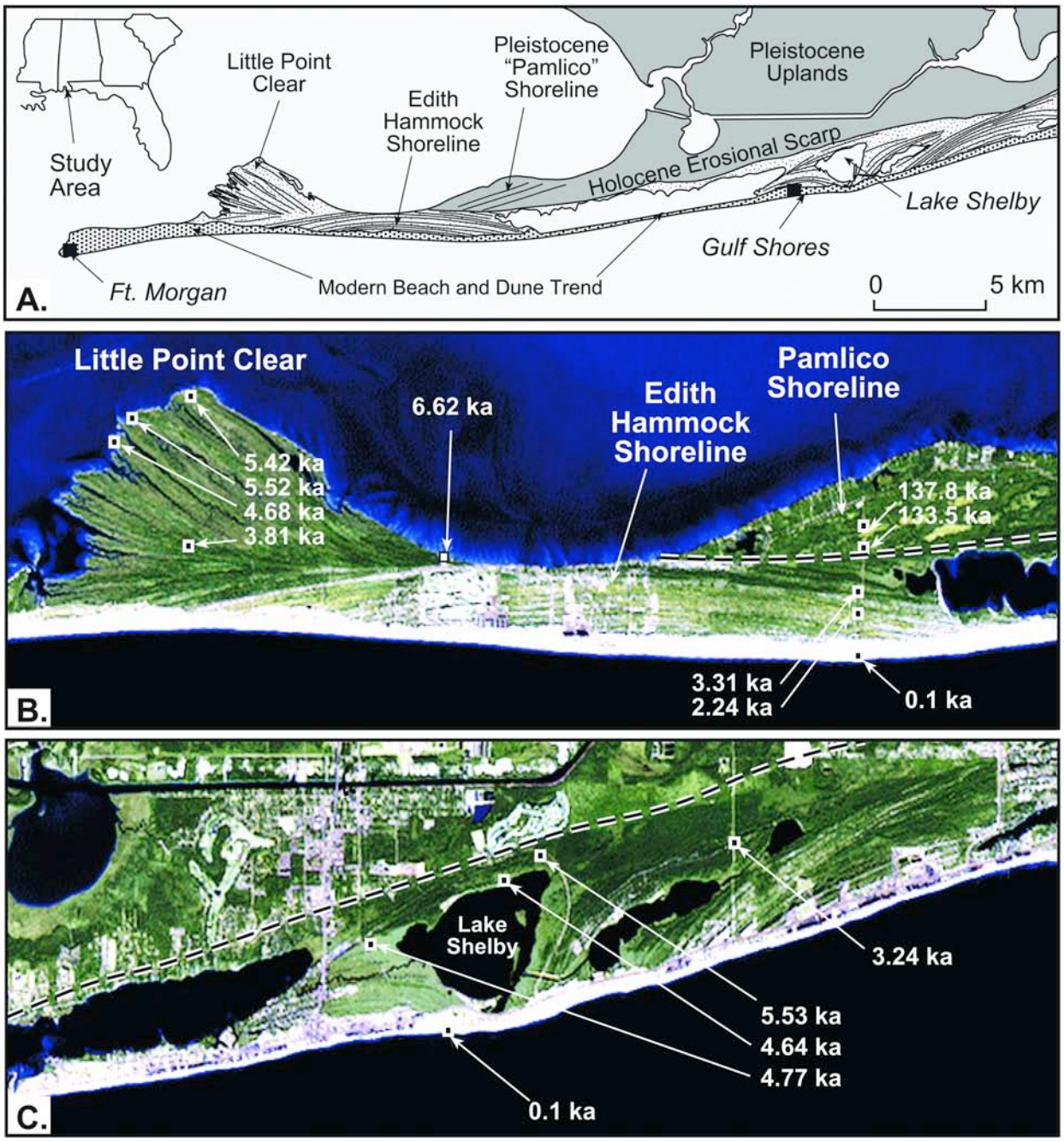


Figure DR1. Gulf Shores and Morgan Peninsula, Alabama study area of Blum et al. (2002). (a) General map, illustrating Pleistocene vs. Holocene landforms and deposits, plus location of key study areas. (b) Landsat TM image of Morgan Peninsula, illustrating cross-cutting beach-ridge plains of the late Pleistocene "Pamlico" shoreline, the Holocene Little Point Clear complex, and the Holocene Edith Hammock complex. OSL sample locations and OSL ages as shown. (c) Landsat TM image of Gulf Shores, Alabama and Lake Shelby, illustrating a major scarp cut into late Pleistocene strata, and successions of Holocene beach ridges both landward and seaward of Lake Shelby. OSL sample locations and OSL ages as shown.

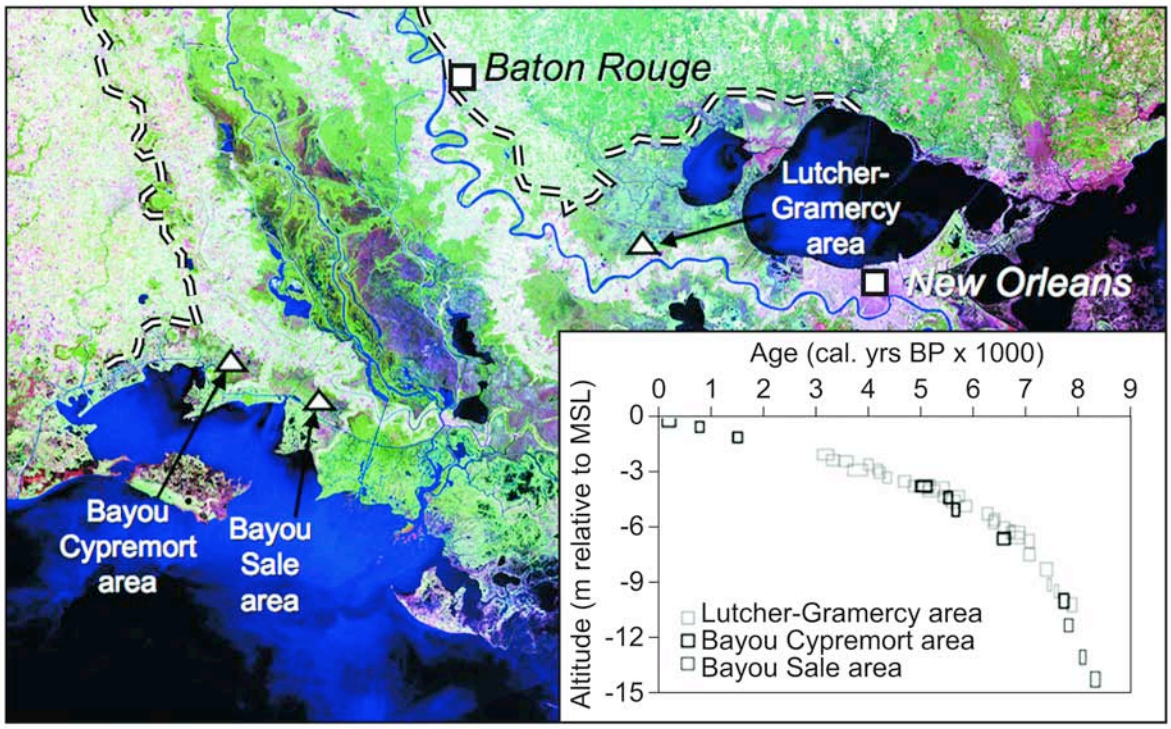


Figure DR2. Landsat TM image of the Tornqvist et al. (2004; 2006) study area in the Mississippi delta region. Inset shows sea-level data points from the three study sites located on the satellite image. Pleistocene-Holocene Mississippi valley walls indicated by dashed lines. Locations of Baton Rouge and New Orleans as shown.

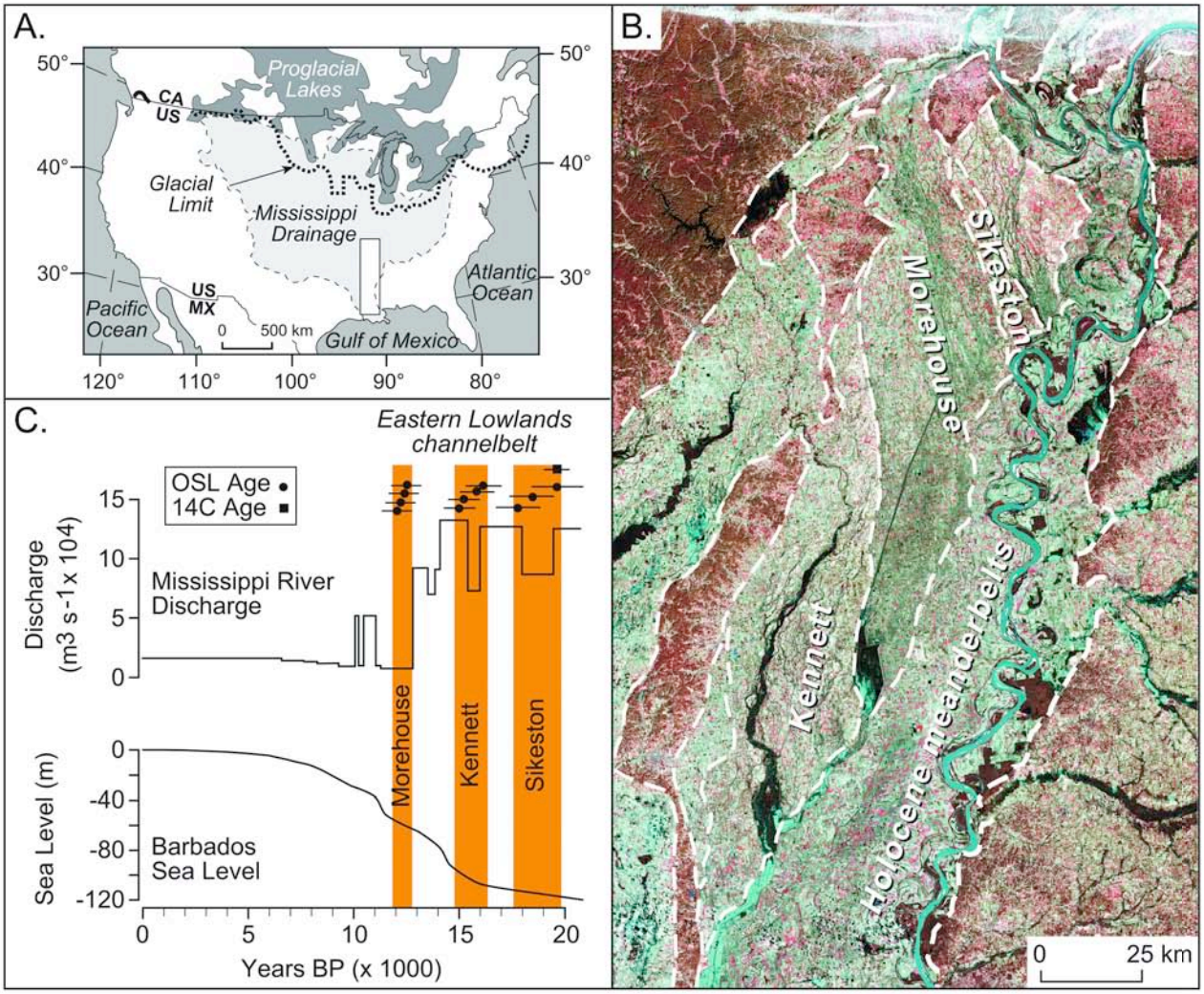


Figure DR3. (a) Map of the Mississippi drainage basin, illustrating limits of late Pleistocene glaciation, meltwater lakes from the last deglaciation, and the location of the LMV (vertical box). (b) Landsat image of the northern LMV, illustrating location and scale of major braid channelbelts from the period 20-12 ka. (c) Plots of modeled meltwater discharge from the ice margin through the Mississippi valley to the GOM (from Licciardi et al., 1999), global sea-level change over the last 20 kyrs (from Peltier and Fairbanks, 2006), and the timing of construction of major braided stream channelbelts (orange bars) in the northern LMV (from Rittenour et al., 2007). Periods between episodes of channelbelt construction represent floodplain abandonment and valley incision.

Licciardi, J.M., Teller, J.T., and Clark, P.U., 1999, Freshwater routing by the Laurentide ice sheet during the last deglaciation, in Clark, P.U., et al., eds., Mechanisms of global climate change at millennial time scales: AGU Geophysical Monograph 112, p. 177–201.

Peltier, W.R. and Fairbanks, R.G., 2006, Global glacial ice volume and Last Glacial Maximum duration from an extended Barbados sea level record: Quaternary Science Reviews, v. 25, p. 3322-3337.

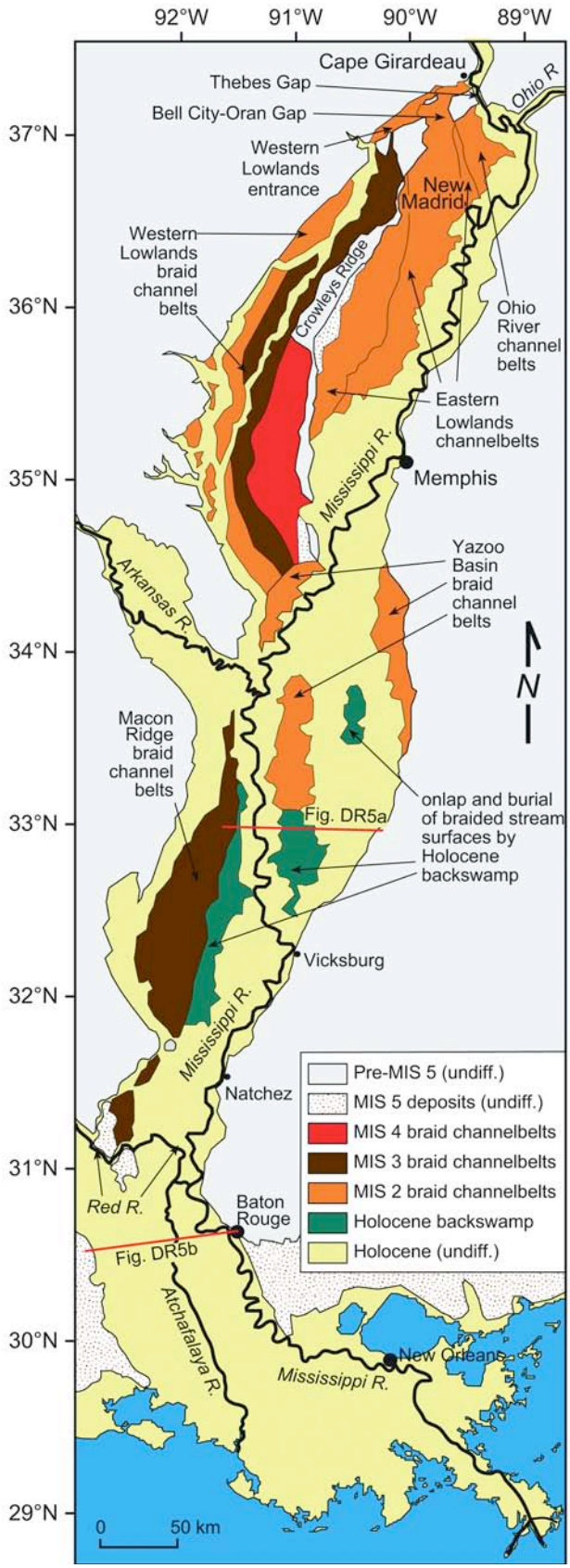
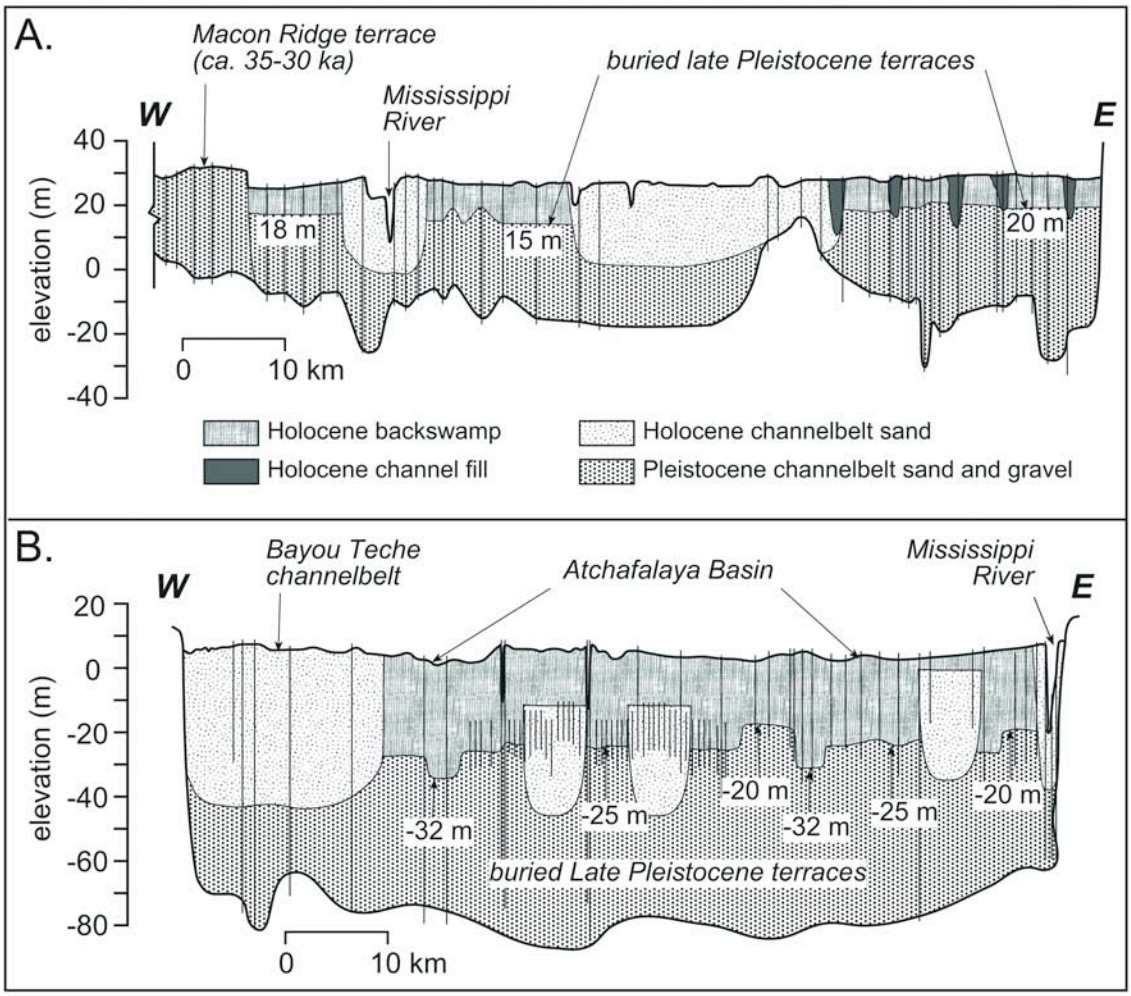


Figure DR4. Simplified map of late Pleistocene and Holocene deposits in the Lower Mississippi valley. Map patterns as shown. Note that mapped area MIS 5 deposits is very general, and does not include some map units identified by other workers. Areas denoted as backswamp on the map are the critical upstream areas where backswamp first onlaps late Pleistocene braided stream surfaces of the Eastewrn Lowlands. Note that Holocene deposits (undiff.) also includes backswamp areas in the southern part of the valley and on the delta plain. Locations of cross-sections in Fig. DR5 as shown. Map of braided stream surfaces and ages based on Rittenour et al. (2007). Other areas based on Saucier (1994).



DR5. Valley cross-sections constructed from USACE borehole data. (a) Valley cross-section in the central Yazoo Basin, illustrating position of the Macon Ridge terrace, then buried basal gravels and sands of presumed late Pleistocene age, overlain by Holocene channel-belt sands and backswamp muds within the incised valley (location shown in Fig. DR4). (b) Valley cross-section in southernmost alluvial valley, between Baton Rouge and Lafayette, Louisiana, illustrating basal gravels and sands of presumed late Pleistocene age, overlain by Holocene channel-belt sands and backswamp muds. In each cross-section, thick backswamp muds occur in locations where Holocene channels have not migrated through, and passively buried braided stream surfaces (location shown in Fig. DR4). Adapted from Blum (2007)

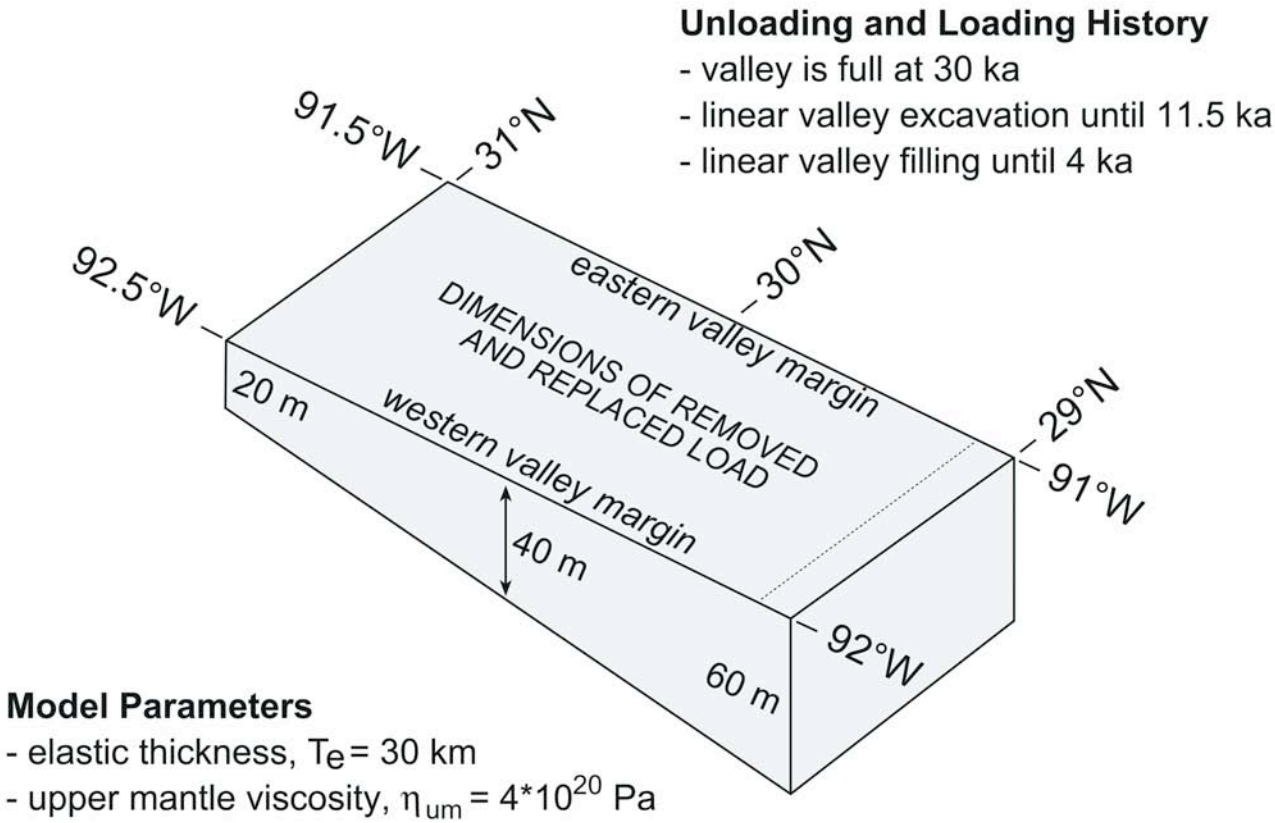


Figure DR6. Definition sketch to illustrate 3-d visco-elastic model parameters. Modelled area of sediment removal and replacement corresponds to geographic coordinates shown, with thicknesses illustrated for each latitudinal boundary.

Table DR1 - Surface elevations for borehole locations, and depths of contact between Holocene backswamp facies and subjacent braided stream gravel and sand. Data derived from: US Army Corps of Engineers, 2008, Lower and Middle Mississippi Valley Engineering Geology Mapping Program: Index of Basins (various quadrangles): http://lmvmapping.erdc.usace.army.mil/ (July, 2008).

LATITUDE	Surface Elevation (ft)	Onlap Contact (ft)	Surface Elevaion (m)	Onlap Contact (m)
30.0563	4	-122	1.22	-37.20
30.0620	6	-122	1.83	-37.20
30.0690	6	-122	1.83	-37.20
30.0821	7	-120	2.13	-36.59
30.0954	7	-119	2.13	-36.28
30.1069	9	-119	2.74	-36.28
30.1080	8	-118	2.44	-35.98
30.1336	9	-118	2.74	-35.98
30.1560	12	-114	3.66	-34.76
30.1711	12	-108	3.66	-32.93
30.1801	19	-106	5.79	-32.32
30.1847	19	-102	5.79	-31.10
30.1966	19	-107	5.79	-32.62
30.2095	11	-92	3.35	-28.05
30.4842	32	-100	9.76	-30.49
30.5058	33	-84	10.06	-25.61
30.5059	27	-78	8.23	-23.78
30.5091	31	-82	9.45	-25.00
30.5100	31	-86	9.45	-26.22
30.5101	30	-78	9.15	-23.78
30.5167	36	-86	10.98	-26.22
30.5220	26	-80	7.93	-24.39
30.5226	28	-78	8.54	-23.78

30.5432	25	-73	7.62	-22.26
30.5444	19	-70	5.79	-21.34
30.5448	36	-86	10.98	-26.22
30.5455	18	-80	5.49	-24.39
30.5479	38	-80	11.59	-24.39
30.5532	40	-78	12.20	-23.78
30.5673	22	-69	6.71	-21.04
30.5686	36	-88	10.98	-26.83
30.5686	22	-64	6.71	-19.51
30.5690	20	-52	6.10	-15.85
30.5703	18	-50	5.49	-15.24
30.5716	29	-91	8.84	-27.74
30.5716	16	-48	4.88	-14.63
30.5725	16	-74	4.88	-22.56
30.5733	34	-92	10.37	-28.05
30.5733	16	-73	4.88	-22.26
30.5737	27	-55	8.23	-16.77
30.5742	18	-72	5.49	-21.95
30.5759	23	-64	7.01	-19.51
30.5772	17	-63	5.18	-19.21
30.5780	16	-67	4.88	-20.43
30.5789	18	-58	5.49	-17.68
30.5793	24	-55	7.32	-16.77
30.5836	23	-62	7.01	-18.90
30.5864	40	-82	12.20	-25.00
30.5915	40	-82	12.20	-25.00
30.6048	40	-80	12.20	-24.39
30.6183	40	-60	12.20	-18.29
30.6250	40	-67	12.20	-20.43
30.6294	36	-76	10.98	-23.17
30.6361	41	-80	12.50	-24.39
30.6411	38	-80	11.59	-24.39

30.6693	41	-66	12.50	-20.12
30.6709	38	-70	11.59	-21.34
30.6714	40	-46	12.20	-14.02
30.6786	24	-66	7.32	-20.12
30.6923	22	-68	6.71	-20.73
30.6925	19	-70	5.79	-21.34
30.6926	38	-67	11.59	-20.43
30.6928	24	-64	7.32	-19.51
30.6991	24	-44	7.32	-13.41
30.7082	38	-68	11.59	-20.73
30.7098	33	-58	10.06	-17.68
30.7105	32	-56	9.76	-17.07
30.7116	36	-62	10.98	-18.90
30.7137	40	-68	12.20	-20.73
30.7152	29	-68	8.84	-20.73
30.7157	28	-64	8.54	-19.51
30.7160	39	-72	11.89	-21.95
30.7206	38	-70	11.59	-21.34
30.7361	40	-66	12.20	-20.12
30.7373	42	-68	12.80	-20.73
30.7444	40	-64	12.20	-19.51
30.7449	38	-67	11.59	-20.43
30.7484	42	-42	12.80	-12.80
30.7498	44	-52	13.41	-15.85
30.7521	39	-54	11.89	-16.46
30.7583	34	-54	10.37	-16.46
30.7598	46	-37	14.02	-11.28
30.7658	40	-50	12.20	-15.24
30.7665	28	-50	8.54	-15.24
30.7685	42	-58	12.80	-17.68
30.7717	44	-53	13.41	-16.16
30.7887	44	-54	13.41	-16.46

31.0873	36	-15	10.98	-4.57
31.1031	44	-21	13.41	-6.40
31.1149	55	-33	16.77	-10.06
31.3811	42	-41	12.80	-12.50
31.3883	38	-41	11.59	-12.50
31.3889	49	-5	14.94	-1.52
31.3930	37	-39	11.28	-11.89
31.3944	37	-57	11.28	-17.38
31.3958	41	-34	12.50	-10.37
31.3962	41	-40	12.50	-12.20
31.4027	41	-41	12.50	-12.50
31.4080	39	-47	11.89	-14.33
31.4098	42	-42	12.80	-12.80
31.4167	36	-42	10.98	-12.80
31.4181	38	-35	11.59	-10.67
31.4185	37	-36	11.28	-10.98
31.4284	48	-22	14.63	-6.71
31.4676	67	-26	20.43	-7.93
31.4701	63	-31	19.21	-9.45
31.4733	64	-31	19.51	-9.45
31.4758	64	-17	19.51	-5.18
31.4786	60	-5	18.29	-1.52
31.4808	58	-21	17.68	-6.40
31.4840	56	6	17.07	1.83
31.4865	58	-3	17.68	-0.91
31.4868	57	-48	17.38	-14.63
31.4925	60	-14	18.29	-4.27
31.4947	61	2	18.60	0.61
31.5708	59	-48	17.99	-14.63
31.5794	39	-7	11.89	-2.13
31.5812	52	-15	15.85	-4.57
31.5962	55	-24	16.77	-7.32

31.6463	42	4	12.80	1.22
31.6856	39	-4	11.89	-1.22
31.7064	60	-14	18.29	-4.27
31.7378	44	-12	13.41	-3.66
31.8183	72	-16	21.95	-4.88
31.9829	60	-16	18.29	-4.88
32.2260	83	21	25.30	6.40
32.4318	78	32	23.78	9.76
32.4380	74	26	22.56	7.93
32.4401	60	22	18.29	6.71
32.4818	64	13	19.51	3.96
32.4839	60	28	18.29	8.54
32.4839	66	38	20.12	11.59
32.4846	52	16	15.85	4.88
32.4850	56	33	17.07	10.06
32.4850	55	30	16.77	9.15
32.4889	64	35	19.51	10.67
32.4893	64	34	19.51	10.37
32.5061	80	12	24.39	3.66
32.5486	84	34	25.61	10.37
32.5486	84	46	25.61	14.02
32.5490	85	45	25.91	13.72
32.5558	87	30	26.52	9.15
32.6511	76	37	23.17	11.28
32.6848	87	44	26.52	13.41
32.6908	83	36	25.30	10.98
32.6982	85	42	25.91	12.80
32.7310	95	50	28.96	15.24
32.7594	94	69	28.66	21.04
32.7641	96	70	29.27	21.34
32.7668	100	67	30.49	20.43
32.7705	91	63	27.74	19.21

32.8083	96	50	29.27	15.24
32.8190	99	60	30.18	18.29
32.8273	100	51	30.49	15.55
32.8287	95	54	28.96	16.46
32.8294	100	57	30.49	17.38
32.8330	90	69	27.44	21.04
32.8369	90	69	27.44	21.04
32.8383	95	60	28.96	18.29
32.8394	91	61	27.74	18.60
32.8419	95	70	28.96	21.34
32.8559	102	56	31.10	17.07
32.8562	96	61	29.27	18.60
32.8580	93	67	28.35	20.43
32.8584	100	60	30.49	18.29
32.8594	96	61	29.27	18.60
32.8598	91	63	27.74	19.21
32.8605	93	63	28.35	19.21
32.8605	93	69	28.35	21.04
32.8609	93	64	28.35	19.51
32.8627	84	52	25.61	15.85
32.8627	104	63	31.71	19.21
32.8698	93	54	28.35	16.46
32.8746	96	60	29.27	18.29
32.8780	93	53	28.35	16.16
32.8830	97	52	29.57	15.85
32.8888	95	54	28.96	16.46
32.8902	103	63	31.40	19.21
32.9020	100	80	30.49	24.39
32.9044	100	79	30.49	24.09
32.9045	102	65	31.10	19.82
32.9074	100	72	30.49	21.95
32.9074	97	68	29.57	20.73

32.9274	105	56	32.01	17.07
32.9275	106	63	32.32	19.21
32.9288	101	73	30.79	22.26
32.9563	106	66	32.32	20.12
32.9574	105	69	32.01	21.04
32.9603	106	67	32.32	20.43
32.9635	101	69	30.79	21.04
32.9721	103	68	31.40	20.73
32.9775	97	65	29.57	19.82
33.0050	111	67	33.84	20.43
33.0261	111	72	33.84	21.95
33.0361	100	71	30.49	21.65
33.0372	102	76	31.10	23.17
33.0376	102	72	31.10	21.95
33.0376	102	66	31.10	20.12
33.0397	108	71	32.93	21.65
33.0415	110	68	33.54	20.73
33.0494	106	74	32.32	22.56
33.0579	98	67	29.88	20.43
33.0604	104	53	31.71	16.16
33.0610	114	84	34.76	25.61
33.0662	99	73	30.18	22.26
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33.2302	120	82	36.59	25.00
33.2449	124	83	37.80	25.30
33.2700	118	83	35.98	25.30
33.2707	110	67	33.54	20.43
33.2721	112	72	34.15	21.95
33.2735	115	69	35.06	21.04
33.2753	116	70	35.37	21.34
33.2901	118	83	35.98	25.30
33.2949	116	73	35.37	22.26

33.5240	120	86	36.59	26.22
33.5254	106	81	32.32	24.70
33.5254	116	80	35.37	24.39
33.5261	120	83	36.59	25.30
33.5265	121	98	36.89	29.88
33.5268	120	75	36.59	22.87
33.5268	120	86	36.59	26.22
33.5279	119	75	36.28	22.87
33.5304	115	82	35.06	25.00
33.5379	115	82	35.06	25.00
33.5433	118	86	35.98	26.22
33.5476	118	86	35.98	26.22
33.5873	141	104	42.99	31.71
33.5919	138	110	42.07	33.54
33.5930	133	101	40.55	30.79
33.5955	140	110	42.68	33.54
33.6005	137	106	41.77	32.32
33.6316	143	115	43.60	35.06
33.7096	135	105	41.16	32.01
33.8091	147	117	44.82	35.67
33.8305	165	135	50.30	41.16
33.8337	158	118	48.17	35.98
33.8390	148	128	45.12	39.02
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33.8665	157	126	47.87	38.41
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33.8814	146	130	44.51	39.63
33.8821	149	120	45.43	36.59
33.8846	163	137	49.70	41.77
33.8896	166	136	50.61	41.46
33.8999	155	116	47.26	35.37

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34.1067	179	139	54.57	42.38
34.1516	194	158	59.15	48.17
34.1609	198	172	60.37	52.44
34.2788	195	167	59.45	50.91
34.2863	195	161	59.45	49.09
34.3041	195	165	59.45	50.30
34.3116	196	167	59.76	50.91
34.3280	193	159	58.84	48.48
34.3458	200	163	60.98	49.70
34.3511	197	175	60.06	53.35
34.3590	199	177	60.67	53.96
34.3604	195	158	59.45	48.17
34.3900	197	160	60.06	48.78
34.3927	182	153	55.49	46.65
34.4213	192	162	58.54	49.39
34.4402	217	193	66.16	58.84
34.5411	203	166	61.89	50.61
34.5751	195	155	59.45	47.26
34.6318	210	183	64.02	55.79
34.6499	228	183	69.51	55.79
34.7133	235	204	71.65	62.20
34.7553	231	196	70.43	59.76
34.8052	232	196	70.73	59.76
33.8319	160	122	48.78	37.20