NOAA Data Report ERL GLERL-20

GREAT LAKES PRECIPITATION BY MONTHS, 1900-80

Frank H. Quinn
David C. Norton

Great Lakes Environmental Research Laboratory
Ann Arbor, Michigan
November 1982

Data available on microfiche
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UNITED STATES
DEPARTMENT OF COMMERCE

Malcolm Baldrige,
Secretary

NATIONAL OCEANIC AND
ATMOSPHERIC ADMINISTRATION

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GREAT LAKES PRECIPITATION BY MONTHS, 1900-80*

Frank H. Quinn and David C. Norton

Accurate values of monthly precipitation are required for simulation, forecasting, and water resource studies of the Great Lakes and their basins. There are often significant errors in the present method of computing these values because of technique problems accentuated when data from preselected stations are missing. Therefore, a monthly precipitation climatology was derived by a modified Thiessen approach using a grid-square technique. The resulting data set, which represents a major improvement over that presently in use, is presented here.

1. INTRODUCTION

Accurate values of monthly precipitation are required for simulation, forecasting, and water resource studies of the Great Lakes and their basins. The present procedure for deriving monthly precipitation estimates was developed in the early 1900's and directly converted to computer operation in the mid-1960's. This procedure, as will be discussed later, uses a limited number of the available stations and can be subject to major errors when preselected stations are missing.

This study was undertaken to develop a monthly precipitation climatology for each of the Great Lakes and Lake St. Clair, as well as their respective basins, using all of the available reporting precipitation stations. A grid-square algorithm was chosen to determine representative areal weights for each station in a modified Thiessen approach. Monthly precipitation estimates were derived for both the water surface and land basin for each lake.

2. BASIC DATA

The basic data consisted of "all available" monthly precipitation data through 1980 for stations in Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, Wisconsin, and Ontario as provided by the United States National Climatic Center (NCC) and the Canadian Atmospheric Environment Service (AES). In the United States, "all available" data consisted of the monthly data available on magnetic tape at NCC. When compared to published data, available pre-1931 data are exceedingly sparse, 1931-47 is 60-75 percent of published and 1948 onward is over 90 percent, with the most recent data being 100 percent of the published. The data provided by the AES for Ontario appear very complete for the entire period of record as

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*GLERL Contribution No. 339.

compared with the published data. Of particular interest are the possible discrepanies that can sometimes occur between the United States and Canadian monthly values. The National Weather Service records daily precipitation as occurring on the day the observations are taken. The AES' daily observations are generally taken in the early morning and recorded as occurring on the previous day.

Latitude and longitude locations of all United States and Canadian stations were obtained from station history magetic tapes. These contained station numbers, latitude, longitude, instrumentation type, etc., and noted each change associated with a station. Since station locations sometimes changed slightly, the last location given for each station was the one used. The data were placed in two-part word-addressable disk files. The first part contains the state or province number, station number, latitude, longitude, block year, and 25 data addresses. The second part contains the annual precipitation data by months. The data were grouped in 25-year blocks with block years beginning in 1875, 1900, 1925, 1950, and 1975. The data were stored with numeric codes equivalent to the alpha and/or overpunch codes that NCC and AES assigned for estimated data, adjusted data, etc. Missing data were also delineated. Figure 1 shows the 2,421 precpitation stations used to form the data base.

To provide the prerequisite grid base, each Great Lake and Lake St. Clair, as well as their respective drainage basins, were digitized on a 1-km grid using equipment at the Environmental Research Institute of Michigan. Chart originals from the Coordinating Committee (1977) were used for the digitizing. These charts contain lake shores, coordinated basin boundaries, and latitudes and longitudes. Each grid point was represented by a numeric indicating its status as being located either outside the drainage basin, inside the drainage basin, river or lake surface, island, and for Lake Superior, over Lake Nipigon or its islands. The accuracy of the 1-km digitizing is illustrated in figure 2. The largest grid, Lake Huron, had approximately 390,000 grid points, which exceeded the available computer memory capacity. A 5-km grid size was selected for all basins.

3. GRID-SQUARE PROCEDURE

The grid-square technique used in this study is a simplified procedure that assigns areal weights to each precipitation gage in the basin under consideration. The assigned weights are the approximate equivalent of Thiessen polygon weights. The computer algorithm searches the entire grid and assigns each grid point to its closest precipitation station. The weighting factor for each station is then computed by dividing the total number of grid points assigned to the station by the total number of grid points under consideration.

Station locations were assigned grid coordinates by using an algorithm to convert from latitude and longitude to X, Y distances from an origin on the grid. The algorithm was set up in a subroutine for polyconic map projections, given in appendix A. The subroutine measures the distance from the equator and the central meridian of the map projection being used to a

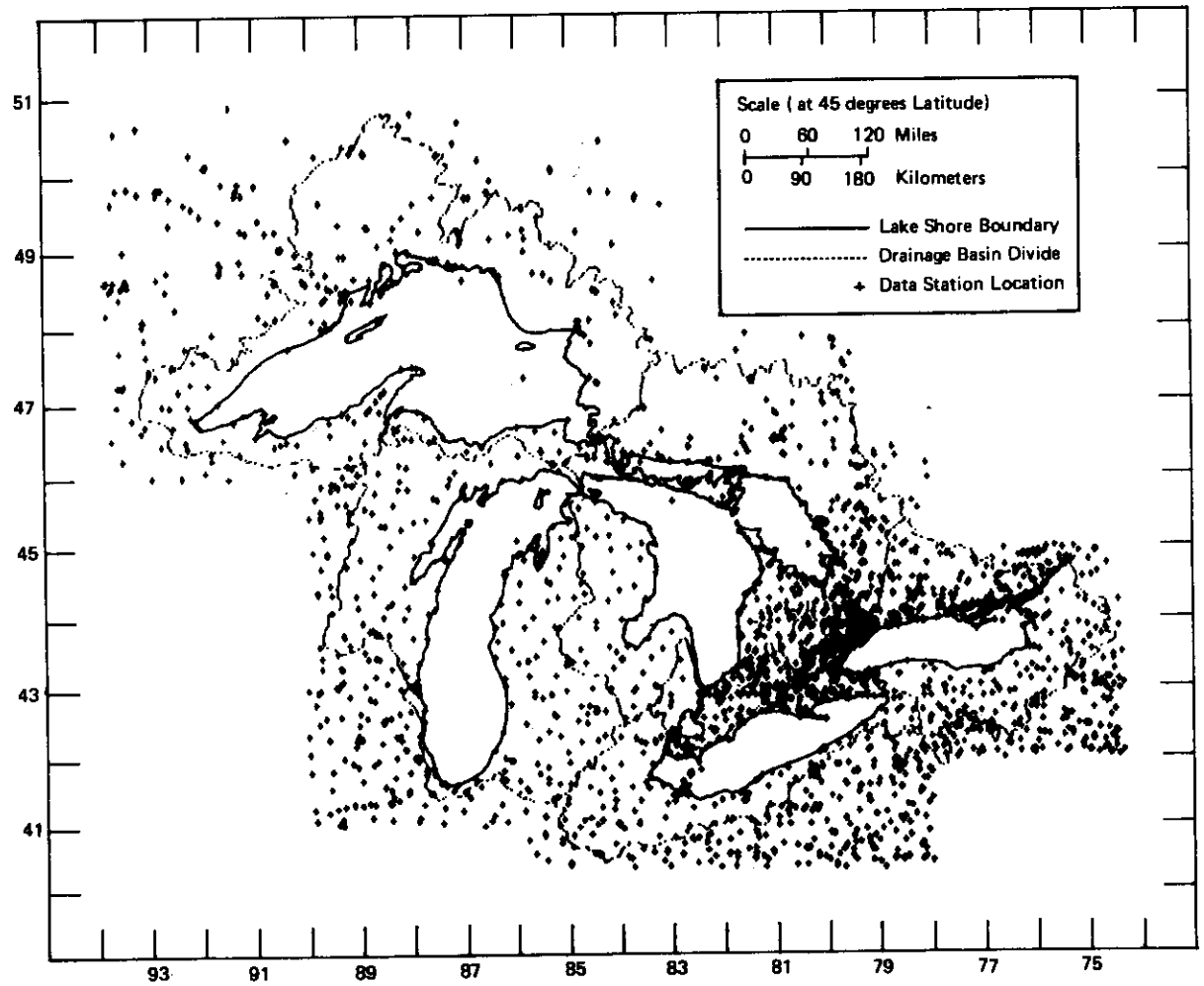

FIGURE 1.--*Map showing 2,421 meteorological stations used to form the data base. Lake shore and drainage basins were drawn from a 2-km grid; stations were located by subroutine GT.*

point on the Earth's surface. For use on the grid, it was called first to locate the grid origin (grid location 0, 0). Each successive call then produced distances that were adjusted relative to the origin to determine a grid location (X, Y) for each reporting precipitation station. The origin is the upper left-hand corner of the grid.

The computations were initiated by establishing windows for the land basin boundaries. Since the basins of the Great Lakes are bordered by only slight-to-moderate topographic divides, it was decided to include reporting precipitation stations located outside the basin but within 25 km of the basin boundary. Eichenlaub (1964) and Petterssen and Calabrese (1959) identified the inland penetration of lake effect as falling within the 24- to

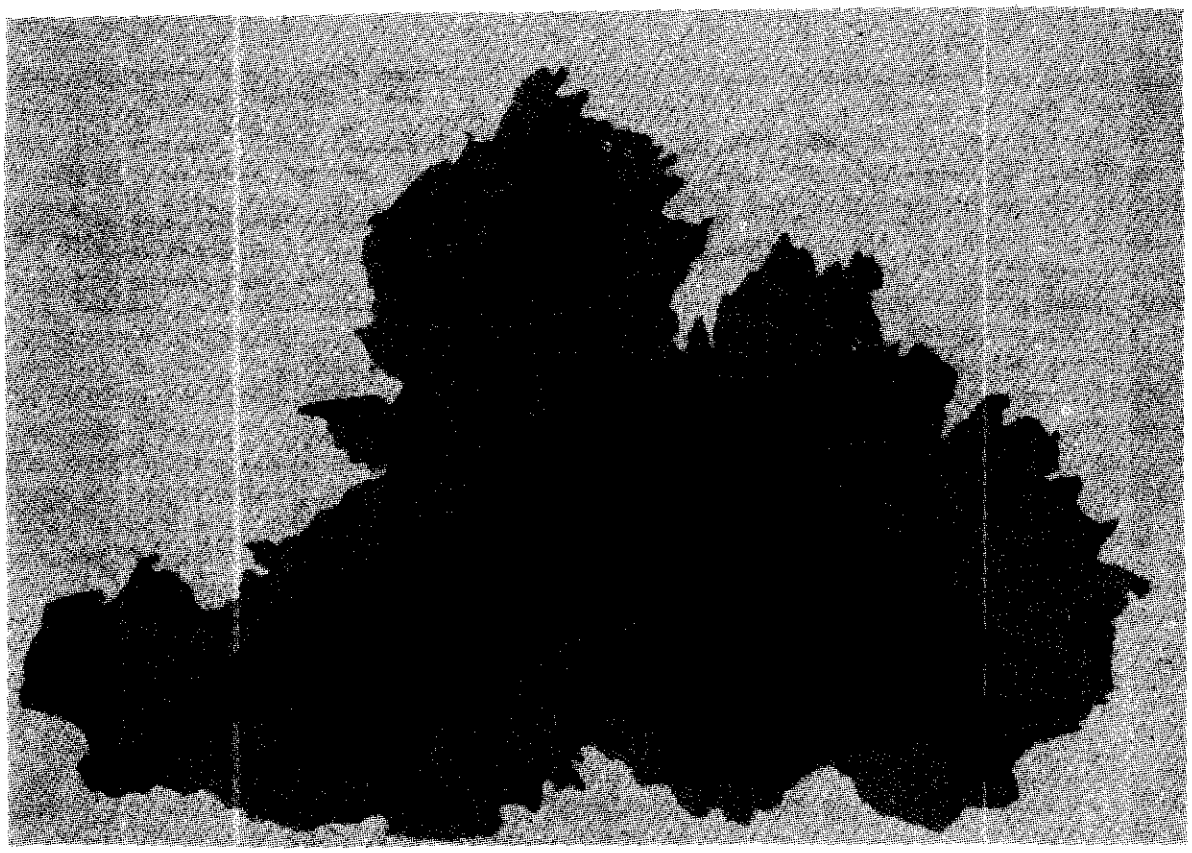

FIGURE 2.--*A 1-km cellular representation of the Lake Superior drainage basin.*

48-km range. In order to minimize the impact of lake effect on overlake precipitation computations, it was also decided to use stations within 25 km of the shore to compute the overlake precipitation. It was found that assigning distances (d) between grid points and stations (when a and b are x and y differences, respectively, between grid points and station locations) in the scaler form of $d = (a \times a) + (b \times b)$ instead of the actual $d = \sqrt{a^2 + b^2}$ eliminated two square functions and one square root function, which resulted in a computer cost savings of 60 percent.

The monthly precipitation values were then determined for each lake by first searching the data base for those stations within a given basin window that had data. Adjusted and estimated data were rejected. All the grid points were then assigned to the individual stations and station weights determined for each month. The monthly overlake and overbasin precipitation were then determined by summing the individual station data times the corresponding station weights. The flow chart for the computer processing is shown in figure 3. The computer costs for producing the monthly precipitation estimates were approximately $2,000.

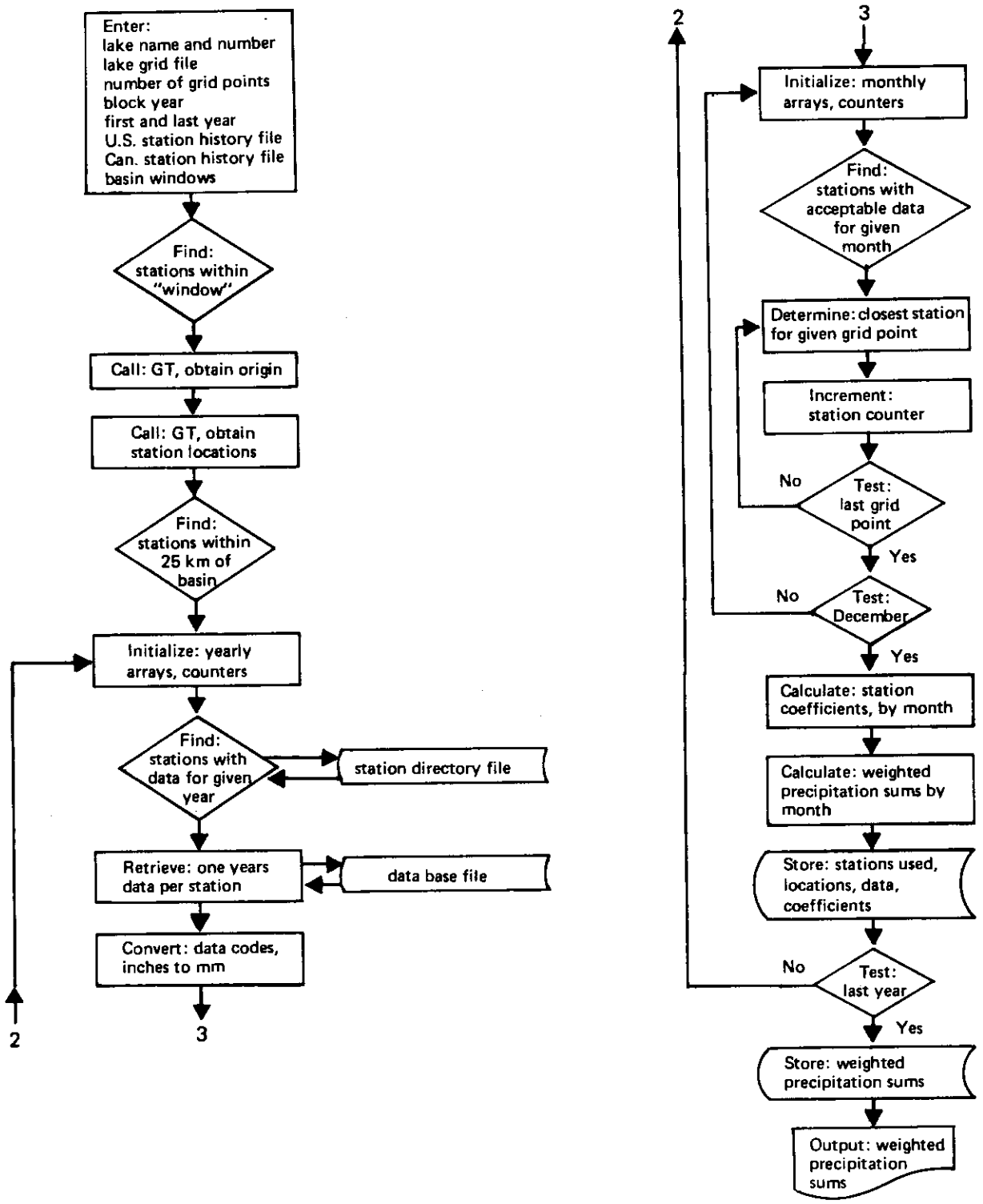

FIGURE 3.--*Flow chart of the grid-square procedure.*

4. PRIOR PROCEDURE

The procedure used from the early 1900's was developed and implemented by the Lake Survey District of the Corps of Engineers and continued since 1970 by the National Ocean Survey. It has been briefly described by Quinn (1981) and consists of an areally weighted district approach. Each lake basin was subdivided into a number of districts and sub-districts. Stations were chosen in each sub-district and an arithmatic mean computed. Each subarea was areally weighted to determine the district precipitation. The district precipitation values were then areally weighted to compute the overland and overwater precipitation values. The sub-districts and districts used in the computations are shown in figure 4. One of the weaknesses of the system is that many times the same precipitation station was used in more than one sub-district and, if stations had missing data, the sub-district precipitation was based on a very small number of stations.

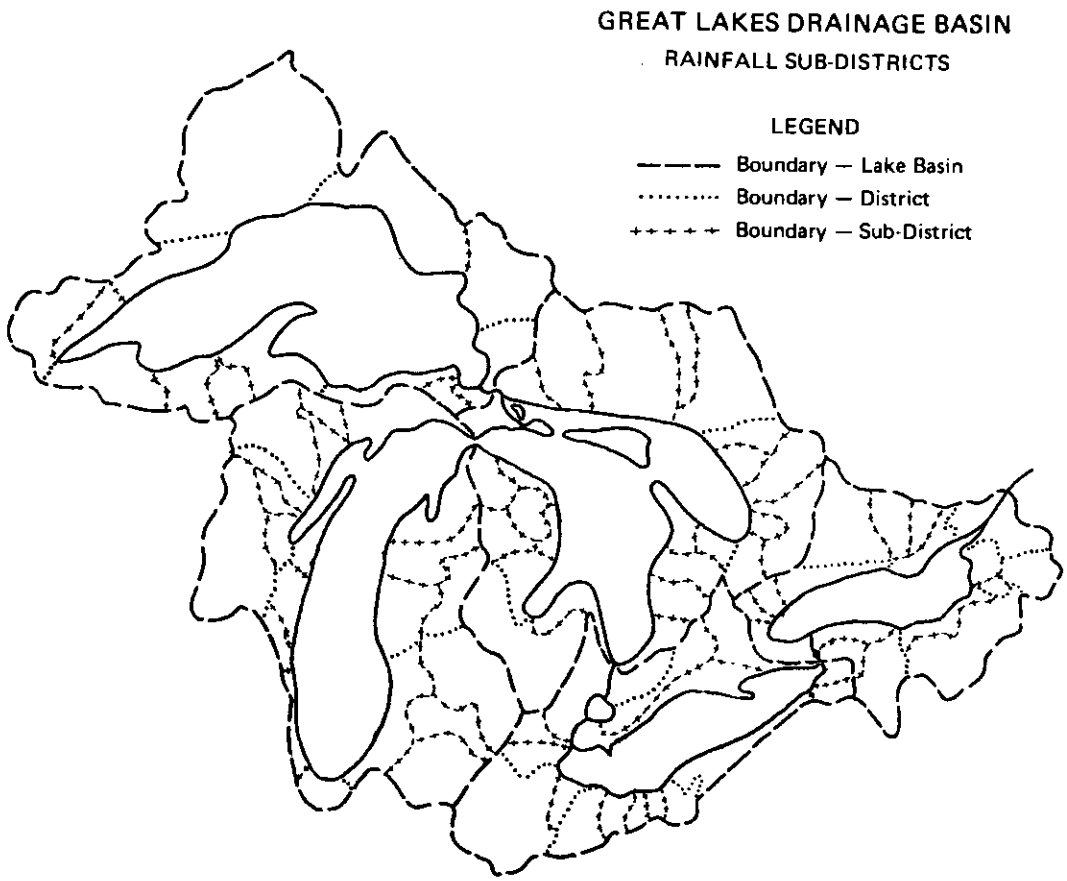

FIGURE 4.--*Great Lakes drainage basin, showing the districts and sub-districts established by the Lake Survey Center.*

5. COMPARISON OF PUBLISHED AND GRID-SQUARE PRECIPITATION

Monthly precipitation was computed for the overland and overwater portions of each of the Great Lakes basins and Lake St. Clair by the grid-square technique for the 1931-80 period. The data available on magnetic tape for prior to 1931 are considerably fewer than those used by the Lake Survey District so their use during this period would degrade the quality of the monthly estimates. The previously published values for the 1900-30 portion and the grid-square values for 1931-80 were used to form a composite data base for 1900-80. These data are presented in tables in appendix B and figures 5-16. Since the Lake Survey District included the Lake St. Clair drainage basin in the Lake Erie overland precipitation computations, the geographic areas covered by the 1900-30 and 1931-80 values differ for Lake Erie.

The overwater and overland precipitation data produced by both grid-square and Lake Survey District procedures were compared for the 1931-80 period. Month-to-month variations in individual grid station weights were usually small. The maximum grid station weights attained were almost always smaller than those used for the published stations. This was because of the greater number of grid stations being used and their more dispersed locations. One problem with the published data was the multiple use (up to four times) of some stations by their inclusion in several sub-districts. Thus, some individual stations could obtain weights of up to 30 percent. These high weight stations often had some of the smaller grid station weights. Missing data also affected the published data since each sub-district's weight remained constant, although the number and location of the stations averaged within the sub-districts varied. As would be expected, the differences between the two data sets were smallest when the published data employed the greatest number of stations.

The comparisons of the yearly differences between the two techniques shown in figures 17-26 indicate a much greater variation in the 1970-80 period than in the earlier period. Since the former marks the time when the computations were switched over to the computer, it seems probable that some sort of error was introduced into the published values at that time. The stations and station weights in the grid-square technique varied little just prior to and during this period. The errors are quite significant as evidenced in the Lake Superior overland computations by a single yearly difference of 36 cm in 1974 and a cumulative difference of 84 cm for the 1970-80 period. The differences between the data sets are highly variable. The nature of the differences varied between basins and also between overlake and overland data for the same basin. These differences are discussed by individual lake basin. When discussing differences between the data sets, the difference is always the grid-square value minus the published value.

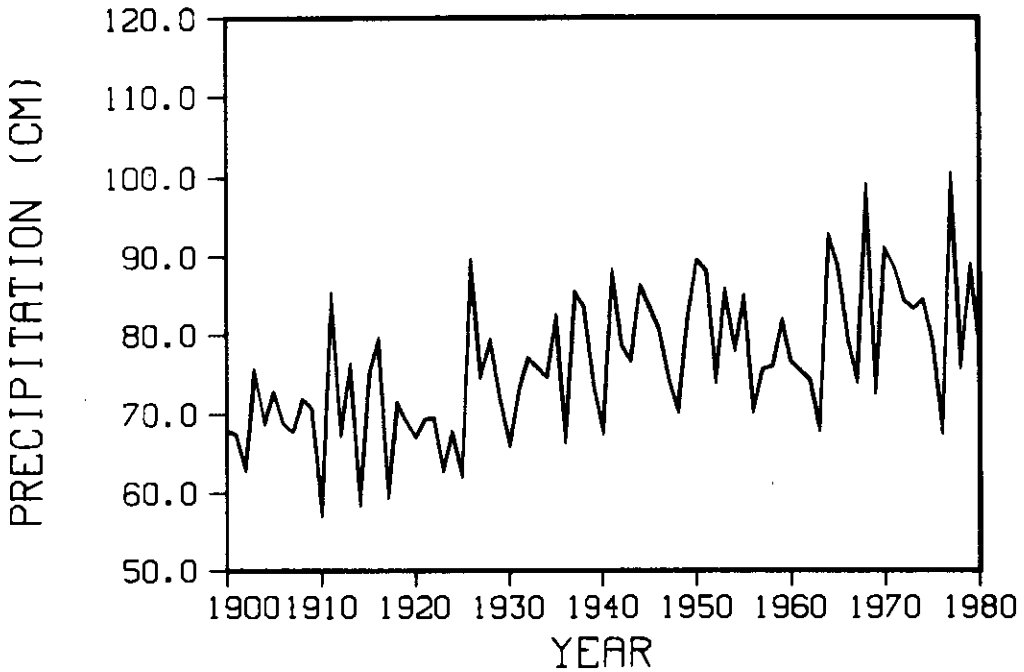

FIGURE 5.--*Yearly overland precipitation volumes for Lake Superior.*

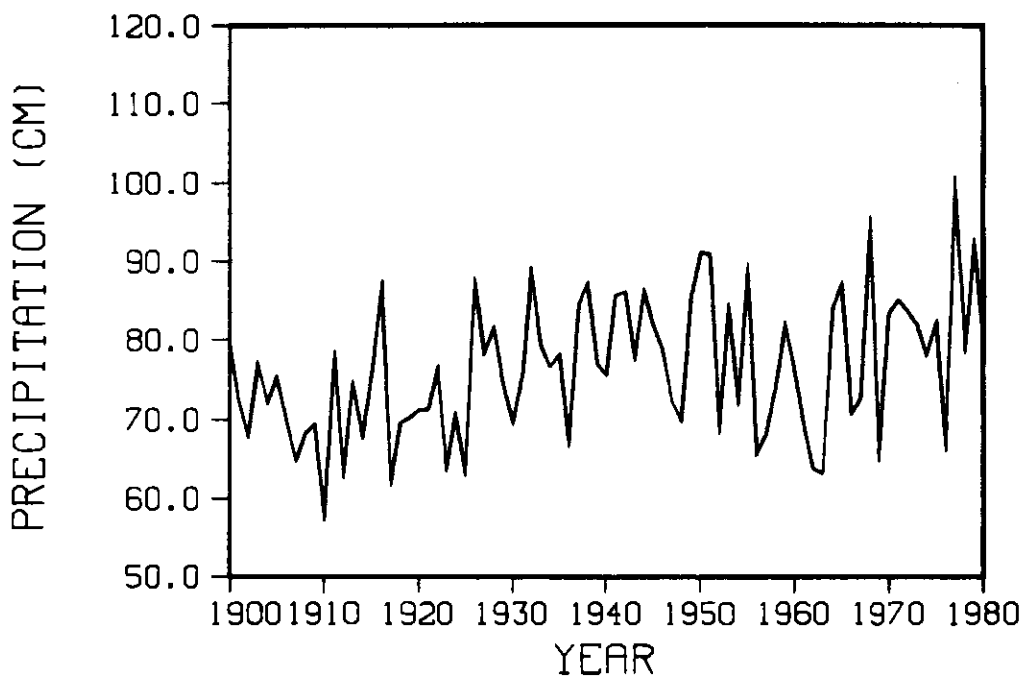

FIGURE 6.--*Yearly overlake precipitation volumes for Lake Superior.*

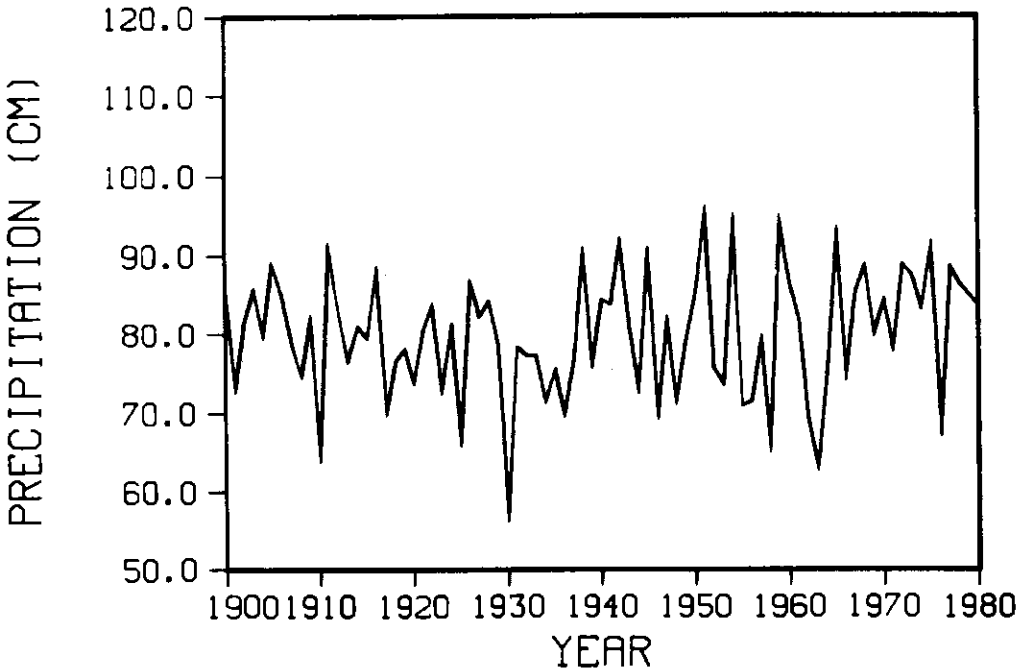

FIGURE 7.--*Yearly overland precipitation volumes for Lake Michigan.*

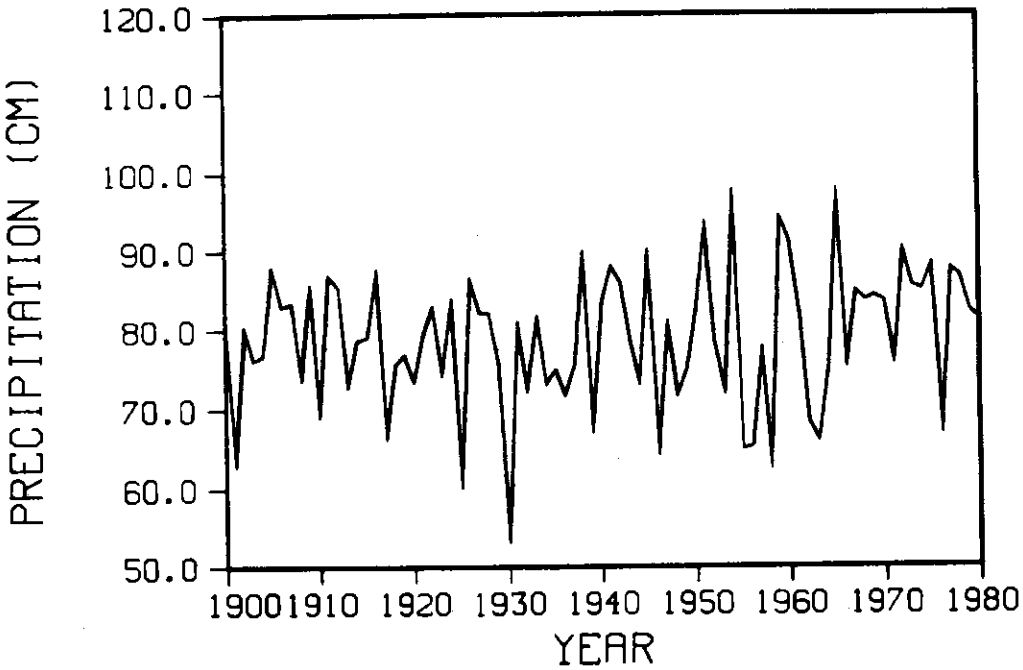

FIGURE 8.--*Yearly overlake precipitation volumes for Lake Michigan.*

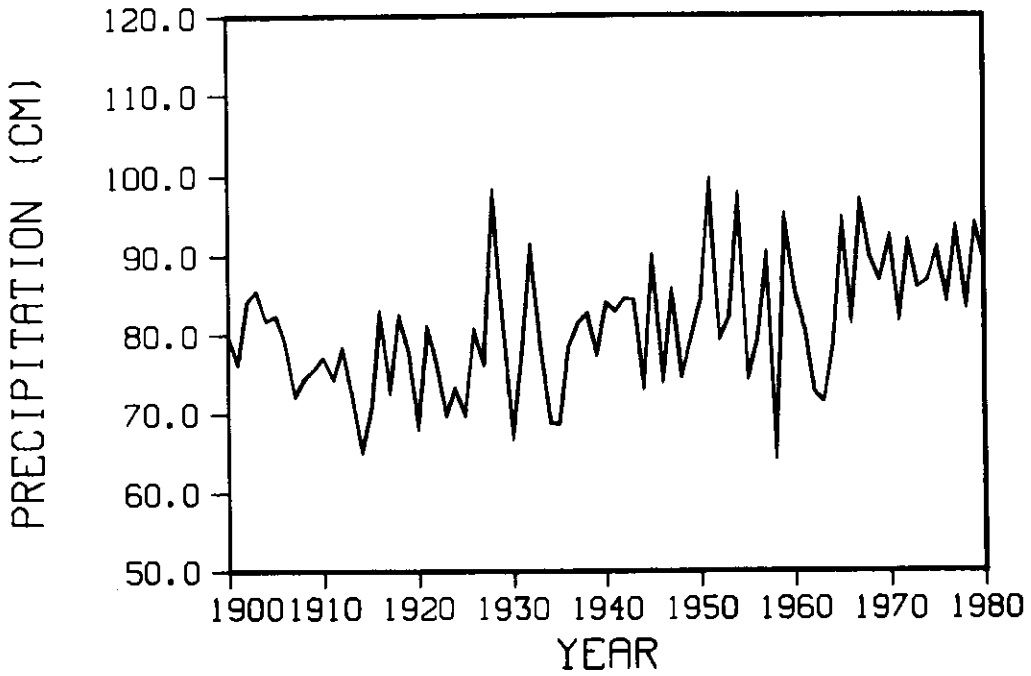

FIGURE 9.--*Yearly overland precipitation volumes for Lake Huron.*

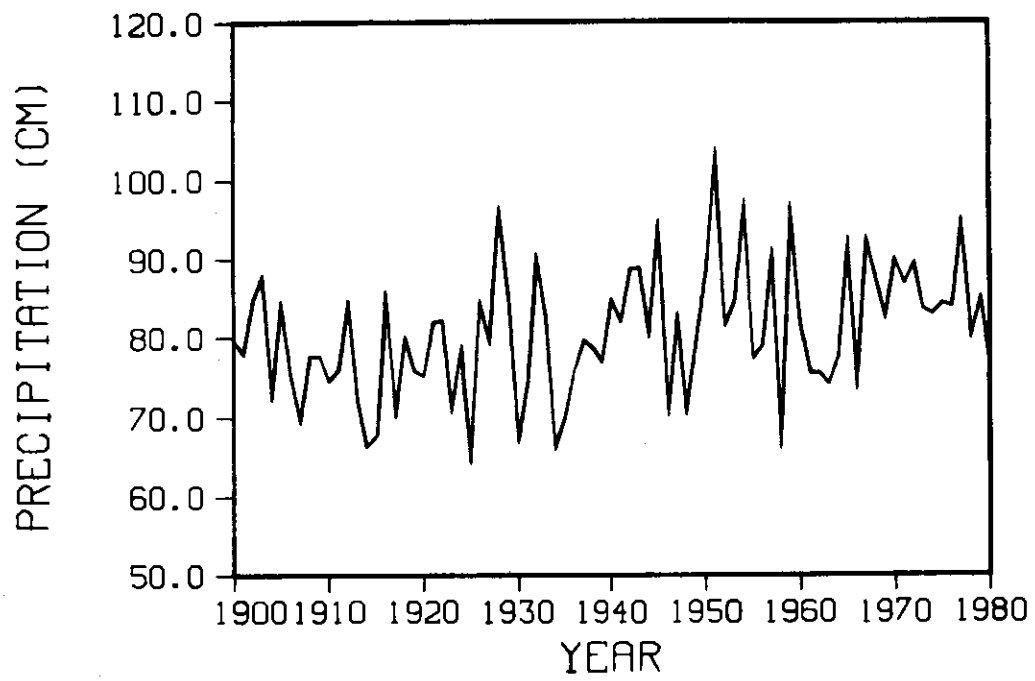

FIGURE 10.--*Yearly overlake precipitation volumes for Lake Huron.*

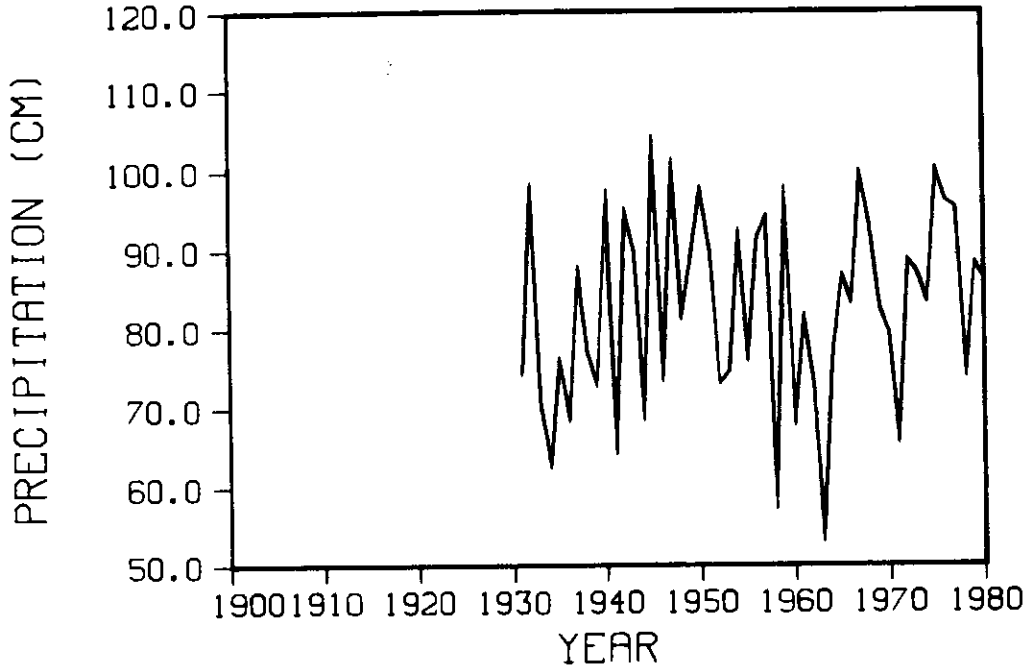

FIGURE 11.--*Yearly overland precipitation volumes for Lake St. Clair.*

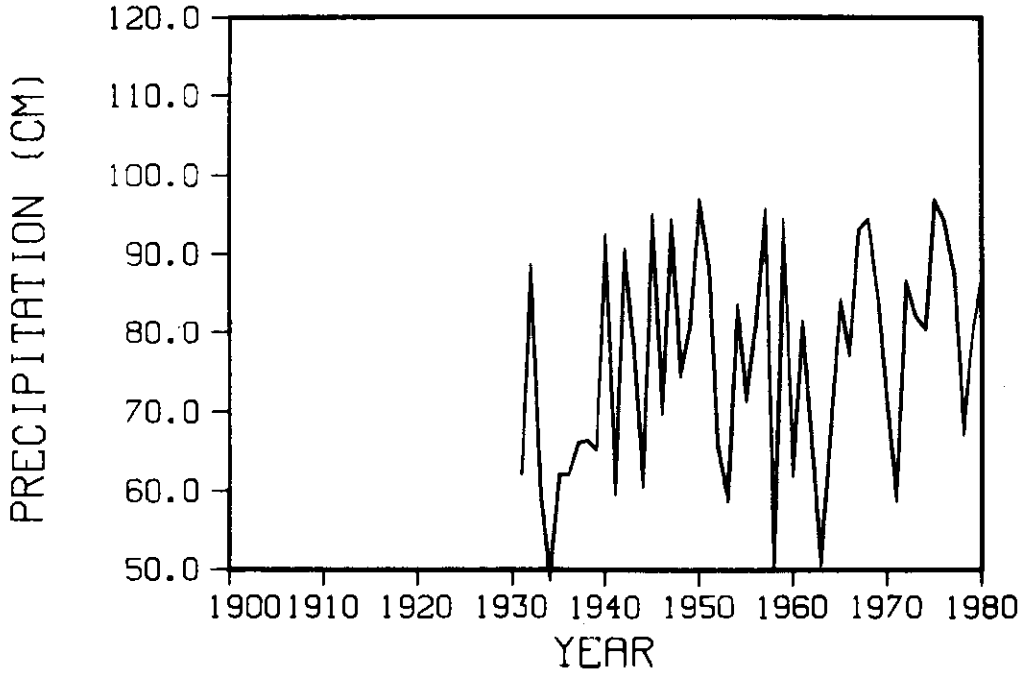

FIGURE 12.--*Yearly overlake precipitation volumes for Lake St. Clair.*

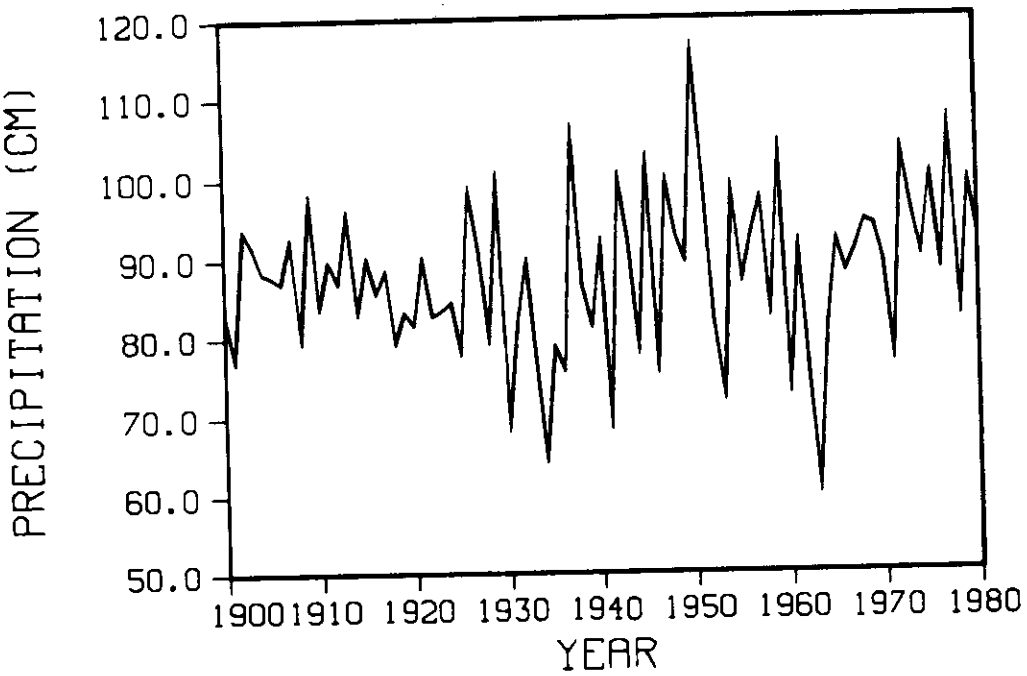

FIGURE 13.--*Yearly overland precipitation volumes for Lake Erie.*

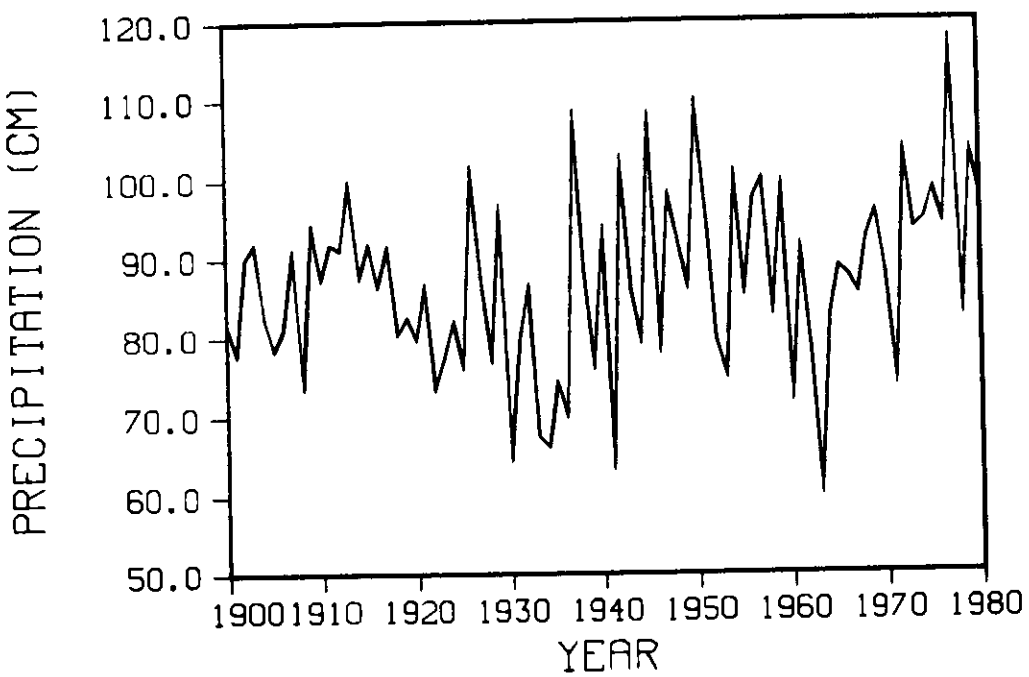

FIGURE 14.--*Yearly overlake precipitation volumes for Lake Erie.*

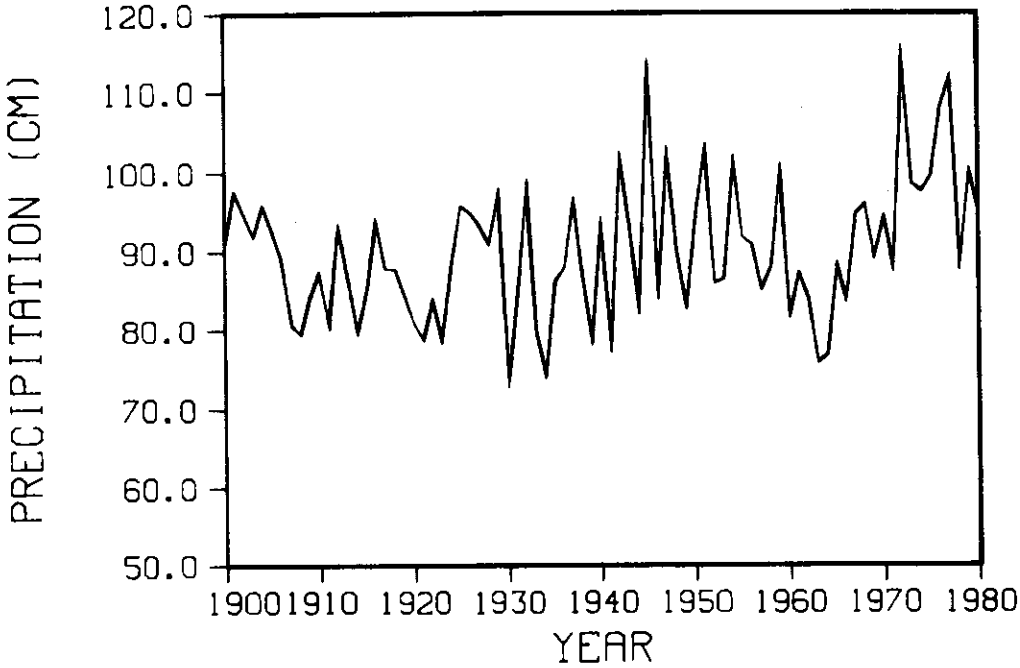

FIGURE 15.--*Yearly overland precipitation volumes for Lake Ontario.*

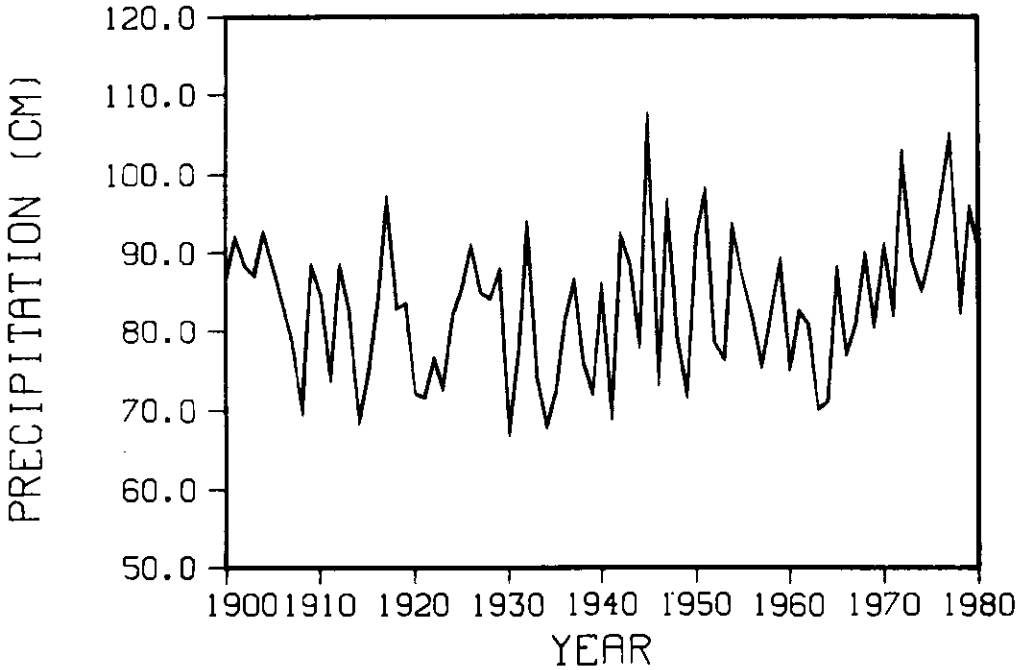

FIGURE 16.--*Yearly overlake precipitation volumes for Lake Ontario.*

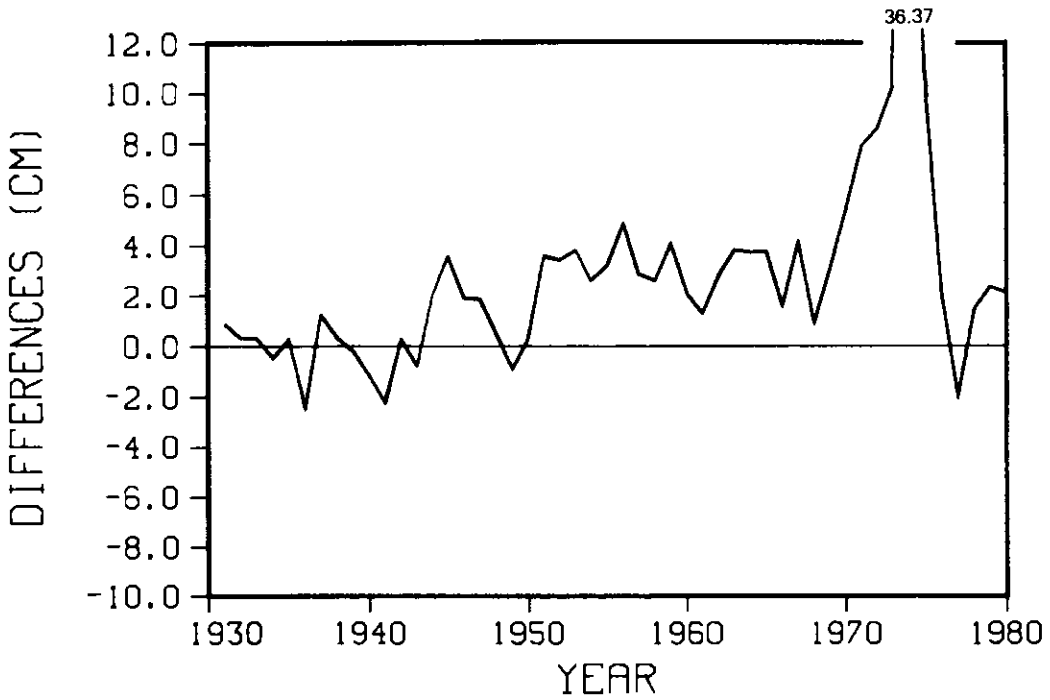

FIGURE 17.--*Yearly differences between grid and published overland precipitation volumes for Lake Superior.*

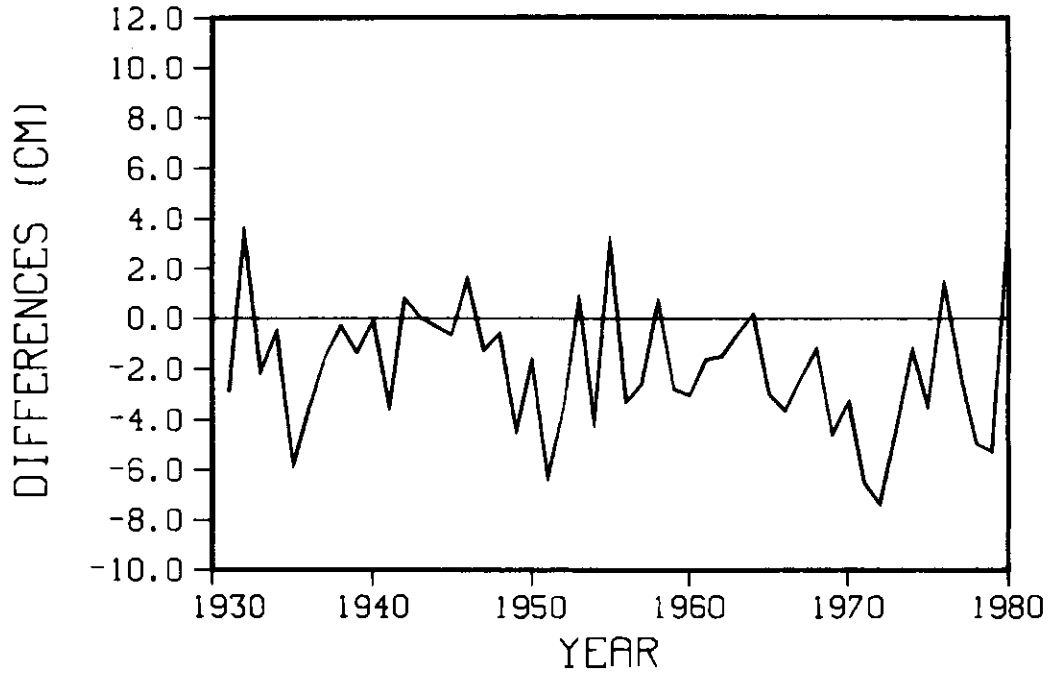

FIGURE 18.--*Yearly differences between grid and published overlake precipitation volumes for Lake Superior.*

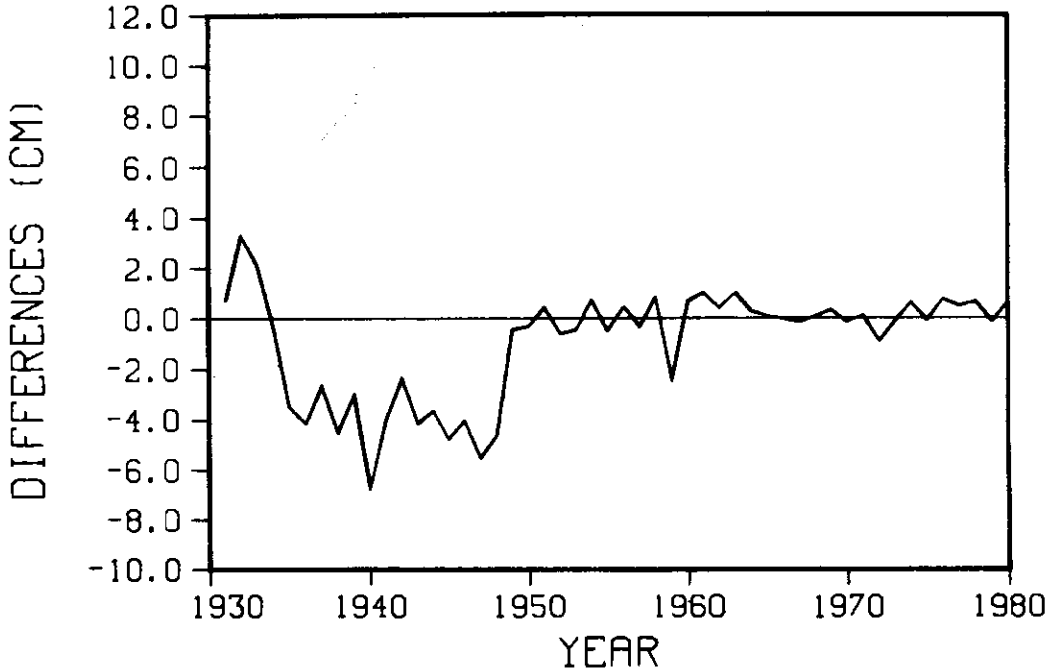

FIGURE 19.--*Yearly differences between grid and published overland precipitation volumes for Lake Michigan.*

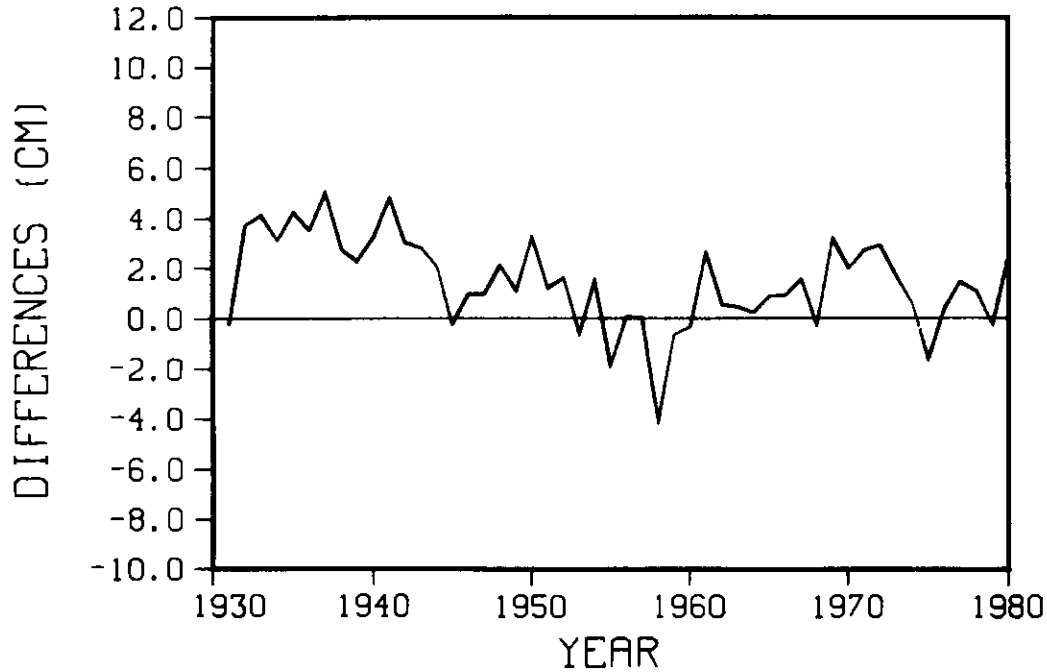

FIGURE 20.--*Yearly differences between grid and published overlake precipitation volumes for Lake Michigan.*

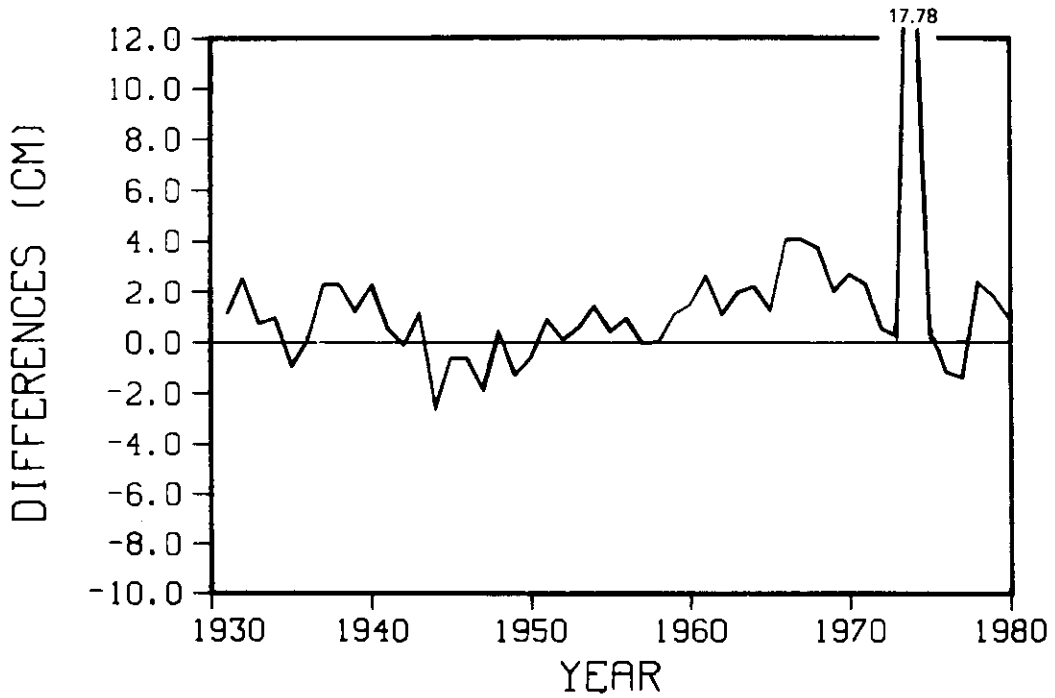

FIGURE 21.--*Yearly differences between grid and published overland precipitation volumes for Lake Huron.*

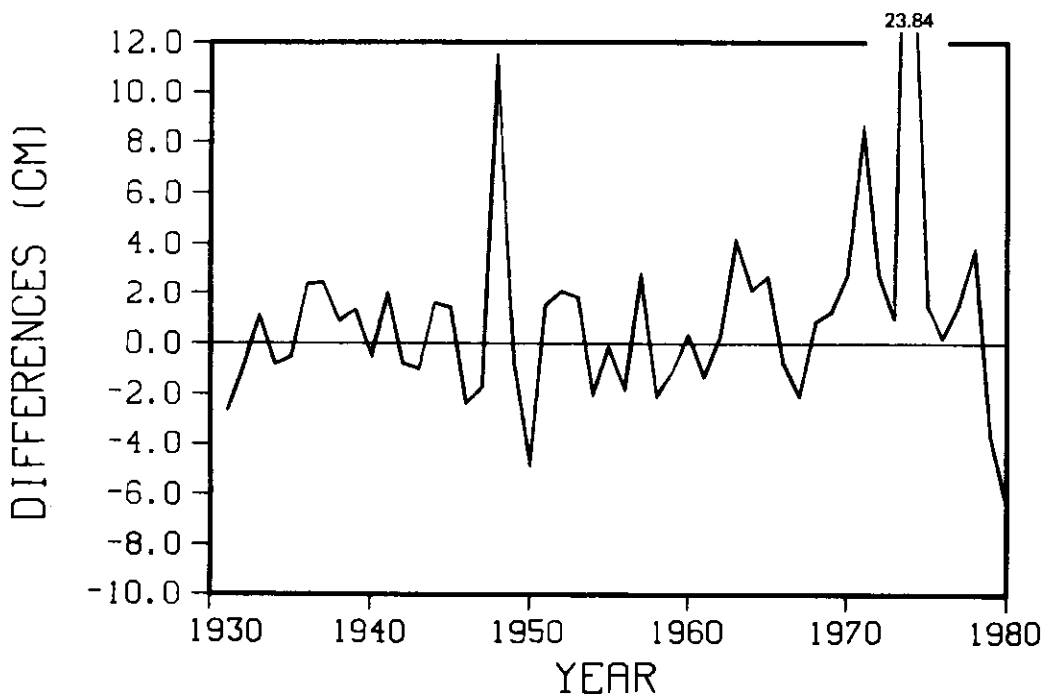

FIGURE 22.--*Yearly differences between grid and published overlake precipitation volumes for Lake Huron.*

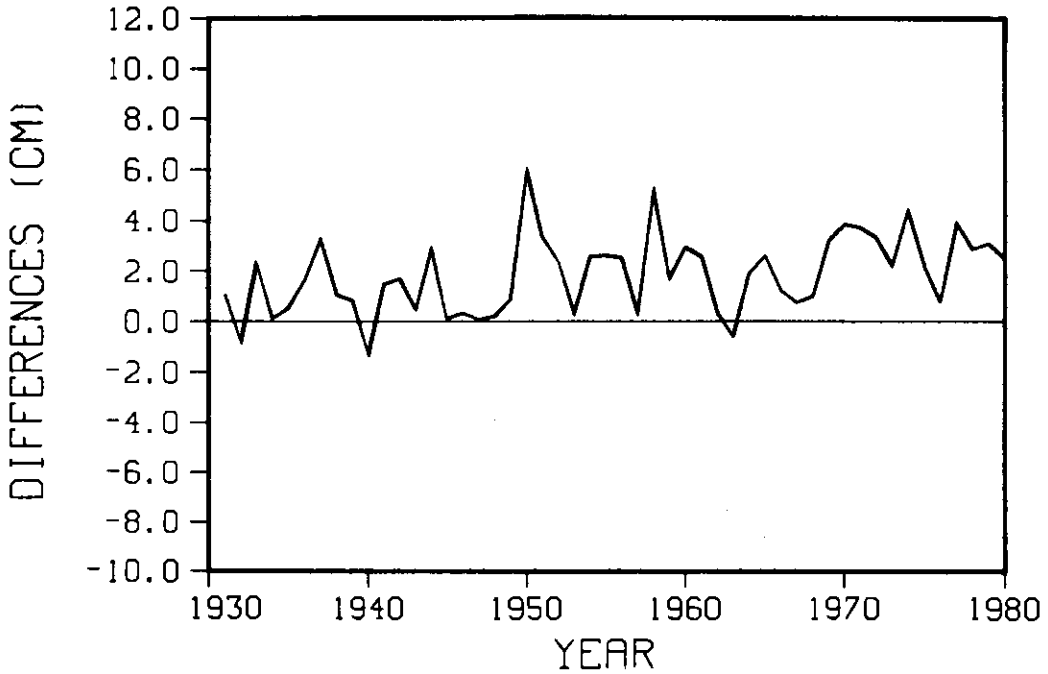

FIGURE 23.--*Yearly differences between grid and published overland precipitation volumes for Lake Erie.*

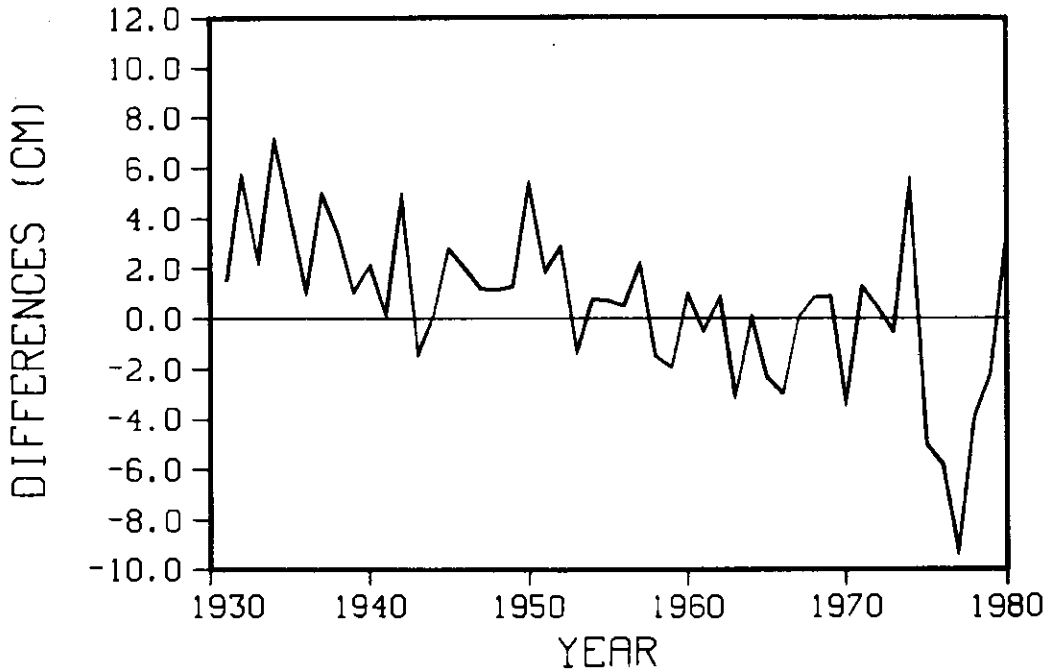

FIGURE 24.--*Yearly differences between grid and published overlake precipitation volumes for Lake Erie.*

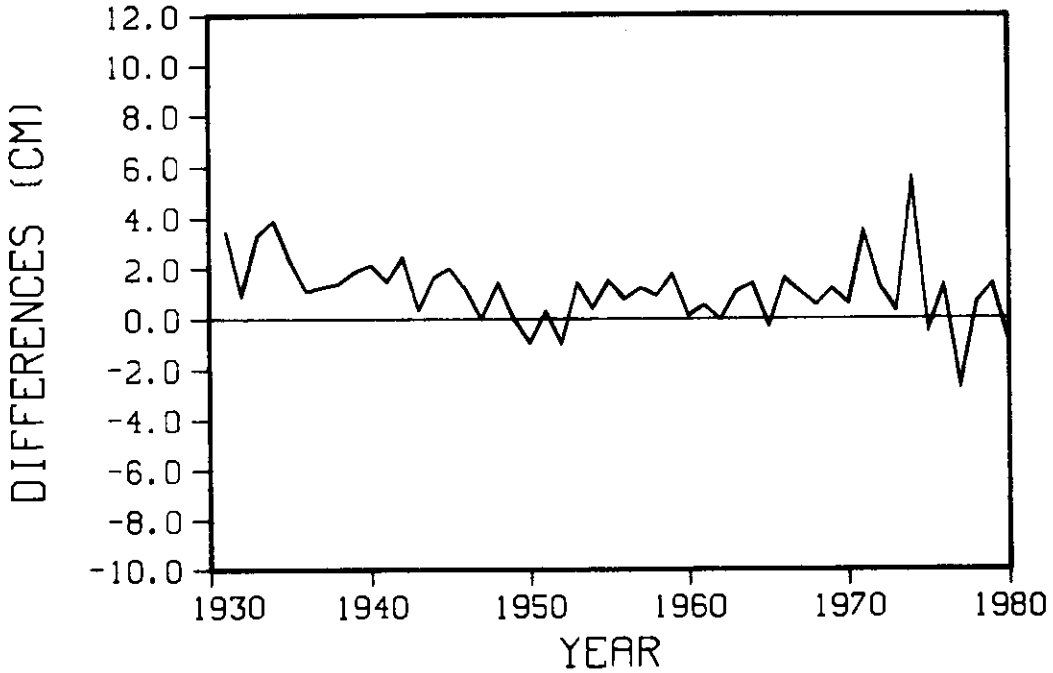

FIGURE 25.--*Yearly differences between grid and published overland precipitation volumes for Lake Ontario.*

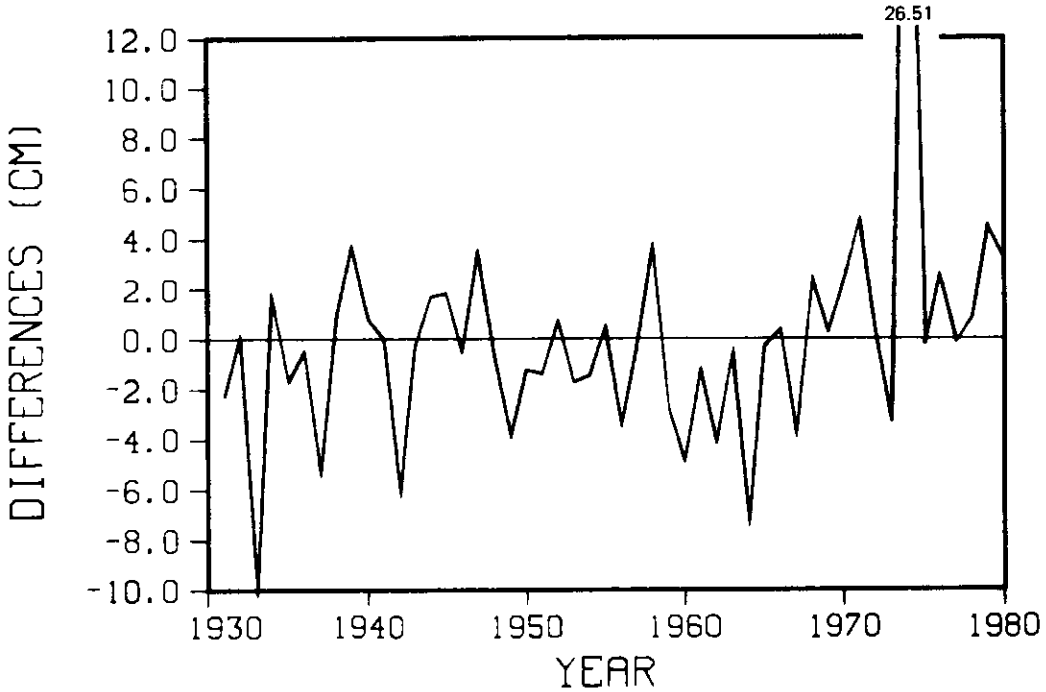

FIGURE 26.--*Yearly differences between grid and published overlake precipitation volumes for Lake Ontario.*

5.1. Lake Superior

The Lake Superior drainage basin is very large and sparsely gaged. The differences in Lake Superior precipitation between the two procedures were quite variable. In the overland portion of the basin (figure 17), the grid values were usually higher than the published values. In the 1970's a significant problem developed in the published record as has previously been discussed. The differences between the data sets were: 5.44 cm--1970, 7.87 cm--1971, 8.56 cm--1972, 10.25 cm--1973, 36.37 cm--1974, and 10.02 cm--1975. Since replication of the technique used to produce the published values was not possible, the cause of the error(s) in the published values could not be determined. The cumulative sum of the 1931-80 differences for the overland data was 148.02 cm, which is almost the equivalent of 2 years of precipitation; the overlake precipitation differences (figure 18) were even more erratic than the overland differences. This was evident in all overlake data as indicated by the greater variability of the overlake differences as compared to the overland differences for all the lakes. The overlake differences here and in the other basins are most attributable to basing the published overlake values on relatively few stations and to using multiple station weights for some of these. The effect of the early 1970's problem, evident in the overland published data, is not as pronounced in the overlake data. The principal differences were: -6.13 cm--1971, -7.37 cm--1972, and -4.49 cm--1973, although differences for the entire 1931-80 period showed significant variation. This period had a cumulative total difference of -98.39 cm.

5.2. Lake Michigan

The gage network of the Lake Michigan drainage basin has been far better than that of the Lake Superior Basin. The most striking characteristic of the plot of the overland differences (figure 19) was the good agreement of the data sets from 1949 onward. In the late 1940's, the U.S. Weather Bureau established numerous new precipitation stations. In 1949 the network used to compute the published Lake Michigan overland precipitation was expanded to encompass many of these new stations. The data for these new stations as provided by NCC begin in 1948. The differences in figure 19 graphically illustrate how well the published data approximate the grid technique data when large numbers of stations are used. The cumulative sum of the 1931-80 differences for the overland data is -49.08 cm. For the 1949-80 period, the overlake precipitation differences (figure 20) do not agree as closely as the overland precipitation. This is because the published station network was not significantly enlarged during this period. There is no evidence of the 1970's problem in these data. The cumulative sum of the 1931-80 differences for the overlake data was 73.02 cm, nearly 1 year's precipitation and in the opposite sign of the overland difference sum.

5.3. Lake Huron

Lake Huron's drainage basin is slightly larger than Lake Superior's, with the greater portion of the basin in Ontario, As can be seen in figure

1, the southern portion of the basin is better gaged than the more northerly reaches. In both the grid and composite technique computations, this distribution increases station weights in the northern section of the Ontario portion of the basin as compared to the station weights in the more southerly section. In 1974 the annual difference was 17.78 cm (figure 21) and is attributed to an error in the computation of the published value. The cumulative sum of the 1931-80 differences was 63.92, less than 1 year's precipitation. The overlake differences (figure 22) were very erratic. This was because the published values contained relatively few stations (varying from roughly 30-60 percent of the number used in the grid computations) and because there was multiple station weighting for some of these. There was no increase in the number of stations used in computing the published values for 1949. Therefore, the large 1948 difference of 11.13 cm and the almost perfect agreement in 1949 must be attributed to chance and/or an error in computing the 1948 published values. The large variances in the 1970's differences are attributed to the computational error in the published values previously discussed. The cumulative sum of the 1931-80 differences was 51.95 cm, about 1 year's precipitation, and was in the same direction as the overland difference sum, indicating an overall underestimate.

5.4. Lakes Erie and Ontario

These two lakes are discussed together because they are very similar from the perspective of this investigation. Both have densely gaged basins (figure 1), have small overlake areas when compared to the other Great Lakes, and exhibit similar differences between the grid and published data sets.

The overland precipitation computations of both methods for either lake used similar numbers of stations. Thus, differences in station weighting were the principal cause of the observed differences (figures 23 and 25). There were no apparent reasons for the positive consistency of these differences. Since nearly 300 stations per lake were involved in these computations, no investigation of the reasons for the differences was conducted. A July 1956 Lake Erie overland published value of 6.43 cm was investigated since it varied significantly from the grid value of 9.69 cm. The published value resulted from a typographical error, and should have been 8.97 cm. The early 1970's period did not exhibit such marked differences here as on Lakes Superior and Huron. Whether or not these lower lakes share the computational error in the published data so evident for those other lakes was not readily apparent. The 5.43-cm spike in the Lake Ontario differences for 1974 (figure 25) tends to indicate that the lower lakes do share the problem, but that it was moderated, possibly by the greater number of stations used. The sum of the 1931-80 cumulative differences was 92.12 cm for Lake Erie and 56.30 cm for Lake Ontario.

The most striking feature of the overlake differences (figures 24 and 26) was the large variability of the data. This was attributed to the paucity of stations used to compute the published values, less than half the number used in producing the grid values (up to 47 stations for Lake Erie and 66 stations for Lake Ontario). Both lower lakes' overlake published data sets exhibit the 1970's computational problem. The greatest difference

was Lake Ontario's 1974 difference of 26.51 cm. Although the number of stations used to compute the published values was slightly increased for the 1979-80 period, this increase was either insufficient or overridden by the 1970's computational error since no improvement in the comparison of the differences occurred. The 1933 Lake Ontario difference of -9.92 cm was attributed to an error in the published value. Notes in the original record book indicate that this error was identified in 1946, but no mention of the correct value was found. For the 1931-80 period, the cumulative sum of the overlake differences was 29.71 cm for Lake Erie and -2.42 cm for Lake Ontario. Thus, underestimates occurred in the overland and overlake published values for Lake Erie and in the overland values for Lake Ontario.

6. CONCLUSIONS

This data set is recommended for use in Great Lakes water resource and climatological studies. The use of the grid-square technique coupled with a significantly larger number of stations has resulted in a data base much improved over that previously published. At the present time, it is not planned to extend the grid-square data prior to 1931 because of the large manpower and cost requirements to extract, keypunch, and enter the requisite data into the data base. It is planned to update the data set in the future on a yearly basis.

7. REFERENCES

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Appendix A.--SUBROUTINE FOR GEOGRAPHIC TRANSFORMATION

```
C       SUBROUTINE FOR GEOGRAPHIC TRANSFORMATION
C
C       THIS PROGRAM CAN BE USED TO FIND THE DISTANCE FROM ONE POINT TO
C       ANOTHER IN THE GREAT LAKES REGION, OR THE LATITUDE AND LONGITUDE
C       OF A POINT IF ITS DISTANCE FROM A KNOWN LATITUDE AND LONGITUDE
C       IS KNOWN.  THE ORIGIN MUST BE TO THE NORTH WEST OF THE OTHER
C       POINTS.  IT REQUIRES DECIMAL DEGREES AND DISTANCES IN METERS.
C       THE FIRST CALL MUST BE FOR THE ORIGIN.  EXAMPLE:
C
C       BASIN = 1.      (2. FOR MICH, 3. FOR HURON, ETC.)
C       IF A MAP BASE OTHER THAN DAVID NORTON'S IS USED, MAKE BASIN
C       EQUAL TO THE "CENTRAL MERIDIAN" OF THE MAP (EX. -83.5).
C       ICODE = 1
C       FLT =
C       FLN =       (NEGATIVE AT THIS LONGITUDE)
C       CALL GT(BASIN,FLT,FLN,ICODE,XFO,YFO)
C
C       SINCE XFO AND YFO ARE DISTANCES FROM THE EQUATOR, THE SUBSEQUENT
C       CALLS FOR LT,LN OR X,Y MUST BE ADJUSTED AS FOLLOWS:
C
C       IF YOU DESIRE A DISTANCE FROM THE ORIGIN, MAIN PROGRAM CODING
C       SHOULD LOOK LIKE:
C
C       REAL LT,LN
C       LT =
C       LN =         (NEGATIVE AT THIS LONGITUDE)
C       CALL GT(BASIN,LT,LN,ICODE,X,Y)
C       X = X-XFO
C       Y = YFO-Y
C
C       IF YOU DESIRE A LATITUDE, LONGITUDE, MAIN PROGRAM CODING
C       SHOULD LOOK LIKE:
C
C       REAL LT,LN
C       ICODE = (-1)
C       X =
C       Y =
C       X = XFO+X
C       Y = YFO-Y
C       CALL GT(BASIN,LT,LN,ICODE,X,Y)
C
        SUBROUTINE GT(BASIN,LT,LN,ICODE,X,Y)
        DIMENSION PCM(6)
        REAL LT,LN,N
        DATA RS,DPR/6371100.,57.29578/
        DATA PCM/-88.0,-87.0,-82.0,-82.0,-82.0,-77.5/
C       CENTRAL MERIDIANS PCM/SUPERIOR,MICH.,HURON,ST.CLAIR,ERIE,ONT./
C       ICODE IS + TO GET X,Y OR - FOR LN,LT
```

```
      IF(BASIN.LT.0)GOTO 10
      GOTO 20
   10 CONTINUE
      PCM(1)=BASIN+(0.01)
      LAKE=1
      GOTO 30
   20 CONTINUE
      LAKE=BASIN+(0.01)
   30 CONTINUE
C
C     CHECK FOR X,Y OR LN,LT DESIRED
C
      IF(ICODE.LT.0)GOTO 40
C
C     COMPUTE X,Y
C
      P=LT/DPR
      TP=TAN(P)
      SNPL=SIN(P)*(LN-PCM(LAKE))/DPR
      X=RS*SIN(SNPL)/TP
      Y=RS*(P+(1-COS(SNPL))/TP)
      RETURN
C
   40 CONTINUE
C
C     COMPUTE LT,LN
C
      LT=Y/RS
      LN=X/(RS*COS(LT))
      DO 50I=1,10

       TP=TAN(LT)
       SNPL=SIN(LT)*LN
       XN=RS*SIN(SNPL)/TP
       YN=RS*(LT+(1.-COS(SNPL))/TP)
       DY=YN-Y
       DX=XN-X
       LT=LT-DY/RS
       LN=LN-DX/(COS(LT)*RS)
C
C     CHECK FOR CONVERGENCE
C
       IF(DX.LT.1.0.AND.DY.LT.1.0)GOTO 60
C
   50 CONTINUE
C
      WRITE(6,1010)DX,DY
C
   60 CONTINUE
      LT=LT*DPR
      LN=LN*DPR+PCM(LAKE)
      RETURN
C
 1010 FORMAT("  WARNING...  CONVERGENCE ERRORS OF ",2F10.1)
      END
```


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Appendix B.--MONTHLY PRECIPITATION TABLES, 1900-80

LAKE SUPERIOR OVERLAND PRECIPITATION (MM X 10)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM
1900	333	251	216	229	229	508	965	1336	1316	800	330	279	6792
1901	366	117	505	292	381	1074	1173	569	704	739	450	376	6746
1902	384	239	196	335	564	711	706	709	645	660	673	493	6315
1903	292	323	437	465	950	404	1130	800	1080	798	508	351	7538
1904	302	229	417	251	836	759	790	828	1013	848	196	424	6893
1905	246	211	533	401	622	843	1196	533	1082	683	709	216	7275
1906	378	269	351	259	775	1321	439	681	493	688	876	348	6878
1907	470	282	549	460	564	351	945	1110	975	475	429	165	6775
1908	284	544	401	696	1080	953	686	615	584	305	485	556	7189
1909	411	485	295	508	419	318	1140	815	693	561	833	594	7072
1910	257	467	104	505	495	244	836	754	803	511	457	358	5791
1911	394	493	394	290	820	1019	1222	1013	780	668	810	538	8441
1912	315	130	239	681	836	404	782	859	1113	465	231	721	6776
1913	399	404	813	282	828	676	1110	678	846	940	523	89	7588
1914	391	272	292	589	495	625	658	643	683	429	561	277	5915
1915	475	312	127	318	615	1260	671	729	1052	688	823	460	7530
1916	884	170	498	676	759	1143	516	823	1133	699	213	422	7936
1917	340	320	645	340	335	681	556	803	518	770	150	546	6004
1918	343	356	218	381	1041	676	594	671	813	869	650	521	7133
1919	345	455	447	485	434	516	660	724	869	759	869	340	6903
1920	386	180	632	488	566	998	866	450	691	500	323	625	6705
1921	257	351	572	589	737	424	1181	513	1013	345	460	498	6940
1922	424	678	427	587	538	777	953	480	521	348	602	610	6945
1923	378	325	559	295	333	856	937	691	648	610	302	358	6292
1924	594	284	201	602	406	607	777	1107	869	353	475	488	6763
1925	399	363	391	318	351	937	772	632	864	503	366	343	6239
1926	450	310	500	323	295	1217	1052	803	1471	808	1110	533	8872
1927	302	409	373	404	1049	772	978	498	716	663	668	653	7485
1928	358	175	356	658	376	1278	993	1204	950	1034	249	295	7926
1929	681	246	549	429	800	566	742	455	1133	638	452	508	7199
1930	300	325	348	259	691	1199	655	279	1044	569	569	368	6606
1931	376	220	274	339	727	780	722	703	1052	929	960	227	7309
1932	660	549	517	279	625	559	1005	1108	481	774	687	461	7705
1933	403	468	372	600	557	613	747	507	1054	1013	726	528	7588
1934	549	262	431	487	426	716	621	717	1264	778	668	542	7461
1935	886	216	473	384	361	934	1242	959	877	894	503	475	8204
1936	393	407	659	433	711	509	306	818	793	540	609	534	6712
1937	825	684	146	546	898	352	1249	866	912	756	654	639	8527
1938	586	360	451	1049	634	1032	746	907	579	412	1032	569	8357
1939	584	823	467	374	644	1216	663	844	670	642	98	324	7349

LAKE SUPERIOR OVERLAND PRECIPITATION (MM X 10)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM
1940	383	341	337	600	906	904	618	588	440	488	788	385	6778
1941	470	382	205	594	796	876	672	1253	1826	854	419	420	8767
1942	348	222	566	446	942	503	884	915	1003	915	662	460	7866
1943	529	375	371	374	892	1465	721	876	605	550	585	327	7670
1944	259	376	727	275	995	1414	1229	1166	741	315	654	475	8626
1945	360	647	411	856	521	790	764	1062	1088	484	868	488	8339
1946	641	539	264	511	632	1033	450	715	952	1157	637	543	8074
1947	465	443	258	800	722	1172	652	584	1019	141	682	494	7432
1948	425	314	564	814	226	672	879	736	386	469	904	642	7031
1949	667	464	499	188	784	1072	1074	611	800	983	615	410	8167
1950	827	337	479	724	966	1123	923	713	540	822	957	537	8948
1951	282	613	822	504	471	1150	634	1132	1325	840	596	449	8818
1952	505	249	496	426	541	1107	1518	904	470	295	568	368	7447
1953	583	478	535	499	1051	1209	931	942	917	224	513	661	8543
1954	628	391	511	870	1054	856	488	704	930	755	398	238	7823
1955	460	496	688	379	684	561	982	913	914	933	909	545	8464
1956	388	213	244	490	848	796	716	788	733	369	747	708	7040
1957	351	373	376	638	595	1060	748	487	1241	337	948	408	7562
1958	415	193	202	391	570	1041	960	1074	895	496	925	443	7605
1959	304	232	305	368	1097	729	728	1424	1264	828	548	349	8176
1960	455	268	278	1028	822	745	618	824	793	645	800	391	7667
1961	185	424	541	508	817	540	837	619	1263	651	570	582	7537
1962	524	527	228	533	998	577	706	1154	950	352	318	560	7427
1963	274	307	362	552	688	1057	666	804	651	283	670	509	6823
1964	577	302	446	786	1094	1292	583	1230	1164	562	623	593	9252
1965	405	578	338	360	1000	696	863	918	1484	581	1058	580	8861
1966	456	290	745	526	414	681	820	1252	491	1036	676	552	7939
1967	699	331	434	718	382	1025	669	959	354	966	462	422	7421
1968	283	289	645	927	651	1458	1421	760	1016	1109	373	852	9784
1969	855	165	167	449	761	847	728	801	795	788	474	520	7350
1970	489	296	268	632	1279	647	1021	532	1266	1283	738	640	9091
1971	542	671	466	325	1082	755	766	592	1041	1205	810	594	8849
1972	784	413	661	290	521	645	1298	1160	1026	494	512	625	8429
1973	359	308	551	488	880	1064	926	1105	892	606	657	488	8324
1974	539	322	377	748	863	885	887	1285	809	666	744	323	8448
1975	836	322	497	392	560	1156	684	578	783	629	1008	466	7911
1976	670	496	973	448	210	1072	665	405	480	390	442	563	6814
1977	449	478	944	575	573	1120	861	1371	1363	643	841	693	9911
1978	352	195	295	352	931	821	1182	1142	738	476	620	543	7647
1979	356	467	1020	484	904	1043	780	905	694	1155	589	449	8846
1980	761	232	367	378	416	661	877	1046	1356	691	368	590	7743

LAKE SUPERIOR OVERLAKE PRECIPITATION (MM X 10)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM
1900	399	366	279	399	282	599	968	1331	1875	701	488	279	7966
1901	348	168	577	300	399	1077	1245	643	693	879	462	455	7246
1902	325	315	196	447	643	935	726	602	671	671	719	544	6794
1903	307	315	564	528	978	394	1087	782	1013	782	508	434	7692
1904	305	300	470	295	947	714	686	650	1019	1054	254	511	7205
1905	348	216	465	389	798	859	1003	533	1242	770	620	284	7527
1906	462	254	427	290	742	1044	414	744	605	688	902	422	6994
1907	561	226	450	472	610	340	752	940	983	475	475	203	6487
1908	234	536	376	632	980	787	770	523	630	318	544	498	6828
1909	338	417	325	508	462	284	1303	721	640	536	749	655	6938
1910	333	472	84	516	551	201	640	729	742	521	569	437	5795
1911	439	495	366	218	859	902	1067	792	726	612	752	554	7782
1912	399	112	155	587	848	401	582	958	932	495	272	592	6333
1913	373	386	711	315	785	665	1166	686	836	940	493	91	7447
1914	495	307	305	886	526	846	605	866	665	361	617	315	6794
1915	460	335	155	318	599	1229	645	714	983	759	993	467	7657
1916	798	221	531	721	848	1250	401	772	1496	785	282	587	8692
1917	345	244	749	323	384	706	521	780	521	805	173	681	6232
1918	450	310	173	384	1082	549	538	719	650	864	686	551	6956
1919	300	460	361	546	447	577	498	602	803	813	1128	485	7020
1920	480	180	739	594	434	942	919	480	622	538	434	752	7114
1921	343	348	678	645	693	437	1034	503	1006	419	472	544	7122
1922	503	803	495	693	671	871	1016	434	607	312	709	531	7645
1923	554	368	584	310	274	594	909	569	693	798	284	457	6394
1924	686	274	218	574	480	559	704	1219	739	386	551	660	7050
1925	384	361	363	254	414	889	632	546	947	665	427	472	6354
1926	389	300	554	267	333	1024	1013	650	1511	914	1130	635	8720
1927	325	389	429	406	1163	668	1041	333	848	668	790	765	7825
1928	516	305	345	770	391	1120	968	973	1034	1133	246	353	8154
1929	864	262	457	445	645	625	704	437	1069	800	577	531	7416
1930	429	419	366	305	726	1113	632	226	1036	681	594	437	6964
1931	385	281	325	307	750	772	656	632	1169	1081	892	303	7553
1932	797	672	569	324	699	517	1212	1173	484	859	846	716	8868
1933	424	642	404	661	469	650	719	440	1217	967	794	557	7944
1934	609	260	448	479	343	581	504	772	1454	705	759	745	7659
1935	958	246	489	408	326	910	957	801	722	789	584	623	7813
1936	570	476	582	452	750	393	231	874	731	457	597	610	6723
1937	853	763	159	590	766	297	1144	787	782	807	807	704	8459
1938	892	342	503	962	584	1054	539	872	656	508	1117	692	8721
1939	773	876	534	392	686	1341	524	883	658	601	130	298	7696

LAKE SUPERIOR OVERLAKE PRECIPITATION (MM X 10)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM
1940	519	266	406	503	1046	1179	498	641	484	499	1092	426	7559
1941	509	481	207	826	702	798	574	1139	1332	1010	501	487	8566
1942	455	262	717	426	986	468	840	798	1236	1011	828	589	8616
1943	528	424	468	469	919	1592	430	798	443	621	694	394	7780
1944	293	411	681	346	865	1522	1044	948	754	316	864	585	8629
1945	539	638	444	869	544	769	660	999	842	398	892	587	8181
1946	695	570	296	380	685	763	396	741	1098	911	744	609	7888
1947	409	539	232	878	736	1146	390	599	787	179	864	470	7229
1948	667	383	488	849	201	493	758	676	253	392	1090	738	6988
1949	727	555	523	143	792	1027	1258	486	849	891	807	467	8525
1950	1015	443	563	793	853	962	853	792	570	635	1079	559	9117
1951	405	720	818	553	495	1213	556	1174	1237	798	604	513	9086
1952	565	205	470	428	567	1134	1198	852	336	265	567	333	6920
1953	548	529	521	571	1137	986	986	854	781	264	560	656	8393
1954	646	364	495	965	982	797	307	549	917	646	366	220	7254
1955	576	436	926	457	768	547	857	917	937	1039	810	598	8868
1956	371	206	227	438	871	686	837	740	631	227	672	669	6575
1957	454	387	373	544	547	890	525	422	997	329	921	424	6813
1958	398	258	176	359	486	852	876	1076	812	477	1027	651	7448
1959	365	217	332	300	1091	620	554	1532	1300	1014	535	344	8204
1960	478	316	287	1086	950	643	761	652	718	626	738	375	7630
1961	283	367	512	419	757	580	501	399	1234	627	669	539	6887
1962	515	532	137	431	914	439	492	940	879	300	253	551	6383
1963	431	326	388	647	514	954	426	757	491	237	559	603	6333
1964	491	309	448	841	1143	809	514	1014	1039	508	578	709	8403
1965	523	659	403	409	1012	636	803	825	1361	558	987	545	8721
1966	602	348	707	381	427	452	464	1153	518	914	589	522	7077
1967	692	480	397	634	307	1052	534	982	286	971	467	463	7265
1968	331	393	535	898	709	1240	1209	874	1134	908	304	900	9435
1969	919	216	154	577	536	680	482	682	569	876	396	504	6591
1970	597	287	264	568	1245	523	1018	326	1091	1079	763	580	8341
1971	687	656	509	311	900	890	744	548	758	1050	811	648	8512
1972	838	484	683	378	530	650	1094	1155	885	380	549	735	8361
1973	465	333	575	540	1029	888	885	986	771	487	585	647	8191
1974	553	354	332	677	716	927	721	1040	742	585	802	367	7816
1975	1124	531	549	390	529	1081	490	533	814	478	1110	601	8230
1976	873	594	1100	408	293	843	534	251	344	365	426	686	6717
1977	622	430	1051	541	477	849	976	1320	1514	588	761	823	9952
1978	522	275	284	404	838	682	1149	1047	770	401	858	692	7922
1979	611	511	1150	366	996	1118	771	726	809	1214	528	427	9227
1980	1068	363	280	466	371	740	730	894	1309	652	341	633	7847

LAKE MICHIGAN OVERLAND PRECIPITATION (MM X 10)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM
1900	312	673	391	536	605	635	1427	1003	1074	965	775	203	8599
1901	404	351	782	254	627	752	1184	574	676	853	361	490	7308
1902	188	340	572	483	1057	1227	1283	351	871	538	691	554	8155
1903	384	475	511	843	859	577	1153	1290	1031	528	422	488	8561
1904	376	493	810	536	1168	566	826	757	1044	841	94	472	7983
1905	434	366	574	511	1163	1354	1166	871	828	706	538	378	8889
1906	737	366	589	460	729	1034	704	881	696	831	894	582	8503
1907	777	157	617	706	671	721	871	724	1212	343	475	589	7863
1908	358	759	660	739	1199	602	792	653	442	208	572	480	7464
1909	396	589	427	1311	625	927	757	612	599	348	859	732	8182
1910	427	348	76	843	711	277	521	932	848	625	521	353	6482
1911	353	513	318	541	1128	836	798	775	1097	1247	907	569	9082
1912	315	282	241	541	1384	361	1318	1237	907	648	577	447	8258
1913	457	399	864	577	986	594	1019	546	759	831	478	137	7647
1914	533	254	450	752	876	1334	803	1036	663	554	434	404	8093
1915	429	559	168	254	904	899	925	864	1369	447	790	333	7941
1916	732	236	648	625	1039	1415	378	650	1077	970	572	462	8804
1917	358	196	518	699	635	1298	587	663	577	1006	193	274	7004
1918	472	480	389	533	1354	511	455	683	597	813	742	615	7644
1919	190	442	592	846	859	754	650	605	879	1049	719	211	7796
1920	335	168	775	724	427	1069	790	686	617	439	592	762	7384
1921	190	221	879	1072	493	508	589	1092	1016	716	577	696	8049
1922	284	709	681	942	818	955	1036	541	980	480	645	290	8361
1923	389	292	729	511	683	777	798	716	879	714	277	511	7276
1924	455	399	518	795	973	853	907	1321	693	147	533	488	8082
1925	183	373	325	518	307	856	945	610	1029	716	401	404	6667
1926	310	531	541	485	785	1036	716	876	1247	803	902	411	8643
1927	274	226	536	681	1189	541	874	236	1270	699	1021	671	8218
1928	325	452	483	699	556	1092	686	1107	909	1013	726	363	8411
1929	737	251	503	1359	912	876	696	417	549	775	338	445	7858
1930	480	442	427	455	752	874	457	234	526	516	384	196	5743
1931	272	193	503	330	729	932	506	549	1473	843	1058	440	7828
1932	685	415	390	382	861	618	895	922	506	955	482	613	7724
1933	357	422	509	830	1088	764	581	451	887	975	432	435	7731
1934	292	154	472	538	393	741	453	666	1315	496	1244	377	7141
1935	496	334	450	473	730	1080	729	977	690	446	805	332	7542
1936	420	438	288	442	574	533	265	1119	1193	764	347	589	6972
1937	617	532	165	946	625	872	749	651	820	761	579	355	7672
1938	663	802	701	484	1053	955	866	1117	1144	295	413	528	9021
1939	583	600	430	722	601	1314	460	1101	703	598	193	314	7619

LAKE MICHIGAN OVERLAND PRECIPITATION (MM X 10)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM
1940	482	265	336	591	1002	1417	502	1490	417	658	816	459	8435
1941	433	268	300	541	851	600	554	989	1290	1487	625	429	8367
1942	382	261	799	387	1267	1041	1024	724	1260	653	660	709	9167
1943	494	357	701	562	1299	1277	714	845	535	483	667	135	8069
1944	273	372	664	609	823	1127	597	711	872	248	679	325	7300
1945	240	452	410	933	1247	992	729	873	1243	556	943	380	8998
1946	551	329	521	220	838	1097	372	523	720	534	711	580	6996
1947	478	249	383	1278	1190	810	640	754	1087	315	594	380	8158
1948	323	414	776	700	703	819	693	474	485	282	991	481	7141
1949	617	407	549	412	633	1180	1142	564	660	572	520	649	7905
1950	860	487	646	1058	498	980	1173	661	707	342	567	561	8540
1951	411	461	705	1018	627	924	1132	978	916	1135	642	587	9536
1952	578	204	594	546	806	779	1489	890	362	136	715	463	7562
1953	398	597	496	909	679	1060	858	751	533	293	321	464	7359
1954	339	532	603	1174	635	1394	762	601	1134	1475	379	364	9392
1955	309	335	510	654	721	747	749	798	365	1007	563	331	7089
1956	156	311	532	772	1033	814	1083	979	378	150	602	327	7137
1957	305	283	314	859	999	888	842	758	663	624	886	503	7924
1958	262	173	150	542	444	837	956	921	848	548	696	222	6599
1959	443	457	604	828	871	450	932	1290	1096	1246	599	613	9429
1960	570	458	276	919	1382	994	916	987	810	573	637	154	8676
1961	140	350	699	710	465	838	880	740	1567	713	640	415	8157
1962	499	512	308	501	746	835	754	813	730	638	193	385	6914
1963	255	175	593	514	773	638	820	686	675	252	568	362	6311
1964	314	130	502	883	914	520	998	996	1055	237	620	379	7548
1965	559	400	561	833	805	648	542	1109	1768	520	725	792	9262
1966	311	348	762	704	506	629	618	952	476	536	939	699	7480
1967	649	368	317	1103	563	1452	476	756	512	1165	559	599	8519
1968	342	379	234	839	906	1575	751	642	1161	603	597	839	8868
1969	716	69	318	833	779	1638	934	201	528	1176	489	318	7999
1970	317	148	459	619	1184	658	1030	392	1503	885	738	498	8431
1971	487	679	490	303	632	694	887	614	828	579	613	993	7799
1972	304	285	657	652	616	632	936	1442	1302	677	510	862	8875
1973	365	298	734	890	1441	872	729	695	742	748	549	678	8741
1974	558	406	611	805	998	1067	678	1001	665	497	616	427	8329
1975	628	450	595	817	766	1103	605	1747	719	270	859	559	9118
1976	475	521	1136	769	950	598	673	386	376	430	253	254	6821
1977	269	312	1046	756	366	850	900	1079	1197	572	804	693	8844
1978	529	138	231	724	889	901	985	1101	1389	617	565	554	8623
1979	620	299	936	739	693	1027	711	1162	200	894	786	426	8493
1980	463	206	315	763	561	1111	918	1376	1228	533	315	558	8347

LAKE MICHIGAN OVERLAKE PRECIPITATION (MM X 10)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM
1900	351	693	333	521	744	559	1328	759	991	762	805	241	8087
1901	391	330	632	175	505	630	991	493	704	699	310	513	6373
1902	155	371	632	437	1102	1163	1369	315	833	483	627	523	8010
1903	368	429	716	729	612	470	1011	1135	795	467	386	498	7616
1904	330	498	917	528	1206	432	696	759	963	752	66	526	7673
1905	427	434	632	455	1168	1115	1209	861	734	836	493	414	8778
1906	711	470	627	561	592	696	592	582	744	853	1273	594	8295
1907	813	190	622	714	721	853	902	871	1156	279	559	653	8333
1908	429	759	632	775	1118	521	744	577	439	234	622	556	7406
1909	485	579	427	1361	874	892	627	599	663	343	693	968	8511
1910	467	345	190	853	739	279	485	1046	869	787	599	320	6979
1911	406	531	244	645	1044	739	531	754	1087	1283	861	556	8681
1912	439	366	257	450	1389	348	1435	1052	1041	724	612	429	8542
1913	414	411	744	582	1039	630	965	467	681	795	457	119	7304
1914	544	295	485	599	899	1298	704	795	696	711	376	465	7867
1915	437	587	665	234	917	777	704	828	1341	401	701	320	7912
1916	744	277	622	572	1019	1252	348	701	876	1054	650	589	8704
1917	389	231	439	627	714	1308	533	414	569	892	246	320	6682
1918	714	417	429	625	1435	442	371	452	495	762	754	668	7564
1919	221	450	650	826	930	432	645	521	988	1064	681	269	7677
1920	376	251	1003	729	429	927	663	569	569	518	554	757	7345
1921	152	190	810	940	503	373	427	1115	1176	871	561	828	7946
1922	328	792	699	859	706	757	980	485	1021	686	665	302	8280
1923	434	335	861	523	599	589	640	919	770	1024	257	503	7454
1924	478	511	564	724	932	833	927	1618	622	53	587	478	8327
1925	198	394	292	584	318	884	790	411	800	704	315	452	6142
1926	269	569	584	452	841	1100	610	688	1232	757	1087	427	8616
1927	310	211	640	782	1090	465	787	274	1283	752	1029	592	8215
1928	292	498	503	660	478	1095	594	1013	805	960	879	422	8199
1929	838	282	561	1336	645	902	607	422	579	716	292	373	7553
1930	447	439	462	531	632	676	462	208	500	544	318	216	5435
1931	317	154	650	285	899	650	600	510	1487	972	1057	458	8039
1932	710	373	434	320	777	504	843	810	320	1118	449	589	7247
1933	388	454	614	831	1268	872	595	472	751	978	432	475	8130
1934	265	188	479	476	429	763	319	716	1202	562	1510	408	7317
1935	499	393	408	434	688	1057	589	907	778	415	923	395	7486
1936	511	469	240	403	569	465	257	1162	1316	818	312	650	7172
1937	595	563	218	937	599	740	708	543	959	690	611	396	7559
1938	831	781	680	371	831	1043	768	1113	1198	304	525	466	8911
1939	561	563	341	616	561	1073	370	884	627	678	208	318	6800

LAKE MICHIGAN OVERLAKE PRECIPITATION (MM X 10)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM
1940	597	262	324	582	995	1180	513	1511	502	644	815	424	8349
1941	491	345	303	548	803	564	621	892	1516	1560	718	436	8797
1942	420	261	679	334	1225	931	822	565	1319	583	624	828	8591
1943	557	397	708	529	1128	1119	716	905	401	498	750	170	7878
1944	271	427	662	665	667	1036	637	602	1042	292	664	377	7342
1945	250	447	344	868	1286	962	591	992	1304	520	899	442	8905
1946	575	301	519	211	787	890	389	512	617	451	681	589	6522
1947	511	324	363	1253	1243	798	670	538	1109	252	652	345	8058
1948	386	451	879	674	756	738	575	423	512	308	963	505	7170
1949	671	496	557	423	566	897	1026	497	587	499	599	670	7488
1950	802	469	590	1063	409	980	1100	615	671	362	595	624	8280
1951	438	467	743	975	588	662	1091	836	903	1237	756	623	9319
1952	606	165	725	595	811	728	1649	818	329	150	768	510	7854
1953	454	653	466	853	661	942	779	664	544	289	347	582	7234
1954	384	478	571	1185	615	1534	898	648	1028	1430	381	480	9632
1955	340	328	444	705	686	718	511	594	364	959	538	318	6505
1956	150	290	518	781	957	570	1025	864	328	148	560	344	6535
1957	330	243	382	807	1105	848	694	793	466	590	909	548	7715
1958	302	235	143	548	424	756	738	864	866	533	661	277	6347
1959	492	490	696	862	768	328	842	1320	997	1325	652	649	9421
1960	656	575	379	958	1349	988	964	993	852	584	641	202	9141
1961	189	295	722	663	381	790	775	582	1875	764	676	435	8147
1962	709	523	324	474	580	605	747	823	687	623	259	485	6839
1963	342	225	620	541	741	461	840	651	698	263	663	564	6609
1964	368	154	579	948	752	397	978	882	1089	244	681	418	7490
1965	714	413	581	869	723	598	601	1155	1923	642	701	759	9679
1966	472	428	766	736	583	482	639	797	426	530	1099	625	7583
1967	682	496	352	1057	557	1383	454	709	531	1073	625	566	8485
1968	399	412	190	791	766	1276	679	700	1020	532	695	906	8366
1969	723	85	346	824	730	1800	905	208	644	1312	483	368	8428
1970	452	183	450	679	989	668	803	385	1719	730	741	564	8363
1971	564	629	508	302	594	613	822	638	655	510	658	1120	7613
1972	302	306	616	643	508	789	969	1522	1350	674	454	867	9000
1973	381	311	524	972	1241	900	643	673	766	849	500	791	8551
1974	709	394	597	851	920	1201	710	873	640	563	583	464	8505
1975	667	430	640	721	708	1073	747	1538	603	270	941	484	8822
1976	507	469	1318	766	959	427	541	402	362	493	277	258	6779
1977	339	328	1056	666	279	766	975	1126	1105	620	773	735	8768
1978	541	185	180	750	884	819	918	1073	1509	706	548	560	8673
1979	784	312	1012	878	599	819	517	1113	133	843	749	470	8229
1980	489	219	252	877	460	1098	880	1309	1131	526	322	556	8119

LAKE HURON OVERLAND PRECIPITATION (MM X 10)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM
1900	439	914	411	310	528	693	1181	699	963	577	856	424	7995
1901	513	312	688	396	696	589	1021	691	579	902	584	671	7642
1902	417	300	696	485	846	1011	1059	577	889	744	767	625	8416
1903	564	691	559	447	632	704	881	1031	922	808	521	798	8558
1904	483	556	701	650	1031	643	719	777	1095	643	284	597	8179
1905	605	518	551	411	978	886	940	627	770	838	653	467	8244
1906	749	424	627	381	554	960	559	645	627	955	770	643	7894
1907	704	315	572	594	587	627	559	498	917	488	653	714	7228
1908	546	932	594	528	1034	404	843	559	424	218	668	688	7438
1909	455	678	498	1016	518	330	846	602	676	505	676	767	7567
1910	533	498	229	742	790	673	617	853	660	899	668	551	7713
1911	371	450	447	396	798	505	561	556	643	1118	1026	564	7435
1912	668	424	249	528	1026	366	653	1008	904	612	798	587	7823
1913	594	528	785	683	447	544	696	808	513	907	579	135	7219
1914	607	419	404	546	465	546	427	805	503	554	732	523	6531
1915	396	447	142	318	518	879	683	932	1107	485	699	470	7076
1916	808	351	602	650	894	851	302	587	833	1036	716	632	8262
1917	513	330	660	566	467	1080	864	699	386	932	302	503	7302
1918	691	658	335	378	1008	650	505	706	889	884	836	691	8231
1919	439	445	665	749	813	457	518	632	833	1074	749	419	7793
1920	434	302	536	709	234	640	782	569	566	503	589	993	6857
1921	320	368	965	780	409	561	767	762	930	673	643	907	8085
1922	485	681	452	973	488	650	1113	480	549	643	617	500	7631
1923	465	358	696	640	655	645	574	747	673	460	384	686	6983
1924	831	503	333	381	815	572	940	726	673	168	671	709	7322
1925	384	508	561	386	330	810	734	389	925	732	681	544	6984
1926	478	411	640	472	544	805	744	732	744	785	1196	503	8054
1927	427	434	445	409	1001	599	790	246	935	625	927	795	7633
1928	592	528	663	826	551	1059	1029	937	1080	1308	729	437	9739
1929	894	254	602	1118	886	681	620	373	605	876	602	655	8166
1930	610	455	462	394	711	1336	554	320	701	465	363	363	6734
1931	415	241	472	482	722	629	734	482	1369	826	990	487	7849
1932	802	648	500	520	712	543	845	1002	875	1364	539	727	9077
1933	426	600	506	711	940	464	597	407	698	1032	807	684	7872
1934	439	222	518	580	309	664	497	451	1200	544	1018	438	6880
1935	640	334	495	275	376	1077	633	528	695	579	885	355	6872
1936	574	526	593	579	641	566	362	759	1041	997	508	692	7838
1937	628	568	242	811	441	516	950	749	1197	776	684	586	8148
1938	703	788	863	577	639	704	567	976	803	340	561	746	8267
1939	612	748	478	673	671	973	425	1048	638	835	245	410	7756

LAKE HURON OVERLAND PRECIPITATION (MM X 10)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM
1940	597	289	442	438	1009	960	632	1154	769	578	911	623	8402
1941	535	412	277	598	536	460	924	728	1037	1364	813	608	8292
1942	579	324	861	359	1029	610	629	475	1322	685	727	848	8448
1943	556	522	813	541	915	1274	636	855	752	438	793	347	8442
1944	310	406	731	404	503	887	802	510	1164	369	686	596	7368
1945	470	489	442	775	1300	777	681	658	1235	918	694	497	8936
1946	755	587	366	314	868	581	521	707	654	520	699	882	7454
1947	660	391	621	979	1106	813	970	422	1108	243	678	536	8527
1948	503	365	830	704	652	717	732	447	311	673	1037	497	7468
1949	832	644	614	391	583	999	712	479	708	543	600	846	7951
1950	977	640	608	687	401	714	845	793	594	528	1019	623	8429
1951	665	616	832	904	444	801	875	875	957	1301	759	854	9883
1952	618	320	608	568	688	537	1177	1019	682	209	991	530	7947
1953	680	600	828	695	725	686	832	610	1023	311	494	724	8208
1954	518	659	697	1003	611	1193	499	642	1323	1511	510	524	9690
1955	535	411	557	553	651	413	610	919	358	1170	733	555	7465
1956	240	431	522	667	920	698	1095	1036	799	268	732	538	7946
1957	535	419	299	743	750	1392	729	333	1213	794	961	808	8976
1958	432	299	159	327	325	669	768	621	881	679	779	634	6573
1959	585	590	526	771	797	464	743	1213	1037	1142	922	671	9461
1960	678	587	358	836	1190	1041	823	531	688	620	786	437	8575
1961	234	343	601	626	481	960	965	799	1334	405	615	680	8043
1962	814	591	191	499	781	630	523	685	829	755	276	697	7271
1963	458	333	684	562	779	539	675	936	627	220	766	572	7151
1964	637	275	578	695	634	484	737	1016	974	412	709	750	7901
1965	795	811	404	538	572	474	703	1216	1419	764	921	791	9408
1966	470	437	669	500	434	619	420	939	715	759	1416	827	8205
1967	863	574	331	946	491	1322	605	982	704	947	1022	866	9653
1968	447	629	374	635	720	1013	722	923	1125	704	703	977	8972
1969	781	203	369	822	828	1204	828	411	544	1280	934	475	8679
1970	543	322	514	589	996	670	1484	473	1449	791	669	718	9218
1971	792	840	617	377	582	583	806	768	653	487	655	1053	8213
1972	678	625	686	548	614	759	837	1349	757	680	509	1126	9168
1973	538	369	720	517	1097	938	851	813	499	808	762	675	8587
1974	881	545	484	815	865	777	704	726	929	783	682	480	8671
1975	983	624	580	635	739	822	774	1011	958	435	878	643	9082
1976	774	721	1154	458	853	728	658	522	875	566	554	565	8428
1977	614	571	777	525	308	592	878	1292	1239	675	1009	844	9324
1978	759	184	377	423	727	687	693	977	1395	644	623	865	8354
1979	741	372	815	1041	691	891	681	994	423	1125	928	674	9376
1980	641	288	611	989	538	985	914	774	1162	729	509	740	8880

LAKE HURON OVERLAKE PRECIPITATION (MM X 10)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM
1900	417	953	401	358	610	561	942	790	904	584	1072	373	7965
1901	523	409	734	422	704	564	1069	663	665	739	610	691	7793
1902	361	417	742	498	765	953	1179	655	866	813	638	582	8469
1903	655	660	516	371	640	686	922	1062	1019	798	561	886	8776
1904	498	587	732	546	942	617	648	401	831	556	269	648	7275
1905	627	460	643	356	1024	800	963	663	648	914	759	561	8418
1906	681	427	503	389	500	894	597	528	706	1029	861	411	7526
1907	759	335	582	625	508	589	338	434	871	478	643	792	6954
1908	627	1013	533	521	1455	450	823	513	300	190	617	724	7766
1909	648	780	480	886	551	267	792	434	630	526	782	998	7774
1910	627	528	165	668	747	368	483	785	678	897	726	787	7459
1911	495	505	531	445	813	394	536	597	643	1189	907	536	7591
1912	838	572	279	432	1473	373	546	932	869	589	993	538	8434
1913	711	597	813	770	396	427	566	665	401	970	668	201	7185
1914	732	330	411	483	401	610	411	795	406	551	759	744	6633
1915	480	559	180	267	389	853	706	749	932	386	683	599	6783
1916	930	333	747	734	1072	919	221	503	632	978	688	757	8514
1917	417	264	488	617	625	1260	810	681	345	838	307	391	7043
1918	798	523	297	455	831	564	404	671	782	787	983	907	8002
1919	470	445	744	744	792	330	480	584	701	1085	754	455	7584
1920	549	272	498	716	226	848	759	574	582	638	757	1105	7524
1921	384	310	1133	770	358	457	831	726	800	859	719	848	8195
1922	544	889	495	970	495	897	1156	465	597	531	640	533	8212
1923	597	432	759	602	820	523	396	671	683	521	396	699	7099
1924	1003	607	345	338	1003	582	968	615	683	142	597	973	7856
1925	338	523	546	406	267	665	622	257	747	831	665	627	6494
1926	508	490	818	503	452	874	569	874	681	848	1237	584	8438
1927	452	396	411	406	1156	566	846	193	963	582	1016	965	7952
1928	671	627	688	861	483	993	942	833	983	1133	881	511	9606
1929	1067	328	610	1280	894	632	483	384	406	937	711	775	8507
1930	765	544	439	424	714	1184	505	213	536	498	394	518	6734
1931	495	233	513	436	651	637	605	456	1143	798	894	585	7446
1932	787	674	533	605	843	499	671	775	965	1357	480	822	9011
1933	382	705	485	838	1018	458	371	381	809	1077	870	860	8254
1934	418	191	549	513	266	582	449	553	1120	493	984	499	6617
1935	698	323	481	297	382	1047	418	525	792	575	947	502	6987
1936	671	660	499	592	578	473	270	783	912	1007	520	621	7586
1937	630	565	253	1002	437	650	580	565	1287	808	639	550	7966
1938	822	748	752	428	735	605	460	1013	676	350	436	848	7873
1939	732	752	533	630	652	796	374	1063	686	797	266	419	7700

LAKE HURON OVERLAKE PRECIPITATION (MM X 10)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM
1940	751	366	423	441	928	792	638	983	817	675	919	746	8479
1941	636	437	351	636	537	284	672	715	868	1383	983	698	8200
1942	772	352	856	393	1189	523	587	448	1340	664	770	973	8867
1943	707	697	865	688	914	940	704	765	611	529	975	485	8880
1944	356	468	780	442	448	1025	850	488	1139	428	871	749	8044
1945	688	534	497	762	1349	950	566	576	1184	917	685	704	9412
1946	894	612	342	243	819	592	345	587	652	421	576	1013	7096
1947	710	567	560	841	1141	607	952	320	1031	274	798	451	8252
1948	681	486	817	644	606	561	569	315	302	525	1015	553	7074
1949	862	725	517	412	562	845	613	444	736	536	638	1061	7951
1950	1023	765	743	637	279	738	769	940	692	526	1003	726	8841
1951	747	655	814	1060	341	631	1108	855	869	1249	911	1066	10306
1952	737	412	589	752	663	579	1062	935	693	185	959	594	8160
1953	680	674	809	655	986	571	808	633	948	363	574	743	8444
1954	515	596	742	1039	513	1106	461	658	1291	1551	603	597	9672
1955	775	506	553	699	669	352	618	788	260	1015	837	668	7740
1956	293	502	473	691	888	746	874	1144	701	247	665	675	7899
1957	762	385	358	791	723	1123	697	316	1204	946	846	901	9052
1958	484	352	142	328	264	641	716	556	891	599	923	831	6727
1959	653	684	394	941	850	347	684	1223	960	1128	1009	728	9601
1960	728	514	426	820	1175	905	699	442	584	606	721	569	8189
1961	348	418	586	506	393	837	680	764	1220	435	643	714	7544
1962	834	603	166	475	705	595	517	629	949	831	331	921	7556
1963	601	327	558	528	856	489	766	860	639	336	680	773	7413
1964	529	229	487	665	653	344	723	1207	885	417	780	837	7756
1965	955	905	455	628	581	467	562	969	1349	661	873	782	9187
1966	527	432	696	515	335	370	265	802	596	583	1321	999	7441
1967	843	545	337	908	381	1305	478	934	631	958	1003	924	9247
1968	563	716	346	597	690	884	562	1158	875	644	686	1029	8750
1969	844	205	396	741	841	1184	577	316	540	1280	834	504	8262
1970	670	308	577	666	655	567	1481	458	1426	767	555	862	8992
1971	985	905	633	408	640	716	843	842	555	329	669	1166	8691
1972	683	647	732	494	495	736	936	1050	683	671	571	1244	8942
1973	492	368	756	409	1138	830	771	814	506	813	775	688	8360
1974	895	550	477	853	785	789	677	578	930	632	677	451	8294
1975	986	715	525	549	538	715	739	1056	770	299	793	745	8430
1976	938	683	1117	307	758	896	721	403	688	621	589	676	8397
1977	833	651	735	515	391	418	784	1368	1158	617	1055	942	9467
1978	789	263	317	367	696	548	590	734	1670	499	638	907	8018
1979	854	417	776	908	648	864	378	913	319	993	813	616	8499
1980	466	307	551	925	507	860	743	602	922	646	359	706	7594

LAKE ST. CLAIR OVERLAND PRECIPITATION (MM X 10)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM
1931	552	321	557	700	584	642	910	399	835	614	751	634	7499
1932	1056	449	427	440	1413	458	1390	741	1037	907	631	765	9714
1933	301	418	644	764	757	360	530	643	622	603	858	546	7046
1934	406	198	656	704	162	348	573	712	936	406	683	514	6298
1935	620	568	596	464	707	963	533	725	538	393	966	527	7600
1936	454	514	336	712	298	782	248	505	1190	856	446	540	6881
1937	1062	466	255	1458	592	1015	744	951	642	681	389	472	8727
1938	383	1216	860	464	846	544	931	709	505	281	356	606	7701
1939	670	1123	479	906	388	922	577	481	531	705	205	318	7305
1940	560	465	550	588	1049	1390	506	1610	544	702	867	794	9625
1941	476	258	379	499	509	624	635	740	304	1130	531	487	6572
1942	546	608	808	355	1213	654	1054	714	1107	848	816	755	9478
1943	664	546	736	838	1601	983	1050	743	521	481	566	246	8975
1944	314	575	681	604	828	771	443	575	838	138	591	614	6972
1945	302	425	849	983	1568	1190	864	740	1388	946	489	519	10263
1946	531	654	531	212	1077	1065	412	589	419	760	425	802	7477
1947	842	290	776	1438	1320	848	1068	837	1156	374	516	561	10026
1948	426	609	932	627	1169	978	686	296	399	539	972	534	8167
1949	745	759	662	521	626	599	938	851	750	846	538	1068	8903
1950	1126	884	627	995	328	644	1120	644	800	756	1116	716	9756
1951	785	655	767	697	605	827	717	522	634	905	859	1009	8982
1952	732	395	662	690	814	337	803	733	503	366	682	597	7314
1953	609	316	753	753	836	879	821	585	683	284	334	608	7461
1954	583	1101	1140	901	212	707	366	591	598	1913	498	573	9183
1955	529	603	616	616	414	479	546	848	539	1114	888	480	7672
1956	343	631	779	1063	1449	808	761	1611	375	191	549	586	9146
1957	538	492	382	1008	843	1041	1013	555	996	829	772	951	9420
1958	248	261	99	446	370	839	644	742	945	320	761	240	5915
1959	826	614	644	973	887	369	846	1079	604	1168	776	846	9632
1960	725	592	405	870	780	1058	469	493	330	455	454	227	6858
1961	160	600	598	1086	588	821	945	1121	748	424	661	392	8144
1962	559	594	214	462	374	1129	547	849	777	725	543	544	7317
1963	214	199	668	677	726	481	597	483	378	135	424	430	5412
1964	616	200	727	943	565	648	736	1566	392	232	347	717	7689
1965	930	813	804	580	510	410	591	900	751	794	642	953	8678
1966	361	439	687	793	427	861	553	903	661	342	1212	1104	8343
1967	534	404	282	1065	460	1843	881	924	616	1068	732	1144	9953
1968	857	476	523	461	990	1321	819	786	788	570	855	877	9323
1969	793	169	421	965	1123	811	1163	369	222	688	973	560	8257
1970	405	259	538	778	735	791	1103	344	803	658	864	676	7954
1971	435	815	457	323	305	487	502	859	535	388	476	1044	6626
1972	466	433	711	814	628	769	623	878	753	928	784	1084	8871
1973	386	410	1310	495	794	1045	729	512	321	776	1145	786	8709
1974	782	716	791	839	1161	662	388	520	620	296	909	666	8350
1975	832	651	731	754	638	1123	626	1929	775	230	715	993	9997
1976	895	684	1192	804	884	946	1290	519	845	670	401	485	9615
1977	529	453	900	868	272	705	750	841	1665	601	954	997	9535
1978	1075	149	532	551	742	600	416	434	1048	550	606	765	7468
1979	646	185	673	1231	855	630	796	613	404	674	1273	851	8831
1980	337	245	875	931	621	911	1271	819	1009	665	265	669	8618

LAKE ST. CLAIR OVERLAKE PRECIPITATION (MM X 10)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM
1931	412	262	550	660	526	611	476	263	722	495	741	525	6243
1932	986	413	271	467	1573	486	1003	429	929	850	568	761	8736
1933	205	345	650	707	795	326	446	682	396	415	572	472	6011
1934	307	178	628	632	98	265	280	674	678	276	478	418	4912
1935	509	410	604	501	763	765	507	598	331	263	641	319	6211
1936	425	443	220	684	329	840	241	551	1203	718	240	325	6219
1937	776	326	127	1063	490	993	696	624	417	502	251	343	6608
1938	262	1250	851	407	693	451	691	789	442	258	176	365	6635
1939	524	1136	483	1005	249	898	466	421	366	596	135	245	6524
1940	280	473	554	531	895	1595	621	1644	405	693	736	661	9088
1941	401	158	393	384	624	683	593	737	278	895	491	467	6104
1942	483	683	776	395	1140	507	990	1078	830	757	687	647	8973
1943	485	440	674	889	1784	564	1175	413	455	268	517	129	7793
1944	219	494	662	756	907	788	306	616	378	147	438	457	6168
1945	240	400	874	833	1698	978	729	613	1362	800	355	471	9353
1946	361	561	585	141	1067	1297	257	784	347	600	329	752	7081
1947	716	74	585	1531	1294	628	1058	1295	1083	218	373	472	9327
1948	355	682	750	593	1430	601	355	284	532	436	979	480	7477
1949	575	678	522	527	763	682	666	709	644	1068	384	872	8090
1950	1177	963	525	1047	530	537	841	566	906	907	967	672	9638
1951	686	722	720	630	662	823	773	529	498	946	820	1014	8823
1952	758	333	757	769	624	297	610	549	416	343	595	505	6556
1953	578	161	688	737	573	779	587	416	477	216	242	458	5912
1954	504	998	1117	740	280	569	377	491	512	1842	404	438	8272
1955	414	672	582	565	392	531	586	835	553	947	770	336	7183
1956	320	538	858	1041	1420	805	364	1350	199	189	523	525	8132
1957	492	535	348	1187	779	819	1306	575	1077	826	615	906	9465
1958	197	182	121	425	276	794	620	562	837	394	695	136	5239
1959	768	498	581	996	843	217	671	1247	763	1049	747	888	9268
1960	704	524	323	599	632	1318	449	570	300	462	244	180	6305
1961	83	638	584	1321	597	751	618	1088	981	352	694	368	8075
1962	500	572	250	405	290	1290	539	810	695	428	501	368	6648
1963	229	168	658	759	558	689	432	523	381	118	301	325	5141
1964	529	192	631	1015	492	697	548	1185	497	128	232	624	6770
1965	895	683	690	601	448	546	700	929	685	847	380	977	8381
1966	179	313	603	830	489	796	782	1006	329	342	994	1080	7743
1967	569	325	216	753	373	1825	853	809	582	1023	640	1348	9316
1968	632	366	580	463	1182	1556	1160	1037	480	366	755	854	9431
1969	726	78	425	981	1141	939	1717	521	247	445	763	444	8427
1970	293	190	525	778	774	910	1036	337	595	445	716	530	7129
1971	132	829	473	236	313	569	401	824	562	280	381	963	5963
1972	420	344	669	861	516	639	556	1042	810	821	1105	845	8628
1973	338	366	1082	463	710	1291	779	419	413	521	995	836	8213
1974	767	605	942	687	1058	428	453	651	595	218	839	798	8041
1975	670	640	602	598	653	1224	462	2131	793	246	623	1037	9679
1976	614	663	1037	789	1048	970	1622	492	885	681	266	354	9421
1977	379	361	970	1162	455	673	660	742	1335	512	672	834	8755
1978	945	102	458	611	730	756	413	354	815	488	520	586	6778
1979	429	152	564	1333	1025	582	934	391	437	375	1045	748	8015
1980	220	187	901	853	650	1073	1541	1164	884	503	238	555	8769

LAKE ERIE OVERLAND PRECIPITATION (MM X 10)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM
1900	475	1046	587	495	640	810	1217	777	460	617	960	221	8305
1901	478	411	617	638	912	709	800	759	582	409	485	922	7722
1902	325	262	681	447	886	1654	1539	381	1367	640	490	696	9368
1903	478	838	648	1031	599	968	1184	1140	564	648	495	574	9167
1904	1039	706	1107	757	864	518	1031	869	759	490	109	579	8828
1905	516	493	376	645	1125	1151	1006	853	709	704	716	478	8772
1906	452	251	645	495	630	914	1024	973	584	1171	660	894	8693
1907	1189	165	856	554	810	1001	864	378	1125	744	587	973	9246
1908	572	1085	818	688	1113	572	879	886	211	307	338	536	8005
1909	704	1072	630	1074	1080	1021	729	726	518	513	980	696	9743
1910	876	737	107	980	856	419	861	554	925	871	627	582	8395
1911	640	538	478	813	442	892	554	978	942	1095	902	686	8960
1912	564	457	617	795	894	572	1054	1110	912	721	533	470	8699
1913	1367	358	1707	810	874	478	861	808	432	937	714	224	9570
1914	640	351	556	922	1161	729	472	1219	574	584	432	693	8333
1915	665	572	277	267	777	780	1588	1240	1090	511	592	648	9007
1916	1067	381	826	691	1234	1113	310	577	625	615	505	630	8574
1917	599	340	711	909	1039	1306	831	719	498	1361	203	333	8849
1918	605	643	610	597	815	584	439	594	1153	584	533	790	7947
1919	307	358	808	973	1128	617	465	970	635	1204	577	279	8321
1920	455	229	457	1064	351	1059	968	876	511	673	739	780	8162
1921	351	445	1123	1006	655	622	792	851	914	775	925	538	8997
1922	417	419	922	917	932	803	876	648	826	462	401	650	8273
1923	686	363	678	511	922	650	780	716	904	452	564	1115	8341
1924	813	472	549	602	942	1270	721	572	1234	114	254	897	8440
1925	328	561	757	371	384	594	940	597	1199	864	889	343	7827
1926	511	653	589	846	434	787	554	1440	1750	1130	699	455	9848
1927	457	508	658	678	1082	668	1151	389	668	457	1514	879	9109
1928	475	495	566	551	544	1331	1006	653	424	693	815	439	7992
1929	1039	366	752	1466	983	782	927	381	546	988	846	884	9960
1930	1189	516	650	587	605	808	300	381	658	450	457	302	6903
1931	381	368	563	760	707	932	727	786	979	584	720	698	8205
1932	1196	337	596	538	797	575	939	566	885	917	718	901	8965
1933	369	435	857	777	1183	446	523	618	990	442	569	527	7736
1934	442	210	682	727	179	637	457	754	1021	310	605	454	6478
1935	617	501	609	412	910	850	856	961	574	403	701	483	7877
1936	380	633	815	629	417	615	490	588	1009	835	580	601	7592
1937	1498	456	413	1338	859	1699	1144	867	569	788	373	539	10543
1938	333	923	1055	637	900	939	970	724	861	229	608	468	8647
1939	615	955	759	940	311	1238	857	552	632	716	220	347	8142

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YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM
1940	429	531	591	967	1080	1287	500	1149	491	565	755	841	9186
1941	444	226	308	448	675	875	751	712	395	1159	559	427	6979
1942	421	672	888	652	1069	905	1124	924	919	753	920	757	10004
1943	484	407	699	853	1888	894	1348	711	692	566	485	184	9211
1944	258	529	878	1048	930	924	451	714	652	325	559	591	7859
1945	337	481	1183	827	1274	1230	757	561	1412	1050	559	507	10178
1946	308	527	575	234	1218	1220	532	508	430	831	598	668	7649
1947	932	229	602	1344	1386	1261	820	925	873	487	584	521	9964
1948	457	634	1110	809	1044	1062	671	581	628	621	990	670	9277
1949	941	654	630	622	904	719	878	879	782	658	446	840	8953
1950	1647	1089	815	1134	447	949	1038	741	1063	759	1282	607	11571
1951	642	723	969	894	800	1063	897	461	673	764	955	1057	9898
1952	984	504	819	845	977	426	728	690	728	257	642	586	8186
1953	672	325	730	709	1073	610	758	664	555	198	404	550	7248
1954	619	744	1113	1091	391	856	635	951	518	1876	504	555	9853
1955	515	560	950	773	589	519	813	964	485	1314	938	289	8709
1956	394	745	939	950	1332	819	968	1333	429	191	541	648	9289
1957	589	482	349	1388	892	1354	784	536	994	777	653	936	9734
1958	415	248	202	701	560	1226	1390	1002	979	392	997	202	8314
1959	1064	822	702	1083	859	593	891	762	749	1221	865	718	10329
1960	762	670	334	593	981	1014	825	694	314	429	489	268	7373
1961	128	780	876	1482	568	917	953	945	910	432	679	475	9145
1962	708	552	372	390	593	718	899	648	870	713	529	519	7511
1963	273	215	824	733	634	556	835	587	316	108	648	353	6082
1964	494	296	1133	1239	646	700	709	1169	420	262	337	721	8126
1965	1006	744	686	728	610	597	669	1010	798	988	642	731	9209
1966	425	404	619	771	651	751	888	928	654	361	1276	1074	8802
1967	417	478	539	863	854	966	788	653	770	880	798	1069	9075
1968	691	321	554	587	1262	1053	853	898	750	496	1024	947	9436
1969	851	151	407	1144	1131	1101	1381	347	808	630	893	541	9385
1970	345	335	585	966	882	915	1219	410	1040	827	801	622	8947
1971	367	802	428	320	775	765	870	542	820	487	522	1049	7747
1972	452	399	834	1028	892	1051	843	862	1462	646	1018	859	10346
1973	423	381	1183	701	1069	1263	944	613	451	835	896	859	9618
1974	751	529	976	820	1142	856	352	789	668	308	1023	800	9014
1975	786	744	657	576	793	1160	695	1728	864	484	620	903	10010
1976	753	801	1084	674	771	946	994	575	954	707	268	341	8868
1977	358	449	1015	1093	406	930	1121	1361	1494	527	811	1088	10653
1978	938	143	620	870	827	757	554	729	757	776	562	777	8310
1979	751	375	628	1072	924	775	856	1264	700	692	1082	802	9921
1980	317	331	1022	831	740	1104	1182	1247	815	646	369	605	9209

LAKE ERIE OVERLAKE PRECIPITATION (MM X 10)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM
1900	551	1085	658	432	478	696	1257	737	493	554	1003	229	8173
1901	493	437	660	691	759	615	777	795	658	318	582	1001	7786
1902	399	282	577	411	940	1519	1560	340	1240	599	439	696	9002
1903	511	836	627	1008	493	1049	1389	1179	478	615	414	587	9186
1904	1059	716	1011	678	808	378	917	780	716	554	71	551	8239
1905	638	462	340	605	1006	917	681	803	523	696	701	462	7834
1906	406	262	711	457	511	650	889	889	615	1321	577	820	8108
1907	1161	193	759	554	805	925	775	340	1191	950	472	940	9065
1908	622	1029	714	747	846	533	706	899	152	320	340	518	7426
1909	688	1031	681	810	1067	787	838	734	569	516	927	744	9392
1910	1057	894	117	940	871	422	889	452	678	1097	678	648	8743
1911	787	643	485	693	472	716	579	1179	950	1062	894	726	9186
1912	699	523	640	884	737	605	925	1146	991	859	533	566	9108
1913	1354	467	1704	726	861	610	833	904	445	980	815	257	9956
1914	820	447	683	940	1186	579	396	1389	511	569	503	742	8765
1915	767	615	295	224	823	747	1560	1382	864	516	615	772	9180
1916	996	549	787	673	1224	953	279	582	645	726	516	714	8644
1917	673	389	785	579	1097	1336	732	721	551	1623	236	417	9139
1918	632	561	752	574	762	693	457	554	1168	612	528	744	8037
1919	284	366	803	1377	1146	572	417	937	536	1008	488	315	8249
1920	467	302	434	1052	300	1181	808	772	442	726	792	699	7975
1921	330	475	1107	965	582	635	699	897	846	665	940	503	8644
1922	386	371	1013	665	638	660	742	785	630	419	409	627	7345
1923	660	361	676	594	737	635	650	457	772	478	597	1146	7763
1924	841	483	513	711	686	1158	676	561	1354	107	236	874	8200
1925	348	620	724	343	373	538	1024	531	1059	831	871	378	7640
1926	546	719	556	965	307	805	429	1468	1783	1265	744	498	10085
1927	442	549	605	551	955	549	1031	411	546	516	1661	904	8720
1928	442	498	523	533	452	1318	991	638	442	752	701	442	7732
1929	1072	368	716	1483	960	650	747	254	569	879	874	998	9570
1930	1196	541	681	566	467	699	277	239	665	500	406	297	6534
1931	522	421	521	795	564	858	899	622	889	600	703	588	7982
1932	1139	342	450	488	1117	351	980	547	795	847	719	864	8639
1933	405	447	779	687	744	353	359	653	655	497	664	506	6749
1934	481	197	738	736	141	480	459	788	1046	386	613	557	6622
1935	617	664	535	419	699	717	677	899	582	452	644	518	7423
1936	437	619	714	605	338	586	504	506	895	749	548	512	7013
1937	1746	467	597	1518	609	1631	900	708	430	935	425	763	10729
1938	328	1133	910	536	856	815	901	591	1211	338	735	471	8825
1939	614	1002	735	921	356	894	753	426	637	680	257	365	7640

LAKE ERIE OVERLAKE PRECIPITATION (MM X 10)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM
1940	356	552	651	781	1138	1022	473	1314	677	516	845	985	9310
1941	460	254	321	392	546	664	665	809	357	985	560	477	6490
1942	438	760	800	634	1317	748	1002	781	1035	935	902	838	10190
1943	478	445	649	1003	1449	680	1103	649	617	762	474	275	8584
1944	304	602	779	1055	820	780	381	748	791	443	605	646	7954
1945	490	569	1056	817	1051	1226	694	736	1637	1263	623	520	10682
1946	290	546	656	237	1379	1096	629	539	356	866	612	688	7894
1947	998	246	617	1402	1341	1055	874	877	813	292	726	550	9791
1948	458	640	1072	808	1019	1160	608	670	445	848	929	538	9195
1949	786	615	682	607	799	498	930	825	875	402	775	834	8628
1950	1480	1058	887	999	430	711	1015	734	881	681	1424	618	10918
1951	767	819	1050	789	675	928	624	431	721	629	1099	983	9515
1952	952	512	670	725	899	384	522	886	829	244	629	694	7946
1953	767	283	754	652	1109	578	604	652	637	172	638	659	7505
1954	684	793	1259	1298	304	619	482	664	519	2195	578	621	10016
1955	542	632	872	854	505	492	495	1067	545	1387	806	378	8575
1956	458	740	947	976	1295	680	939	1652	562	248	607	644	9748
1957	732	528	365	1313	834	1344	973	590	1126	652	690	844	9991
1958	477	315	203	751	525	1114	1087	1004	1057	525	984	293	8335
1959	1139	748	735	1006	794	423	768	521	765	1338	822	825	9884
1960	760	622	384	711	914	969	638	658	443	406	502	273	7280
1961	161	798	697	1628	557	926	909	1095	690	417	682	550	9110
1962	713	564	323	379	404	809	728	812	984	711	688	723	7838
1963	293	222	734	744	546	424	635	682	369	187	789	477	6102
1964	513	328	1057	1117	671	529	681	1485	373	355	350	801	8260
1965	1082	744	750	503	606	642	624	941	673	903	708	704	8880
1966	409	485	664	872	488	764	718	863	705	362	1297	1134	8761
1967	350	405	409	863	820	950	703	722	746	801	862	907	8538
1968	870	237	493	583	1035	936	790	866	704	661	1069	1001	9245
1969	781	144	394	1192	1399	1076	1396	303	676	613	959	659	9592
1970	424	371	532	743	747	826	1081	379	1166	895	969	631	8764
1971	382	807	420	361	593	670	654	638	681	512	676	1053	7447
1972	473	533	921	885	863	1189	719	848	1258	635	1096	922	10342
1973	417	437	1188	706	958	1216	738	562	457	935	855	891	9360
1974	705	591	1014	870	1094	1033	501	587	689	376	1230	790	9480
1975	795	736	731	386	568	1045	588	1962	883	434	653	1087	9868
1976	787	886	1200	603	782	887	1064	594	1136	736	344	414	9433
1977	470	421	978	1161	428	873	1193	1525	1873	527	1008	1187	11644
1978	985	133	612	763	821	718	386	737	957	997	499	763	8371
1979	824	383	672	1118	952	693	605	1030	973	922	1158	1010	10340
1980	312	279	999	848	611	1063	1394	1279	1064	912	422	563	9746

LAKE ONTARIO OVERLAND PRECIPITATION (MM X 10)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM
1900	765	1011	889	363	488	663	1057	564	671	767	1306	538	9082
1901	622	475	767	996	1130	790	996	1013	752	429	714	1067	9751
1902	645	648	737	681	671	1113	1593	610	668	841	450	808	9465
1903	757	688	795	648	236	1318	1029	1168	363	960	462	767	9191
1904	876	688	833	955	912	869	1128	899	1016	622	170	612	9580
1905	767	498	414	521	719	1316	1095	998	716	866	564	777	9251
1906	551	277	693	437	709	1328	757	780	782	1222	627	744	8907
1907	716	328	432	671	638	640	671	325	1072	795	767	1011	8066
1908	653	874	653	765	1072	699	960	546	358	384	437	544	7945
1909	673	828	638	894	914	467	983	564	597	546	660	645	8409
1910	851	930	307	820	848	340	757	897	775	836	681	686	8728
1911	559	640	635	361	556	795	706	724	732	894	820	632	8054
1912	699	549	594	749	1405	302	699	980	1123	759	848	602	9309
1913	1123	417	1206	737	759	488	523	709	495	983	818	396	8654
1914	632	605	688	864	605	767	442	1105	518	457	612	681	7976
1915	851	711	193	295	587	795	1133	1313	643	683	546	782	8532
1916	782	780	676	770	1318	1273	462	544	762	737	617	658	9379
1917	683	493	622	645	795	1191	795	747	455	1481	302	574	8783
1918	658	744	472	518	841	800	665	714	1242	947	518	650	8769
1919	386	330	792	810	1336	696	732	874	554	980	561	391	8442
1920	528	513	559	749	168	599	1102	612	894	559	953	848	8084
1921	312	460	919	759	475	564	861	632	566	869	925	533	7875
1922	516	638	696	935	579	1453	704	884	569	544	343	521	8382
1923	775	376	668	554	798	871	442	495	699	668	759	765	7870
1924	960	638	259	808	1059	704	942	770	1519	140	417	582	8798
1925	737	747	757	549	516	940	1021	538	1321	958	866	615	9565
1926	615	625	625	805	356	871	688	1138	1034	1133	1041	544	9475
1927	432	686	457	391	1006	559	1191	660	391	945	1699	902	9319
1928	625	584	759	744	445	1097	988	988	650	947	859	404	9090
1929	1029	401	805	1275	1029	602	886	584	582	874	787	881	9735
1930	953	467	881	485	833	945	714	427	544	363	345	391	7348
1931	605	356	571	658	1098	554	1026	512	1045	611	665	768	8469
1932	1139	627	871	657	646	508	1041	974	630	1110	964	641	9808
1933	374	544	807	837	749	525	344	1084	523	545	858	795	7985
1934	580	334	694	731	270	834	515	466	1045	531	784	643	7427
1935	850	503	462	580	641	1115	1279	472	840	613	718	540	8613
1936	671	557	1409	760	495	555	335	681	948	987	681	716	8795
1937	1175	614	519	862	854	1007	548	952	522	1187	793	597	9630
1938	583	894	678	620	663	589	1093	911	1339	207	540	556	8673
1939	708	855	700	715	444	663	783	605	741	696	268	688	7866

LAKE ONTARIO OVERLAND PRECIPITATION (MM X 10)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM
1940	565	692	829	757	1015	943	761	518	738	490	1026	1011	9345
1941	577	489	501	372	407	408	1160	821	603	1163	602	712	7815
1942	574	677	982	589	1191	508	925	599	1207	755	880	1284	10171
1943	573	555	794	839	1464	763	821	941	482	1115	675	281	9303
1944	314	596	696	861	740	1021	716	470	867	424	590	990	8285
1945	602	638	799	954	1244	867	1240	583	1615	1216	1029	474	11261
1946	564	627	363	381	941	709	636	664	856	1105	752	894	8492
1947	1138	465	932	843	1364	1123	1498	519	716	220	793	618	10229
1948	606	593	934	803	970	853	760	625	312	788	1048	710	9002
1949	785	645	532	753	516	359	738	827	994	504	717	930	8300
1950	1061	838	835	557	462	715	767	930	615	740	1261	700	9481
1951	738	807	1028	1104	454	1003	1157	669	814	501	949	1068	10292
1952	703	562	678	689	1078	412	835	760	748	539	769	823	8596
1953	669	478	961	653	1219	535	774	799	966	293	581	721	8649
1954	655	859	934	1114	589	902	408	989	923	949	847	967	10136
1955	409	556	1094	605	607	372	546	1256	596	2113	566	456	9176
1956	468	668	854	979	1104	500	875	1168	834	356	612	665	9083
1957	715	437	409	791	872	1139	807	344	949	456	686	912	8517
1958	690	721	274	619	627	952	887	851	1160	753	817	450	8801
1959	951	772	623	727	661	539	864	895	615	1379	974	1022	10022
1960	769	1049	411	809	1112	912	533	652	358	666	535	386	8192
1961	316	769	622	1091	834	1073	879	833	393	531	719	664	8724
1962	774	694	269	760	542	646	786	761	978	957	545	681	8393
1963	473	368	661	709	847	352	655	1088	492	132	1225	577	7579
1964	709	307	839	834	751	427	802	996	253	380	599	787	7684
1965	801	892	456	670	344	523	620	992	885	1036	1001	604	8824
1966	792	601	689	431	535	672	494	865	862	391	1193	854	8379
1967	532	487	299	732	791	943	920	1003	1040	1059	1023	629	9458
1968	607	446	617	463	1011	1086	496	836	956	847	1214	1003	9582
1969	721	250	415	1052	1020	1112	727	562	411	689	1060	900	8919
1970	444	577	536	701	780	761	1062	730	961	965	917	999	9433
1971	589	1147	712	406	507	776	988	840	733	472	698	912	8780
1972	583	905	831	610	1029	1727	876	927	764	865	1124	1219	11460
1973	562	522	891	1103	983	811	578	554	811	893	956	1184	9848
1974	722	508	889	775	1170	916	839	789	855	469	1022	796	9750
1975	667	786	817	569	658	944	869	978	1320	578	760	999	9945
1976	896	729	1132	848	1155	1166	995	844	881	1133	433	579	10791
1977	687	456	898	735	371	699	862	1439	1599	913	1235	1286	11180
1978	1402	226	594	576	639	621	542	904	1084	758	560	932	8838
1979	1228	473	575	926	833	575	479	1066	1091	1038	963	757	10004
1980	443	275	1064	1060	386	1079	1033	666	872	1077	744	766	9465

LAKE ONTARIO OVERLAKE PRECIPITATION (MM X 10)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM
1900	785	1176	833	396	345	589	922	447	714	704	1194	554	8659
1901	627	467	828	1059	950	691	917	787	808	376	569	1118	9197
1902	645	625	645	759	559	1001	1460	518	739	729	432	721	8833
1903	714	721	706	798	297	1260	856	1146	231	716	470	782	8697
1904	917	813	864	851	902	869	991	894	925	630	99	505	9260
1905	630	551	284	417	777	1184	1034	1133	523	953	584	734	8804
1906	498	201	645	483	569	1163	953	511	645	1440	554	701	8363
1907	754	264	434	478	638	518	620	307	960	831	813	1229	7846
1908	523	767	544	594	1052	462	874	615	325	417	411	406	6990
1909	711	782	635	996	1057	328	945	564	526	615	859	813	8831
1910	767	841	272	836	711	335	859	838	638	975	676	704	8452
1911	467	564	610	356	432	683	671	594	782	803	780	681	7423
1912	739	450	437	676	1438	305	569	1039	1059	724	846	533	8815
1913	1143	386	1082	980	632	475	467	762	401	917	686	325	8256
1914	660	371	640	782	533	732	264	851	437	401	544	658	6873
1915	742	645	145	254	427	640	866	1433	528	513	457	846	7496
1916	810	632	549	772	1341	1232	310	422	472	729	483	625	8377
1917	742	457	587	1275	1242	1306	671	630	353	1491	325	584	9663
1918	701	843	417	503	706	757	592	630	1158	848	437	696	8288
1919	411	356	813	828	1521	711	574	739	518	993	483	406	8353
1920	480	472	516	724	127	635	660	495	676	640	937	851	7213
1921	206	442	907	808	488	424	671	538	437	909	762	569	7161
1922	399	632	701	884	508	1257	683	630	559	594	396	409	7652
1923	777	328	556	439	790	683	290	544	627	612	881	749	7276
1924	864	688	216	759	998	615	894	780	1336	102	335	607	8194
1925	574	792	681	411	401	701	897	617	1321	851	772	513	8531
1926	498	643	531	744	307	683	693	1209	1201	1092	965	518	9084
1927	345	635	414	333	894	483	1092	511	361	909	1615	892	8484
1928	610	584	640	711	378	1080	991	780	559	805	889	386	8413
1929	1044	386	803	1237	810	483	752	442	503	706	798	808	8772
1930	970	483	922	411	673	762	635	310	485	417	335	340	6743
1931	633	363	695	585	1037	627	699	417	910	573	561	669	7769
1932	1214	649	815	730	658	448	872	896	631	744	989	672	9318
1933	348	562	740	800	538	389	227	1073	495	525	903	819	7419
1934	525	443	662	600	265	715	324	411	966	395	816	680	6802
1935	796	507	348	444	668	1010	647	413	696	533	569	615	7246
1936	631	662	1519	627	319	423	325	539	929	801	643	730	8148
1937	1138	584	569	890	686	847	384	668	392	1145	756	584	8643
1938	553	857	571	501	538	474	840	833	1295	157	498	488	7605
1939	707	901	658	717	336	494	616	712	729	524	200	623	7217

LAKE ONTARIO OVERLAKE PRECIPITATION (MM X 10)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM
1940	604	658	605	706	1010	825	717	384	688	409	1031	898	8535
1941	580	520	459	240	350	390	936	784	357	994	671	701	6982
1942	589	762	921	548	1184	455	790	381	907	708	805	1179	9229
1943	546	566	734	839	1388	705	751	916	507	1111	559	234	8856
1944	290	604	664	942	653	939	676	575	685	295	563	973	7859
1945	546	599	761	957	1221	740	1217	558	1514	1042	962	497	10614
1946	443	609	285	311	869	564	568	563	749	1012	699	785	7457
1947	1119	385	851	786	1132	1178	1486	491	681	202	679	603	9593
1948	565	674	869	693	827	712	517	426	361	801	899	583	7927
1949	703	672	429	709	374	243	540	565	880	365	816	906	7202
1950	1026	848	760	550	500	624	761	990	467	893	1157	608	9184
1951	716	779	1032	1100	421	959	1168	608	697	493	886	941	9800
1952	645	578	715	675	1050	272	636	726	741	468	684	683	7873
1953	629	330	884	544	1250	428	541	736	899	269	512	620	7642
1954	597	810	906	1007	411	694	245	952	811	1048	858	991	9330
1955	401	523	976	648	667	237	491	1203	535	2126	408	470	8685
1956	421	568	793	946	1094	351	679	1127	760	302	548	610	8199
1957	752	458	377	738	772	949	582	279	897	384	579	794	7561
1958	627	783	206	640	472	748	802	950	1082	661	768	517	8256
1959	923	717	547	749	624	387	847	499	587	1198	736	1083	8897
1960	699	1072	426	762	1035	769	439	654	161	667	487	373	7544
1961	318	782	661	1038	765	1056	747	744	264	418	847	619	8259
1962	808	654	230	641	566	626	703	746	1095	826	526	671	8092
1963	509	355	585	765	792	192	494	919	318	100	1300	685	7014
1964	611	282	790	797	654	361	754	1043	205	353	553	703	7106
1965	817	1065	472	662	278	469	649	977	851	942	1019	564	8765
1966	797	595	591	450	387	552	376	750	895	272	1188	854	7707
1967	471	407	249	671	747	768	497	754	1108	986	804	631	8093
1968	734	390	489	328	1004	900	298	916	938	803	1290	875	8965
1969	770	179	441	1003	831	984	712	473	315	589	983	803	8083
1970	539	587	494	716	754	830	928	682	794	1003	869	891	9087
1971	526	1166	595	361	423	861	833	925	563	494	603	899	8249
1972	548	889	794	680	859	1160	677	921	753	823	1065	1066	10235
1973	433	502	897	1103	846	638	421	349	571	982	992	1174	8908
1974	667	480	746	673	1115	882	664	541	731	430	871	727	8527
1975	609	703	918	536	655	1020	615	785	1116	472	615	984	9028
1976	736	575	1131	986	1069	1078	951	595	734	918	348	572	9693
1977	833	347	790	741	253	565	628	1387	1523	756	1272	1365	10460
1978	1300	287	605	560	565	421	446	875	1150	686	576	832	8303
1979	1341	453	526	962	764	511	488	892	1111	964	782	773	9567
1980	376	298	1097	1066	358	1058	917	638	794	984	683	749	9018