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# Moon Lake 11,000 Year Diatom-inferred Salinity Data

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Published online (1996) at:

[ftp://ftp.ncdc.noaa.gov/pub/data/paleo/paleolimnology/greatplains/moonlake/moonlake\\_salinity\\_1996b.txt](ftp://ftp.ncdc.noaa.gov/pub/data/paleo/paleolimnology/greatplains/moonlake/moonlake_salinity_1996b.txt)

## **Moon Lake 11,000 Year Diatom-inferred Salinity Data**

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World Data Center for Paleoclimatology, Boulder  
and  
NOAA Paleoclimatology Program  
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NOTE: PLEASE CITE CONTRIBUTORS WHEN USING THIS DATA!!!!

NAME OF DATA SET: Moon Lake 11,000 Year Diatom-inferred Salinity Data  
LAST UPDATE: 4/2003 (Original Receipt by WDCA Paleo)  
CONTRIBUTORS: Kathleen R. Laird, Sherilyn C. Fritz,  
Eric C. Grimm and P.G. Mueller.

IGBP PAGES/WDCA CONTRIBUTION SERIES NUMBER: 2003-030

SUGGESTED DATA CITATION: Laird, K.R., et al., 2003,  
Moon Lake 11,000 Year Diatom-inferred Salinity Data,  
IGBP PAGES/World Data Center for Paleoclimatology  
Data Contribution Series #2003-030.  
NOAA/NGDC Paleoclimatology Program, Boulder CO, USA.

ORIGINAL REFERENCE: Laird, K.R., Fritz, S.C., Grimm, E.C., and  
Mueller, P.G. (1996) Century-scale paleoclimatic reconstructions  
from Moon Lake, a closed-basin lake in the northern Great Plains.  
Limnol. Oceanogr. 41(5): 890-902.

### ADDITIONAL REFERENCE:

Laird, K.R., S.C. Fritz, K.A. Maasch, and B.F. Cumming, 1996,  
Greater drought intensity and frequency before AD 1200 in the  
Northern Great Plains, USA, Nature v.384 552-554.

GEOGRAPHIC REGION: Northern Great Plains, USA and Canada

PERIOD OF RECORD: 11 KYrBP - present

### DESCRIPTION:

11,000 year diatom-derived salinity record, interpreted as a  
drought intensity and frequency proxy on the Great Plains of North America  
Site: Moon Lake, North Dakota, USA  
(46 51' 27" N, 98 09' 30" W. ~35 ha, max. depth ~13m).

### ABSTRACT:

Estimates of past lake-water salinity from fossil diatom assemblages  
were used to infer past climatic conditions at Moon Lake, a climatically  
sensitive site in the northern Great Plains. A good correspondence

between diatom-inferred salinity and historical records of mean annual precipitation minus evapotranspiration (P-ET) strongly suggests that the sedimentary record from Moon Lake can be used to reconstruct past climatic conditions. Century-scale analysis of the Holocene diatom record indicates four major hydrological periods: an early Holocene transition from an open freshwater system to a closed saline system by 7300 BP, which corresponds with a transition from spruce forest to deciduous parkland to prairie and indicates a major shift from wet to dry climate; a mid-Holocene period of high salinity from 7300 to 4700 BP, indicating low effective moisture (P-ET); a transitional period of high salinity 4700 to 2200 BP, characterized by poor diatom preservation; and a late Holocene period of variable lower salinity during the past 2,200 years, indicating fluctuations in effective moisture.

DATA:

Moon Lake salinity - Holocene

depth (cm)	<sup>14</sup> Cdate <sup>14</sup> CyrsBP	salinity g/L
0	0	15.410
8	24	12.566
16	48	15.120
24	78	18.560
32	112	3.714
40	147	3.290
48	182	13.929
56	217	7.683
64	251	6.787
72	286	11.056
80	321	19.202
104	425	5.008
112	460	9.052
120	498	7.493
128	536	10.623
136	574	3.881
144	612	1.391
152	650	22.065
160	688	2.907
168	726	21.499
176	764	15.534
184	802	26.206
192	839	12.528
200	876	19.298
208	913	25.662
216	950	28.417
224	987	15.658
232	1024	22.399
240	1061	22.421
248	1129	13.874
256	1226	21.955
264	1323	9.718

272	1420	6.619
280	1517	16.593
288	1614	19.925
296	1711	14.197
304	1808	10.423
312	1905	25.894
320	2003	16.297
328	2100	12.110
336	2197	20.206
344	2294	18.597
352	2435	9.116
360	2578	39.686
368	2722	42.820
376	2866	13.572
384	3009	43.207
392	3153	14.717
400	3297	30.877
408	3441	32.753
416	3584	25.204
424	3728	24.804
432	3872	23.736
440	4015	26.602
448	4159	24.459
456	4303	27.113
464	4446	41.059
472	4590	22.805
480	4660	44.434
488	4730	43.423
496	4800	36.672
504	4870	33.515
512	4939	38.590
520	5009	32.427
528	5079	34.744
536	5149	32.753
544	5219	36.892
552	5289	35.695
560	5359	41.141
568	5429	41.141
576	5503	36.416
584	5576	36.598
592	5649	38.359
600	5723	40.772
608	5796	37.600
616	5870	36.966
624	5943	38.054
632	6016	40.569
640	6090	38.900
648	6163	29.195
656	6237	31.849
664	6310	36.635
672	6324	34.329
680	6338	31.500
688	6352	38.668
696	6366	33.616
704	6381	29.518
712	6395	34.953
720	6409	32.169

728	6423	31.343
736	6437	29.224
744	6451	31.722
752	6465	22.242
760	6479	31.944
768	6494	35.058
776	6508	26.180
784	6522	26.128
792	6536	34.192
800	6550	30.908
808	6564	18.803
816	6578	28.191
824	6592	37.675
832	6606	36.017
840	6669	19.550
848	6748	33.182
856	6827	31.000
864	6906	33.549
872	6985	33.954
880	7063	28.474
888	7142	21.607
900	7261	22.131
908	7418	22.154
912	7536	10.014
920	7773	7.164
924	7891	3.323
928	8009	7.257
936	8245	4.464
944	8481	5.743
952	8718	3.579
960	8954	4.229
968	9190	4.129
976	9427	3.111
984	9629	2.656
988	9716	2.048
1000	9980	1.293
1008	10155	0.917
1016	10330	1.228
1024	10506	1.603
1032	10681	1.190
1040	10836	1.655
1048	10965	1.489
1056	11094	2.022