Data repository for Straub et al. manuscript: Interactions between turbidity currents and sinuous submarine channels

REPOSITORY CAPTIONS

DR1. Video of laboratory experiments documenting interactions between turbidity currents and topography in aggrading sinuous submarine channels. Digital video was collected from camera positioned directly above experimental basin and therefore yield a close to synoptic representation of the channelized-overbank flow field. Video is presented at 4 times the actual experimental time. Video includes experimental flows 2, 8, 15, and 20. Each flow is clipped to incorporate the passage of both the turbidity current head and the and dye injections.

DR2. Estimation of u* obtained with best-fit slope of ln z vs. current velocity plots. Velocity measurements were obtained below the velocity maximum of each sample profile. Mean u* value of the 6 flow events presented equaled 0.025 m/sec.

DR3. Maps from the experimental channel. Channel flow was from the left to the right in each map. A: Topographic map of channel form following flow event number 4. Topography is defined as vertical distance between the bed and an overlying datum of constant elevation. Contour interval is 5 mm. B: Topographic map of channel form following flow event number 8. Contour interval is 5 mm. C: Topographic map of channel form following flow event number 12. Contour interval is 5 mm. D: Topographic map of channel form following flow event number 16. Contour interval is 5 mm. E: Topographic map of channel form following flow event number 20. Contour interval is 5 mm.

DR4. Maps from the experimental channel. Channel flow was from the left to the right in each map. A: Map of deposit thickness from sedimentation by 3 turbidity currents. This map is the difference between topographic maps collected after flows 1 and 4. Contour interval equals 5 mm. Gray bold lines represent location of channel margin prior to deposition by flow 1. B: Map of deposit thickness from sedimentation by 7 turbidity currents. This map is the difference between topographic maps collected after flows 1 and 8. Contour interval equals 5 mm. C: Map of deposit thickness from sedimentation by 11 turbidity currents. This map is the difference between topographic maps collected after flows 1 and 12. Contour interval equals 5 mm. D: Map of deposit thickness from sedimentation by 15 turbidity currents. This map is the difference between topographic maps collected after flows 1 and 16. Contour interval equals 5 mm. E: Map of deposit thickness from sedimentation by 19 turbidity currents. This map is the difference between topographic maps collected after flows 1 and 20. Contour interval equals 5 mm.

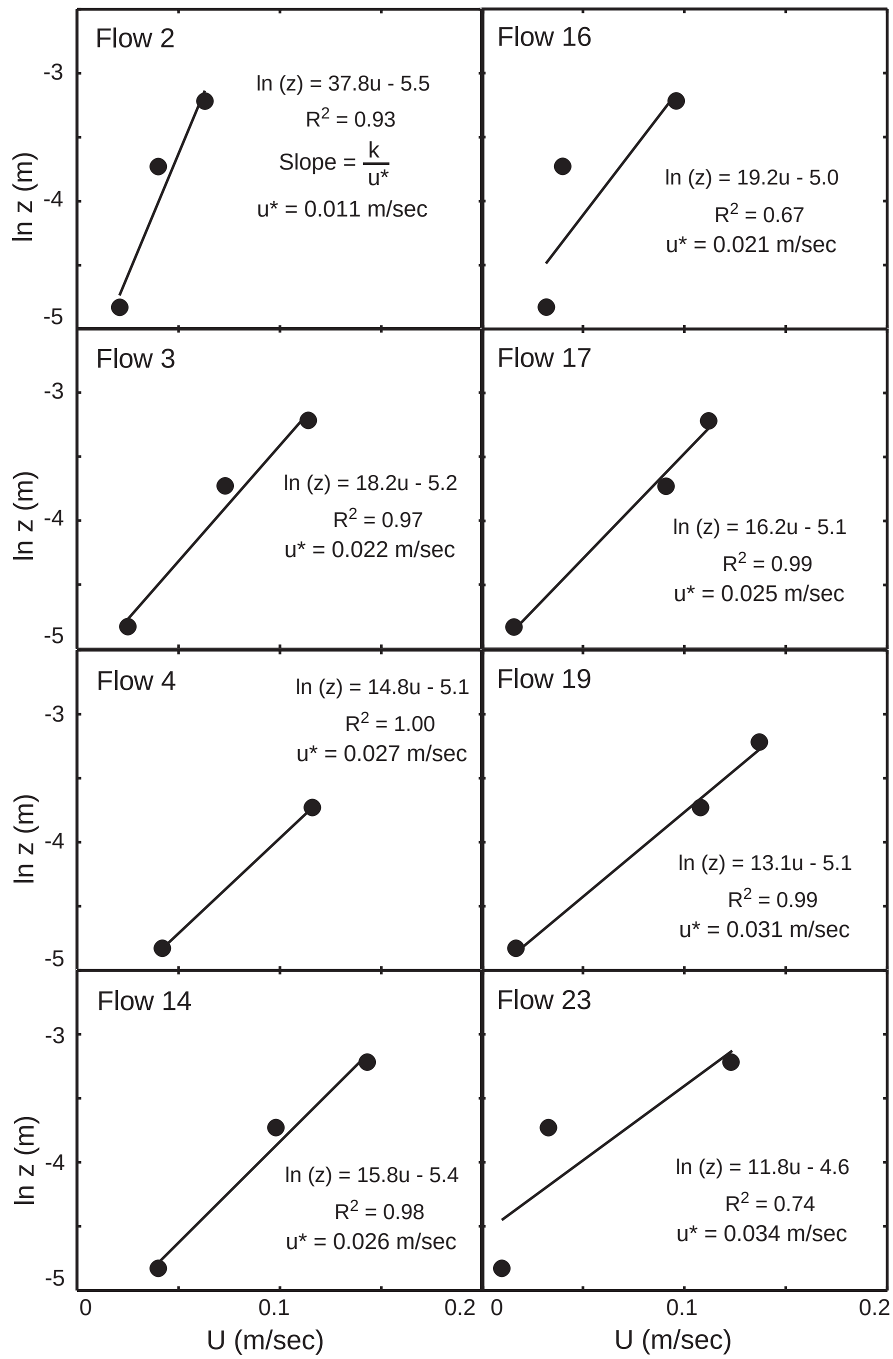
DR5. Downstream trends following sedimentation by 24 currents. Arrows mark locations of channel bend apexes. A) Channel centerline topography measured after flows 1, 5, 10, 15, 20 and 24 as a function of distance from the channel entrance. Topography is defined as vertical distance between the bed and an overlying datum of constant elevation. B)

Deposit thickness as a function of distance along the channel centerline following flows 1, 5, 10, 15, 20 and 24.

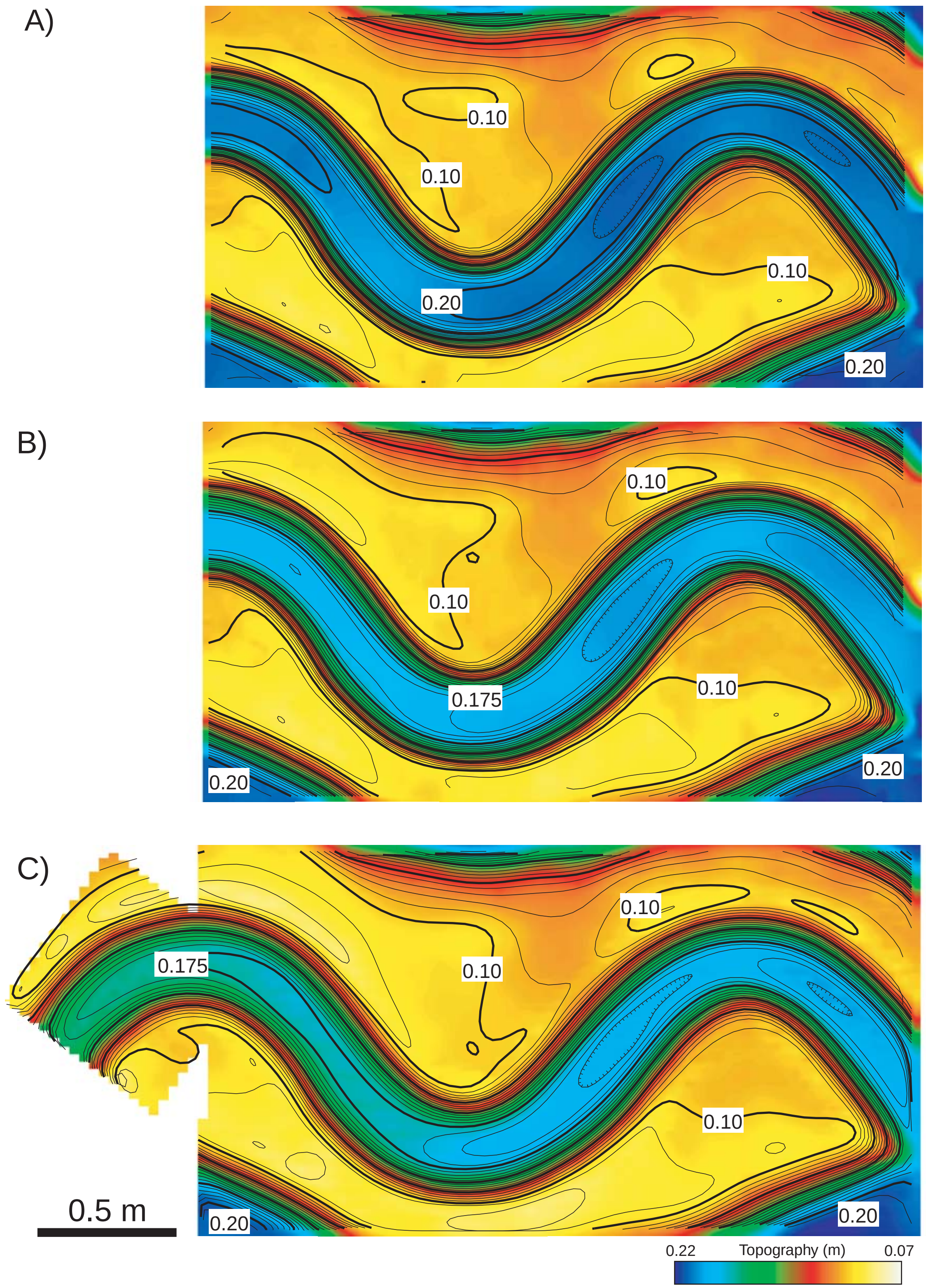
DR6. Photo mosaic of experimental channel and deposit following flow 24. Flow was from bottom to top of image.

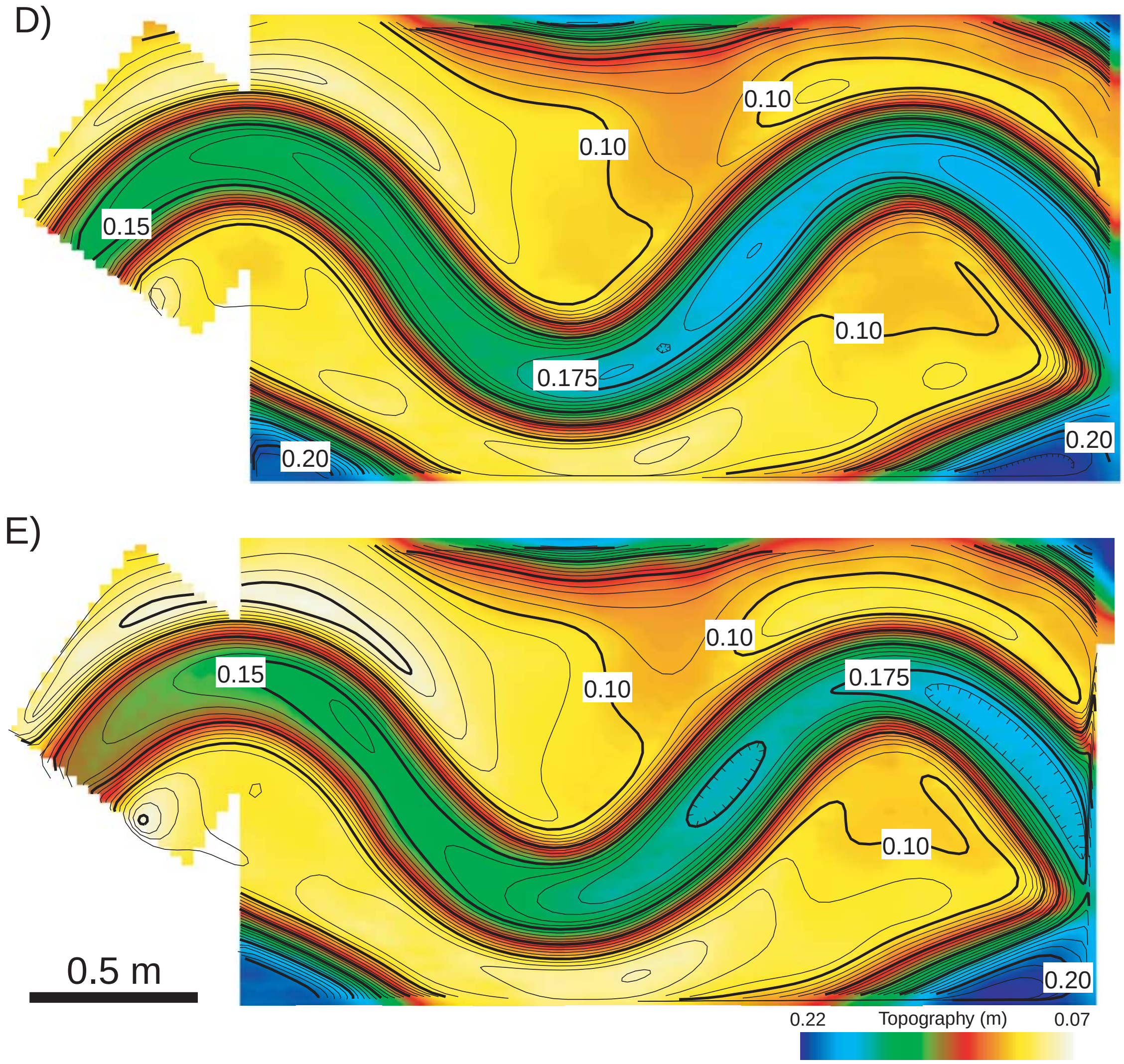
DR7. Defining a separation zone immediately downstream from the apex of bend 2 using time and space variation in tracer intensity recorded in digital photographs. Intensity of red dye released into a turbidity current was measured for each pixel across the channel at the streamwise position labeled ADP4 in Figure 4a (x=0m=left channel edge, x=0.4m=right channel edge). The line labeled 0 sec defines red intensity across the channel at the time immediately preceding arrival of the dye pulse. Lines 20, 70 and 120 sec describe the cross-stream variation in dye intensity 20, 70, and 120 s after passage of the leading edge of the dye plug. The zone of flow separation developed along the left-hand (inner) channel bank is defined here by relatively low dye concentrations at 20 s and relatively high dye concentrations at 70 s. The inset photo depicts the separation zone at the time roughly equal to 70 s and arrow indicates center of flow separation zone.

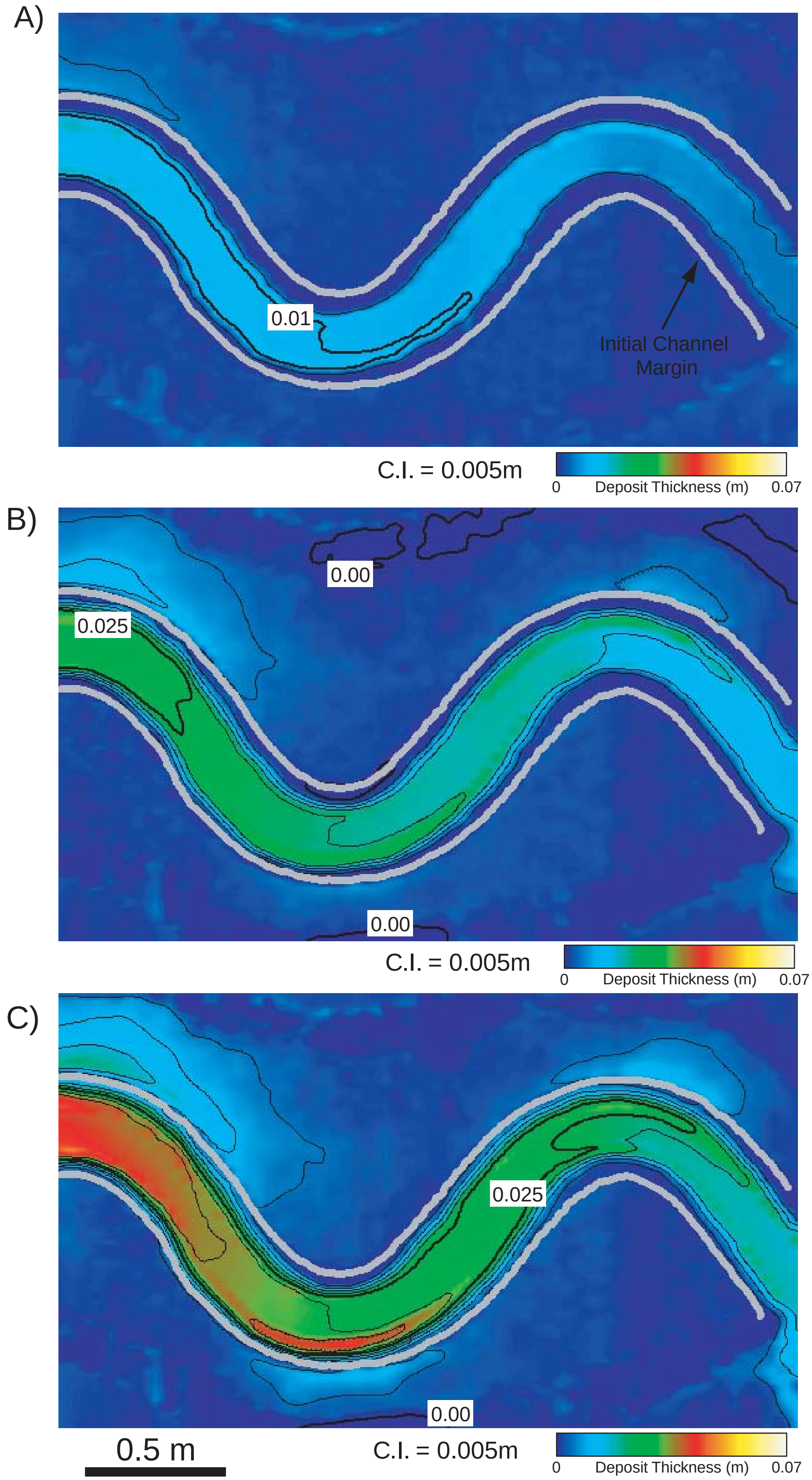
DR8. Comparison of model and prototype grain size and particle settling velocity distributions for sediment discharged into experimental basin. A) Model and prototype particle size distributions. B) Model and prototype particle settling velocity distributions.



Mean u* = 0.025 m/sec


A)
0.10
0.10
0.20
0.10
0.20
B)
0.10
0.10
0.175
0.10
0.20
0.20
C)
0.175
0.10
0.10
0.10
0.20
0.20
0.5 m
0.22
Topography (m)
0.07


D)
0.10
0.10
0.15
0.10
0.175
0.20
0.20
E)
0.10
0.15
0.10
0.175
0.10
0.20
0.5 m
0.22
Topography (m)
0.07



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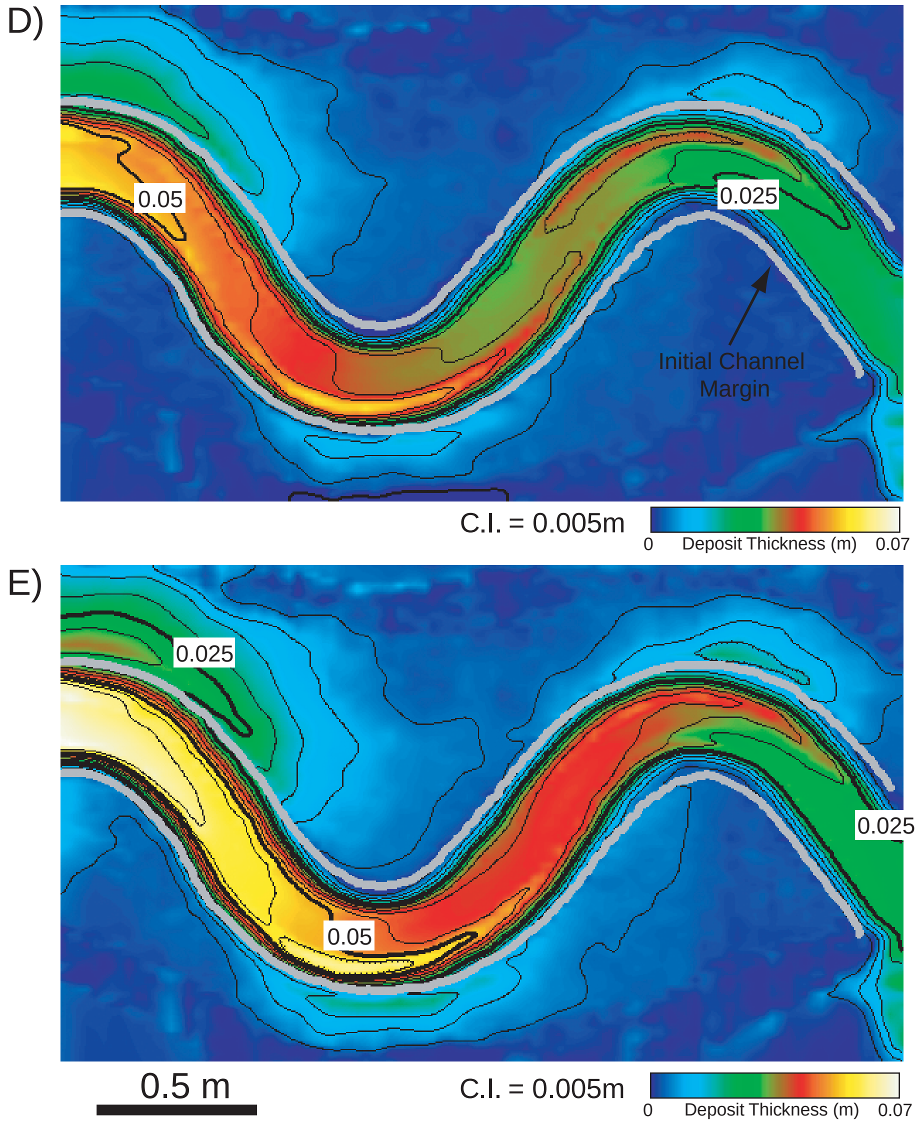
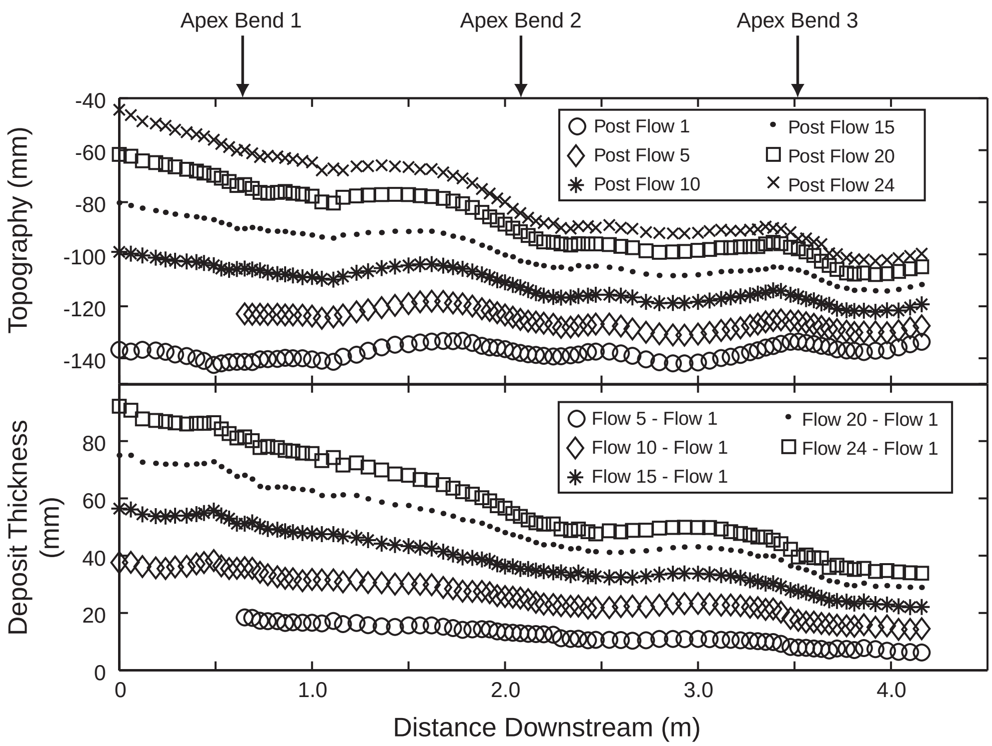
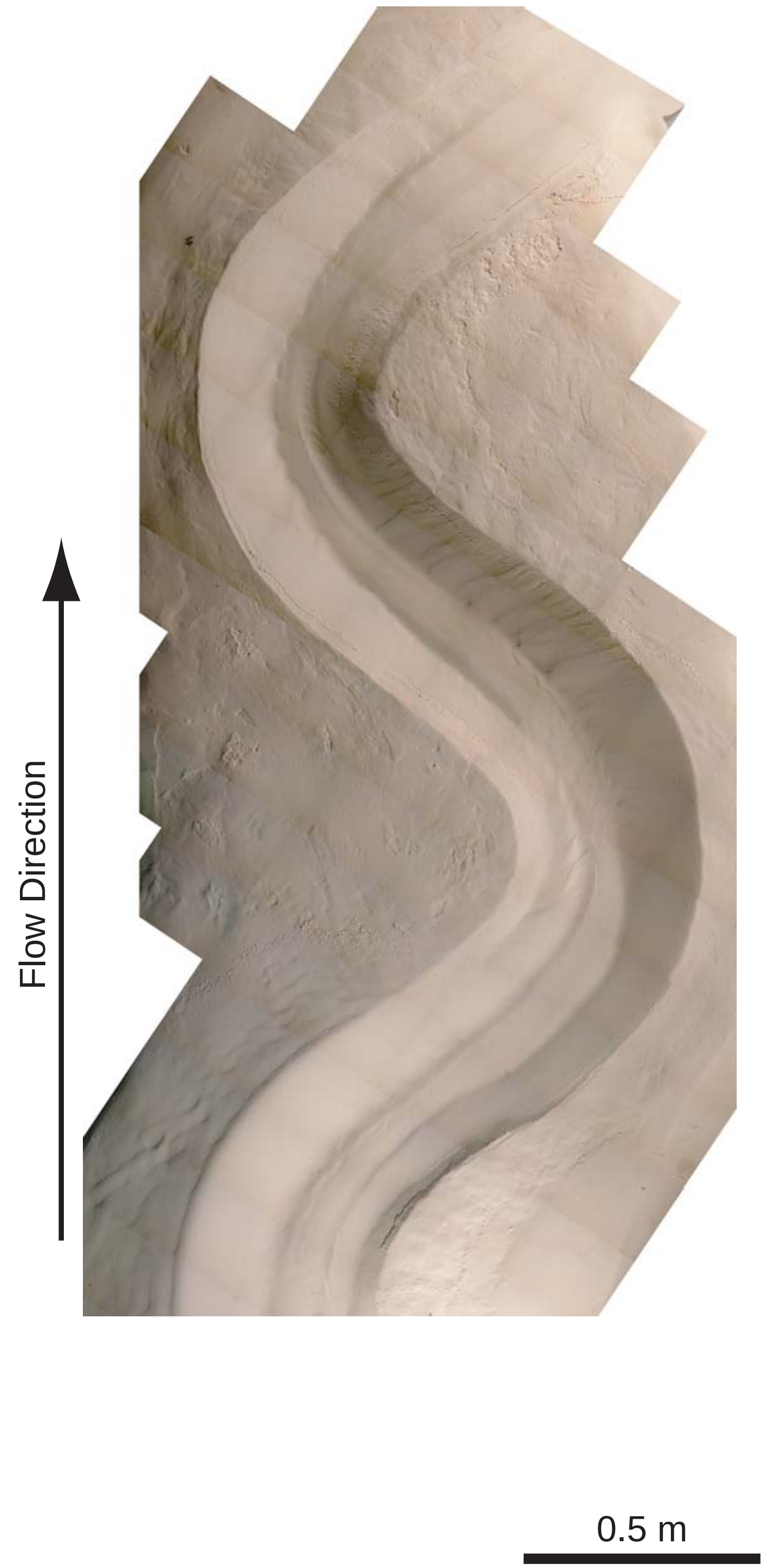
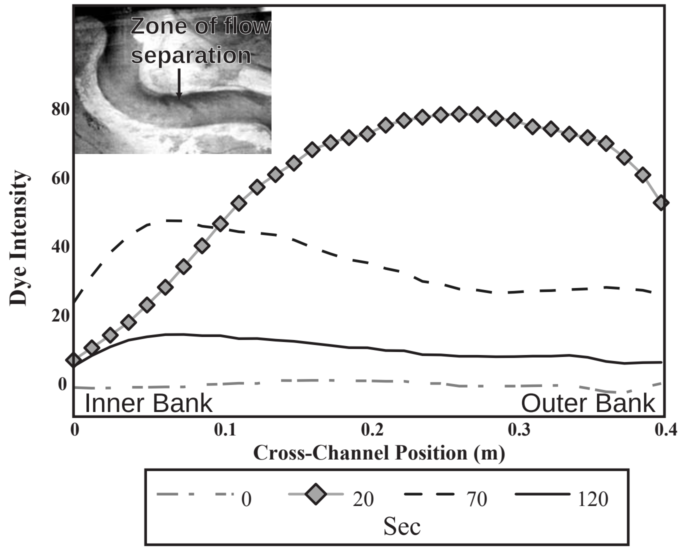
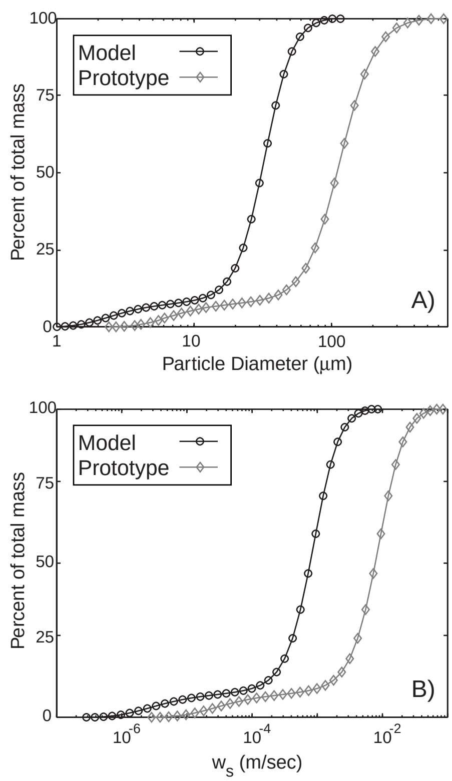

D)
0.05
0.025
Initial Channel
Margin
C.I. = 0.005m
0
Deposit Thickness (m)
0.07
E)
0.025
0.025
0.05
0.5 m
C.I. = 0.005m
0
Deposit Thickness (m)
0.07


Apex Bend 1
Apex Bend 2
Apex Bend 3
Topography (mm)
-40
-60
-80
-100
-120
-140
Post Flow 1
Post Flow 5
Post Flow 10
Post Flow 15
Post Flow 20
Post Flow 24
Deposit Thickness (mm)
80
60
40
20
0
Flow 5 - Flow 1
Flow 10 - Flow 1
Flow 15 - Flow 1
Flow 20 - Flow 1
Flow 24 - Flow 1
0
1.0
2.0
3.0
4.0
Distance Downstream (m)


Flow Direction
0.5 m


Zone of flow separation
Dye Intensity
80
60
40
20
0
Inner Bank
Outer Bank
0
0.1
0.2
0.3
0.4
Cross-Channel Position (m)
0
20
70
120
Sec



Model
Prototype
Percent of total mass
100
75
50
25
0
1
10
100
Particle Diameter (μm)
A)
Model
Prototype
Percent of total mass
100
75
50
25
0
10-6
10-4
10-2
ws (m/sec)
B)