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Alluvial channel response to environmental perturbations: fill-terrace formation and sediment-signal disruption

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Ctrl_1

Runtime (min)	*Height inlet (cm)*	*Height outlet (min)*	*Calculated slope (m/m)*	$O_{s,out}$ *(ml/s)*	*Runtime (min)*	*Height inlet (cm)*	*Height outlet (min)*	*Calculated slope (m/m)*	$O_{s,out}$ *(ml/s)*
Setting: Q_w = 94.6 ml/s; $Q_{s,in}$ = 1.29 ml/s									
0	35.0	13.0	0.055		400	30.5	2.0	0.071	
20				15.0	403				2.3
30	34.0	4.0	0.075		408	30.5	2.0		
32				12.5	411				1.8
48	33.5	3.0	0.076	10.0	418	30.5	2.0	0.071	
60	33.5	2.5	0.078		420	30.0	2.0	0.070	
73				14.0	426	30.0	2.0	0.070	4.3
90	33.5	3.0	0.076		435	30.0	2.0	0.070	1.7
95				4.4	448				1.6
107	33.5	2.5	0.078		450				
113				9.0	455	30.5	2.0	0.071	
117				5.0	465				2.6
120	32.5	2.5	0.075		474	30.5	2.0	0.071	2.2
125				4.9	480				
133	32.5	2.5	0.075	4.9	488	30.5	2.0	0.071	1.7
150	32.5	2.5	0.075		497	30.5	2.0	0.071	1.6
154				4.5	510	30.0	2.0	0.070	
160	32.0	2.5	0.074	4.3	513				1.4
180	32.0	2.5	0.074	4.5	524				2.0
187	32.0	2.5	0.074	2.4	530	30.0	2.0	0.070	
197				4.8	533				1.5
210	32.0	2.5	0.074		540	29.5	2.0	0.069	
212				4.3	543				1.0
231				4.3	546				3.8
240	32.0	2.5	0.074		550	29.5	2.0	0.069	
252				3.2	555				7.0
270	32.0	2.5	0.074		564				5.8
280				2.0	567	29.5	1.5	0.070	
288	32.0	2.5		2.1	568				2.7
300	32.0	2.5	0.074		570				
310	32.0	2.0	0.075	3.2	573				1.6
319				3.5	579				4.3
330	32.0	2.0	0.075		591	29.5	1.5	0.070	1.7
337	32.0	2.0	0.075	2.2	600	29.5	1.5	0.070	
343				2.7	604	29.5	1.5	0.070	2.4
347	32.0	2.0	0.075		615				1.6
350				1.3	625				3.8
354				2.5	630				
360	31.5	2.0	0.074		645	29.5	1.5	0.070	2.7
365				2.3	657				3.9
375				2.3	660	29.5	1.5	0.070	
388				2.6	668				2.3
390	31.0	2.0	0.073		687				3.2
394				4.0	690	29.5	1.5	0.070	

Ctrl_2

Runtime (min)	*Height inlet (cm)*	*Height outlet (min)*	*Calculated slope (m/m)*	$O_{s,out}$ *(ml/s)*	*Runtime (min)*	*Height inlet (cm)*	*Height outlet (min)*	*Calculated slope (m/m)*	$O_{s,out}$ *(ml/s)*
Setting: Q_w = 94.6 ml/s; $Q_{s,in}$ = 1.29 ml/s									
0	34.0	13.0	0.053		350	30.5	2.0	0.071	5.7
10	33.0	4.0	0.073	27.5	360	30.3	2.0	0.071	4.6
20	32.8	4.0	0.072	21.5	370	30.0	2.0	0.070	2.6
30	32.5	3.5	0.073	9.0	380	30.5	2.3	0.071	4.0
40	33.0	3.5	0.074	12.5	390	30.0	2.3	0.069	6.0
50	33.0	2.5	0.076	13.0	400	30.5	2.3	0.071	3.0
60	32.8	2.8	0.075	12.6	410	30.3	2.0	0.071	3.0
70	33.0	2.5	0.076	8.2	420	30.3	2.3	0.070	4.1
80	33.0	2.3	0.077	11.8	430	29.8	2.0	0.069	3.6
90	33.0	2.0	0.078	6.6	440	30.0	2.0	0.070	4.7
100	33.0	2.3	0.077	13.0	450	30.0	2.3	0.069	5.4
110	32.5	2.0	0.076	5.5	460	30.0	2.3	0.069	1.8
120	32.0	2.5	0.074	11.6	470	30.3	2.0	0.071	3.6
130	32.5	2.3	0.076	4.6	480	30.0	2.0	0.070	3.1
140	32.3	2.5	0.074	4.6	490	30.0	2.0	0.070	2.5
150	32.0	2.3	0.074	5.6	500	30.0	2.3	0.069	1.7
160	31.8	2.3	0.074	7.6	510	29.5	2.0	0.069	4.0
170	32.5	2.3	0.076	10.6	520	30.0	2.3	0.069	2.6
180	32.0	2.5	0.074	5.1	530	30.0	2.3	0.069	2.2
190	31.8	2.0	0.074	5.4	540	29.8	1.8	0.070	1.8
200	32.0	2.0	0.075	5.0	550	29.5	2.5	0.068	2.6
210	31.3	2.0	0.073	4.4	560	30.0	2.3	0.069	3.0
220	31.0	2.3	0.072	3.8	570	29.8	2.3	0.069	3.8
230	31.5	2.5	0.073	4.7	580	30.0	2.0	0.070	2.7
240	31.0	2.8	0.071	3.8	590	29.8	2.0	0.069	2.9
250	30.8	2.5	0.071	3.0	600	29.5	2.3	0.068	2.4
260	30.5	2.0	0.071	4.6	610	30.0	2.0	0.070	6.0
270	31.0	2.5	0.071	3.4	620	30.0	2.0	0.070	1.8
280	31.0	2.3	0.072	7.2	630	29.3	2.3	0.068	2.0
290	31.3	2.3	0.073	4.2	640	29.8	2.5	0.068	3.8
300	30.5	2.5	0.070	7.0	650	29.5	2.0	0.069	3.0
310	30.8	2.5	0.071	3.6	660	29.3	2.3	0.068	2.8
320	31.0	2.5	0.071	6.7	670	30.0	1.8	0.071	2.4
330	30.5	2.5	0.070	5.2	680	29.0	2.3	0.067	1.6
340	30.8	2.5	0.071	3.9	690	29.0	2.3	0.067	3.2

IQ$_w$

Runtime (min)	*Height inlet (cm)*	*Height outlet (min)*	*Calculated slope (m/m)*	*$O_{s,out}$ (ml/s)*	*Runtime (min)*	*Height inlet (cm)*	*Height outlet (min)*	*Calculated slope (m/m)*	*$O_{s,out}$ (ml/s)*
Setting: Q_w = 94.6 ml/s; $Q_{s,in}$ = 1.29 ml/s									
0	36.0	14.0	0.055		250	29.0	2.0	0.068	20.7
4	31.5	5.0	0.066		260	28.0	2.5	0.064	29.0
11	31.5	5.0	0.066	30.0	270	26.0	2.0	0.060	16.8
20	31.5	5.0	0.066	18.0	280	25.0	2.0	0.058	26.3
30	32.0	4.0	0.070	18.5	290	24.0	2.0	0.055	17.3
40				17.9	300	23.0	2.0	0.053	9.6
42	32.0	4.0	0.070		310	23.0	2.0	0.053	10.9
50	32.5	3.5	0.073	20.5	320	23.0	2.5	0.051	13.0
60	32.0	2.5	0.074	13.0	330	21.0	2.0	0.048	11.3
70	32.0	3.0	0.073	9.3	340	22.0	2.0	0.050	17.5
80	32.0	3.0	0.073	11.9	350	21.0	2.0	0.048	11.3
90	32.0	2.5	0.074	8.0	360	21.0	2.0	0.048	7.7
100	32.0	2.5	0.074	7.9	370	20.5	1.5	0.048	8.1
110	32.0	2.5	0.074	7.7	380	20.5	2.0	0.046	9.8
120	32.0	2.5	0.074	6.7	390	20.0	1.5	0.046	5.6
130	32.0	3.0	0.073	6.0	400	20.0	1.5	0.046	7.6
138	32.5	2.0	0.076		410	20.0	2.0	0.045	8.8
140				9.3	420	20.0	1.5	0.046	5.1
150	32.5	2.0	0.076	5.1	430	20.0	2.0	0.045	11.6
158	32.5	2.0	0.076		440	20.0	1.0	0.048	10.6
160				8.1	450	19.0	1.5	0.044	8.6
170	32.5	2.0	0.076	7.9	460	19.0	1.0	0.045	9.9
181	32.0	2.5	0.074	7.9	470	19.0	1.0	0.045	6.7
190	32.0	2.0	0.075	4.5	480	19.0	2.0	0.043	4.1
200	31.5	2.0	0.074	6.8	490	19.0	2.0	0.043	8.3
210	31.0	2.0	0.073	3.3	500	19.0	2.0	0.043	10.3
220	31.0	2.0	0.073	6.0	510	19.0	2.0	0.043	2.9
230	31.0	2.0	0.073	5.3	520	19.0	1.5	0.044	3.8
240	31.0	2.0	0.073	10.9	530	19.0	1.0	0.045	5.0
Q_w = 189.2 ml/s; $Q_{s,in}$ = 1.29 ml/s					534	18.5	1.5	0.043	
240	31.0	2.0	0.073		540	18.5	1.0	0.044	4.6
245	30.0	2.0	0.070						

DQ_w _IQ_w

Runtime (min)	*Height inlet (cm)*	*Height outlet (min)*	*Calculated slope (m/m)*	*$O_{s,out}$ (ml/s)*	*Runtime (min)*	*Height inlet (cm)*	*Height outlet (min)*	*Calculated slope (m/m)*	*$O_{s,out}$ (ml/s)*
Setting: Q_w = 94.6 ml/s; $Q_{s,in}$ = 1.29 ml/s									
0	33.5	13.0	0.051		350	34.5	2.0	0.081	1.4
10	31.5	4.5	0.068	31.0	360	34.5	2.0	0.081	1.0
20	31.8	3.5	0.071	30.0	370	34.5	2.0	0.081	0.7
30	32.0	3.5	0.071	18.0	380	34.8	1.5	0.083	1.2
40	33.0	3.0	0.075	14.0	390	34.8	2.0	0.082	1.9
50	32.5	2.5	0.075	15.0	400	34.8	1.5	0.083	1.0
60	32.8	2.0	0.077	12.0	410	34.8	1.5	0.083	0.9
70	32.5	2.0	0.076	9.5	420	34.8	1.8	0.083	1.3
80	32.5	2.0	0.076	13.5	430	34.8	2.0	0.082	1.1
90	32.5	2.0	0.076	15.4	440	34.8	1.5	0.083	1.0
100	32.5	2.0	0.076	11.1	450	34.8	1.5	0.083	1.5
110	32.5	2.5	0.075	9.5	460	35.0	1.5	0.084	2.5
120	32.5	2.5	0.075	11.0	470	35.0	1.5	0.084	0.9
130	32.0	2.0	0.075	8.7	480	35.3	1.5	0.084	1.0
140	32.0	2.5	0.074	8.7	Q_w = 94.6 ml/s; $Q_{s,in}$ = 1.29 ml/s				
150	31.8	2.0	0.074	4.5	490	32.8	2.0	0.077	4.6
160	31.5	2.0	0.074	10.0	500	31.8	2.0	0.074	3.3
170	31.5	2.0	0.074	8.6	510	31.0	2.0	0.073	12.0
180	30.5	1.5	0.073	8.8	520	30.8	1.5	0.073	2.2
190	30.5	2.0	0.071	4.7	530	30.8	2.0	0.072	5.2
200	31.0	1.5	0.074	5.2	540	30.8	2.0	0.072	3.2
210	31.0	2.0	0.073	10.6	550	30.5	2.0	0.071	5.8
220	31.0	2.0	0.073	5.6	560	30.3	2.0	0.071	5.1
230	30.8	1.5	0.073	6.2	570	30.3	2.0	0.071	5.2
240	30.8	2.0	0.072	3.7	580	30.0	2.0	0.070	5.4
Q_w = 47.2 ml/s; $Q_{s,in}$ = 1.29 ml/s					590	30.3	2.0	0.071	3.8
250	32.0	2.0	0.075	1.7	600	30.3	2.0	0.071	4.6
260	32.5	1.5	0.078	2.0	610	30.3	2.0	0.071	6.9
270	33.0	2.0	0.078	2.3	620	30.5	2.5	0.070	5.1
280	33.0	2.0	0.078	1.9	630	30.0	2.0	0.070	9.4
290	33.3	2.0	0.078	2.8	640	29.5	2.0	0.069	3.0
300	33.5	2.0	0.079	1.4	650	29.8	2.5	0.068	4.6
310	33.8	2.0	0.079	1.2	660	30.0	2.0	0.070	5.3
320	34.0	2.0	0.080	2.1	670	30.3	1.5	0.072	5.0
330	34.0	2.0	0.080	1.9	680	29.8	1.8	0.070	3.3
340	34.3	2.0	0.081	0.9	690	29.8	2.0	0.069	4.2

DQ$_{s,in}$

Runtime (min)	*Height inlet (cm)*	*Height outlet (min)*	*Calculated slope (m/m)*	*$O_{s,out}$ (ml/s)*	*Runtime (min)*	*Height inlet (cm)*	*Height outlet (min)*	*Calculated slope (m/m)*	*$O_{s,out}$ (ml/s)*
Setting: Q_w = 94.6 ml/s; $Q_{s,in}$ = 1.29 ml/s									
0	34.0	12.0	0.055		280	31.0	2.0	0.073	7.3
10				29.3	290	30.5	2.5	0.070	5.5
12	34.0	4.0	0.075		298	30.5	2.0	0.071	
20	34.0	3.0	0.078	19.0	300				8.3
29	33.0	4.0	0.073	18.0	310	30.5	2.0	0.071	7.0
30					320	30.0	2.0	0.070	7.5
40	33.0	3.0	0.075	20.0	330	30.0	2.0	0.070	5.8
50	33.0	3.0	0.075	16.3	332	30.0	2.0	0.070	
60	33.0	3.0	0.075	19.8	340	29.8	2.0	0.069	6.5
66	33.0	3.0	0.075		348	29.8	2.0	0.069	
70				13.5	350				9.8
76	33.0	3.0	0.075		352	29.5	1.5	0.070	
80				7.8	360	29.0	1.5	0.069	5.8
85	33.0	3.0	0.075		370	29.0	1.5	0.069	3.5
90				7.0	380	28.8	2.0	0.067	4.0
100	33.0	3.0	0.075	5.8	389	28.8	2.0	0.067	
110	33.0	2.5	0.076	10.5	390				2.8
120	33.0	2.5	0.076	6.8	400	28.5	2.0	0.066	4.7
130	33.0	2.0	0.078	7.5	410	28.5	2.0	0.066	5.3
140	33.0	2.0	0.078	6.0	420	28.5	2.0	0.066	3.7
150	33.5	2.5	0.078	10.0	430	28.0	1.5	0.066	5.8
160	33.5	2.0	0.079	7.5	438	28.0	1.5	0.066	
167	33.5	2.0	0.079		440				4.3
170				5.5	450	28.0	2.0	0.065	5.0
180	33.5	2.0	0.079	8.2	460	28.0	2.0	0.065	4.3
186	33.5	2.0	0.079		470	27.8	2.0	0.064	6.8
190	33.5	2.5	0.078	5.0	480	27.5	2.0	0.064	5.5
200	33.5	2.0	0.079	9.3	490	27.5	2.0	0.064	2.6
210	33.5	2.0	0.079	4.0	500	27.0	2.5	0.061	4.0
218	33.5	2.0	0.079		510	27.0	1.5	0.064	3.0
220				6.8	520	27.0	2.0	0.063	8.0
230	33.5	2.0	0.079	9.0	522				4.5
240	33.5	2.0	0.079	6.0	530	26.8	2.0	0.062	7.0
Q_w = 94.6 ml/s; $Q_{s,in}$ = 0.22 ml/s					540	26.8	2.0	0.062	3.4
244	33.0	2.0	0.078		550	26.8	2.0	0.062	3.1
250	32.5	2.0	0.076	4.5	560	26.8	2.0	0.062	7.1
260	32.0	2.0	0.075	6.5	570	26.8	2.0	0.062	2.2
268	31.0	2.0	0.073		580	26.8	2.0	0.062	2.8
270				6.0	590	26.5	2.0	0.061	3.8
273	31.0	2.0	0.073		600	26.0	2.0	0.060	4.5

IQ$_{s,in}$ _DQ$_{s,in}$

Runtime (min)	*Height inlet (cm)*	*Height outlet (min)*	*Calculated slope (m/m)*	*$O_{s,out}$ (ml/s)*	*Runtime (min)*	*Height inlet (cm)*	*Height outlet (min)*	*Calculated slope (m/m)*	*$O_{s,out}$ (ml/s)*
Setting: Q_w = 94.6 ml/s; $Q_{s,in}$ = 1.29 ml/s									
0	34.0	14.0	0.050		370	32.5	2.3	0.076	7.2
10	30.0	3.0	0.068	20.4	380	32.8	2.0	0.077	4.3
20	29.8	2.5	0.068	13.5	390	32.8	2.0	0.077	2.9
30	30.0	3.0	0.068		400	32.8	2.3	0.076	2.4
40	30.0	2.5	0.069	20.3	410	32.8	1.5	0.078	2.5
50	30.0	2.5	0.069	11.4	420	33.0	2.0	0.078	5.0
60	30.2	2.5	0.069	9.4	430	33.3	2.0	0.078	3.7
70	30.5	2.5	0.070	11.6	440	33.0	2.3	0.077	2.3
80	31.0	2.0	0.073	7.0	450	32.8	2.3	0.076	2.2
90	30.8	2.0	0.072	16.1	460	33.0	2.5	0.076	4.5
100	31.0	2.0	0.073	7.0	470	33.0	2.0	0.078	4.8
110	31.0	2.0	0.073	7.1	480	33.0	2.0	0.078	6.5
120	31.0	2.0	0.073	3.9	Q_w = 94.6 ml/s; $Q_{s,in}$ = 1.29 ml/s				
130	31.0	2.5	0.071	8.1	490	31.8	1.8	0.075	2.6
140	31.0	2.5	0.071	8.0	500	31.0	2.0	0.073	5.9
150	31.0	2.5	0.071	5.9	510	30.8	2.3	0.071	3.6
160	31.3	2.5	0.072	6.8	520	30.8	2.0	0.072	14.0
170	31.0	2.5	0.071	4.9	530	30.0	2.0	0.070	11.4
180	31.0	2.5	0.071	5.4	540	30.1	2.0	0.070	5.5
190	30.5	2.5	0.070	3.5	550	30.5	1.8	0.072	4.2
200	30.0	2.5	0.069	7.6	560	30.8	1.8	0.073	6.4
210	29.8	2.3	0.069	8.2	570	30.5	2.3	0.071	5.5
220	30.3	2.0	0.071	3.7	570	30.0	2.0	0.070	
230	30.0	2.0	0.070	10.2	580	30.0	2.0	0.070	3.0
240	30.0	2.0	0.070	4.2	590	30.0	2.0	0.070	6.0
Q_w = 94.6 ml/s; $Q_{s,in}$ = 2.6 ml/s					600	30.3	2.3	0.070	3.0
250	30.8	2.0	0.072	14.1	610	30.5	2.0	0.071	2.3
260	31.0	2.0	0.073	5.5	620	30.8	2.3	0.071	2.8
270	31.0	2.0	0.073	5.6	630	30.3	2.5	0.069	3.3
280	31.8	2.0	0.074	5.1	640	30.0	2.3	0.069	3.3
290	32.0	2.0	0.075	5.6	650	29.8	2.5	0.068	3.9
300	32.0	2.3	0.074	3.8	660	29.8	2.5	0.068	3.2
310	32.3	2.3	0.075	5.2	670	30.0	2.5	0.069	4.2
320	32.5	2.3	0.076	3.2	680	30.0	2.0	0.070	4.5
330	32.5	2.3	0.076	5.4	690	29.8	2.0	0.069	8.6
340	31.8	2.0	0.074	3.8	700	30.3	2.0	0.071	4.4
350	31.9	2.0	0.075	6.4	710	30.5	2.0	0.071	4.1
360	32.0	2.3	0.074	4.6	720	29.8	2.0	0.069	4.0

BLF

Runtime (min)	*Height inlet (cm)*	*Height outlet (min)*	*Calculated slope (m/m)*	$O_{s,out}$ *(ml/s)*	*Runtime (min)*	*Height inlet (cm)*	*Height outlet (min)*	*Calculated slope (m/m)*	$O_{s,out}$ *(ml/s)*
Setting: Q_w = 94.6 ml/s; $Q_{s,in}$ = 1.29 ml/s									
0	34.0	13.8	0.051		225	32.8	14.0	0.047	
13	30.5	13.8	0.042		230	32.9	14.0	0.047	
20	30.3	13.8	0.041		240	32.9	14.0	0.047	
30	30.3	14.0	0.041		Onset of base-level fall: 0.5 cm/min				
40	30.8	14.0	0.042		250	33.0	9.0	0.060	
45	30.5	14.0	0.041		260	33.0	4.0	0.073	
50	30.8	14.0	0.042		270	33.1	3.5	0.074	
60	30.8	14.0	0.042		280	33.0	3.0	0.075	11.8
70	30.8	14.0	0.042		290	33.0	3.0	0.075	18.0
75	31.0	14.0	0.043		300	32.9	2.5	0.076	14.4
80	31.0	14.0	0.043		310	33.0	2.5	0.076	11.7
90	31.0	14.0	0.043		320	33.2	2.5	0.077	12.3
100	31.5	14.0	0.044		330	33.2	2.0	0.078	14.6
108	31.5	14.0	0.044		340	33.2	2.0	0.078	10.4
110	31.5	14.0	0.044		350	33.5	2.0	0.079	12.7
120	31.8	14.0	0.044		360	32.8	2.0	0.077	7.4
130	31.8	14.0	0.044		370	32.0	2.0	0.075	7.7
135	31.8	14.0	0.044		380	31.9	2.0	0.075	11.5
140	32.0	14.0	0.045		390	32.0	2.0	0.075	11.0
150	32.0	14.0	0.045		400	32.0	2.0	0.075	7.2
160	32.3	14.0	0.046		410	32.0	2.0	0.075	8.2
165	32.3	14.0	0.046		420	32.0	2.0	0.075	6.5
170	32.5	14.0	0.046		430	32.0	2.5	0.074	10.7
180	32.5	14.0	0.046		440	32.0	2.0	0.075	6.9
190	32.8	14.0	0.047		450	32.0	2.3	0.074	3.7
195	32.8	14.0	0.047		460	32.0	2.5	0.074	5.0
200	32.8	14.0	0.047		470	32.0	2.5	0.074	3.9
210	32.8	14.0	0.047		480	31.8	2.5	0.073	13.2
220	32.8	14.0	0.047						