Geografia Fisica e Dinamica Quaternaria
GFDQ 49 (2026), 227-244, suppl. mat. 1-15

DOI 10.4454/j3c5gh52

Qutbudin ISHANCH[1*], Sharon PITTAU[2], Giovanni MONEGATO[3], Vittoria SCORPIO[2], Kanchan MISHRA[1], Tobias LAUER[1], Christiane ZARFL[1], Kathryn E. FITZSIMMONS[4]

Sedimentary characteristics of fluvial deposits from the Serio River, northern Italy: implications for recent channel evolution

SUPPLEMENTARY MATERIAL

Table S1 - A brief descriptions of source rock samples and analytical approach.

a) Source Rock samples brief descriptions as well as analytical procedures applied to each

Sample location	Sample ID	Sample description	Latitude (Degree)	Longitude (Degree)	Elevation (m)	Sample type	analysis
Serio River							
Source Rock	RT.1	Hand sample	9.94	45.99	709	Metamorphic (Schist)	XRF, Thin section
	RT.2		9.90	45.98	1188	Sandstone	XRF, Thin section
	RT.3		9.91	45.97	916		XRF, Thin section
	RT.4		9.91	45.96	992		XRF, Thin section
	RT.5		9.92	45.94	602	Dolostone	Thin section
	RT.6		9.88	45.87	656		Thin section
	RT.7		9.84	45.81	794		Thin section
	RT.8		9.84	45.82	791	Limestone	XRF, Thin section
	RT.9		9.842	45.81	557		XRF, Thin section
	RT.10		9.784	45.73	415		Thin section
	RT.11		9.74	45.72	358		XRF, Thin section

[1] *Department of Geosciences, Eberhard Karls University of Tübingen, Schnarrenbergstraße 94-96, 72076 Tübingen, Germany.*
[2] *Department of Chemical and Geological Sciences, University of Modena and Reggio Emilia, via Campi 103, 41125 Modena, Italy.*
[3] *CNR-GEO, Corso Stati Uniti 4, 35127 Padova, Italy.*
[4] *School of Earth, Atmosphere and Environment, Monash University, 9 Rainforest Walk, Clayton VIC 3800, Australia.*
* *Corresponding author: Qutbudin Ishanch (qutbudin.ishanch@sedgeo.uni-tuebingen.de)*

Table S2 - Summary of sediment grain-size characteristics for channel deposits in the Serio River.

Sample Name	Mean [μm]	Median (M) [μm]	Mode [μm]	Sorting Description	Skewness Description	Kurtosis Description	Sand Proportions [%]	Silt Proportions [%]	Clay Proportions [%]
CB.1	149	225	543	Very poorly sorted	Fine skewed	Mesokurtic	76	23	2
CB.2	62	81	352	Very poorly sorted	Fine skewed	Platykurtic	56	40	4
CB.3	91	109	543	Very poorly sorted	Fine skewed	Platykurtic	61	36	3
CB.4	57	77	148	Very poorly sorted	Fine skewed	Mesokurtic	58	39	3
CB.5	102	176	296	Very poorly sorted	Fine skewed	Mesokurtic	72	26	2
CB.6	54	69	136	Very poorly sorted	Fine skewed	Mesokurtic	56	40	4
CB.7	67	88	296	Very poorly sorted	Fine skewed	Mesokurtic	58	38	4
CB.8	63	101	176	Very poorly sorted	Fine skewed	Mesokurtic	62	34	4
CB.9	57	70	96	Poorly sorted	Fine skewed	Leptokurtic	58	39	3
CB.10	81	130	228	Very poorly sorted	Fine skewed	Mesokurtic	67	30	3
CB.11	64	86	323	Very poorly sorted	Fine skewed	Platykurtic	57	39	4
CB.12	54	68	105	Poorly sorted	Fine skewed	Leptokurtic	56	41	3
CB.13	47	53	62	Poorly sorted	Fine skewed	Leptokurtic	45	53	2
CB.14	161	266	384	Very poorly sorted	Very fine skewed	Leptokurtic	79	19	2
CB.15	47	57	62	Very poorly sorted	Fine skewed	Mesokurtic	49	47	4
CB.16	59	79	323	Very poorly sorted	Fine skewed	Mesokurtic	57	39	5
CB.17	65	101	323	Very poorly sorted	Fine skewed	Platykurtic	58	38	5
CB.18	53	65	192	Very poorly sorted	Fine skewed	Mesokurtic	53	43	4
CI.1	27	33	52	Very poorly sorted	Fine skewed	Mesokurtic	33	61	6
CI.2	30	38	52	Poorly sorted	Very fine skewed	Leptokurtic	27	69	4
C.IP.1	34	42	62	Poorly sorted	Fine skewed	Mesokurtic	35	61	4
C.IP.2	49	59	296	Very poorly sorted	Fine skewed	Platykurtic	50	45	5
C.IP.3	32	39	57	Very poorly sorted	Fine skewed	Mesokurtic	35	59	6
CT.1	33	39	52	Poorly sorted	Fine skewed	Mesokurtic	33	64	3
CT.2	32	40	52	Poorly sorted	Fine skewed	Mesokurtic	32	65	4
CT.3	33	38	57	Poorly sorted	Fine skewed	Mesokurtic	30	68	3
S.P1.1	6	6	5	Very poorly sorted	Symmetrical	Platykurtic	6	69	25
S.P1.2	7	7	4	Very poorly sorted	Symmetrical	Platykurtic	8	69	23
S.P1.3	24	28	44	Poorly sorted	Fine skewed	Mesokurtic	23	71	6
S.P1.4	24	29	57	Poorly sorted	Fine skewed	Mesokurtic	24	70	6
S.P1.5	47	63	148	Very poorly sorted	Fine skewed	Mesokurtic	52	42	6
S.P2.1	34	40	68	Very poorly sorted	Fine skewed	Mesokurtic	38	57	5
S.P2.2	40	53	81	Very poorly sorted	Fine skewed	Mesokurtic	47	47	6
S.P2.3	131	371	543	Very poorly sorted	Fine skewed	Mesokurtic	70	25	6
S.P2.4	43	59	271	Very poorly sorted	Fine skewed	Platykurtic	50	42	8
S.P3.1	13	13	14	Poorly sorted	Symmetrical	Platykurtic	11	79	10
S.P3.2	14	16	34	Poorly sorted	Fine skewed	Mesokurtic	8	82	9
S.P3.3	12	12	17	Poorly sorted	Symmetrical	Mesokurtic	8	81	11
S.P3.4	42	60	114	Poorly sorted	Fine skewed	Mesokurtic	51	45	4
S.P3.5	44	60	136	Very poorly sorted	Fine skewed	Mesokurtic	51	45	4
S.P3.6	38	45	52	Very poorly sorted	Fine skewed	Platykurtic	43	51	6
S.P4.1	40	49	62	Poorly sorted	Fine skewed	Leptokurtic	40	57	3
S.P4.2	45	53	352	Very poorly sorted	Symmetrical	Platykurtic	48	44	7

Table S3 - Major elements concentration for each sample.

	Major elements								
Sample ID	SiO2	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	LOI
	g/100g	g/100g	g/100g	g/100g	g/100g	g/100g	g/100g	g/100g	g/100g
CB.1	61.6	16.9	5.6	2.0	1.3	1.9	4.6	0.6	4.7
CB.2	60.3	16.1	5.5	2.0	3.1	1.6	4.3	0.5	6.0
CB.3	60.4	17.0	6.0	1.9	1.8	2.1	4.5	0.6	4.9
CB.4	34.6	9.0	3.4	6.4	19.5	0.8	2.2	0.4	24.3
CB.7	41.4	8.4	2.8	3.5	20.2	1.0	2.0	0.3	21.0
CB.9	37.7	9.0	3.2	5.5	19.6	1.0	2.1	0.3	22.4
CB.12	37.7	8.8	3.2	6.1	18.3	0.9	2.0	0.4	23.2
CB.14	36.0	8.4	3.1	5.9	17.8	0.8	1.9	0.4	26.1
CB.15	38.2	8.5	3.1	4.7	20.0	0.9	1.9	0.3	23.3
CB.17	43.9	8.9	3.1	3.2	18.8	1.0	2.0	0.3	19.6
CI.1	38.0	9.0	3.3	5.4	17.3	0.8	2.0	0.4	24.6
CI.2	33.3	8.1	3.0	7.6	19.6	0.8	1.8	0.3	26.3
C.IP.1	36.1	8.8	3.5	5.8	17.9	0.8	1.8	0.4	25.3
C.IP.2	39.8	7.0	2.5	2.3	24.0	0.9	1.5	0.3	22.4
C.IP.3	35.7	8.9	3.3	5.9	18.6	0.8	1.9	0.4	25.2
CT.1	34.8	7.4	3.2	4.6	17.0	0.7	1.5	0.4	30.5
CT.2	36.0	8.9	4.6	3.7	12.7	0.7	1.6	0.6	30.9
CT.3	36.1	6.9	4.1	5.1	19.0	0.8	1.3	0.5	25.9
RT.1	67.2	18.3	3.5	0.5	0.1	0.3	5.2	0.9	3.6
RT.3	73.2	13.9	4.7	0.5	0.1	1.5	3.0	0.4	2.4
RT.5	0.1	0.1	0.0	1.2	55.7	0.0	0.0	0.0	42.4
RT.6	0.9	0.3	0.2	2.8	53.0	0.0	0.1	0.0	43.2
RT.9	20.2	6.8	5.6	0.9	35.3	0.3	0.9	0.3	30.6
RT.11	23.9	3.8	1.6	0.5	38.8	0.0	0.7	0.2	32.0
S.P1.1	55.1	19.4	7.4	1.4	0.7	0.4	2.9	0.6	12.1
S.P1.2	56.0	19.0	7.4	1.5	0.9	0.3	2.8	0.6	11.6
S.P1.3	38.2	8.8	4.0	5.3	17.2	0.7	1.6	0.5	23.7
S.P1.4	36.2	8.4	4.0	4.9	19.0	0.7	1.5	0.5	24.3
S.P1.5	28.7	5.9	2.2	4.9	28.4	0.6	1.3	0.2	28.2
S.P2.1	33.6	7.2	3.2	4.9	22.4	0.7	1.4	0.4	26.2
S.P2.2	36.6	5.9	2.2	3.4	25.9	0.7	1.3	0.2	24.3
S.P2.3	34.5	5.1	1.7	2.1	30.0	0.7	1.2	0.2	25.5
S.P2.4	36.9	7.1	2.4	3.4	25.0	0.8	1.6	0.2	23.8
S.P3.1	43.7	12.4	4.8	5.6	10.3	0.8	2.3	0.5	20.0
S.P3.2	40.8	11.4	4.5	5.3	14.6	0.7	2.0	0.5	20.9
S.P3.3	41.6	12.4	4.9	5.0	13.2	0.7	2.4	0.5	19.9
S.P3.4	39.1	9.4	3.4	5.9	17.5	0.9	2.1	0.4	21.9
S.P3.5	41.0	9.6	3.5	5.3	17.1	0.9	2.2	0.4	20.5
S.P3.6	43.6	8.2	3.1	5.7	16.9	1.0	1.8	0.3	20.2
S.P4.1	34.5	8.6	3.3	6.8	18.5	0.8	1.8	0.4	25.3
S.P4.2	41.5	7.7	2.9	3.0	21.5	0.9	1.7	0.3	21.4

Table S4 - Trace elements concentration for each sample.

Sample ID	Trace elements											
	Sc	Cr	Zn	Ga	Rb	Sr	Zr	Nb	Cs	Ba	Pb	Th
	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g
CB.1	16.6	56.1	101.1	22.4	219.7	80.5	175.9	14.6	33.8	553.3	25.9	13.5
CB.2	16.0	57.9	92.1	21.3	206.4	110.2	169.3	14.1	28.5	517.5	23.5	13.1
CB.3	14.7	58.4	87.0	22.0	215.0	88.3	190.3	14.6	32.5	589.2	21.8	16.0
CB.4	12.5	49.5	458.3	10.1	99.0	202.4	115.2	7.1	19.7	295.6	90.1	8.3
CB.7	13.0	67.0	296.0	10.0	91.0	229.0	110.0	8.0	12.0	278.0	43.0	8.0
CB.9	13.3	49.7	419.3	10.1	95.4	201.4	124.9	7.7	12.4	293.4	63.4	8.0
CB.12	12.5	58.9	490.6	10.0	94.5	190.7	117.8	7.5	12.5	275.5	74.6	6.5
CB.14	10.2	71.7	527.9	7.8	83.2	191.3	129.4	7.5	13.4	294.2	86.5	8.8
CB.15	11.2	55.2	650.5	8.9	83.3	221.2	124.6	7.6	12.7	278.6	118.3	8.1
CB.17	11.2	41.9	157.6	10.5	87.9	222.6	121.6	7.0	9.6	257.3	36.2	7.0
CI.1	11.2	62.6	504.7	8.9	90.3	203.9	126.2	8.6	12.8	309.0	80.6	7.2
CI.2	10.5	56.0	386.9	8.5	79.4	164.8	128.6	7.6	7.8	269.4	66.3	6.1
C.IP.1	12.8	67.4	1538.1	5.6	83.9	185.0	140.7	8.5	11.6	320.8	268.6	8.4
C.IP.2	12.2	39.3	339.3	8.2	68.3	322.1	104.7	5.7	9.9	215.5	59.2	6.0
C.IP.3	12.0	60.7	1107.3	7.9	86.1	185.6	121.4	7.6	14.1	328.8	180.9	7.4
CT.1	12.5	99.6	3729.9	0.0	66.2	175.1	120.3	7.5	8.7	295.4	591.5	6.7
CT.2	12.3	170.0	6828.0	0.0	73.7	128.2	177.0	10.0	10.4	463.0	1444.1	10.9
CT.3	11.4	117.4	8289.2	0.0	57.1	172.0	208.2	9.2	10.7	320.5	1245.2	9.1
RT.1	15.0	70.6	17.9	23.6	259.2	29.5	316.4	18.7	6.7	594.1	16.4	14.2
RT.3	16.5	43.6	89.6	17.2	166.8	50.4	114.8	8.3	19.5	542.9	11.9	8.2
RT.5	11.7	11.7	16.2	1.4	1.1	201.8	19.5	0.0	4.0	0.0	3.7	0.0
RT.6	11.2	22.8	48.5	1.4	4.2	198.4	19.6	0.8	6.3	0.0	6.8	0.0
RT.9	14.8	58.9	35.8	8.5	47.4	243.4	80.7	6.2	7.4	88.9	10.1	4.1
RT.11	14.5	41.5	37.8	4.0	29.6	626.2	49.4	2.6	8.1	143.1	8.1	1.6
S.P1.1	21.9	93.7	175.9	22.5	168.7	55.0	134.5	12.6	19.1	591.8	33.6	13.5
S.P1.2	22.7	93.9	229.5	22.9	165.1	57.3	133.3	12.7	19.8	577.3	46.1	12.8
S.P1.3	14.2	96.8	5182.4	0.0	73.6	174.7	176.4	9.5	10.5	458.8	939.0	7.6
S.P1.4	11.5	86.6	7257.4	0.0	71.4	198.2	167.5	8.2	9.6	433.8	1240.4	7.4
S.P1.5	11.9	42.8	2588.2	0.0	57.9	349.0	87.1	5.1	4.8	203.7	343.2	3.9
S.P2.1	13.6	72.6	4959.7	0.0	66.1	237.7	132.5	6.3	9.5	320.6	821.9	6.4
S.P2.2	12.3	40.3	1679.2	3.2	58.4	339.4	92.4	4.7	8.4	170.8	405.6	6.8
S.P2.3	10.6	40.6	301.8	5.1	51.4	401.2	79.7	4.2	8.1	140.0	53.5	3.9
S.P2.4	12.4	36.7	231.9	7.8	70.1	327.9	86.6	5.1	10.8	196.3	28.8	7.1
S.P3.1	14.8	66.7	180.5	15.8	110.8	126.8	162.2	11.9	18.2	348.1	78.0	9.5
S.P3.2	14.8	58.8	220.6	13.4	96.5	184.0	149.4	10.5	10.6	340.6	133.2	9.8
S.P3.3	14.5	63.2	121.9	15.0	115.4	163.7	142.5	11.4	19.1	383.4	55.2	9.6
S.P3.4	15.1	51.3	54.3	12.5	99.4	186.6	126.2	9.0	16.3	271.2	15.4	7.6
S.P3.5	13.5	47.2	54.2	11.5	104.0	185.0	115.7	7.6	9.8	253.2	11.1	8.3
S.P3.6	10.7	45.8	50.2	9.5	79.1	169.6	103.4	6.6	10.8	229.6	14.7	7.1
S.P4.1	13.0	58.0	897.8	7.8	82.9	169.8	134.7	7.5	14.6	325.1	170.8	8.4
S.P4.2	9.7	54.9	1009.4	6.4	74.9	273.2	113.5	7.1	11.0	218.4	247.7	5.3

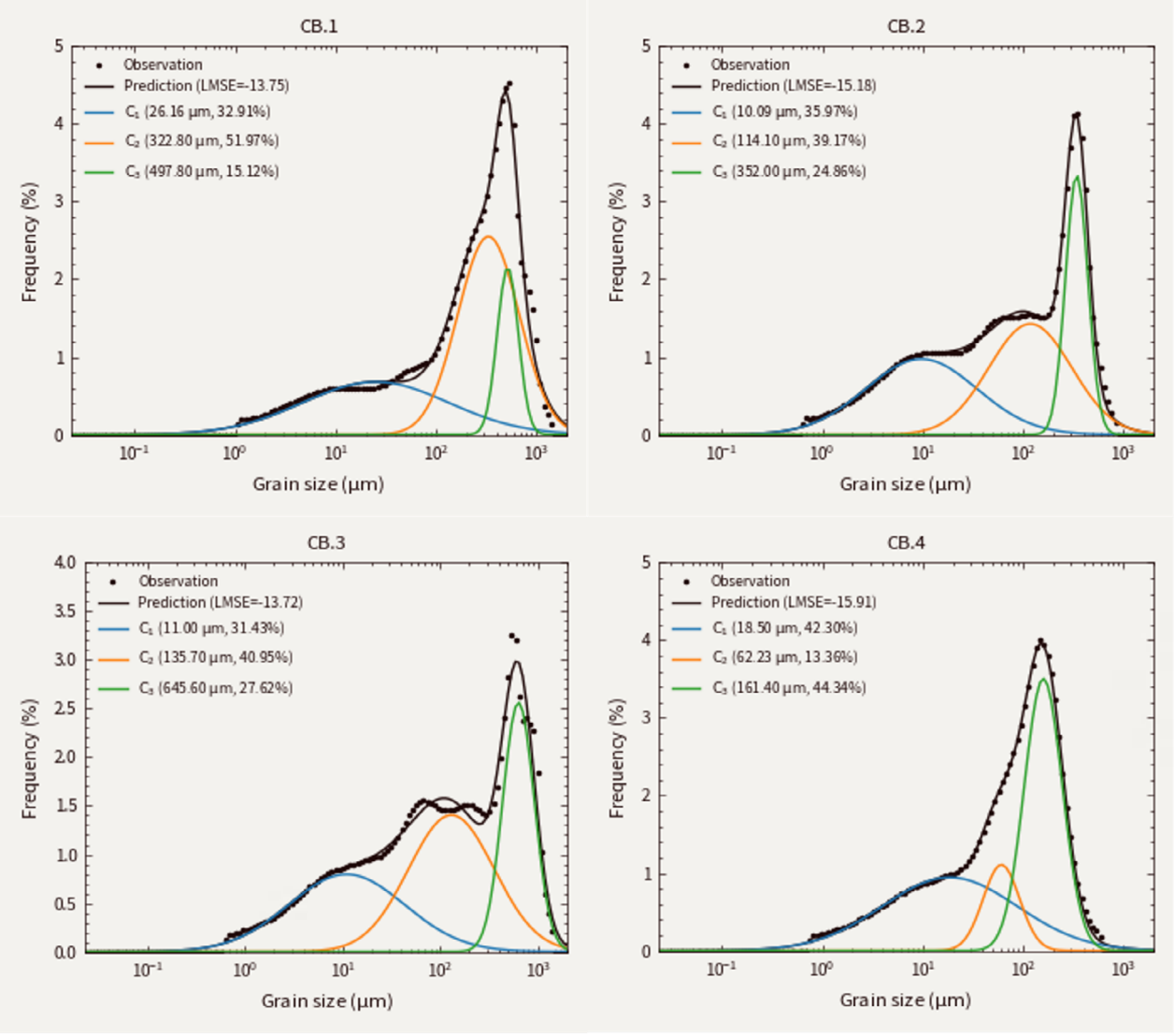


Figure S1 - Grain size distribution of the mountain catchment channel bed deposits.

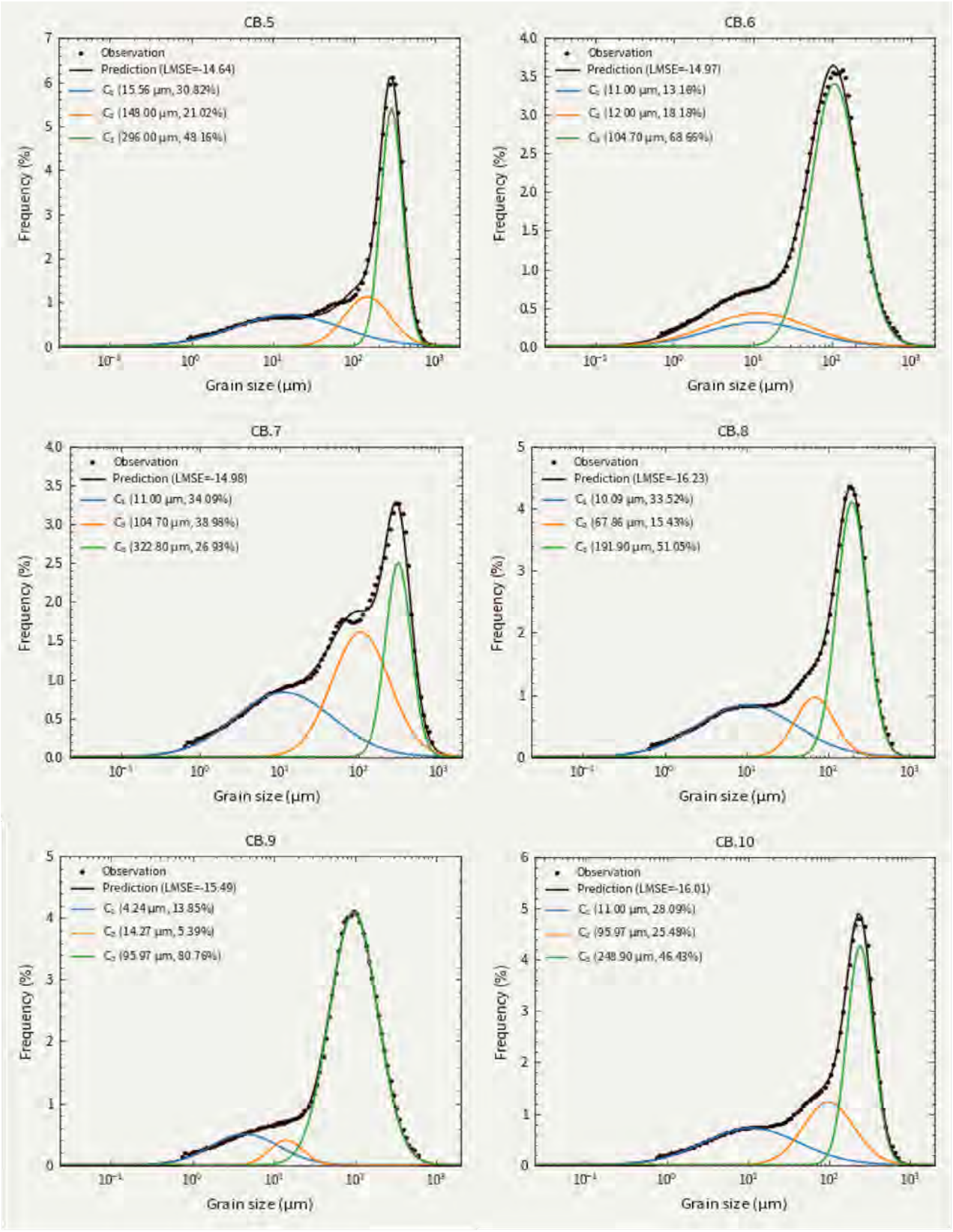


Figure S2a - Grain-size distribution of channel-bed sediments in the piedmont plain.

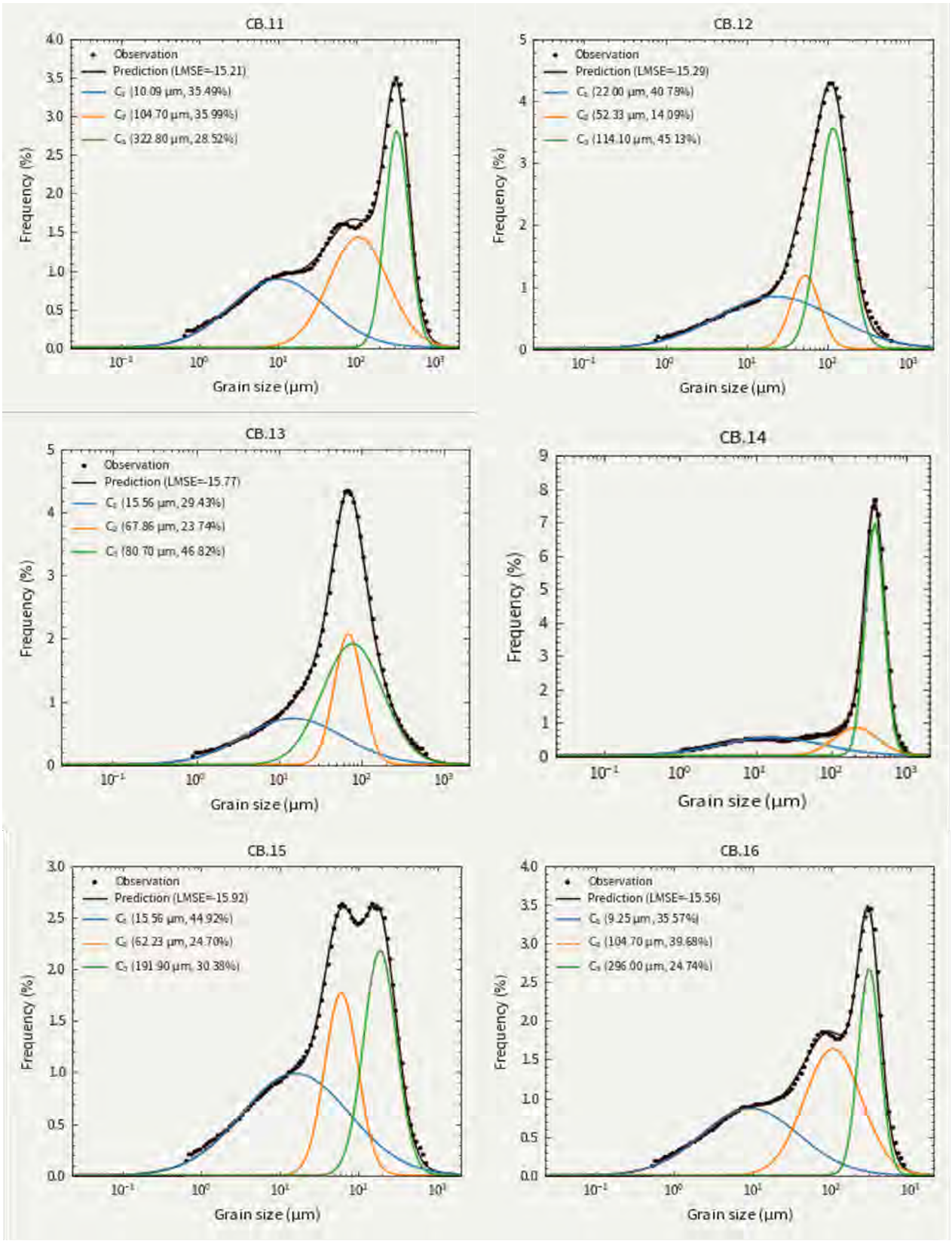


Figure S2b - Grain-size distribution of channel-bed sediments in the piedmont plain.

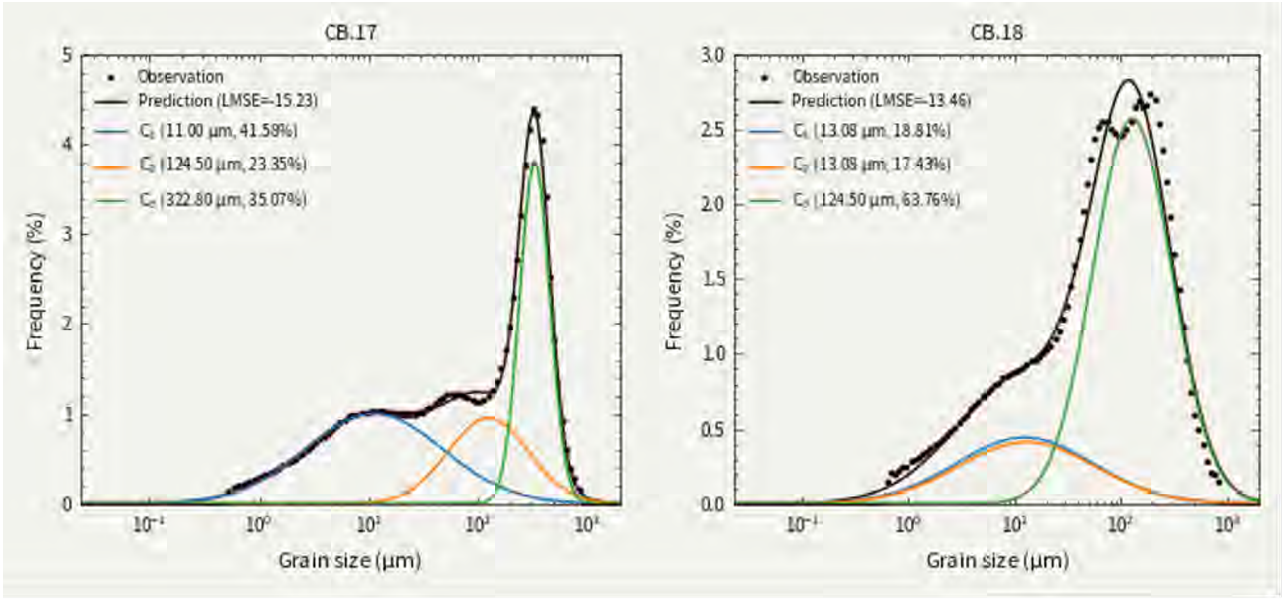


Figure S2c - Grain-size distribution of channel-bed sediments in the piedmont plain.

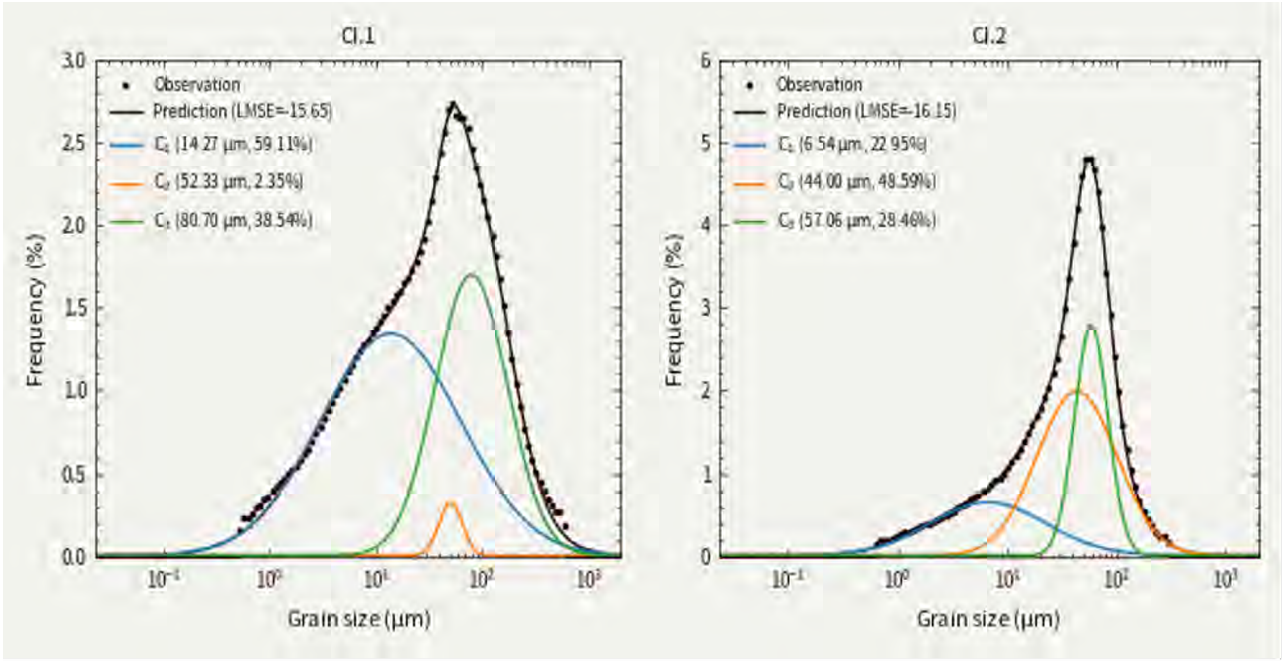


Figure S3 - Grain-size distribution of island sediments in the piedmont plain.

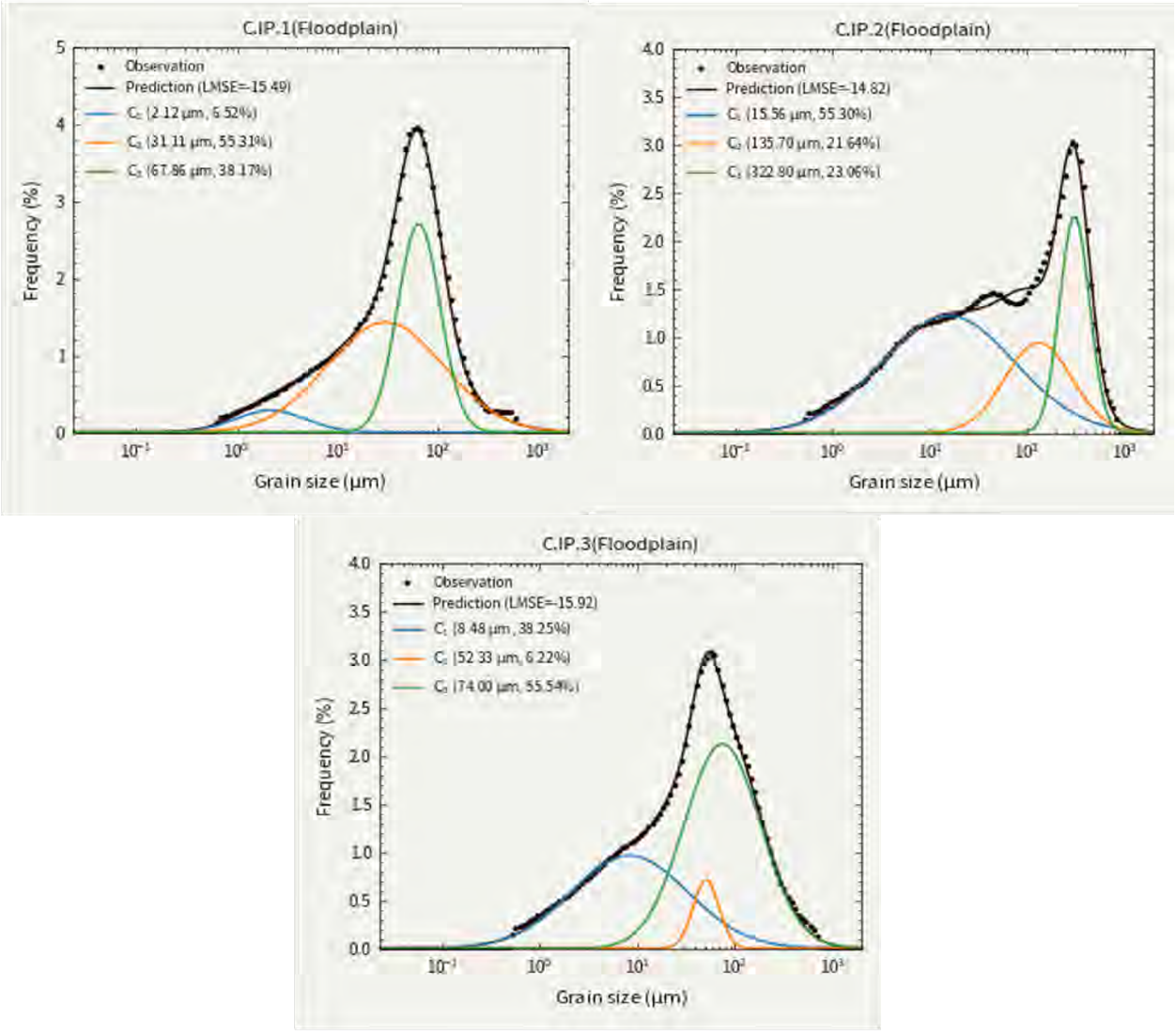


Figure S4 - Grain-size distribution of Floodplain sediments in the piedmont plain.

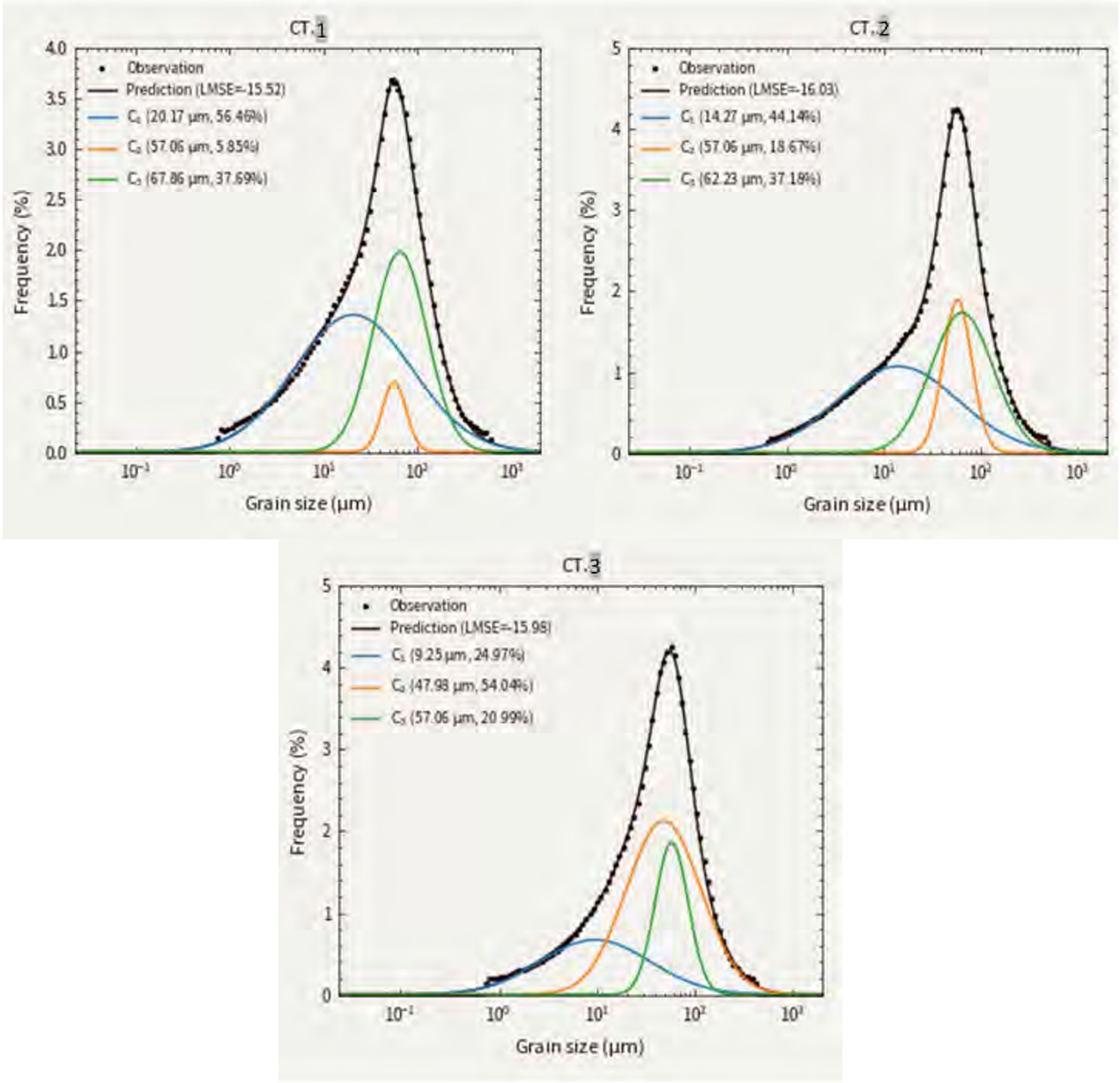


Figure S5 - Grain-size distribution of terrace sediments in the piedmont plain.

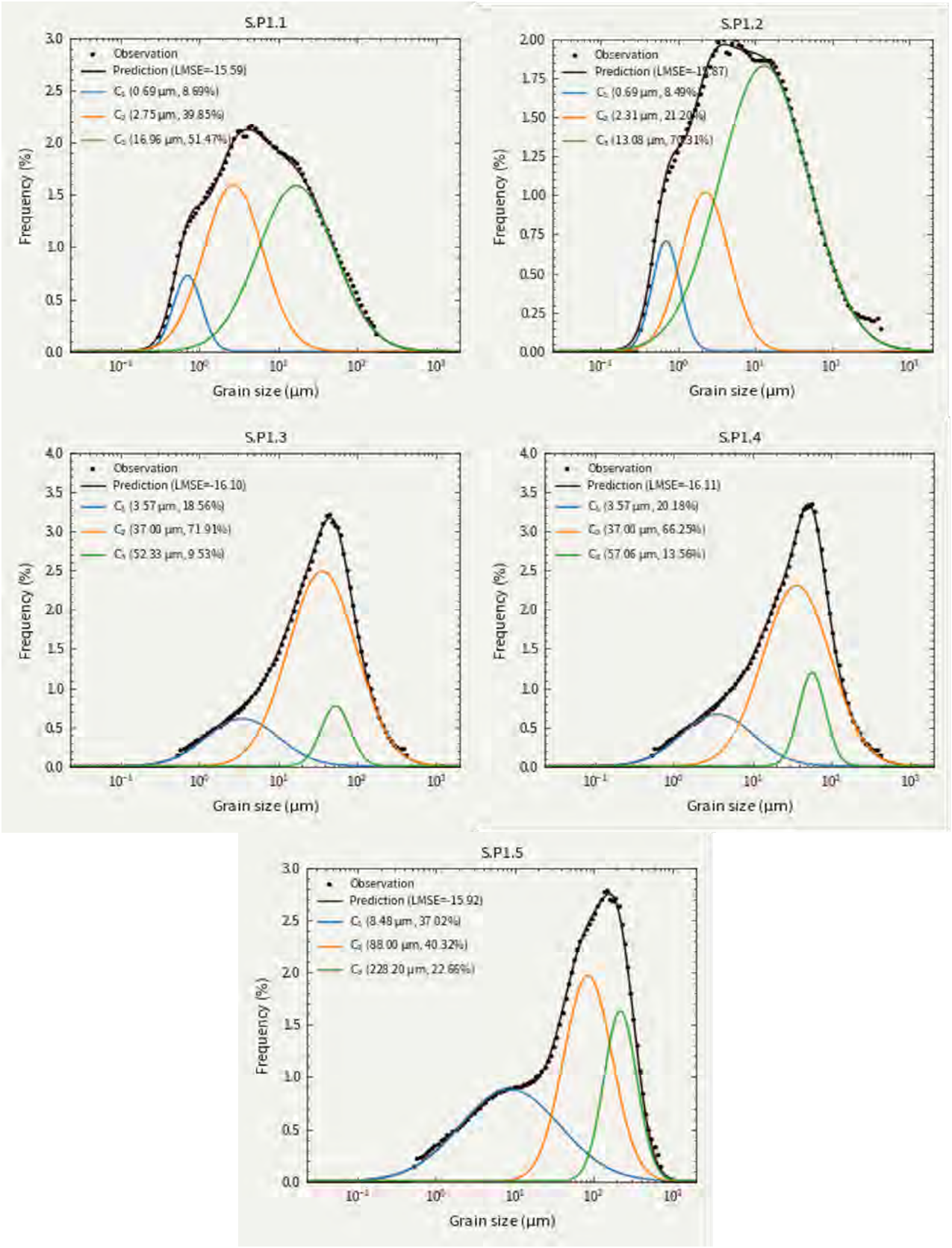


Figure S6a - Grain-size distribution of channel bank profile section sediments at Site 1.

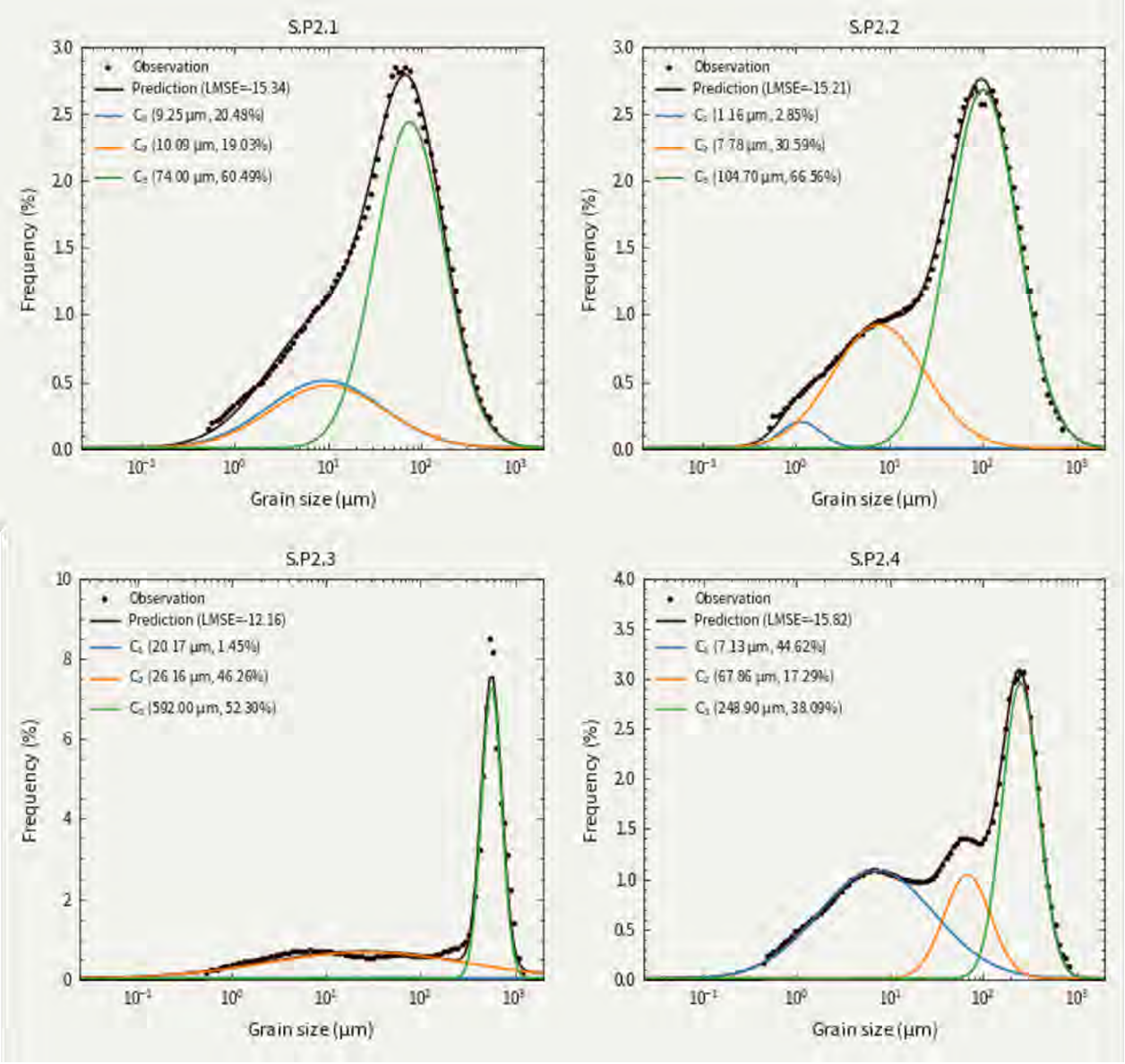


Figure S6b - Grain-size distribution of channel bank profile section sediments at Site 3.

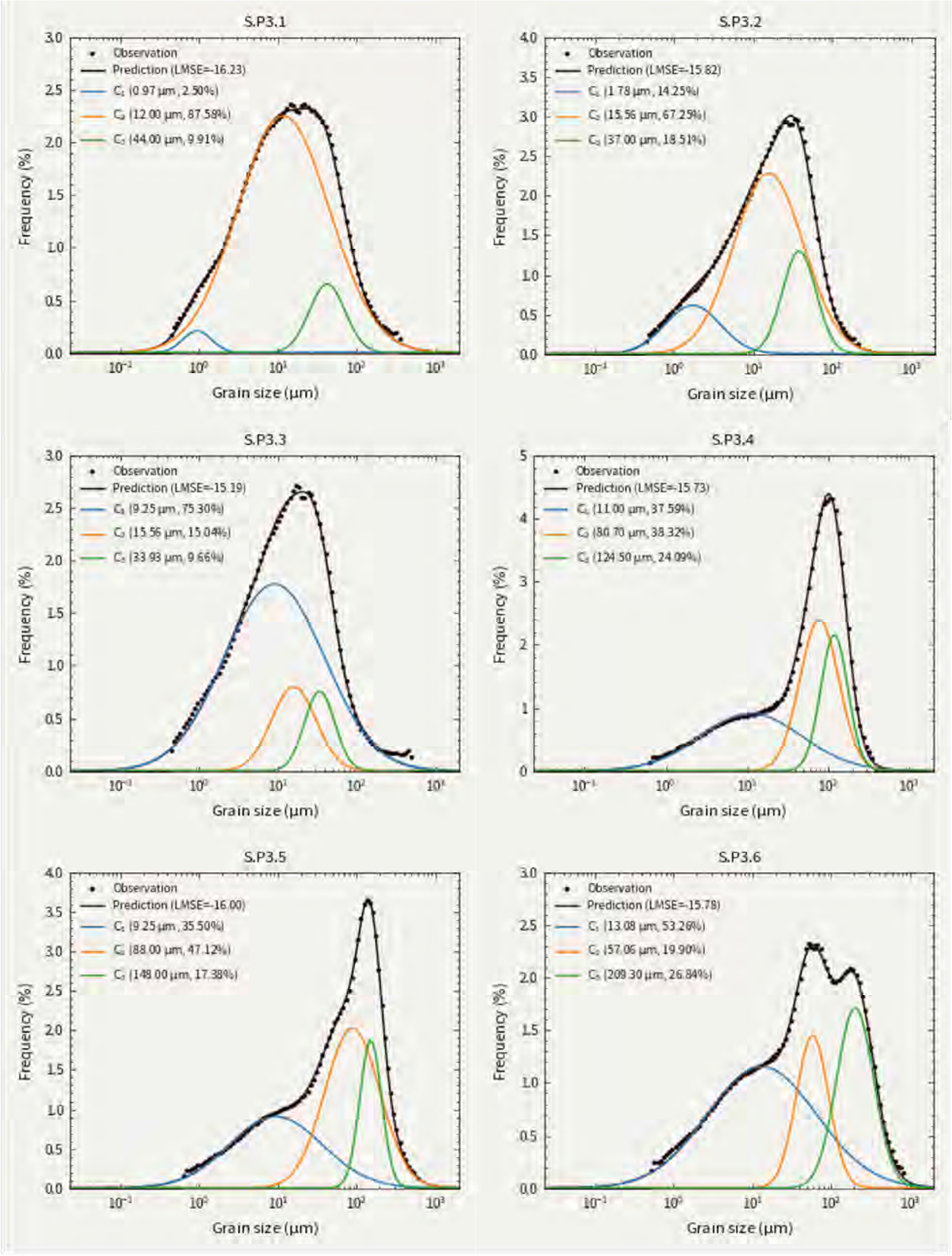


Figure S6c - Grain-size distribution of channel bank profile section sediments at Site 3.

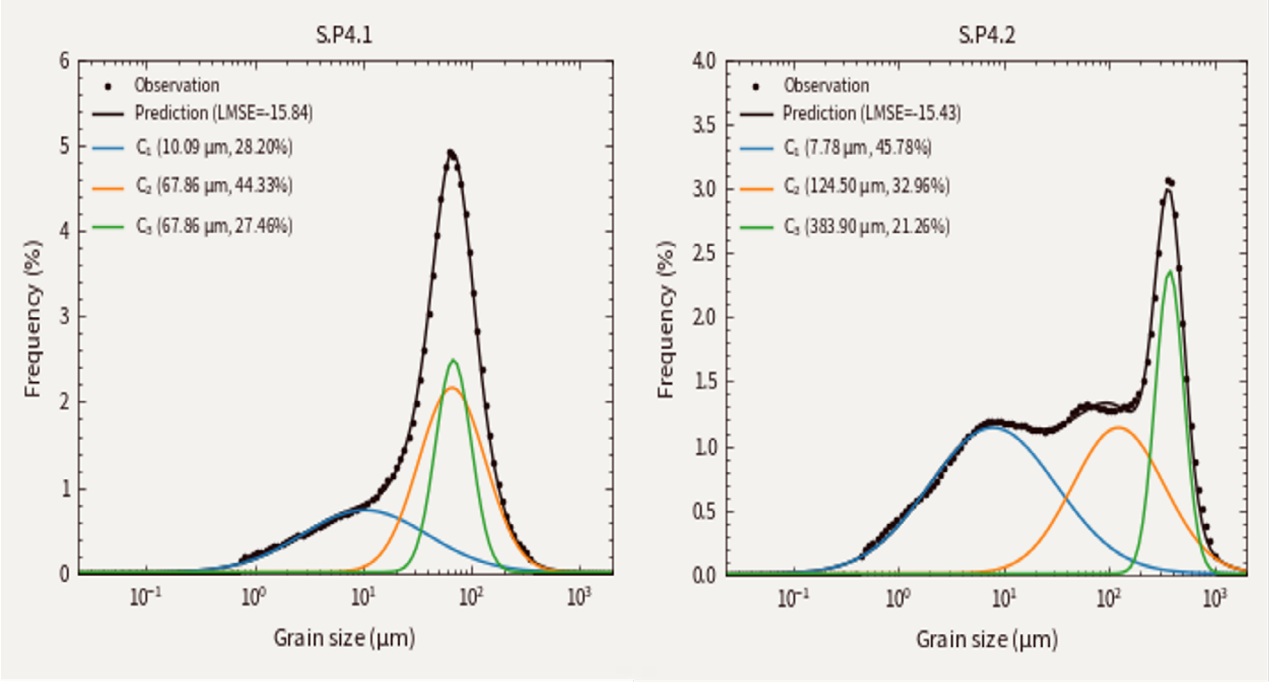


Figure S6d - Grain-size distribution of channel bank profile section sediments at Site 4.

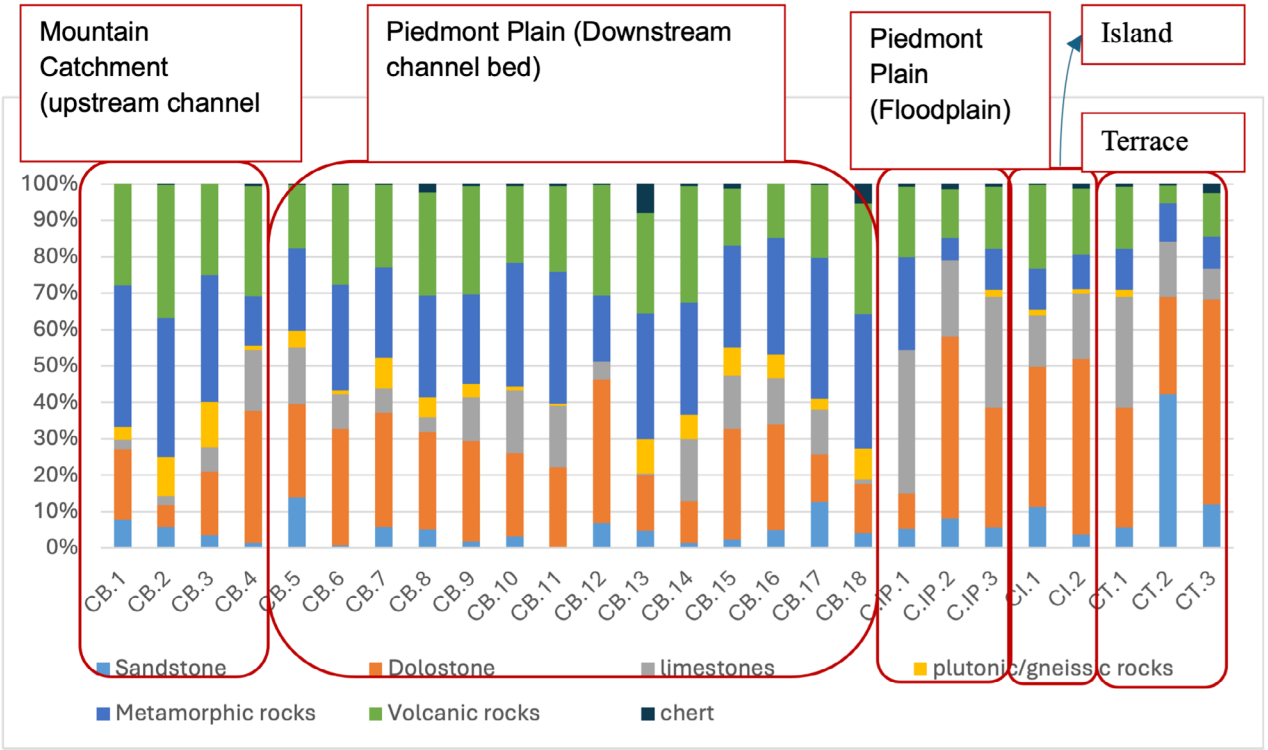


Figure S7 - Lithology percentages in the Serio river for major lithology composition.

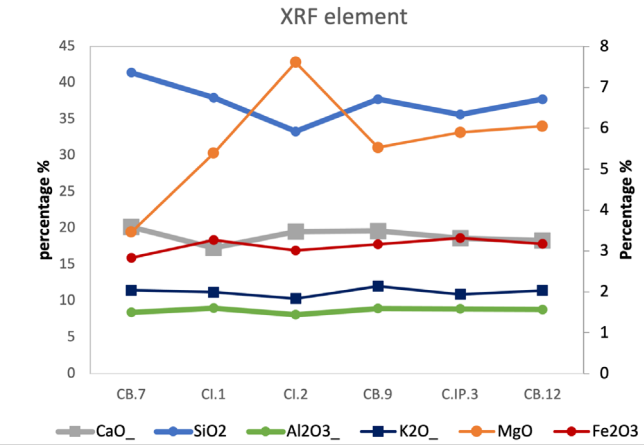


Figure S8 - Variation in major element concentrations along the Romano transects of Serio river. The right axis corresponds to the bold lines, while the left axis represents the regular lines.

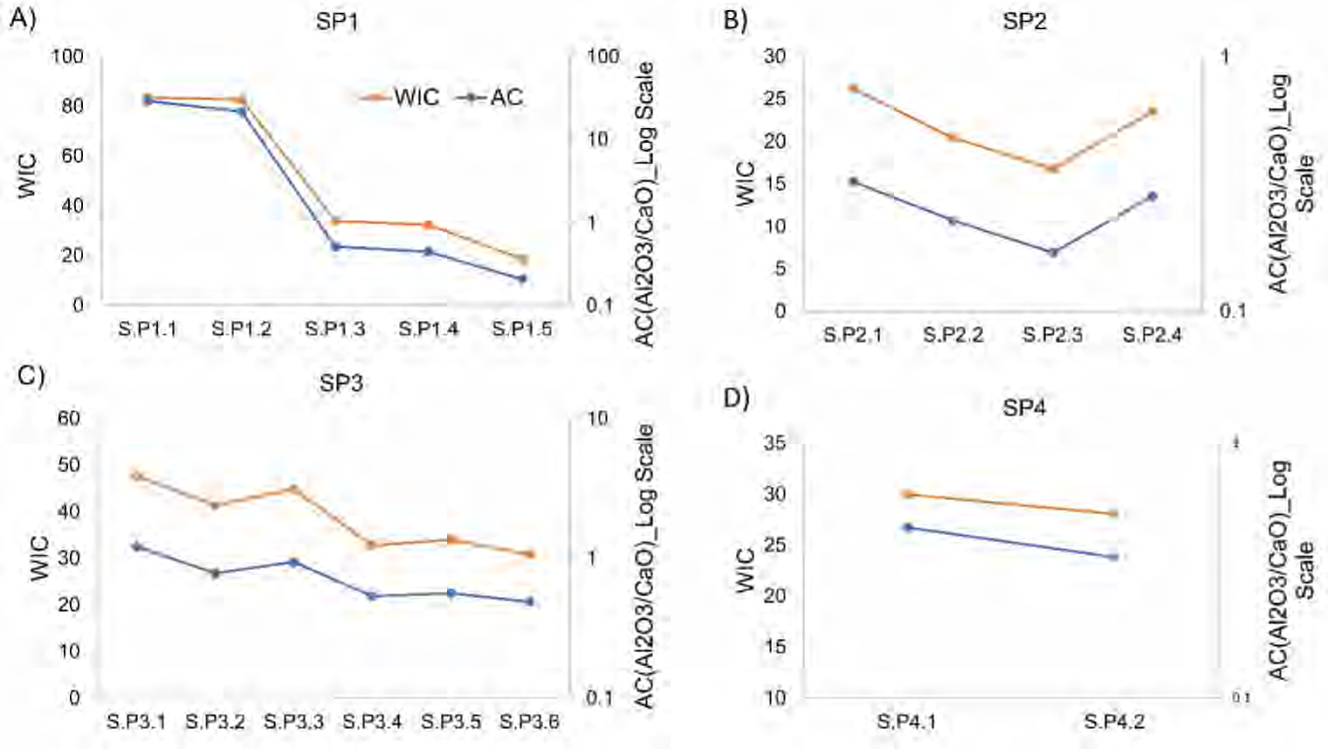


Figure S9 - Weathering intensity changes for profile sections. A) profile section SP1, B) profile section SP2, C) profile section SP3, D) profile section SP4.