Goldstein, H.L., Springer, K.B., Pigati, J.S., Reheis, M.C., Skipp, G.L., 2021, Aeolian sediments in paleowetland deposits of the Las Vegas Formation. *Quaternary Research*.

Captions for the Supplemental Information

Supplemental Figure 1. (A) Plot of low frequency magnetic susceptibility (MS) values for untreated Las Vegas Formation (LVF) bulk sediments (LVF_b) and LVF sediments after carbonate minerals had been removed (LVF_{cr}). (B) Box and whiskers plot based on the same MS data. Boxes represent the likely range of variation (known as the interquartile range, or IQR), which is defined by the first quartile (lower limit) and third quartile (upper limit). Median values are shown by horizontal lines within each colored box, whereas the full range of values are depicted by the whiskers. Outliers (defined as either 3×IQR or more above the third quartile or 3×IQR or more below the first quartile) are shown as filled circles. We note that the HCl treatments prior to measurement of MS typically lasted for hours to days, depending on the size and carbonate percent of the sediments. One concern in treating the samples with acid for such an extended period of time is that the treatment might affect the magnetic properties of the sediments via dissolution or chemical alteration. Although additional observations and measurements are needed to definitively determine whether magnetic particles were affected by the pretreatment, comparison of the MS values of untreated aliquots and treated, or carbonate-free, aliquots from the same samples show that in nearly all cases, the HCl treatment enhanced the MS values. Removal of carbonates during the HCl treatments therefore resulted in a higher proportion of the magnetic component in the resulting material, whether or not some magnetite was dissolved.

Supplemental Table 1. Table summarizing the particle size analysis (PSA) data for the LVF and alluvial sediments.

Supplemental Figure 2. Plots of PSA data for the LVF sediments compared to the (A) age and (B) hydrologic setting of the sampled units (after Springer et al., 2018; also see Table 1).

Supplemental Table 2. Table summarizing the semi-quantitative mineral abundances (in volume percent) of carbonate and non-carbonate minerals of the LVF sediments based on X-ray diffraction (XRD). Note that the presence of trace amounts of minerals not included in the totals can cause the summed values to be slightly less than 100%.

Supplemental Figure 3. Plots of XRD data for the LVF sediments compared to the (A) age and (B) hydrologic setting of the sampled units (after Springer et al., 2018; also see Table 1).

Supplemental Table 3. Table summarizing the low frequency magnetic susceptibility (MS) data for the LVF and alluvial sediments.

Supplemental Figure 4. Plots of the low frequency MS data for the LVF sediments compared to the (A) age and (B) hydrologic setting of the sampled units (after Springer et al., 2018; also see Table 1).

Supplemental Figure 5. Photomicrographs of magnetic minerals present in the LVF sediments. (A) An ~40 µm titanomagnetite grain (magnetite with ilmenite lamellae) from sample 13MS3-11.1 (U), and (B) An ~35 µm magnetite grain (darker) from sample OSL 8 with ilmenite and hematite (lighter) on the left and an ~40 µm ilmenohematite grain on the right, where ilmenite is darker and hematite is lighter.

Supplemental Table 4. Table summarizing the major and trace element geochemistry data for the LVF and alluvial sediments.

Supplemental Figures 6-12. Plots of the major and trace element geochemistry data for the LVF sediments compared to the (A) age and (B) hydrologic setting of the sampled units (after Springer et al., 2018; also see Table 1).

Supplemental Figure 6: K/Rb
Supplemental Figure 7: K/Ba
Supplemental Figure 8: Ca+Mg %
Supplemental Figure 9: Al+Fe %
Supplemental Figure 10: Si %
Supplemental Figure 11: Fe %
Supplemental Figure 12: Ti %

Supplemental Figure 13. Summary of parameters and results for the systems of equations calculations.

Supplemental Figure 14. Photomicrographs showing carbonate minerals present in sample 10CM3-11.1, which are typical of the LVF sediments. (A) Grain of authigenic groundwater carbonate measuring ~450 µm in the long dimension in the LVF sediments. Note that areas that were etched during the acid treatment are visible around the edges and in the center of the carbonate grain. (B) Sparry calcite measuring ~240 µm in the long dimension. (C) Sparry calcite measuring ~150 µm in the long dimension under crossed nicols that exhibits the characteristic birefringence pattern of calcite. For both (B) and (C), we interpret the rounded nature of the grains to indicate aeolian transport into the Las Vegas Valley wetland system.

References for the Supplemental Information

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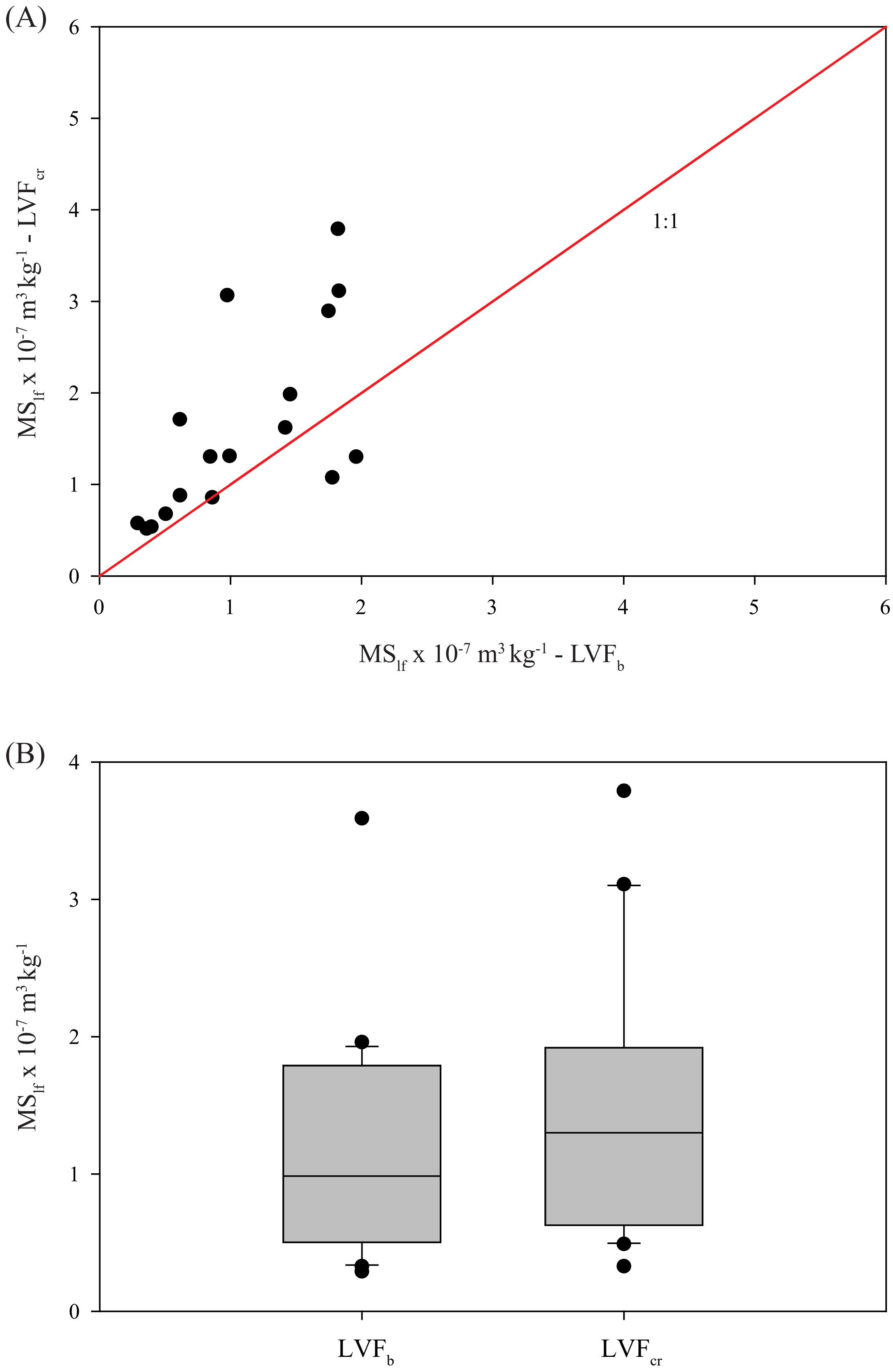
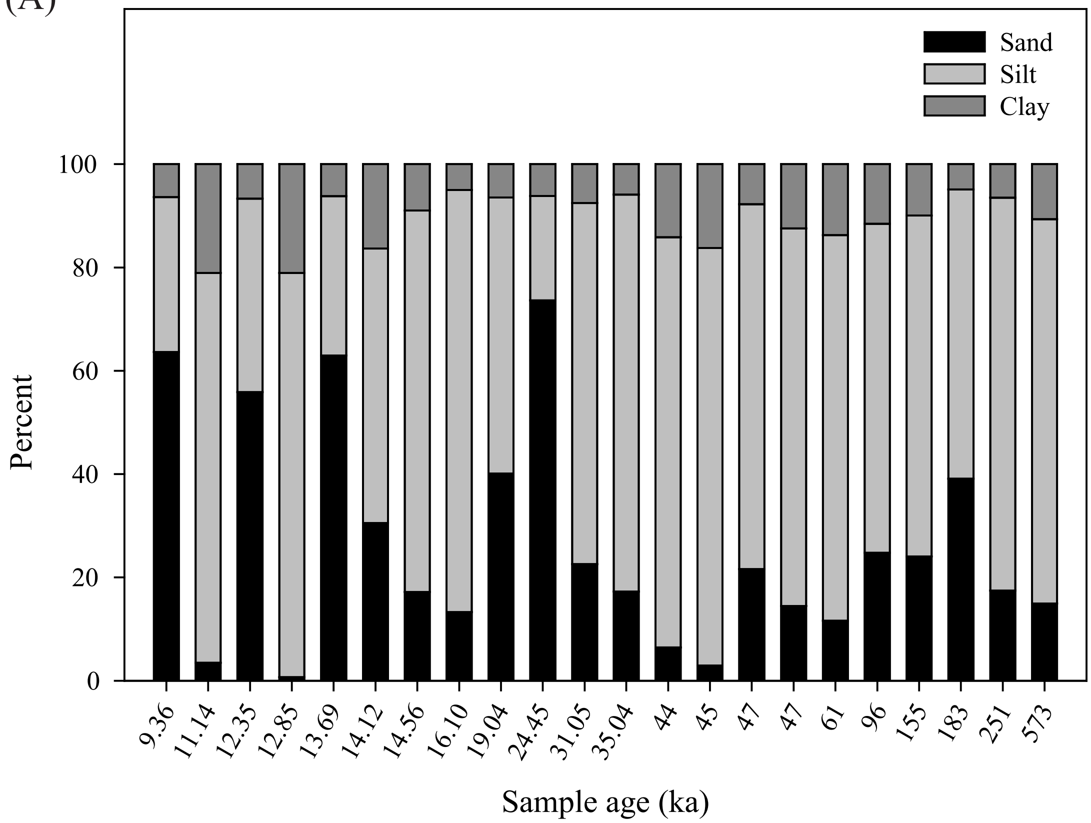
Reheis, M.C., Budahn, J.R., Lamothe, P.J., 2002. Geochemical evidence for diversity of dust sources in the southwestern United States. Geochimica et Cosmochimica Acta 66, 1569-1587, doi:1510.1016/S0016- 7037(1501)00864-X.

Springer, K.B., Pigati, J.S., Manker, C.R., Mahan, S.A., 2018. The Las Vegas Formation. U.S. Geological Survey Professional Paper 1839, 62 p., doi: 10.3133/pp1839.



Goldstein et al
Supplemental Figure 1

(A)



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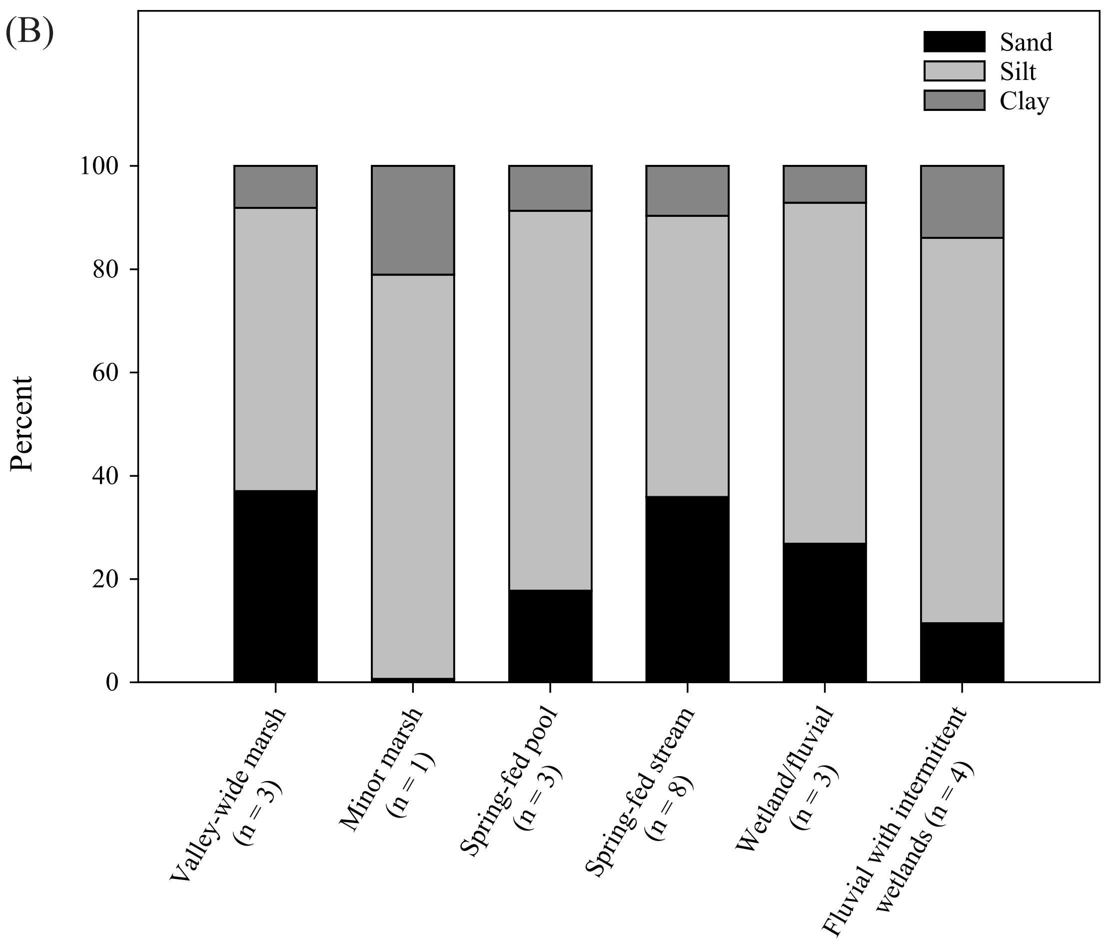
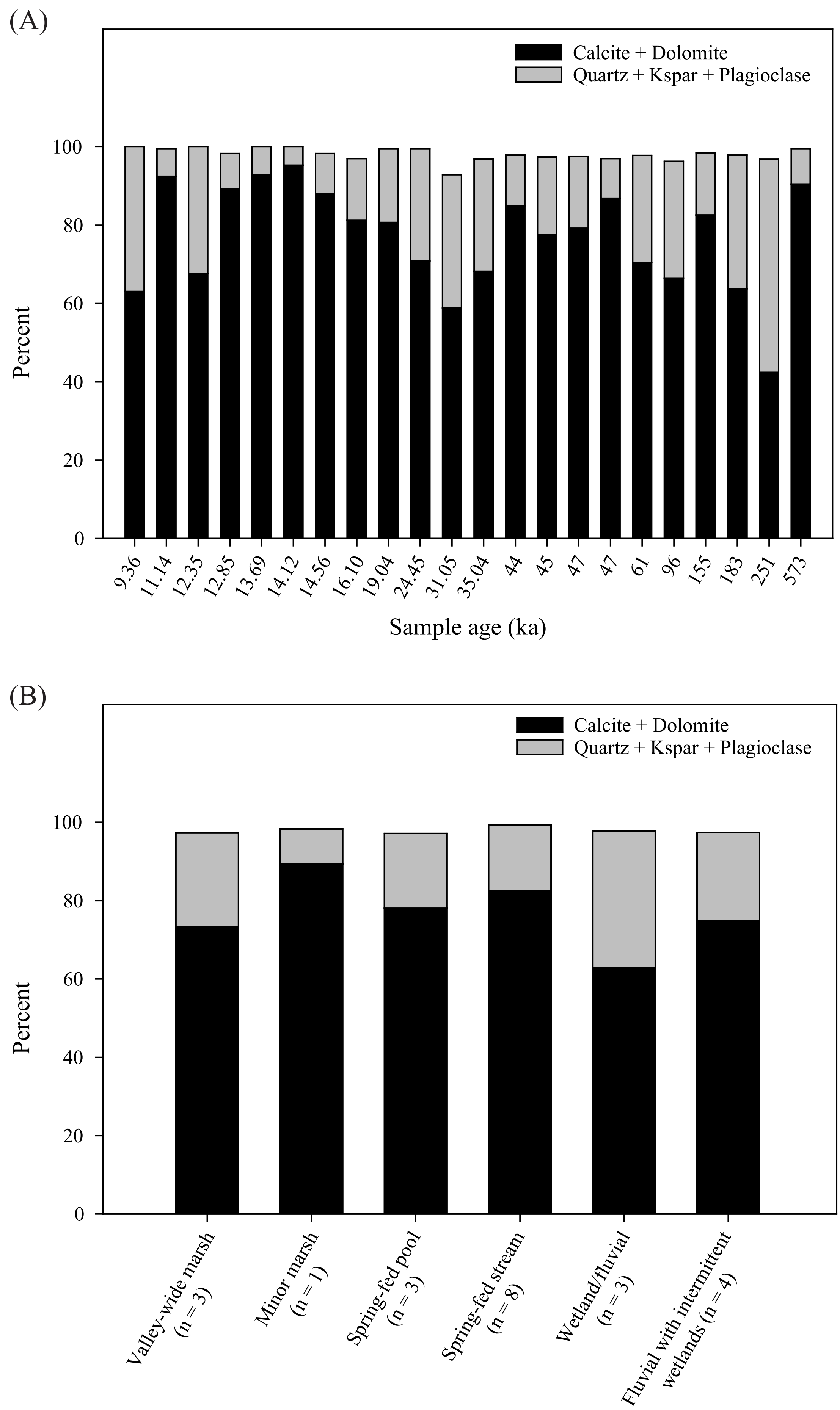
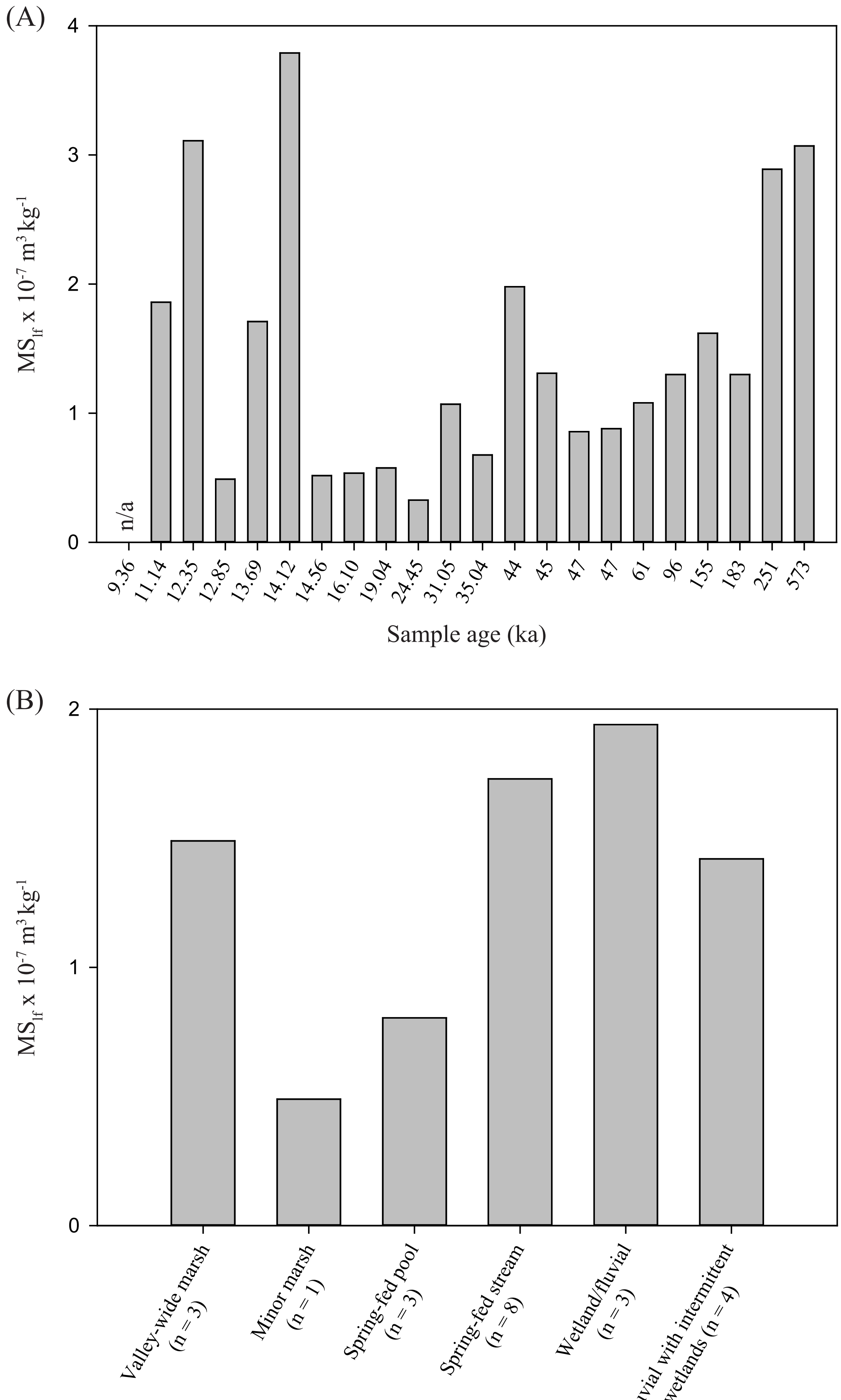


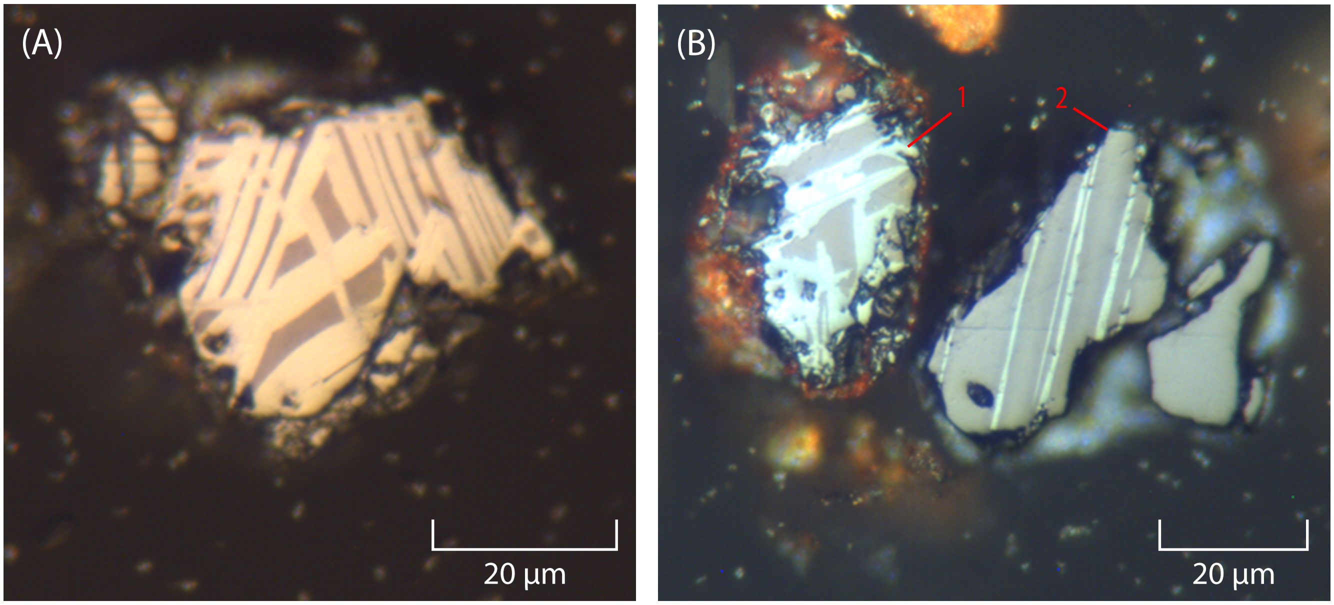
Goldstein et al
Supplemental Figure 2



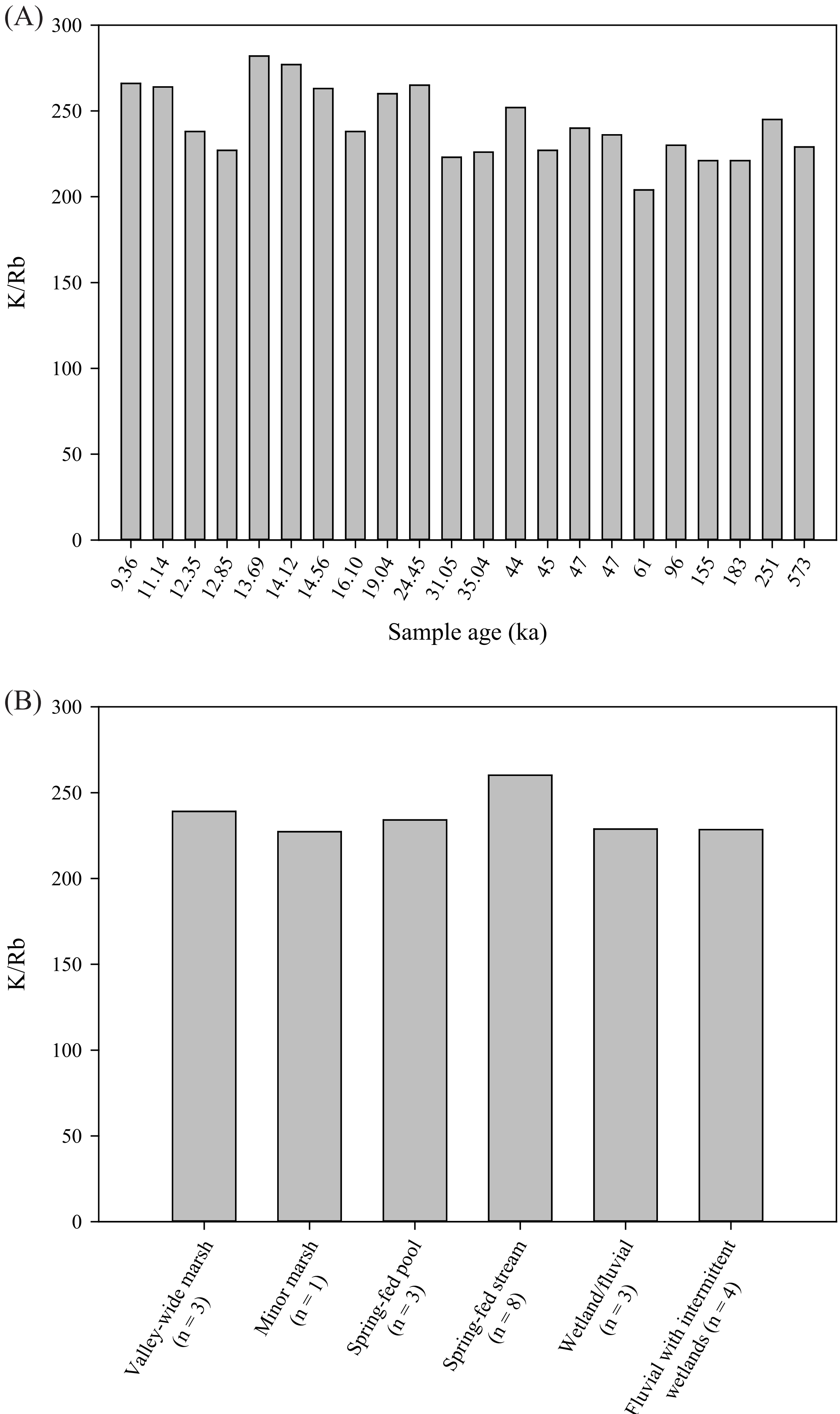
Goldstein et al
Supplemental Figure 3



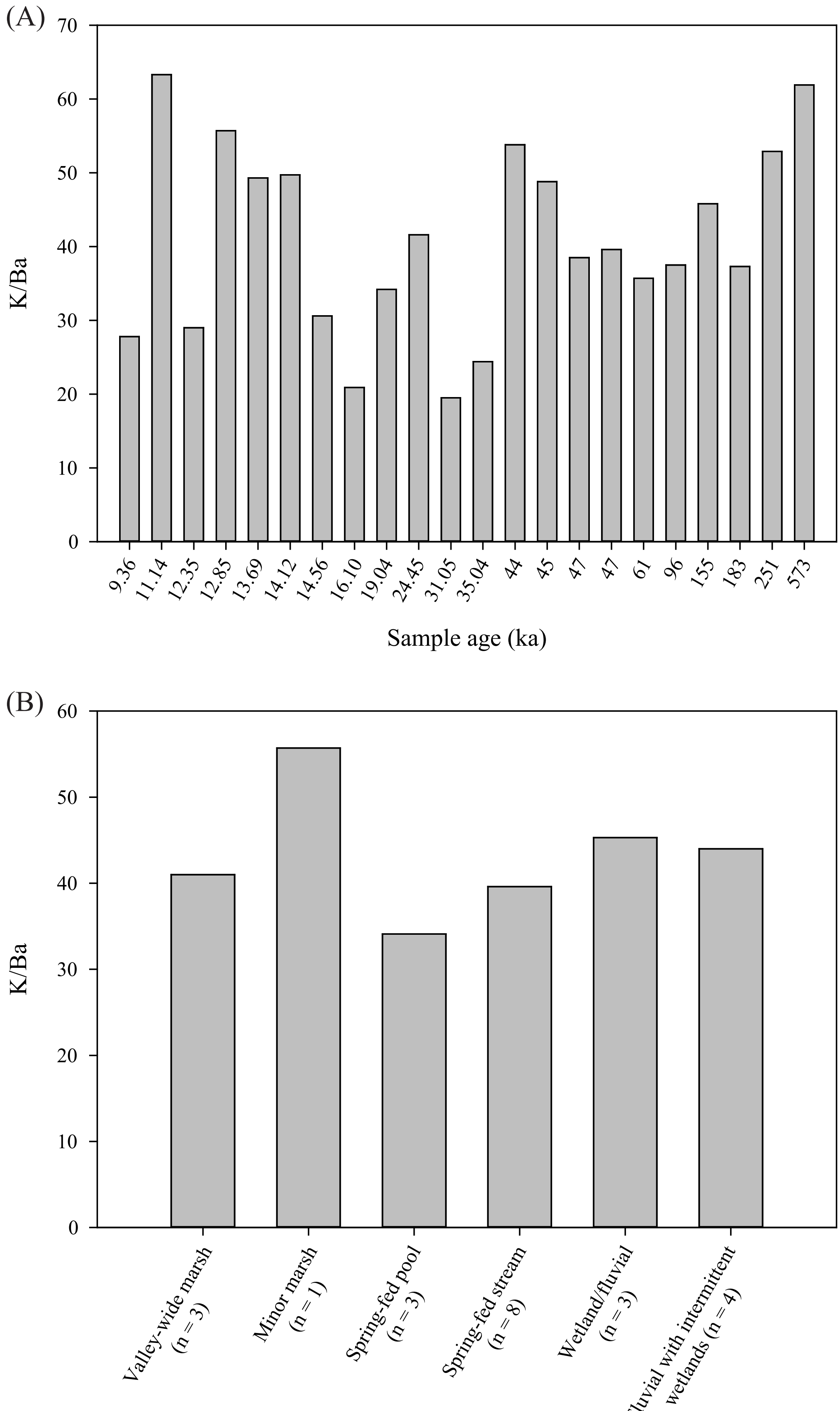
Goldstein et al
Supplemental Figure 4



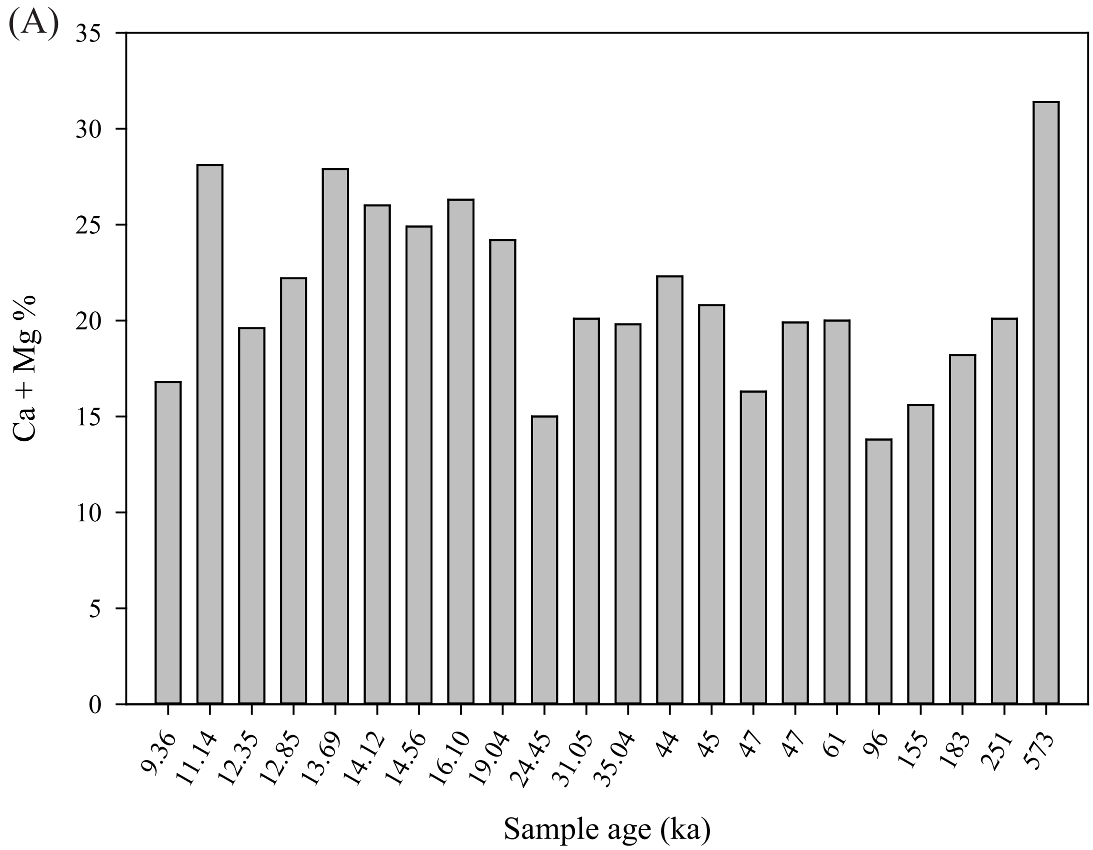
Goldstein et al
Supplemental Figure 5

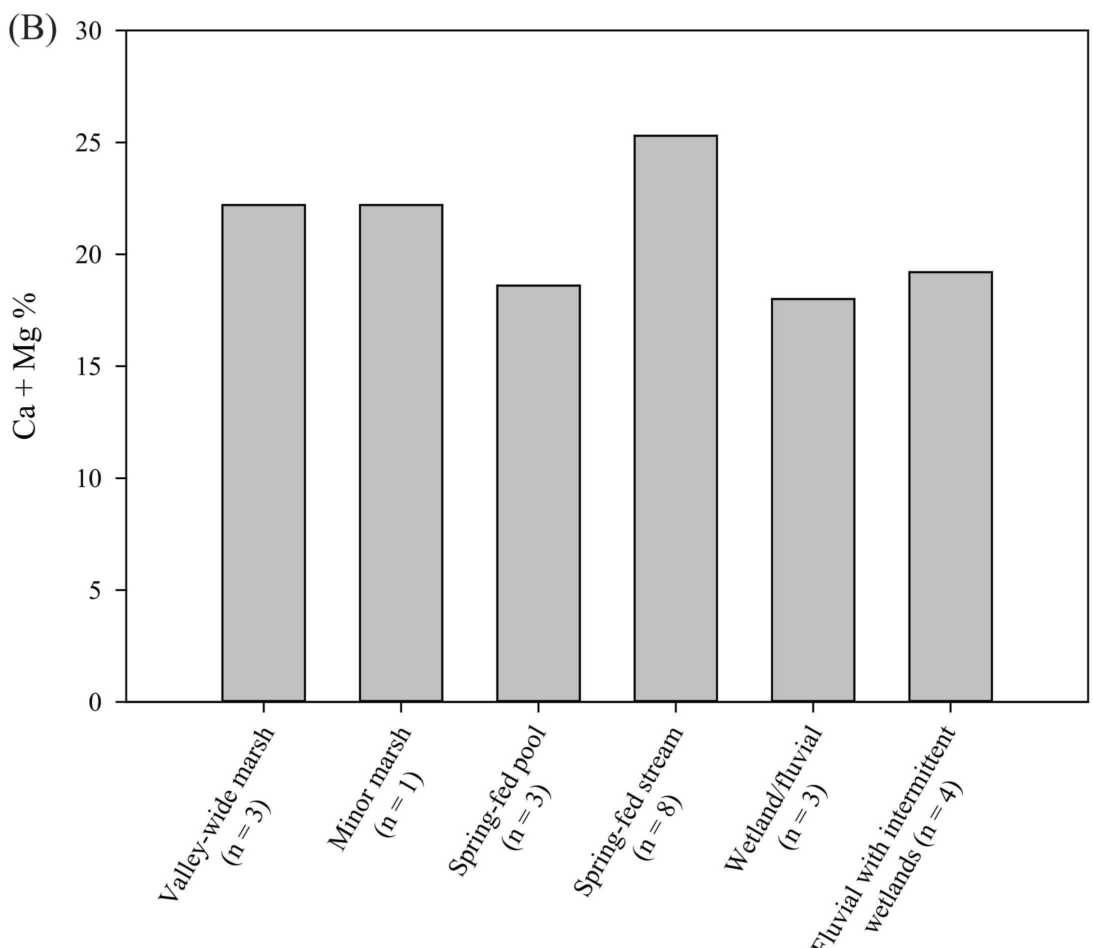


Goldstein et al
Supplemental Figure 6



Goldstein et al
Supplemental Figure 7





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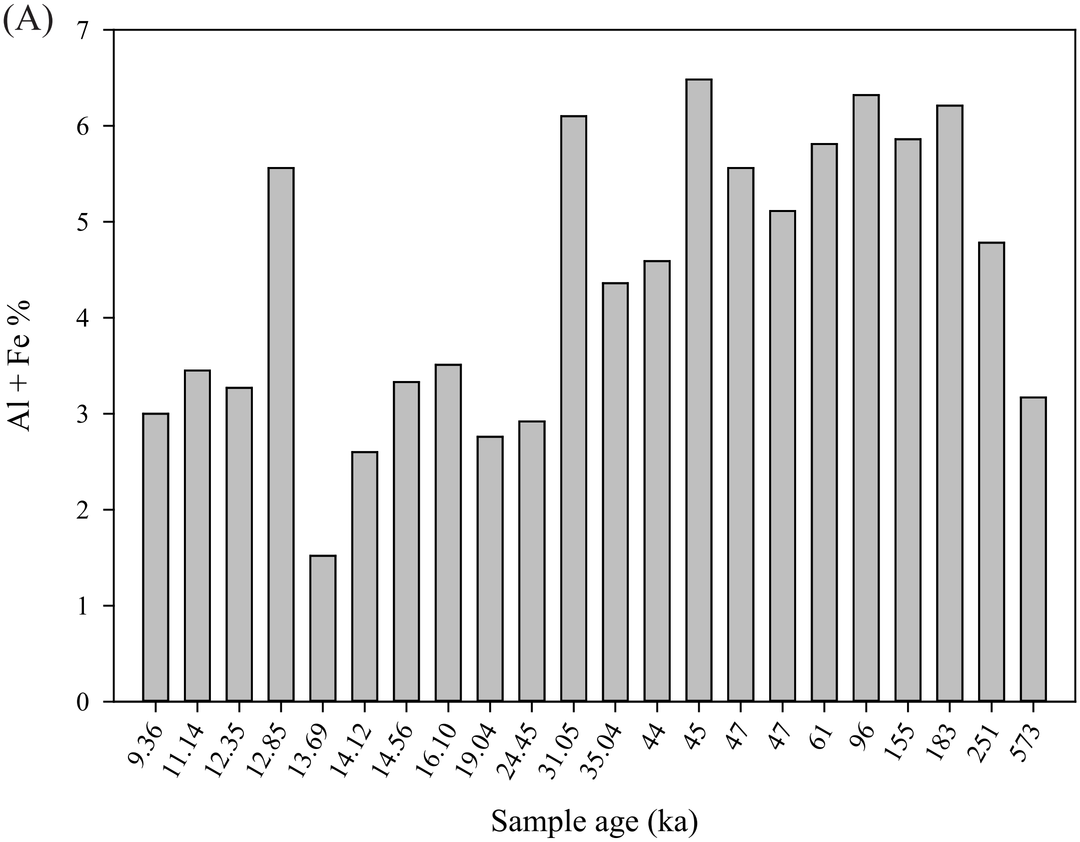
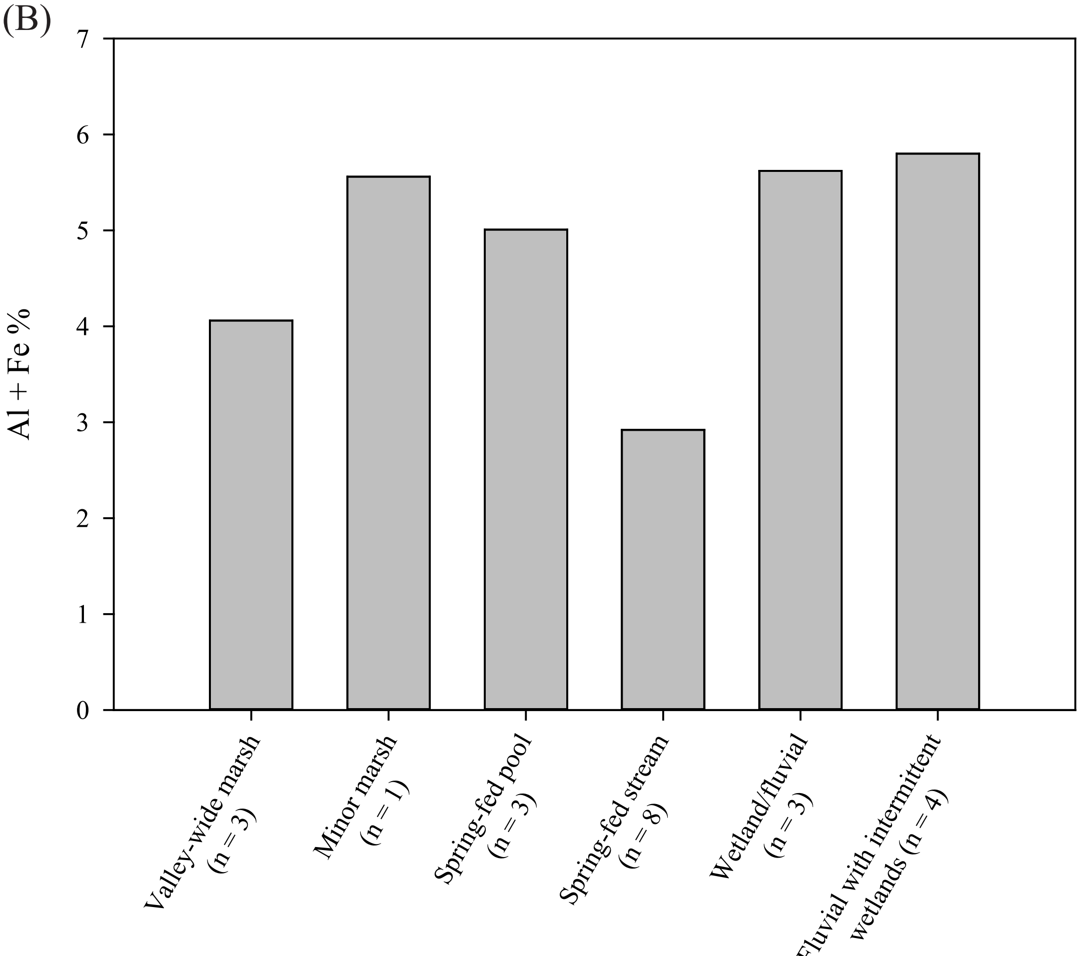
Supplemental Figure 8

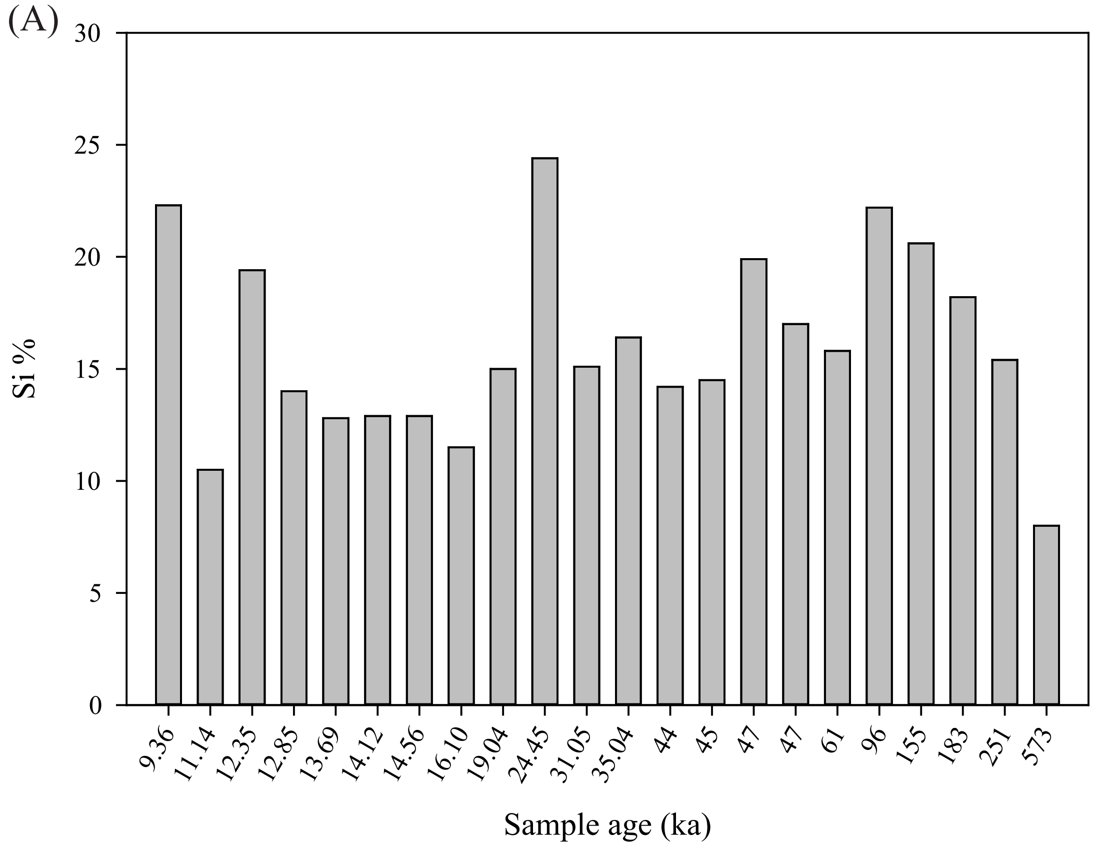
(A)

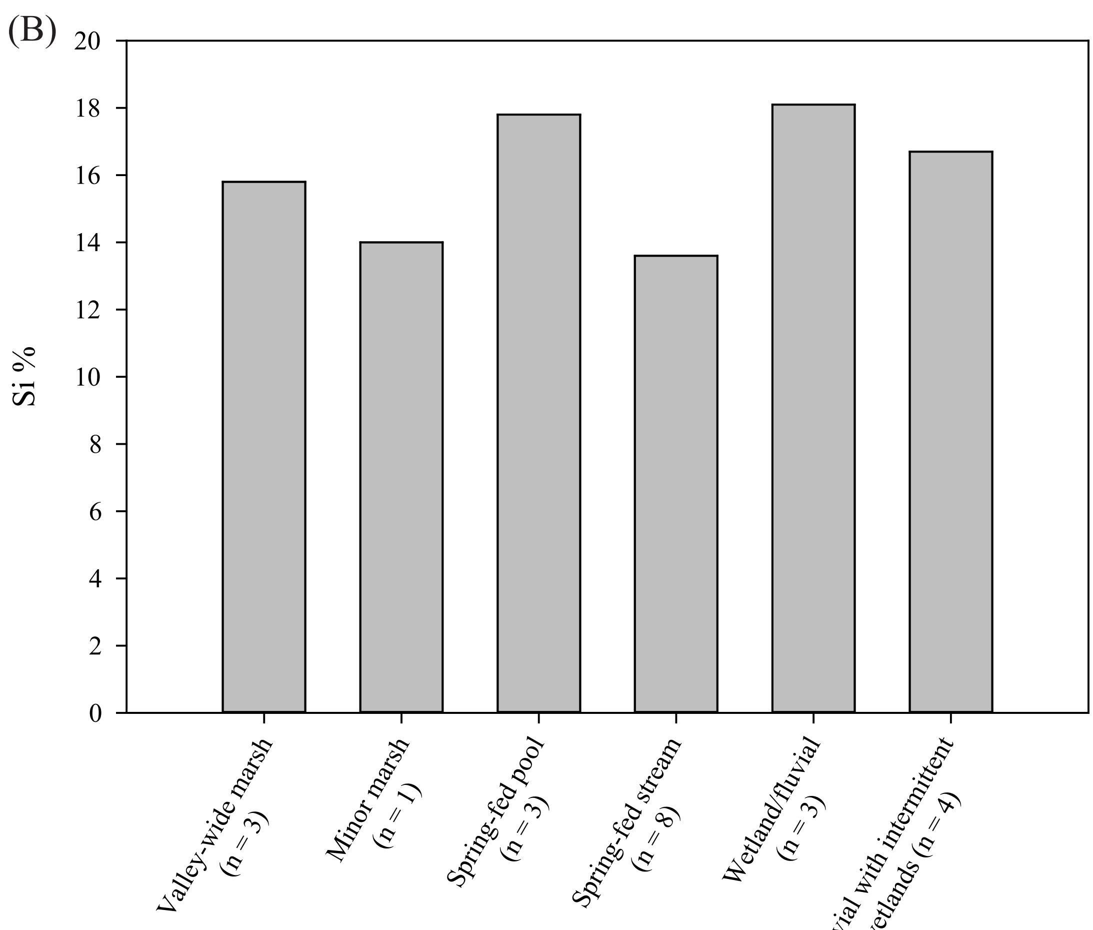


(B)



Goldstein et al
Supplemental Figure 9





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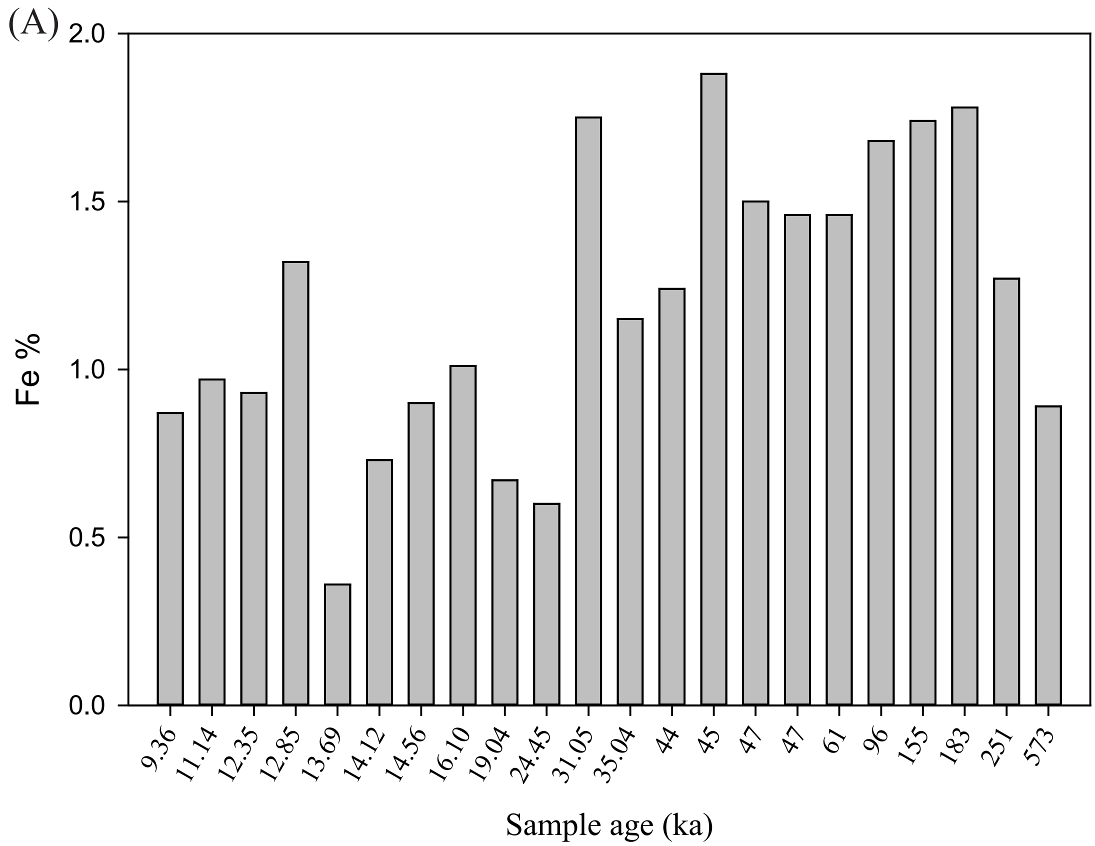
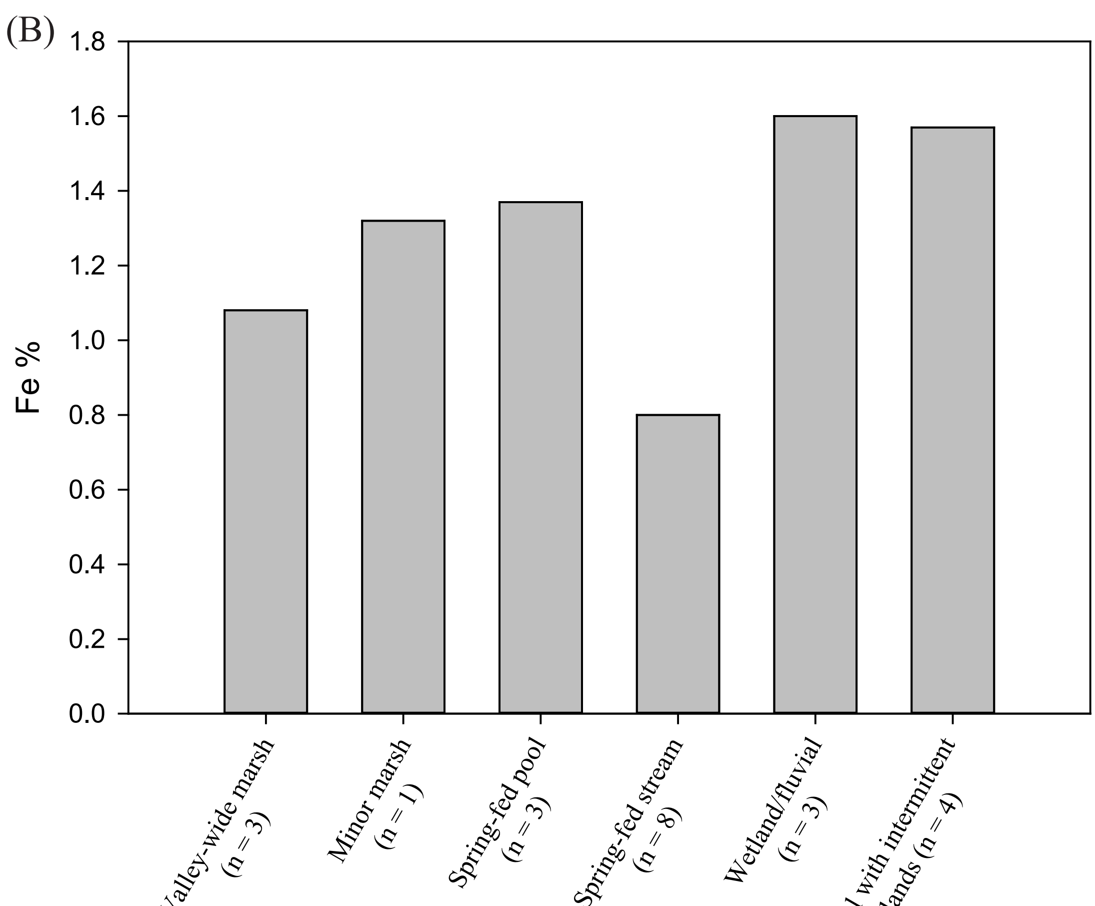
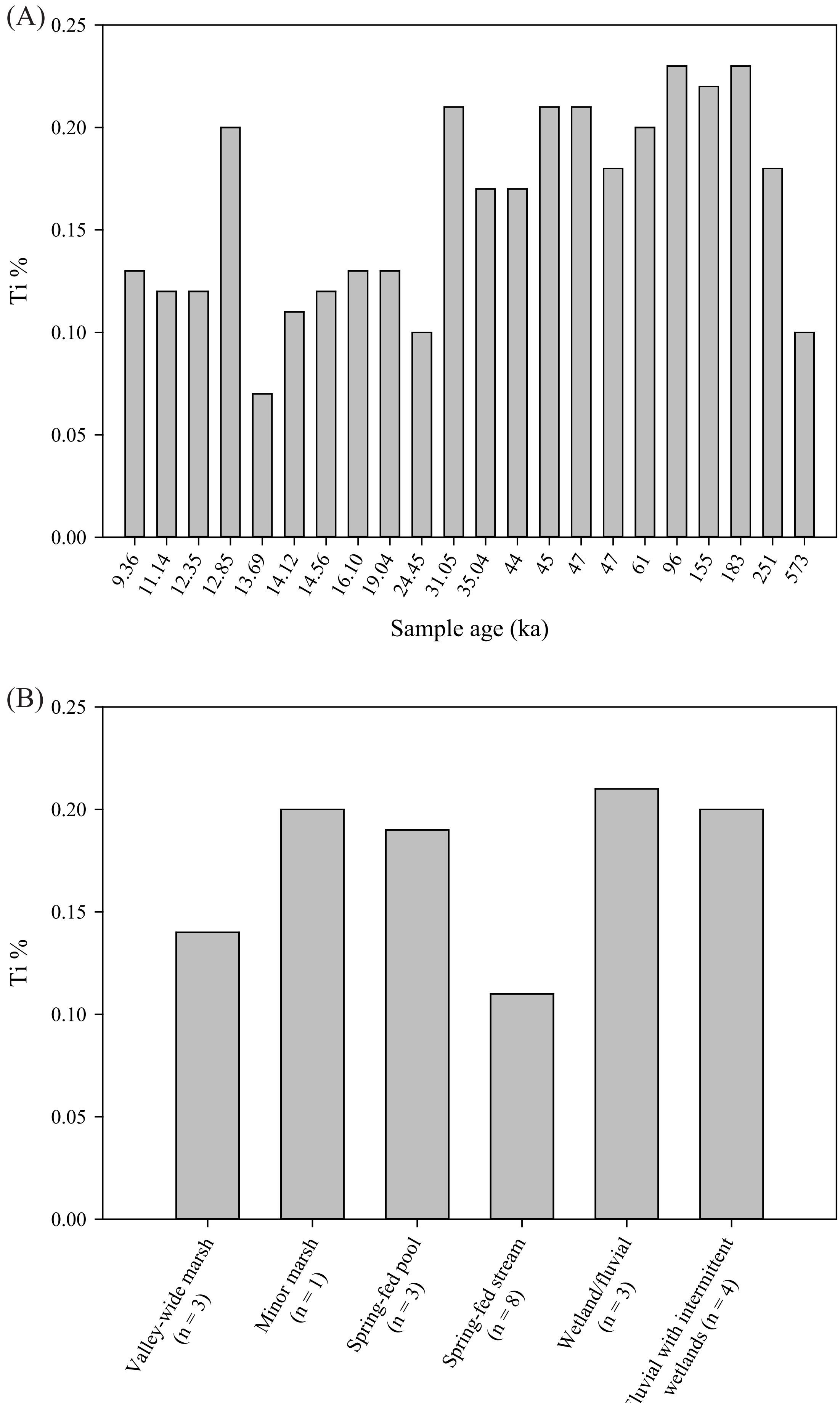
Supplemental Figure 10





Goldstein et al
Supplemental Figure 11



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Supplemental Figure 12

Supplemental Figure 13 – Results of systems of equations calculations[1]

a = *aeolian carbonates*
b = *aeolian non-carbonates*
c = *non-aeolian carbonates*
d = *non-aeolian non-carbonates*

Mean values (77% carbonates, 23% non-carbonates)

Input:
a + c = 0.77
b + d = 0.23
19 x d = c
3 x a = b

Result:
a = 6.4%, b = 19.3%, c = 70.6%, d = 3.7%

Lower end-member (74% carbonates, 26% non-carbonates)

Input:
a + c = 0.74
b + d = 0.26
19 x d = c
3 x a = b

Result:
a = 7.5%, b = 22.5%, c = 66.5%, d = 3.5%

Upper end-member (80% carbonates, 20% non-carbonates)

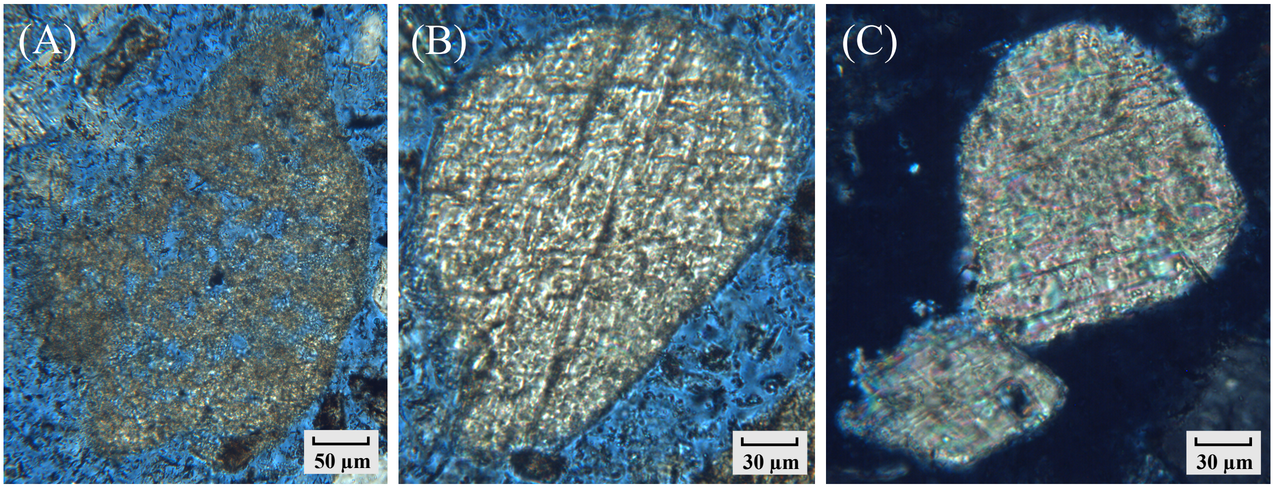
Input:
a + c = 0.80
b + d = 0.20
19 x d = c
3 x a = b

Result:
a = 5.4%, b = 16.1%, c = 74.6%, d = 3.9%

[1] Equations were solved simultaneously using WolframAlpha's Systems of Equations Calculator, *https://www.wolframalpha.com*, accessed online 1/8/21. Uncertainties for each parameter were calculated as the difference between the mean value and either the lower or upper end-member value, whichever is greater.

Supplemental Figure 13 (cont'd)

Sample #	carbonate %[1]	non-carbonate %	aeolian carbonates %	aeolian non-carbonates %	non-aeolian carbonates %	non-aeolian non-carbonates %
18KS6-14.3	63.10	36.90	11.4	34.2	51.7	2.7
LVV-X-5	92.40	7.60	0.9	2.8	91.5	4.8
10CM3-11.1	67.60	32.40	9.8	29.4	57.8	3.0
LVV-X-7	89.40	10.60	2.0	6.0	87.4	4.6
03KS9-23.1	92.90	7.10	0.8	2.3	92.2	4.9
13MS3-11.1 (U)	95.20	4.80	0.1	0.2	94.7	5.0
10CM3-18.1a	88.00	12.00	2.5	7.5	85.5	4.5
10CM3-18.1b	81.20	18.80	4.9	14.8	76.3	4.0
10CM6-30-H-C1	80.70	19.30	5.1	15.3	75.6	4.0
04MRR1-22.2	70.90	29.10	8.6	25.8	62.3	3.3
11CM12-20.2c	58.90	41.10	12.9	38.7	46.0	2.4
09KS2-12.1	68.20	31.80	9.6	28.7	58.6	3.1
OSL10	84.90	15.10	3.6	10.8	81.3	4.3
OSL7	77.50	22.50	6.3	18.8	71.3	3.8
OSL9	79.20	20.80	5.6	16.9	73.6	3.9
OSL6	86.80	13.20	2.9	8.8	83.9	4.4
OSL8	70.50	29.50	8.8	26.3	61.8	3.3
OSL5	66.40	33.60	10.2	30.6	56.2	3.0
OSL2	82.60	17.40	4.4	13.3	78.2	4.1
OSL4	63.80	36.20	11.1	33.4	52.7	2.8
OSL1	42.40	57.60	18.8	56.4	23.6	1.2
OSL3	90.40	9.60	1.6	4.9	88.8	4.7



Goldstein et al
Supplemental Figure 14

Supplemental Table 1

Summary of particle size data.

Sample #	Sample Type	Sand %	Silt %	Clay %	Source
18KS6-14.3	LVF sediments	63.64	29.99	6.37	this study
LVV-X-5	LVF sediments	3.48	75.45	21.07	this study
10CM3-11.1	LVF sediments	55.87	37.45	6.68	this study
LVV-X-7	LVF sediments	0.68	78.26	21.06	this study
03KS9-23.1	LVF sediments	62.97	30.83	6.21	this study
13MS3-11.1 (U)	LVF sediments	30.50	53.15	16.34	this study
10CM3-18.1a	LVF sediments	17.17	73.85	8.98	this study
10CM3-18.1b	LVF sediments	13.29	81.72	5.00	this study
10CM6-30-H-C1	LVF sediments	40.11	53.42	6.47	this study
04MRR1-22.2	LVF sediments	73.62	20.23	6.16	this study
11CM12-20.2c	LVF sediments	22.55	69.90	7.54	this study
09KS2-12.1	LVF sediments	17.25	76.86	5.89	this study
OSL10	LVF sediments	6.46	79.39	14.15	this study
OSL7	LVF sediments	2.95	80.81	16.24	this study
OSL9	LVF sediments	21.61	70.65	7.74	this study
OSL6	LVF sediments	14.46	73.10	12.44	this study
OSL8	LVF sediments	11.61	74.66	13.73	this study
OSL5	LVF sediments	24.77	63.67	11.57	this study
OSL2	LVF sediments	24.05	65.99	9.96	this study
OSL4	LVF sediments	39.11	56.01	4.88	this study
OSL1	LVF sediments	17.43	76.07	6.50	this study
OSL3	LVF sediments	14.96	74.40	10.64	this study
CC-1	Alluvium (≤2 mm)	98.48	1.52	0.00	this study
CC-2	Alluvium (≤2 mm)	89.32	8.67	2.01	this study
CC-3	Alluvium (≤2 mm)	97.92	2.08	0.00	this study
CC-4	Alluvium (≤2 mm)	99.55	0.40	0.05	this study
GS-1	Alluvium (≤2 mm)	100.00	0.00	0.00	this study
GS-2	Alluvium (≤2 mm)	94.13	5.66	0.21	this study
H160-1	Alluvium (≤2 mm)	95.85	3.61	0.54	this study
HG-1	Alluvium (≤2 mm)	81.26	14.55	4.19	this study
HG-2	Alluvium (≤2 mm)	90.65	7.38	1.98	this study
HG-3A	Alluvium (≤2 mm)	89.27	7.34	3.39	this study
HG-3B	Alluvium (≤2 mm)	88.32	9.39	2.29	this study
HG-4	Alluvium (≤2 mm)	90.68	5.22	4.10	this study
HG-5	Alluvium (≤2 mm)	48.88	27.14	23.98	this study
KC-1	Alluvium (≤2 mm)	96.09	3.62	0.30	this study
KC-2	Alluvium (≤2 mm)	96.03	3.02	0.95	this study
KC-3	Alluvium (≤2 mm)	86.16	10.34	3.49	this study
LC-1	Alluvium (≤2 mm)	79.08	17.27	3.64	this study
LC-2	Alluvium (≤2 mm)	93.95	4.74	1.31	this study
PS-1	Alluvium (≤2 mm)	63.94	30.95	5.11	this study

RRC-1	Alluvium (≤2 mm)	96.51	2.77	0.72	this study
RRC-2	Alluvium (≤2 mm)	99.80	0.20	0.00	this study
RRC-4	Alluvium (≤2 mm)	97.37	2.45	0.19	this study
RRC-6	Alluvium (≤2 mm)	91.97	6.73	1.30	this study
RRC-7	Alluvium (≤2 mm)	90.11	7.64	2.25	this study
T-16	Modern Dust Spring 05	16.44	68.26	15.31	this study
T-16	Modern Dust Fall 05	11.81	71.81	16.38	this study
T-16	Modern Dust Spring 06	15.77	73.79	10.44	this study
T-16	Modern Dust Fall 06	11.62	74.82	13.56	this study
T-16	Modern Dust Spring 07	14.85	74.93	10.23	this study
T-16	Modern Dust Fall 07	14.49	77.52	7.98	this study
T-16	Modern Dust Spring 08	5.88	71.28	22.84	this study
T-16	Modern Dust Fall 08	25.75	66.48	7.77	this study
T-16	Modern Dust Spring 09	21.23	72.18	6.59	this study
T-16	Modern Dust Fall 09	16.26	75.68	8.06	this study
T-16	Modern Dust Spring 10	13.48	76.89	9.63	this study
T-16	Modern Dust Fall 10	14.04	78.53	7.43	this study
T-16	Modern Dust Spring 11[1]	17.59	73.14	9.27	this study
T-16	Modern Dust Fall 11	14.04	78.53	7.43	this study
T-16	Modern Dust 1984-1985[1]	30.20	38.80	31.00	Reheis et al. (2002)
T-16	Modern Dust 1987-1988[1]	14.72	58.88	26.40	Reheis et al. (2002)
T-16	Modern Dust 1988-1989[1]	14.72	58.88	26.40	Reheis et al. (2002)
T-16	Modern Dust 1989-1991[1]	10.48	75.19	14.34	Reheis et al. (2002)
T-16	Modern Dust 1991-1993[1]	9.59	77.19	13.22	Reheis et al. (2002)
T-16	Modern Dust 1993-1995[1]	17.38	68.99	13.63	Reheis et al. (2002)
T-16	Modern Dust 1995-1997[1]	11.00	71.21	17.79	Reheis et al. (2002)
T-16	Modern Dust 1997-1999[1]	21.81	62.19	16.00	Reheis et al. (2002)
T-16,17,18[1]	Modern Dust 1985-1986[1]	13.81	34.04	52.15	Reheis et al. (2002)
T-16,17,18[1]	Modern Dust 1986-1987[1]	6.10	64.48	29.42	Reheis et al. (2002)
T-18	Modern Dust Spring 2005	14.10	69.14	16.77	this study
T-18	Modern Dust Fall 2005	9.63	78.90	11.48	this study
T-18	Modern Dust Spring 2006	15.18	77.35	7.48	this study
T-18	Modern Dust Fall 2006	16.45	76.82	6.73	this study
T-18	Modern Dust Spring 2007	12.53	78.54	8.93	this study
T-18	Modern Dust Fall 2007	7.44	84.08	8.48	this study
T-18	Modern Dust Spring 2008	8.64	73.72	17.65	this study
T-18	Modern Dust Fall 2008	17.23	74.01	8.76	this study
T-18	Modern Dust Spring 2009	18.50	73.05	8.44	this study
T-18	Modern Dust Fall 2009	12.00	79.06	8.94	this study
T-18	Modern Dust Spring 2010	18.87	73.19	7.94	this study
T-18	Modern Dust Fall 2010	8.23	83.87	7.90	this study
T-18	Modern Dust Spring 2011	16.85	74.82	8.33	this study
T-18	Modern Dust Fall 2011	8.23	83.87	7.90	this study
T-18	Modern Dust 1984-1985[1]	4.20	57.70	38.00	Reheis et al. (2002)

T-18	Modern Dust 1991-1993[1]	29.61	59.43	10.95	Reheis et al. (2002)
T-18	Modern Dust 1993-1995[1]	15.18	71.36	13.46	Reheis et al. (2002)
T-18	Modern Dust 1995-1997[1]	7.46	75.42	17.12	Reheis et al. (2002)
T-18	Modern Dust 1997-1999[1]	9.52	72.75	17.73	Reheis et al. (2002)
T-18, 18A	Modern Dust 1987-1988[1]	5.11	66.36	28.53	Reheis et al. (2002)
T-18, 18A	Modern Dust 1988-1989[1]	5.73	75.85	18.42	Reheis et al. (2002)
T-18, 18A	Modern Dust 1989-1991[1]	5.22	72.86	21.92	Reheis et al. (2002)
T-18A	Modern Dust Spring 2006	14.45	77.62	7.93	this study
T-18A	Modern Dust Fall 2006	18.32	70.88	10.79	this study
T-18A	Modern Dust Spring 2007	15.56	74.08	10.36	this study
T-18A	Modern Dust Fall 2007	26.14	64.92	8.94	this study
T-18A	Modern Dust Spring 2008	9.15	74.33	16.52	this study
T-18A	Modern Dust Fall 2008	18.71	73.10	8.19	this study
T-18A	Modern Dust Spring 2009	20.20	71.75	8.04	this study
T-18A	Modern Dust Fall 2009	15.93	75.01	9.06	this study
T-18A	Modern Dust Spring 2010	16.41	74.73	8.86	this study
T-18A	Modern Dust Fall 2010	12.30	78.60	9.10	this study
T-18A	Modern Dust Spring 2011	27.71	64.41	7.89	this study
T-18A	Modern Dust Fall 2011	12.30	78.60	9.10	this study
T-18A	Modern Dust 1991-1993[1]	7.84	73.18	18.98	Reheis et al. (2002)
T-18A	Modern Dust 1993-1995[1]	43.77	45.83	10.40	Reheis et al. (2002)
T-18A	Modern Dust 1995-1997[1]	22.34	65.37	12.29	Reheis et al. (2002)
T-18A	Modern Dust 1997-1999[1]	10.39	69.38	20.24	Reheis et al. (2002)
T-19	Modern Dust 1984-1985[1]	4.60	50.80	44.60	Reheis et al. (2002)
T-19	Modern Dust 1988-1989[1]	7.94	78.48	13.58	Reheis et al. (2002)

[1] Samples were combined to obtain enough mass for analysis. See Reheis et al. (2002) for details.

Supplemental Table 2

Summary of mineralogical data.

Sample #	Sample Type	Calcite + Dolomite %	Quartz + Kspar + Plagioclase %
18KS6-14.3	LVF sediments	63.10	36.90
LVV-X-5	LVF sediments	92.40	7.10
10CM3-11.1	LVF sediments	67.60	32.40
LVV-X-7	LVF sediments	89.40	8.90
03KS9-23.1	LVF sediments	92.90	7.10
13MS3-11.1 (U)	LVF sediments	95.20	4.80
10CM3-18.1a	LVF sediments	88.00	10.30
10CM3-18.1b	LVF sediments	81.20	15.80
10CM6-30-H-C1	LVF sediments	80.70	18.80
04MRR1-22.2	LVF sediments	70.90	28.60
11CM12-20.2c	LVF sediments	58.90	33.90
09KS2-12.1	LVF sediments	68.20	28.70
OSL10	LVF sediments	84.90	13.00
OSL7	LVF sediments	77.50	19.90
OSL9	LVF sediments	79.20	18.30
OSL6	LVF sediments	86.80	10.20
OSL8	LVF sediments	70.50	27.30
OSL5	LVF sediments	66.40	29.90
OSL2	LVF sediments	82.60	15.90
OSL4	LVF sediments	63.80	34.10
OSL1	LVF sediments	42.40	54.40
OSL3	LVF sediments	90.40	9.10
CC-1	Alluvium (≤2 mm)	93.20	6.10
CC-2	Alluvium (≤2 mm)	92.10	7.90
CC-3	Alluvium (≤2 mm)	93.50	6.50
CC-4	Alluvium (≤2 mm)	93.90	5.60
GS-1	Alluvium (≤2 mm)	90.50	9.50
GS-2	Alluvium (≤2 mm)	95.70	4.30
H160-1	Alluvium (≤2 mm)	93.70	6.30
HG-1	Alluvium (≤2 mm)	79.00	20.10
HG-2	Alluvium (≤2 mm)	90.70	8.80
HG-3A	Alluvium (≤2 mm)	83.80	14.60
HG-3B	Alluvium (≤2 mm)	89.90	9.20
HG-4	Alluvium (≤2 mm)	92.40	7.00
HG-5	Alluvium (≤2 mm)	93.30	6.70
KC-1	Alluvium (≤2 mm)	87.10	12.20
KC-2	Alluvium (≤2 mm)	91.40	8.60
KC-3	Alluvium (≤2 mm)	89.10	10.20
LC-1	Alluvium (≤2 mm)	86.70	12.10
LC-2	Alluvium (≤2 mm)	92.70	7.30
PS-1	Alluvium (≤2 mm)	70.90	28.20

RRC-1	Alluvium (≤2 mm)	79.30	20.70
RRC-2	Alluvium (≤2 mm)	93.90	6.10
RRC-4	Alluvium (≤2 mm)	85.10	14.90
RRC-6	Alluvium (≤2 mm)	88.80	11.20
RRC-7	Alluvium (≤2 mm)	82.60	17.40
CC-3	Alluvium (>2 mm)	99.20	0.80
CC-4	Alluvium (>2 mm)	97.90	2.10
GS-1	Alluvium (>2 mm)	94.30	5.70
GS-2	Alluvium (>2 mm)	99.20	0.80
H160-1	Alluvium (>2 mm)	97.40	2.60
HG-1	Alluvium (>2 mm)	95.30	4.70
HG-2	Alluvium (>2 mm)	85.90	14.10
HG-3A	Alluvium (>2 mm)	91.80	8.20
HG-3B	Alluvium (>2 mm)	89.50	10.50
HG-4	Alluvium (>2 mm)	95.80	4.20
HG-5	Alluvium (>2 mm)	98.70	1.30
KC-1	Alluvium (>2 mm)	95.10	4.90
KC-2	Alluvium (>2 mm)	92.80	7.20
KC-3	Alluvium (>2 mm)	95.40	4.60
LC-1	Alluvium (>2 mm)	98.60	1.40
LC-2	Alluvium (>2 mm)	98.70	0.60
PS-1	Alluvium (>2 mm)	97.00	3.00
RRC-1	Alluvium (>2 mm)	99.00	1.00
RRC-2	Alluvium (>2 mm)	97.50	2.50
RRC-4	Alluvium (>2 mm)	98.60	1.40
RRC-6	Alluvium (>2 mm)	98.80	1.20
RRC-7	Alluvium (>2 mm)	96.50	3.10

Supplemental Table 3

Summary of low frequency magnetic susceptibility data.

Sample #	Sample Type	MS_{lf} (m^3kg^{-1})
18KS6-14.3	LVF sediments	not determined
LVV-X-5	LVF sediments	1.86E-07
10CM3-11.1	LVF sediments	3.11E-07
LVV-X-7	LVF sediments	4.90E-08
03KS9-23.1	LVF sediments	1.71E-07
13MS3-11.1 (U)	LVF sediments	3.79E-07
10CM3-18.1a	LVF sediments	5.17E-08
10CM3-18.1b	LVF sediments	5.37E-08
10CM6-30-H-C1	LVF sediments	5.76E-08
04MRR1-22.2	LVF sediments	3.27E-08
11CM12-20.2c	LVF sediments	1.07E-07
09KS2-12.1	LVF sediments	6.77E-08
OSL10	LVF sediments	1.98E-07
OSL7	LVF sediments	1.31E-07
OSL9	LVF sediments	8.58E-08
OSL6	LVF sediments	8.80E-08
OSL8	LVF sediments	1.08E-07
OSL5	LVF sediments	1.30E-07
OSL2	LVF sediments	1.62E-07
OSL4	LVF sediments	1.30E-07
OSL1	LVF sediments	2.89E-07
OSL3	LVF sediments	3.07E-07
CC-1	Alluvium (≤2 mm)	1.53E-07
CC-2	Alluvium (≤2 mm)	2.23E-07
CC-3	Alluvium (≤2 mm)	2.66E-07
CC-4	Alluvium (≤2 mm)	1.26E-07
GS-1	Alluvium (≤2 mm)	6.77E-08
GS-2	Alluvium (≤2 mm)	2.08E-07
H160-1	Alluvium (≤2 mm)	2.85E-07
HG-1	Alluvium (≤2 mm)	5.07E-07
HG-2	Alluvium (≤2 mm)	2.59E-07
HG-3A	Alluvium (≤2 mm)	1.96E-07
HG-3B	Alluvium (≤2 mm)	2.73E-07
HG-4	Alluvium (≤2 mm)	9.92E-08
HG-5	Alluvium (≤2 mm)	2.74E-07
KC-1	Alluvium (≤2 mm)	2.21E-07
KC-2	Alluvium (≤2 mm)	8.40E-08
KC-3	Alluvium (≤2 mm)	1.57E-07
LC-1	Alluvium (≤2 mm)	4.57E-07
LC-2	Alluvium (≤2 mm)	1.11E-07
PS-1	Alluvium (≤2 mm)	4.69E-07

RRC-1	Alluvium (≤2 mm)	5.35E-08
RRC-2	Alluvium (≤2 mm)	3.37E-08
RRC-4	Alluvium (≤2 mm)	5.16E-08
RRC-6	Alluvium (≤2 mm)	1.03E-07
RRC-7	Alluvium (≤2 mm)	1.32E-07
CC-3	Alluvium (>2 mm)	1.39E-08
CC-4	Alluvium (>2 mm)	1.19E-08
GS-1	Alluvium (>2 mm)	-7.48E-10
GS-2	Alluvium (>2 mm)	2.73E-10
H160-1	Alluvium (>2 mm)	7.49E-09
HG-1	Alluvium (>2 mm)	7.19E-09
HG-2	Alluvium (>2 mm)	8.37E-09
HG-3A	Alluvium (>2 mm)	6.21E-09
HG-3B	Alluvium (>2 mm)	6.08E-09
HG-4	Alluvium (>2 mm)	6.73E-09
HG-5	Alluvium (>2 mm)	2.32E-08
KC-1	Alluvium (>2 mm)	1.07E-08
KC-2	Alluvium (>2 mm)	6.38E-09
KC-3	Alluvium (>2 mm)	1.07E-08
LC-1	Alluvium (>2 mm)	4.31E-09
LC-2	Alluvium (>2 mm)	3.07E-08
PS-1	Alluvium (>2 mm)	7.94E-09
RRC-1	Alluvium (>2 mm)	7.49E-09
RRC-2	Alluvium (>2 mm)	7.77E-09
RRC-4	Alluvium (>2 mm)	6.79E-09
RRC-6	Alluvium (>2 mm)	1.68E-08
RRC-7	Alluvium (>2 mm)	9.87E-09

Supplemental Table 4

Summary of geochemical data.

Sample #	Sample Type	K/Ba	K/Rb	Ca + Mg %	Al + Fe %	Si %	Fe %	Ti %	Li / (Ca+Mg)
18KS6-14.3	LVF sediments	27.8	266	16.8	3.00	22.3	0.87	0.13	8.34E-05
LVV-X-5	LVF sediments	63.3	264	28.1	3.45	10.5	0.97	0.12	7.82E-05
10CM3-11.1	LVF sediments	29.0	238	19.6	3.27	19.4	0.93	0.12	9.18E-05
LVV-X-7	LVF sediments	55.7	227	22.2	5.56	14.0	1.32	0.20	1.58E-04
03KS9-23.1	LVF sediments	49.3	282	27.9	1.52	12.8	0.36	0.07	below detection
13MS3-11.1 (U)	LVF sediments	49.7	277	26.0	2.60	12.9	0.73	0.11	6.15E-05
10CM3-18.1a	LVF sediments	30.6	263	24.9	3.33	12.9	0.90	0.12	6.41E-05
10CM3-18.1b	LVF sediments	20.9	238	26.3	3.51	11.5	1.01	0.13	7.22E-05
10CM6-30-H-C1	LVF sediments	34.2	260	24.2	2.76	15.0	0.67	0.13	5.78E-05
04MRR1-22.2	LVF sediments	41.6	265	15.0	2.92	24.4	0.60	0.10	below detection
11CM12-20.2c	LVF sediments	19.5	223	20.1	6.10	15.1	1.75	0.21	1.64E-04
09KS2-12.1	LVF sediments	24.4	226	19.8	4.36	16.4	1.15	0.17	1.06E-04
OSL10	LVF sediments	53.8	252	22.3	4.59	14.2	1.24	0.17	1.12E-04
OSL7	LVF sediments	48.8	227	20.8	6.48	14.5	1.88	0.21	1.64E-04
OSL9	LVF sediments	38.5	240	16.3	5.56	19.9	1.50	0.21	1.48E-04
OSL6	LVF sediments	39.6	236	19.9	5.11	17.0	1.46	0.18	1.16E-04
OSL8	LVF sediments	35.7	204	20.0	5.81	15.8	1.46	0.20	1.45E-04
OSL5	LVF sediments	37.5	230	13.8	6.32	22.2	1.68	0.23	2.03E-04
OSL2	LVF sediments	45.8	221	15.6	5.86	20.6	1.74	0.22	1.67E-04
OSL4	LVF sediments	37.3	221	18.2	6.21	18.2	1.78	0.23	1.60E-04
OSL1	LVF sediments	52.9	245	20.1	4.78	15.4	1.27	0.18	1.29E-04
OSL3	LVF sediments	61.9	229	31.4	3.17	8.0	0.89	0.10	4.45E-05
CC-1	Alluvium (≤2 mm)	43.1	306	26.0	1.35	11.6	0.50	0.05	below detection
CC-2	Alluvium (≤2 mm)	40.5	258	26.7	2.10	10.0	0.70	0.08	3.75E-05
CC-3	Alluvium (≤2 mm)	53.6	288	24.0	1.48	14.8	0.64	0.07	below detection
CC-4	Alluvium (≤2 mm)	38.6	302	25.4	1.48	12.7	0.47	0.05	below detection
GS-1	Alluvium (≤2 mm)	30.8	253	23.1	0.94	16.4	0.37	0.03	below detection
GS-2	Alluvium (≤2 mm)	9.7	225	24.3	1.91	9.64	0.79	0.06	below detection
H160-1	Alluvium (≤2 mm)	43.6	290	27.9	1.80	8.52	0.76	0.07	below detection
HG-1	Alluvium (≤2 mm)	36.7	248	15.9	3.63	22.3	1.23	0.17	1.01E-04
HG-2	Alluvium (≤2 mm)	37.8	256	20.6	2.44	18.7	0.79	0.11	5.35E-05
HG-3A	Alluvium (≤2 mm)	41.7	262	21.0	2.50	17.0	0.82	0.11	6.18E-05
HG-3B	Alluvium (≤2 mm)	38.3	273	21.2	2.43	17.1	0.82	0.11	6.13E-05
HG-4	Alluvium (≤2 mm)	44.6	255	24.5	2.06	13.4	0.75	0.07	4.49E-05
HG-5	Alluvium (≤2 mm)	52.5	208	20.6	4.78	13.0	1.57	0.15	1.80E-04
KC-1	Alluvium (≤2 mm)	41.6	274	23.4	1.80	16.4	0.61	0.10	below detection
KC-2	Alluvium (≤2 mm)	48.8	299	28.9	0.96	11.4	0.35	0.04	below detection
KC-3	Alluvium (≤2 mm)	47.3	249	26.1	2.90	12.9	1.02	0.11	5.75E-05
LC-1	Alluvium (≤2 mm)	48.1	185	5.9	12.4	23.3	4.29	0.35	9.68E-04
LC-2	Alluvium (≤2 mm)	52.3	260	29.3	1.24	8.35	0.51	0.05	below detection
PS-1	Alluvium (≤2 mm)	39.9	244	17.9	4.07	18.1	1.25	0.19	8.95E-05
RRC-1	Alluvium (≤2 mm)	55.9	317	14.2	1.22	27.9	0.43	0.05	below detection
RRC-2	Alluvium (≤2 mm)	58.4	360	23.4	0.78	16.3	0.37	0.02	below detection
RRC-4	Alluvium (≤2 mm)	56.6	309	17.5	1.10	22.4	0.41	0.04	below detection
RRC-6	Alluvium (≤2 mm)	26.7	285	18.8	1.72	19.9	0.64	0.07	below detection
RRC-7	Alluvium (≤2 mm)	36.3	259	17.1	2.40	22.9	0.85	0.09	6.45E-05
CC-3	Alluvium (>2 mm)	111.1	553	34.2	0.33	4.49	0.15	0.01	below detection
CC-4	Alluvium (>2 mm)	58.4	403	30.7	0.67	7.17	0.18	0.02	below detection
GS-1	Alluvium (>2 mm)	61.5	314	30.7	0.65	9.07	0.22	0.03	below detection
GS-2	Alluvium (>2 mm)	31.7	296	33.3	0.19	2.22	0.08	0.01	below detection
H160-1	Alluvium (>2 mm)	74.8	400	30.5	0.71	5.39	0.21	0.04	below detection
HG-1	Alluvium (>2 mm)	65.7	298	29.8	0.94	9.51	0.33	0.04	below detection
HG-2	Alluvium (>2 mm)	55.5	339	26.0	1.22	13.3	0.36	0.07	below detection
HG-3A	Alluvium (>2 mm)	49.0	305	26.0	1.45	11.8	0.78	0.10	below detection
HG-3B	Alluvium (>2 mm)	69.8	347	26.3	1.10	11.9	0.35	0.04	below detection

HG-4	Alluvium (>2 mm)	52.4	382	29.8	0.67	8.94	0.22	0.02	below detection
HG-5	Alluvium (>2 mm)	54.0	334	32.1	0.65	6.70	0.24	0.02	below detection
KC-1	Alluvium (>2 mm)	33.1	351	30.4	0.62	8.71	0.24	0.03	below detection
KC-2	Alluvium (>2 mm)	75.1	408	26.4	0.84	13.7	0.35	0.05	below detection
KC-3	Alluvium (>2 mm)	83.7	397	35.3	0.56	4.97	0.17	0.02	below detection
LC-1	Alluvium (>2 mm)	123.8	474	33.0	0.49	4.33	0.17	0.01	below detection
LC-2	Alluvium (>2 mm)	126.7	415	34.2	0.44	2.07	0.18	0.01	below detection
PS-1	Alluvium (>2 mm)	73.5	348	33.9	0.36	5.66	0.15	0.02	below detection
RRC-1	Alluvium (>2 mm)	170.1	575	33.8	0.47	1.98	0.14	0.02	below detection
RRC-2	Alluvium (>2 mm)	84.3	458	31.8	0.37	5.09	0.15	0.01	below detection
RRC-4	Alluvium (>2 mm)	128.3	623	30.0	0.52	7.25	0.23	0.02	below detection
RRC-6	Alluvium (>2 mm)	131.8	415	32.7	0.67	3.16	0.23	0.02	below detection
RRC-7	Alluvium (>2 mm)	94.4	365	29.8	0.68	7.39	0.29	0.02	below detection
T-16	Modern Dust 1991	29.5	196	no data	no data	no data	2.50	0.17	3.44E-04
T-18	Modern Dust 1991	35.1	222	no data	no data	no data	2.70	0.23	4.29E-04
T-18	Modern Dust 1995	49.7	209	no data	no data	no data	4.20	no data	no data
T-18A	Modern Dust 1997	30.0	164	no data	no data	no data	2.80	0.28	4.68E-04

Supplemental Table 5

Summary of dust-trap carbonate data (from Reheis 2003).

Trap #	% Carbonate[1]
1984-1985	
T16	26.1
T17	18.2
T18	25.6
T19	24.3
1985-1986	
T16	28.0
T17	---
T18	44.8
T18A	21.7
T19	25.4
1986-1987	
T16	19.9
T17	18.2
T18	19.2
T18A	24.0
T19	23.1
1987-1988	
T16	34.3
T17	18.6
T18	29.0
T18A	33.6
T19	32.6
1988-1989	
T16	36.0
T17	---
T18	31.9
T18A	30.7
T19	---
1989-1991	
T16	35.7
T18	29.6
T18A	29.1
1991-1993	
T16	36.4
T18	35.1
T18A	36.5
1993-1995	
T16	36.4
T18	36.3
T18A	35.6
1995-1997	
T16	28.82
T18	24.32
T18A	20.02
1997-1999	
T16	13.76
T18	17.41
T18A	19.39

[---, not measured]

[1] $CaCO_3$ measured by Chittick apparatus from 1985 through 1995, thereafter by coulometry.