

NOAA Technical Memorandum ERL GLERL-1

LAKE ONTARIO BASIN:
OVERLAND PRECIPITATION, 1972-73

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2. Daily overland precipitation for the United States portion of the Lake Ontario Basin for 1973, in inches.	

The data set was separated into the categories of measured precipitation and missing data. Traces were assigned the value of 0.00 inches. When daily precipitation values were not reported for several consecutive days, followed by a cumulative sum, the entire period was listed as missing data. This was done to avoid having to distribute the data through the pertinent time period arbitrarily. Daily precipitation sums for the basin were computed using the Thiessen weighting factors in the following manner:

$$P_i = S_{i,1}W_1 + S_{i,2}W_2 + S_{i,3}W_3 + \dots + S_{i,n}W_n$$

$$\text{for } W_1 + W_2 + W_3 + \dots + W_n = 1.0,$$

where

P_i is the weighted daily basin precipitation sum
 $S_{i,1} - S_{i,n}$ are daily precipitation values by station
 $W_1 - W_n$ are station weighting factors
 i is the Julian Day of the year
 n is the number of stations in the network.

In the above computation all missing data were assigned the value of zero. These missing data were then accounted for by the following procedure:

$$M_i = D_{i,1}W_1 + D_{i,2}W_2 + D_{i,3}W_3 + \dots + D_{i,n}W_n,$$

where

M_i is the daily sum of weighting factors for stations
with missing data
 $D_{i,1} - D_{i,n}$ have ascribed values of 0.0 for stations
with recorded daily data and 1.0 for stations with
missing daily data
 $W_1 - W_n$ are station weighting factors
 i is the Julian Day of the year
 n is the number of stations in the network.

LAKE ONTARIO BASIN: OVERLAND PRECIPITATION, 1972-73

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1. INTRODUCTION

The need for accurate overland precipitation data was recognized early in the International Field Year for the Great Lakes (IFYGL) planning for use in terrestrial water balance studies. These studies indicated that daily precipitation values with monthly summaries would meet most requirements. This report is in partial fulfillment of IFYGL task number 48, "Island/Land Precipitation Data Analysis."

The computations were based on a Thiessen polygon procedure using National Weather Service (NWS) station data from the United States portion of the basin. Analysis indicated that the reporting times of the 84 available stations were not consistent, but varied through the day. Therefore, to provide more accurate daily values, a smaller network of 57 stations with similar reporting times was utilized.

Daily and monthly summaries are provided in this report. Isohyetal maps are provided for 1972 and 1973.

2. BASIC DATA

The NWS provided daily data for 84 precipitation stations located in the United States portion of the Lake Ontario Basin. Daily precipitation sums to the nearest hundredth of an inch were obtained on two magnetic tapes. Recorded precipitation values were of three types: either an actual hourly value, an accumulated value, or a trace (less than 0.005 in.). There were missing data for some stations for short periods of time.

Table 1. Daily Overland Precipitation for the United States Portion Of the Lake Ontario Basin for 1972, in Inches

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	0.05	0.00	0.21	0.09	0.37	0.12	0.00	0.09	0.00	0.04	0.28	0.14
2	0.24	0.01	0.76	0.03	0.65	0.01	0.21	0.57	0.05	0.00	0.44	0.02
3	0.03	0.83	0.01	0.04	0.19	0.20	0.53	0.20	0.05	0.00	0.03	0.02
4	0.18	0.17	0.09	0.05	0.36	0.09	0.00	0.00	0.00	0.00	0.18	0.43
5	0.01	0.10	0.06	0.02	0.03	0.00	0.05	0.00	0.00	0.00	0.01	0.06
6	0.02	0.09	0.07	0.28	0.23	0.02	0.02	0.35	0.00	0.96	0.00	0.37
7	0.05	0.04	0.16	0.00	0.08	0.03	0.07	0.55	0.03	0.06	0.59	0.02
8	0.00	0.02	0.06	0.00	0.59	0.50	0.03	0.10	0.30	0.08	1.01	0.27
9	0.04	0.01	0.02	0.00	0.10	0.06	0.29	0.01	0.01	0.01	0.01	0.06
10	0.00	0.01	0.00	0.14	0.00	0.00	0.30	0.00	0.00	0.00	0.05	0.07
11	0.05	0.00	0.01	0.01	0.01	0.00	0.00	0.04	0.01	0.05	0.11	0.01
12	0.00	0.04	0.01	0.33	0.00	0.01	0.00	0.00	0.01	0.16	0.00	0.46
13	0.20	0.68	0.18	0.22	0.08	0.03	0.35	0.20	0.31	0.00	0.39	0.00
14	0.02	0.02	0.39	0.07	0.11	0.00	0.26	0.32	0.15	0.11	0.44	0.01
15	0.03	0.04	0.00	0.11	0.40	1.22	0.54	0.00	0.00	0.03	0.00	0.60
16	0.03	0.01	0.11	0.37	0.21	0.00	0.06	0.10	0.00	0.07	0.00	0.14
17	0.01	0.00	0.06	0.00	0.05	0.00	0.00	0.10	0.03	0.03	0.00	0.01
18	0.06	0.16	0.01	0.00	0.00	0.05	0.02	0.06	0.23	0.07	0.00	0.07
19	0.01	0.81	0.00	0.37	0.01	0.08	0.02	0.00	0.00	0.00	0.36	0.13
20	0.24	0.03	0.00	0.09	0.11	0.66	0.04	0.00	0.00	0.00	0.01	0.04
21	0.00	0.10	0.12	0.00	0.00	2.21	0.00	0.00	0.00	0.12	0.01	0.41
22	0.17	0.01	0.38	0.27	0.00	1.17	0.29	0.05	0.00	0.48	0.01	0.05
23	0.08	0.09	0.14	0.02	0.00	0.43	0.25	0.18	0.45	0.29	0.01	0.00
24	0.14	0.03	0.04	0.02	0.00	0.12	0.17	0.08	0.30	0.04	0.01	0.00
25	0.09	0.21	0.01	0.00	0.00	0.07	0.24	0.00	0.04	0.01	0.60	0.03
26	0.03	0.05	0.00	0.00	0.00	0.01	0.14	0.10	0.14	0.00	0.27	0.12
27	0.13	0.04	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.02	0.03	0.21
28	0.06	0.03	0.00	0.00	0.00	0.01	0.00	0.05	0.01	0.30	0.11	0.05
29	0.01	0.00	0.09	0.00	0.00	0.79	0.00	0.00	0.77	0.22	0.03	0.07
30	0.07		0.04	0.00	0.83	0.22	0.00	0.00	0.22	0.01	0.32	0.07
31	0.03		0.00		0.62		0.01	0.00		0.01		0.33
SUM	2.08	3.63	3.03	2.53	5.03	8.11	3.89	3.65	3.11	3.17	5.31	4.27

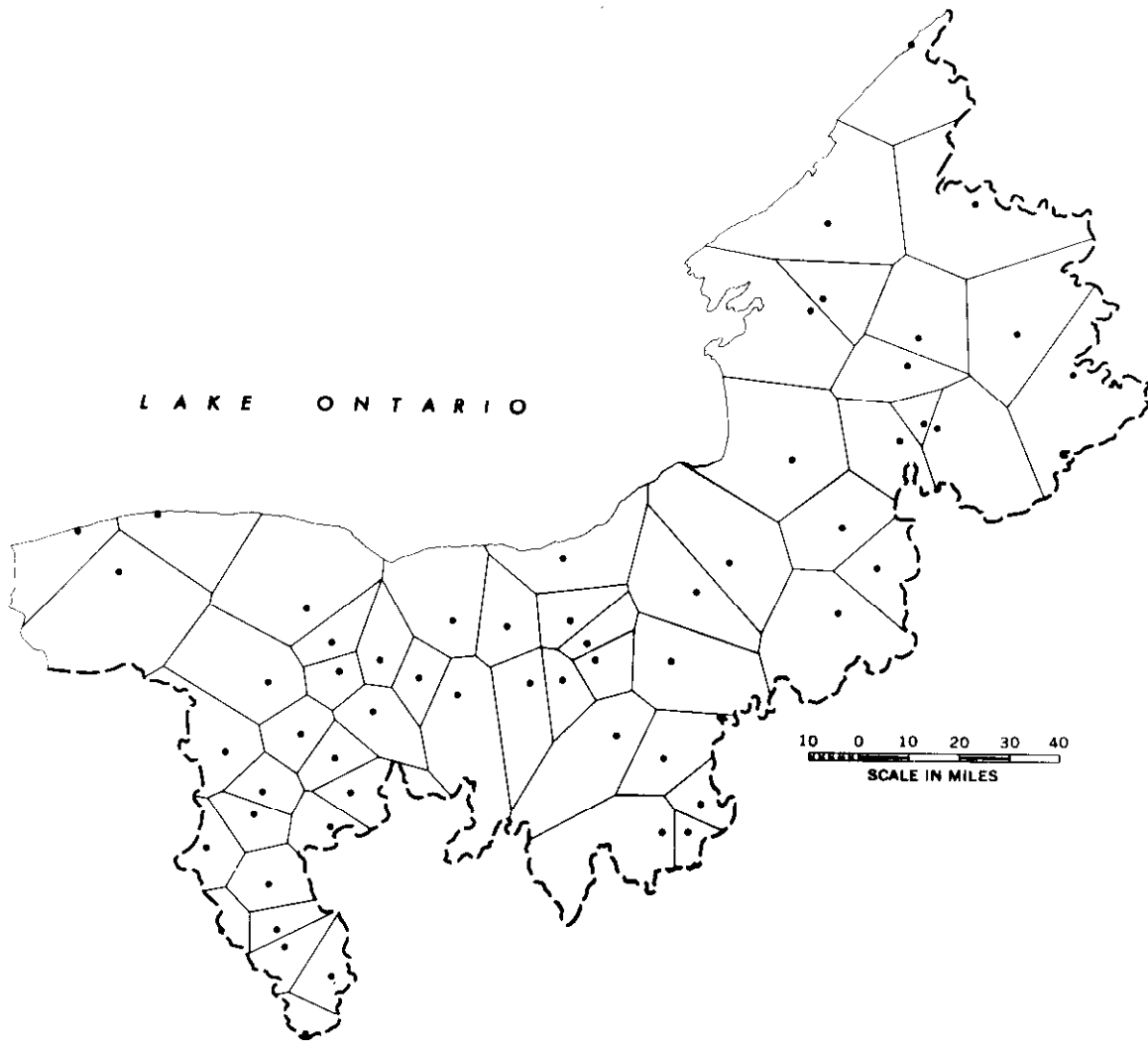


Figure 1. *The United States portion of the Lake Ontario drainage basin with the precipitation stations, as indicated by dots, and their respective Thiessen polygons.*



Figure 2. *Isohyetal map of overland precipitation for the Lake Ontario Basin for 1972, in inches.*

The daily precipitation sums were adjusted for missing data using the following relationship:

$$PA_i = P_i / (1.0 - M_i),$$

where

PA_i is the weighted and adjusted daily basin precipitation sum

P_i is the weighted daily basin precipitation sum

M_i is the daily sum of weighting factors for stations with missing data

i is the Julian Day of the year.

The daily basin precipitation values are contained in tables 1 and 2.

Isohyetal maps for 1972 and 1973 basin precipitation are given in figures 2 and 3. The isohyets are based on data published by NWS in the annual summary for the New York and Pennsylvania Climatological Data and include NWS estimated data. Stations of all reporting times were utilized in establishing the isohyets. The impact of Hurricane Agnes on 1972 basin precipitation is quite evident in the eastern end of the basin.

4. ACKNOWLEDGMENTS

This study was performed under the general guidance of Dr. Frank H. Quinn, Chief, Lake Hydrology Group, Great Lakes Environmental Research Laboratory, NOAA. The assistance of Mr. Vernon Maxey in computerized data analysis is gratefully acknowledged.

APPENDIX. LAKE ONTARIO STATION SUMMARY

(Including: National Weather Service numbers (NWS NO.), weighting factors (W) expressed as a percent, periods of missing data (41, entire month; m, partial month), and observation times (OT).)

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NW NO.	NA!!	W	1972												1973												OT
			J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	
300183	Angelica	1.058																								7A.M.	
300331	Aurora Research Farm	2.839																								8A.M.	
300343	Avon	0.619																								7A.M.	
300379	Baldwinsville	2.348																								8A.M.	
300412	Barker 4 NE	1.755																								7A.M.	
300500	Beaver Falls	2.168																								9A.M.	
300608	Bennett Bridge	3.845																								8A.M.	
300706	Black River 1 SW	1.342																								7A.H.	
300870	Brewerton Lock 23	3.265																								0A.M.	
301110	Camden 2 NW	1.923																								10A.M.	
301152	Canandaigua 3 S	2.890																								8A.N.	
301156	Canaseraga	0.671																								7A.H.	
301160	Canastota	3.329																								8A.M.	
301265	Cayuga Lock 1	0.723																								8A.N.	
301484	Churchville	3.871	m	m	m																					7A.M.	
301580	Clyde Lock 26	0.903																								8A.M.	
301974	Dansville	0.968																								8A.M.	
302234	Eagle Bay 3 SE	3.200																								8A.M.	
302277	East Bloomfield	0.748																								7A.H.	
303050	Freeville 1 NE	0.619	M	M	M	M	M																			8A.M.	
303065	Friendship 7 SW	0.348																								7A.M.	
303128	Garbutt	0.813																								7A.M.	
303184	Geneva Research Farm	1.677																								8A.M.	
303520	Groveland	0.748																								8A.M.	

Table 2. Daily Overland Precipitation for the United States Portion of the Lake Ontario Basin
for 1973, in Inches

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	0.01	0.20	0.00	1.08	0.13	0.15	0.03	0.21	0.05	0.29	0.28	0.01
2	0.01	0.70	0.00	0.62	0.09	0.00	0.00	0.06	0.10	0.32	0.24	0.00
3	0.32	0.07	0.21	0.08	0.26	0.10	0.06	0.00	0.03	0.04	0.04	0.01
4	0.04	0.02	0.02	0.97	0.08	0.04	0.33	0.03	0.00	0.51	0.01	0.07
5	0.03	0.00	0.06	0.06	0.02	0.21	0.01	0.00	1.02	0.07	0.09	0.35
6	0.00	0.03	0.00	0.08	0.00	0.51	0.00	0.00	0.23	0.00	0.10	0.05
7	0.00	0.11	0.07	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.03	0.00
8	0.00	0.24	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.01	0.08
9	0.07	0.00	0.08	0.32	0.19	0.01	0.00	0.10	0.00	0.01	0.05	0.96
10	0.02	0.00	0.02	0.14	0.35	0.00	0.03	0.45	0.00	0.00	0.01	0.03
11	0.08	0.00	0.18	0.01	0.13	0.04	0.01	0.05	0.01	0.00	0.01	0.03
12	0.05	0.00	0.09	0.00	0.17	0.41	0.07	0.01	0.00	0.00	0.00	0.01
13	0.00	0.00	0.01	0.00	0.00	0.05	0.27	0.00	0.01	0.20	0.01	0.23
14	0.05	0.48	0.47	0.00	0.02	0.00	0.11	0.28	0.46	0.02	0.21	0.01
15	0.00	0.11	0.03	0.00	0.01	0.02	0.08	0.27	0.01	0.03	1.02	0.01
16	0.00	0.02	0.61	0.02	0.04	0.29	0.00	0.00	0.01	0.09	0.05	0.08
17	0.00	0.00	0.78	0.02	0.48	0.25	0.00	0.06	0.61	0.12	0.01	0.43
18	0.00	0.00	0.19	0.06	0.25	0.05	0.00	0.26	0.15	0.18	0.06	0.00
19	0.17	0.01	0.05	0.02	0.04	0.00	0.01	0.09	0.02	0.11	0.01	0.11
20	0.01	0.01	0.00	0.00	0.64	0.09	0.13	0.02	0.04	0.01	0.00	0.92
21	0.01	0.12	0.01	0.06	0.14	0.59	0.02	0.16	0.07	0.00	0.18	0.30
22	0.62	0.04	0.00	0.11	0.01	0.04	0.00	0.00	0.54	0.00	0.00	0.02
23	0.05	0.01	0.00	0.00	0.02	0.05	0.00	0.00	0.09	0.00	0.03	0.02
24	0.02	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.40	0.00
25	0.00	0.05	0.10	0.00	0.03	0.01	0.08	0.00	0.00	0.00	0.15	0.51
26	0.00	0.00	0.00	0.01	0.13	0.00	0.47	0.07	0.00	0.00	0.07	0.45
27	0.01	0.00	0.00	0.85	0.11	0.06	0.10	0.04	0.02	0.01	0.34	0.02
28	0.33	0.00	0.00	0.17	0.30	0.38	0.50	0.00	0.00	0.28	0.22	0.02
29	0.03		0.04	0.02	0.05	0.14	0.01	0.00	0.00	0.62	0.10	0.05
30	0.14		0.03	0.00	0.35	0.01	0.00	0.01	0.01	0.07	0.06	0.13
31	0.00		0.22		0.03		0.08	0.08		0.29		0.08
SUM	2.07	2.22	3.27	4.70	4.23	3.59	2.40	2.25	3.49	3.27	3.79	4.99

APPENDIX. LAKE ONTARIO STATION SUMMARY (continued)

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NWS NO.	NAME	W	1972	1973	OT
			J F M A M J J A S O N D	J F M A M J J A S O N D	
308962	Warsaw 5 SW	1.523		m	7A.M.
308987	Waterloo	0.774			8A.M.
309000	Watertown	3.665			9A.M.
309072	Wellsville	0.723		M	9A.M.
309425	Whitesville	0.774			7A.M.
309507	Wilson 2 NE	1.471			7A.M.
309533	Wiscoy 1 E	0.800			8A.H.
309544	Wolcott 3 NW	2.077			7A.H.
367310	Raymond	0.374		m	7A.M.

MM LNU