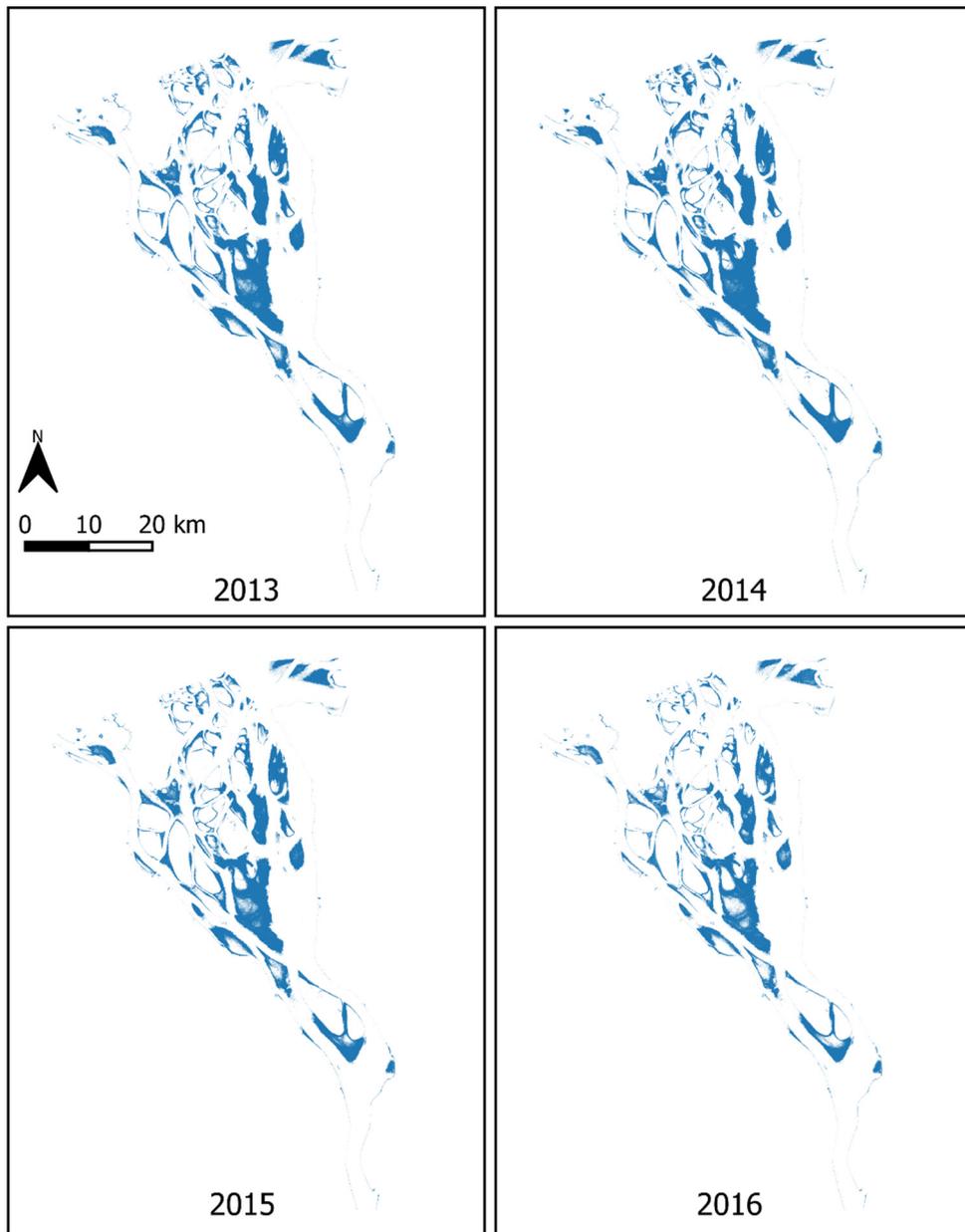
Figure S3. The modeled inundation area on the Lena delta floodplain (sans the main channel) of the 2013, 2014, 2015, and 2016 flood events
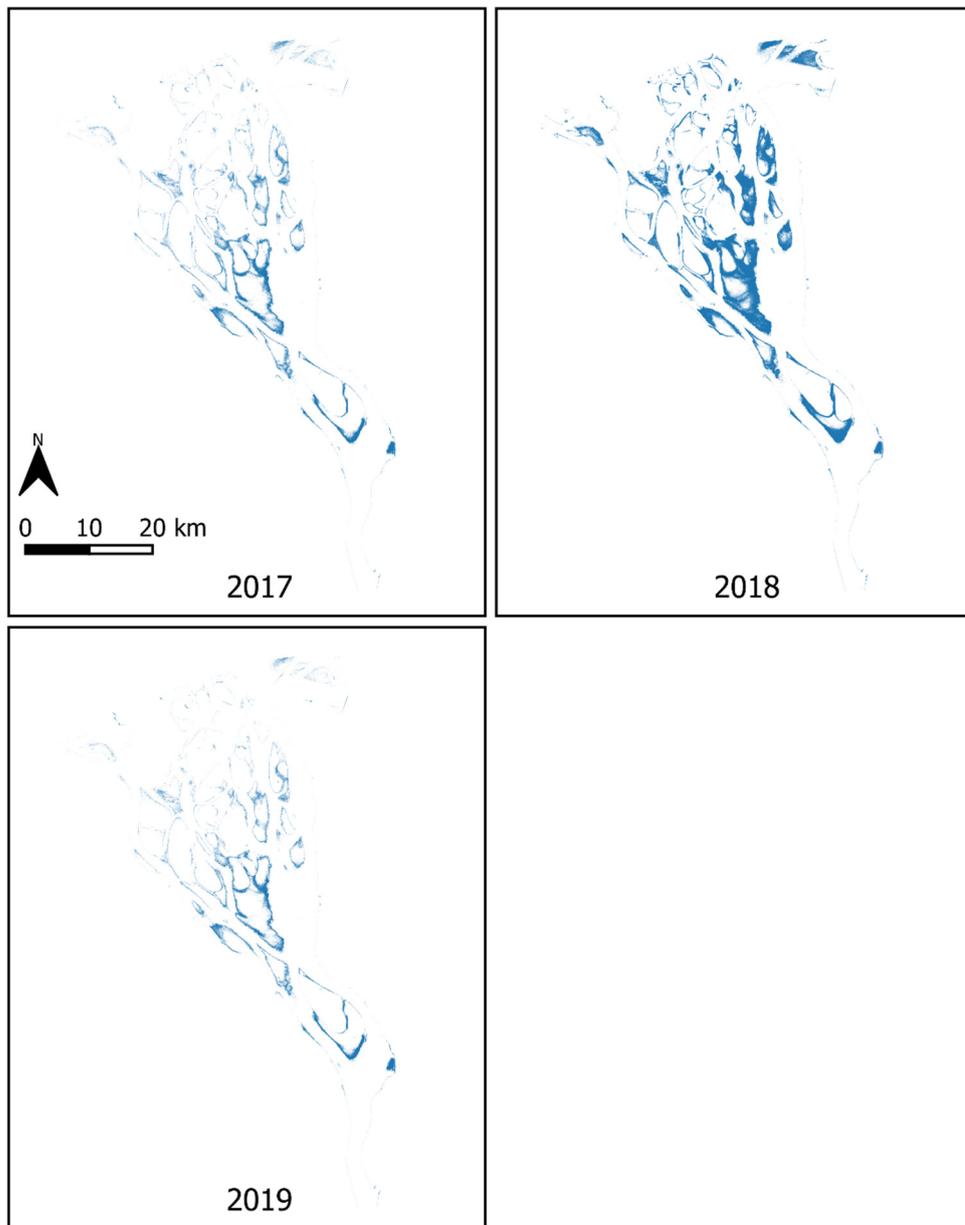
Figure S4. The modeled inundation area on the Lena delta floodplain (sans the main channel) of the 2017, 2018, and 2019 flood events
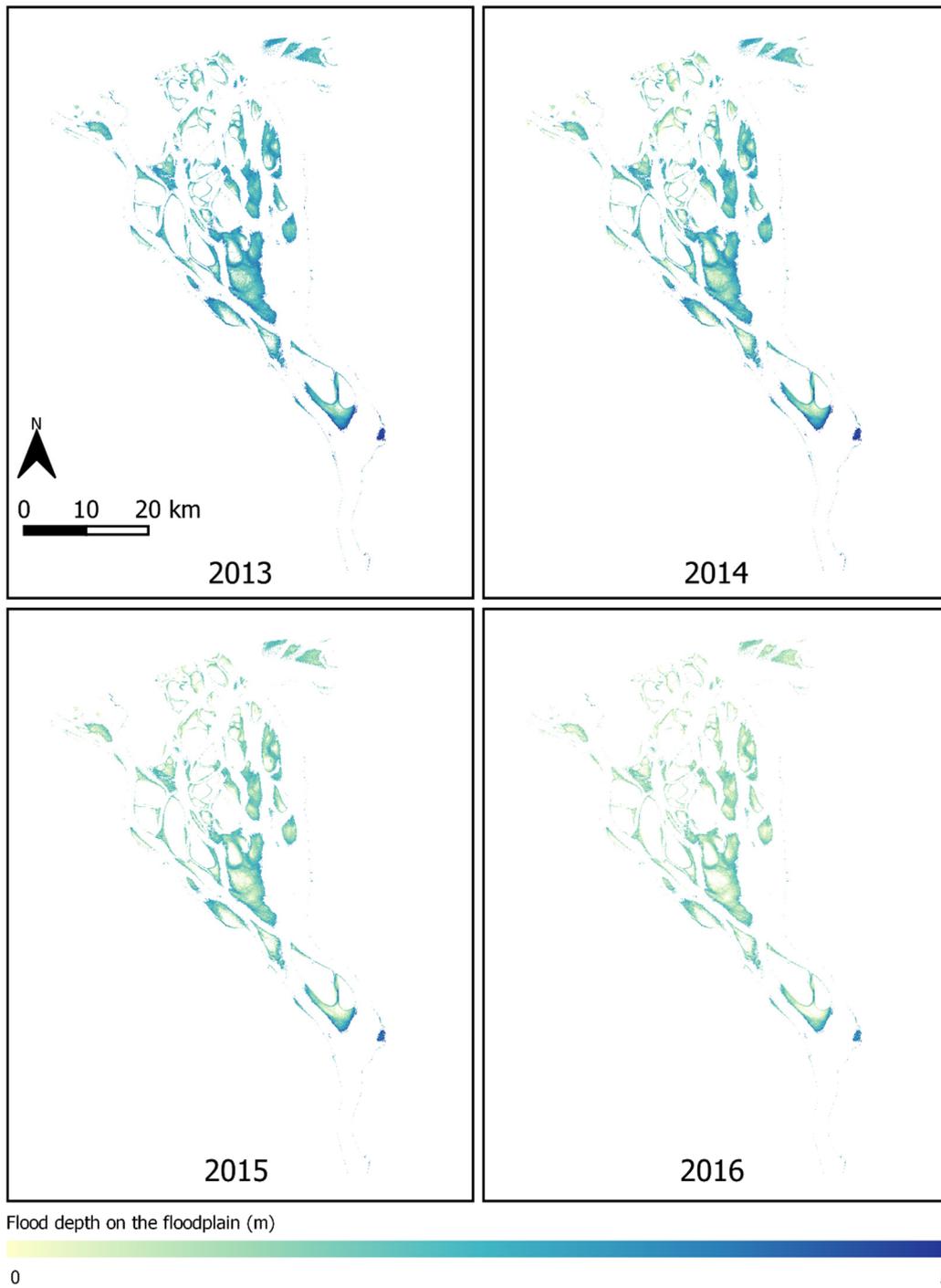
**Figure S5.** The inundation area and flood depth on the Lena delta floodplain (sans the main channel) of the 2013, 2014, 2015, and 2016 flood events
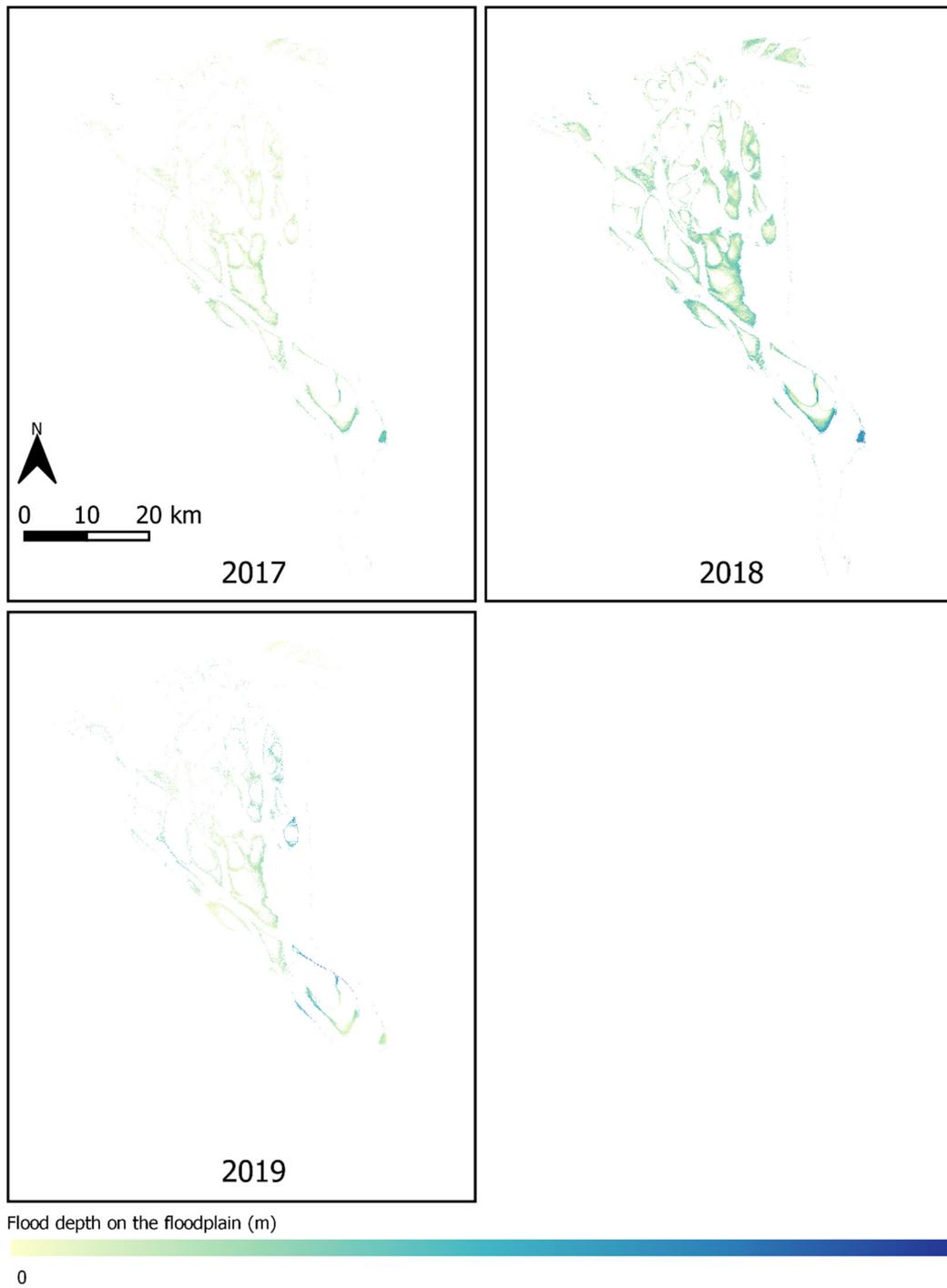
Figure S6. The inundation area and flood depth on the Lena delta floodplain (sans the main channel) of the 2017, 2018, and 2019 flood events
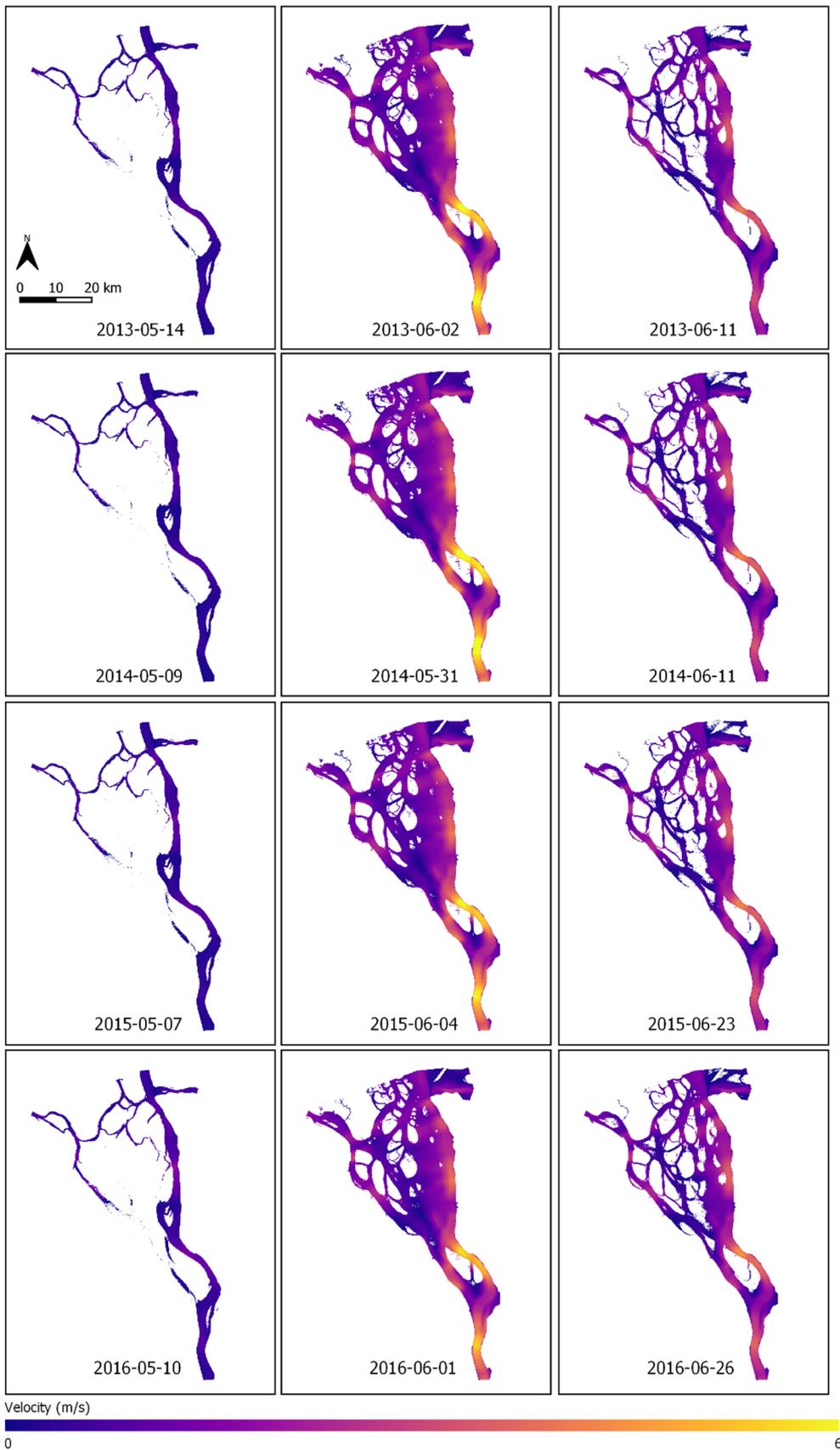
Figure S7. The inundation area and flow velocity of the 2013, 2014, 2015, and 2016 flood events
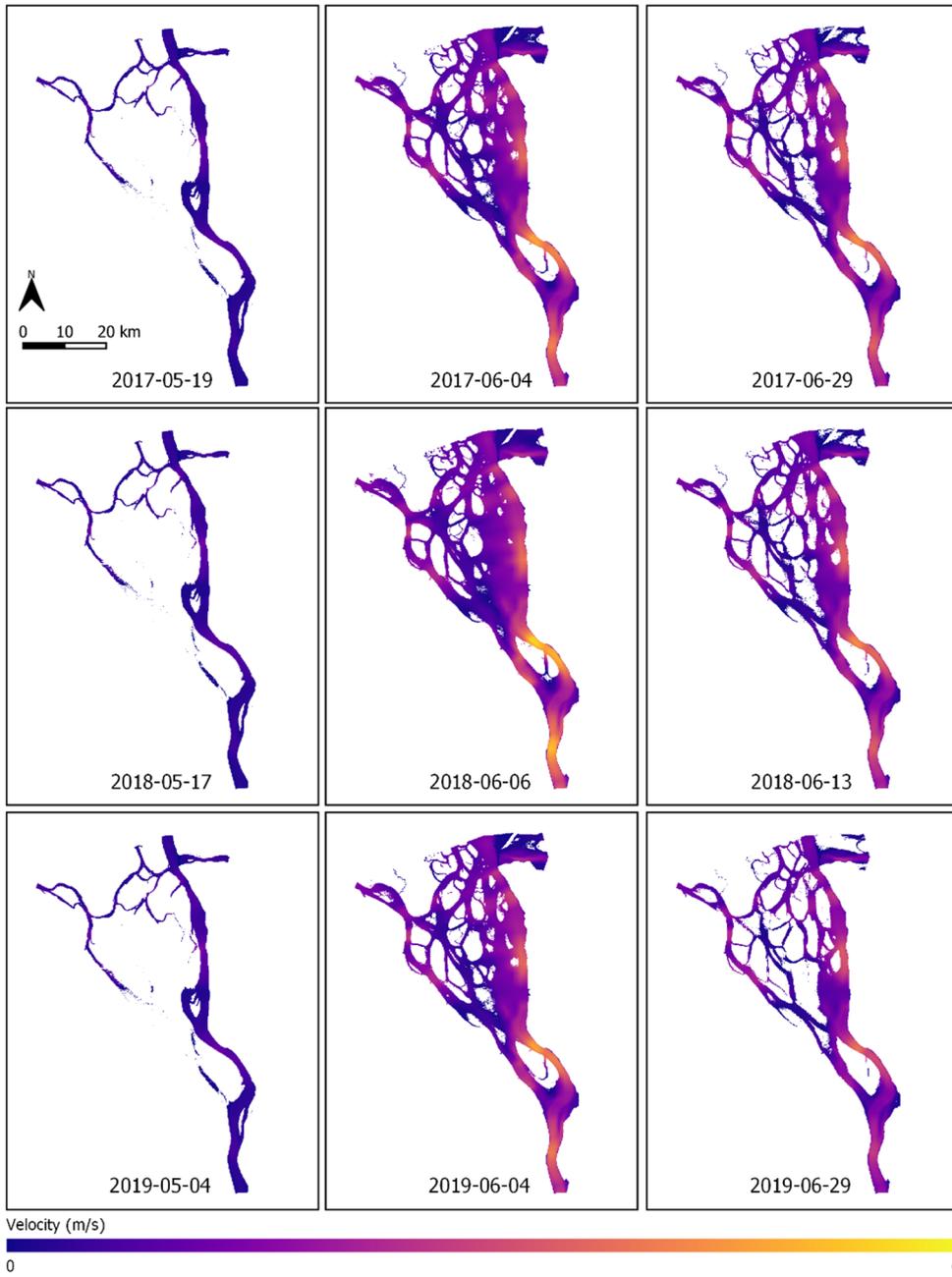
**Figure S8.** The inundation area and flow velocity of the 2017, 2018, and 2019 flood events
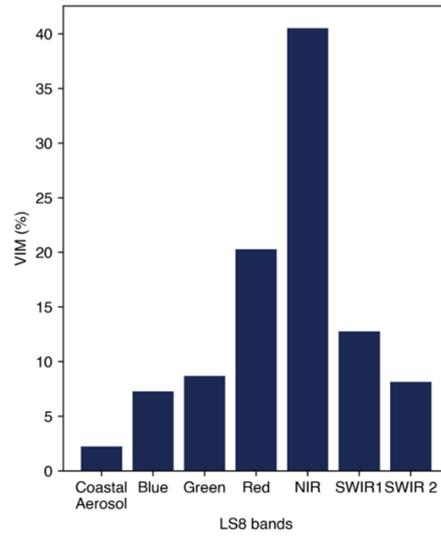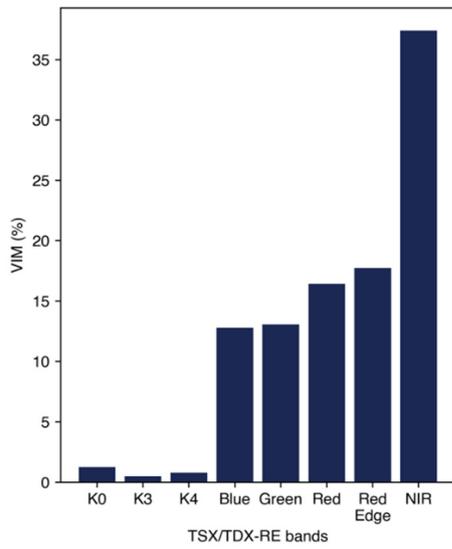
(a)

(b)

Figure S9. The Variable Importance Measures (VIM) of **(a)** the TSX/TDX-RE composite bands and **(b)** LS8 bands for the Random Forest-based land cover classification

Table S1. Flow data input

	Date (YYYY-MM-DD)	Lena upstream discharge (m³/s)	Lena downstream discharge (m³/s)	Khabarova downstream discharge (m³/s)
2013	2013-05-14	3,020	1,980	1,040
	2013-06-02	155,000	101,632	53,368
	2013-06-11	56,000	36,719	19,281
2014	2014-05-09	2,280	1,495	785
	2014-05-31	173,000	113,434	59,566
	2014-06-11	62,400	40,915	21,485
2015	2015-05-07	2,989	1,960	1,029
	2015-06-04	147,029	96,405	50,624
	2015-06-23	62,000	40,653	21,347
2016	2016-05-10	5,366	3,518	1,848
	2016-06-01	128,593	84,317	44,276
	2016-06-26	70,900	46,488	24,412
2017	2017-05-19	2,720	1,783	937
	2017-06-04	87,120	57,124	29,996
	2017-06-29	67,980	44,574	23,406
2018	2018-05-17	2,810	1,842	968
	2018-06-06	119,200	78,158	41,042
	2018-06-13	65,870	43,190	22,680
2019	2019-05-04	3,420	2,242	1,178
	2019-06-04	83,000	54,422	28,578
	2019-06-29	46,200	30,293	15,907

Table S2. The inundation areas

Flood event		Inundation area (km²)
	Before the flood	312.67
2013	The flood peak	1095.09
	After the flood	679.80
	Before the flood	300.71
2014	The flood peak	1118.71
	After the flood	726.73
	Before the flood	312.20
2015	The flood peak	1082.70
	After the flood	723.87
	Before the flood	333.86
2016	The flood peak	1047.41
	After the flood	785.40
	Before the flood	308.20
2017	The flood peak	891.70
	After the flood	765.69
	Before the flood	309.54
2018	The flood peak	1023.82
	After the flood	751.21
	Before the flood	317.93
2019	The flood peak	866.80
	After the flood	604.94

Table S3. The range of depth during the annual flood peaks on the floodplains

Flood event	Flood depth (m)	
	Min	Max
2013	0	4.46
2014	0	5.12
2015	0	4.17
2016	0	3.49
2017	0	2.12
2018	0	3.14
2019	0	1.89

Table S4. The range of flow velocity

Flood event		Velocity (m/s)		
		Min	Max	Mean
2013	Before the flood	0	1.49	0.46
	The flood peak	0	5.66	1.61
	After the flood	0	3.85	1.31
2014	Before the flood	0	1.34	0.41
	The flood peak	0	6.13	1.67
	After the flood	0	3.96	1.34
2015	Before the flood	0	1.49	0.47
	The flood peak	0	5.51	1.58
	After the flood	0	3.95	1.33
2016	Before the flood	0	1.90	0.59
	The flood peak	0	5.16	1.52
	After the flood	0	4.12	1.36
2017	Before the flood	0	1.43	0.44
	The flood peak	0	4.38	1.39
	After the flood	0	4.08	1.35
2018	Before the flood	0	1.45	0.45
	The flood peak	0	4.97	1.49
	After the flood	0	4.03	1.35
2019	Before the flood	0	1.57	0.49
	The flood peak	0	4.31	1.38
	After the flood	0	3.67	1.27

Table S5. Kappa coefficients of all study cases

Flood event	Discharge	Kappa coefficient
2013	Low	0.79
	High	0.94
	Medium	0.76
2014	Low	0.80
	High	0.94
	Medium	0.91
2015	Low	0.95
	High	0.94
	Medium	0.82
2016	Low	0.86
	High	0.97
	Medium	0.87
2017	Low	0.78
	High	0.83
	Medium	0.86
2018	Low	0.81
	High	0.91
	Medium	0.87
2019	Low	0.83
	High	0.86
	Medium	0.88