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Great Lakes – St. Lawrence River

2019 High Water Conditions & 2020 Outlook

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Environment and Climate
Change Canada

Recreational Boating Advisory
Council
January 21, 2020



Canada 

Why did the Great Lakes flood in 2019? Outlook for 2020?



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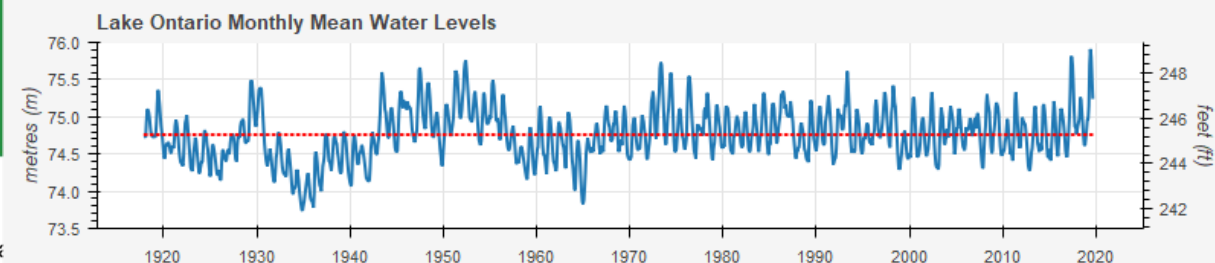
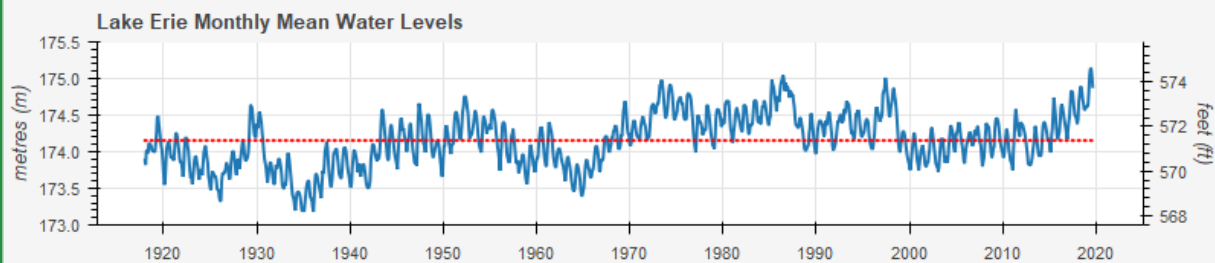
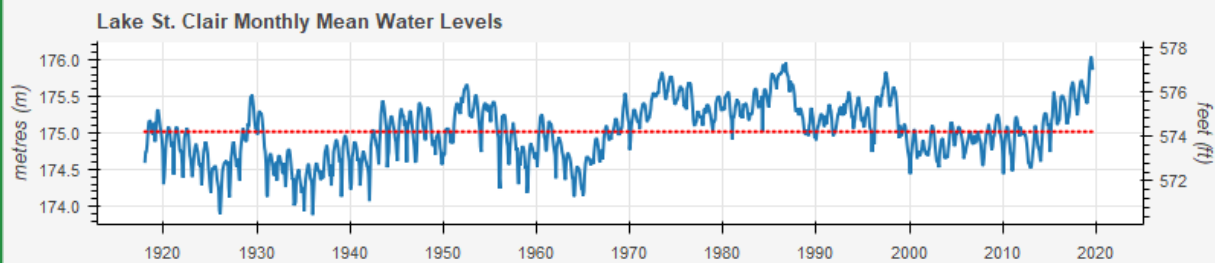
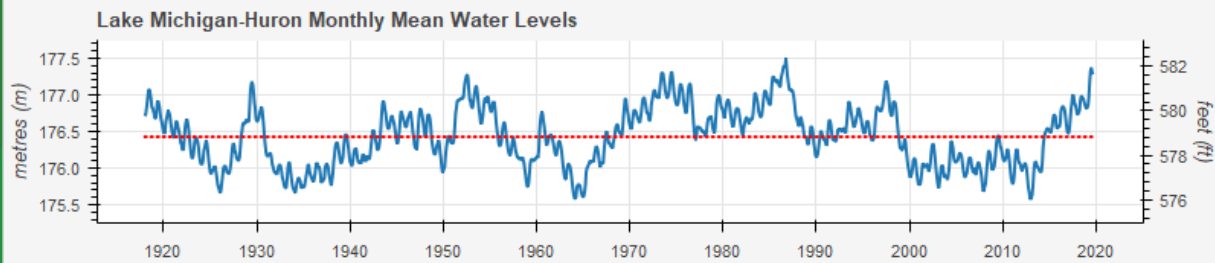
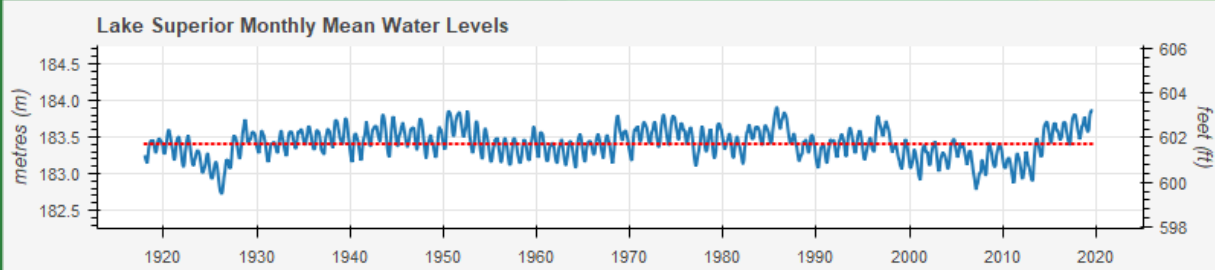
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Why did the Great Lakes flood in 2019?

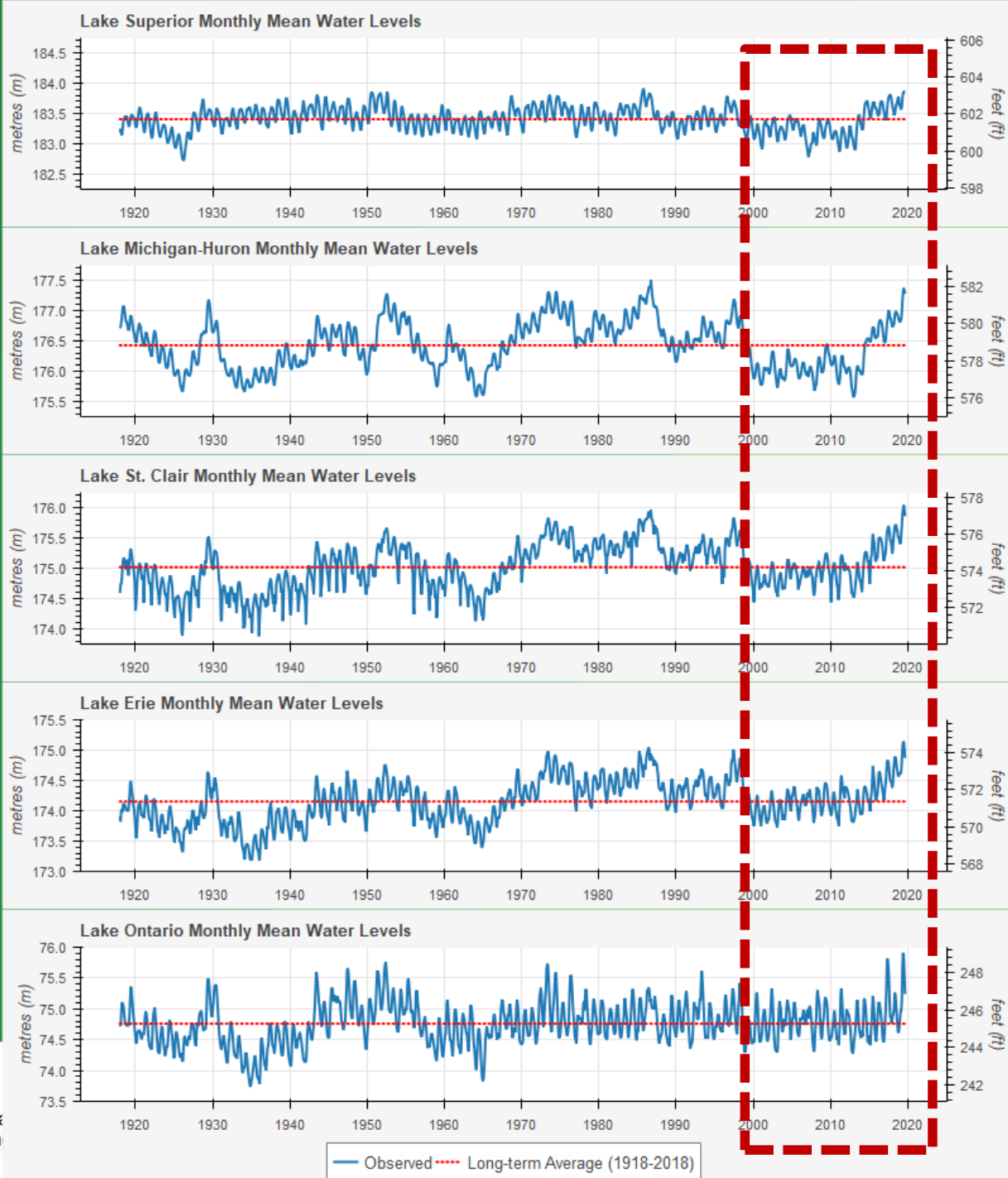
- ▶ Wet weather conditions across the Great Lakes – St. Lawrence River basin
 - have generally persisted for several years
 - increased in intensity recently (2017 + several months leading up to spring of 2019)

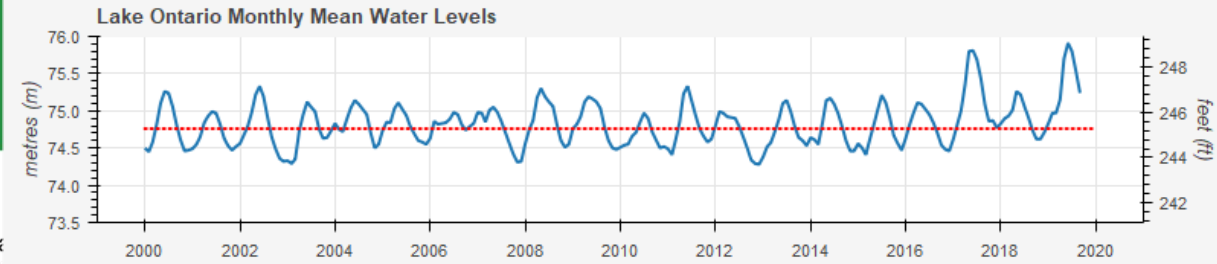
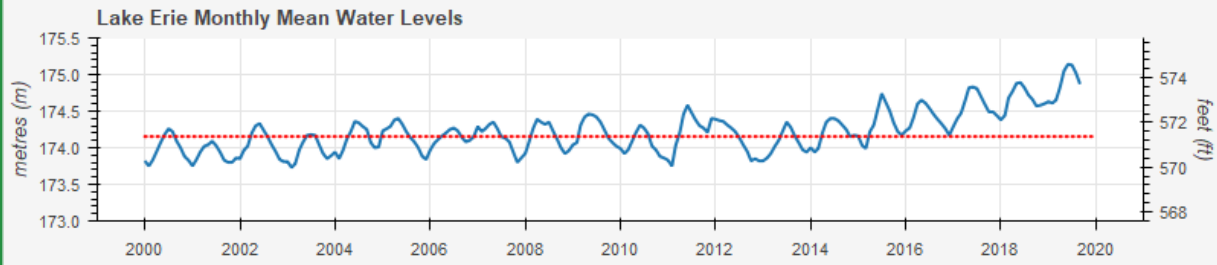
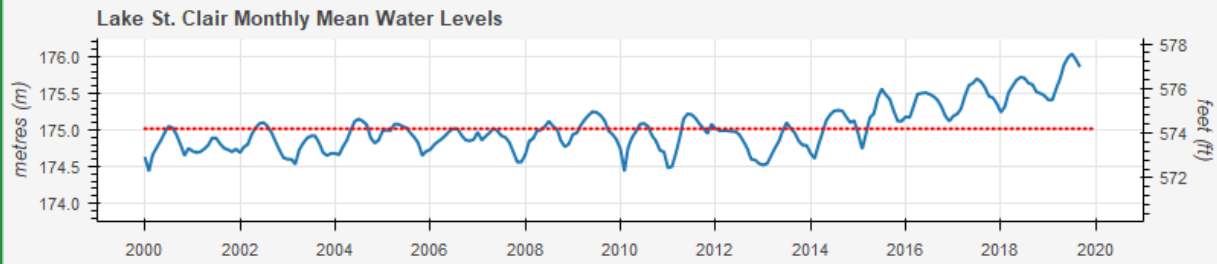
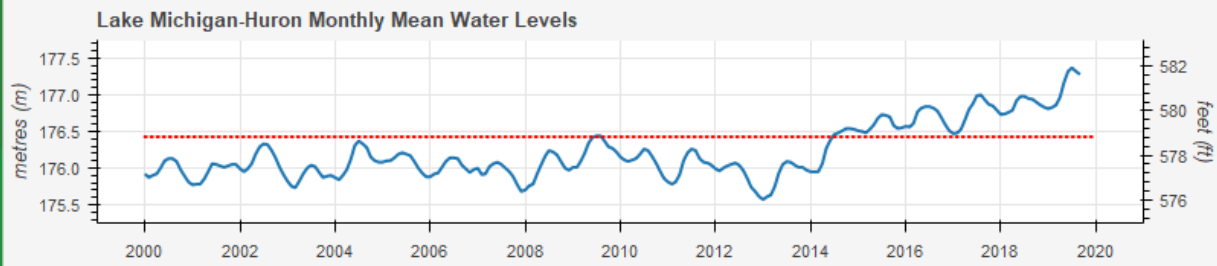
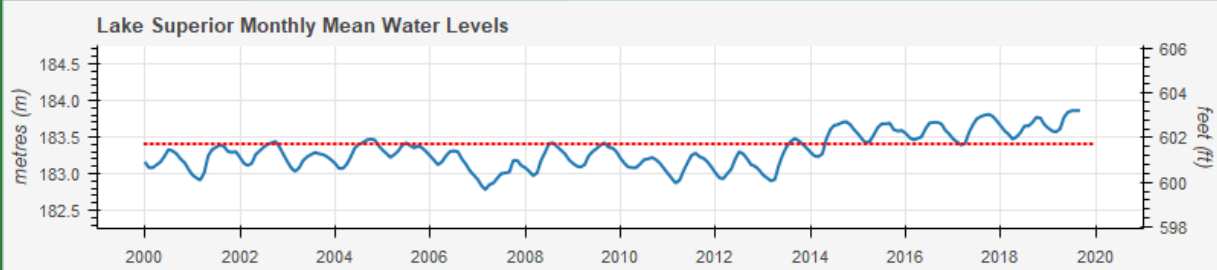




— Observed — Long-term Average (1918-2018)



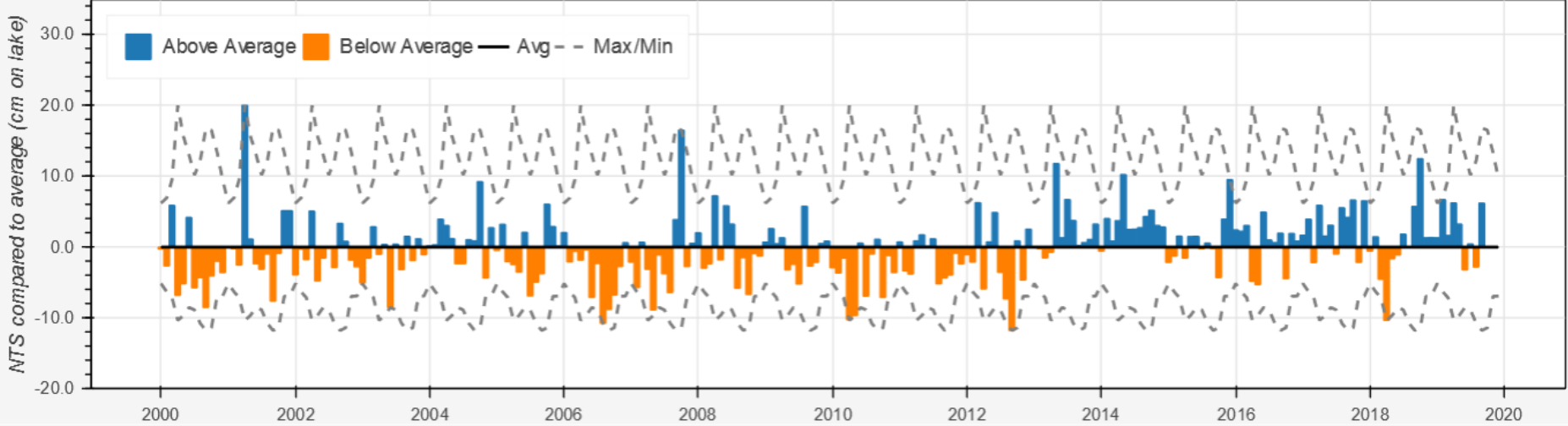




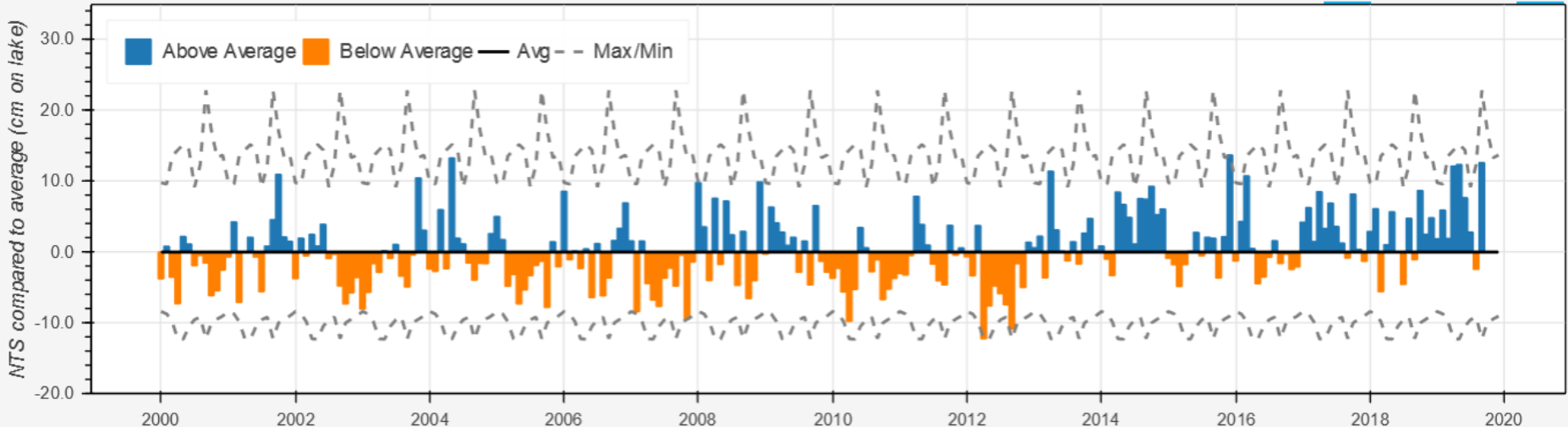
— Observed — Long-term Average (1918-2018)

Net Total Supply Compared to Average: Superior/Michigan-Huron

Lake Superior Monthly Mean Net Total Supply (NTS) Compared to Average

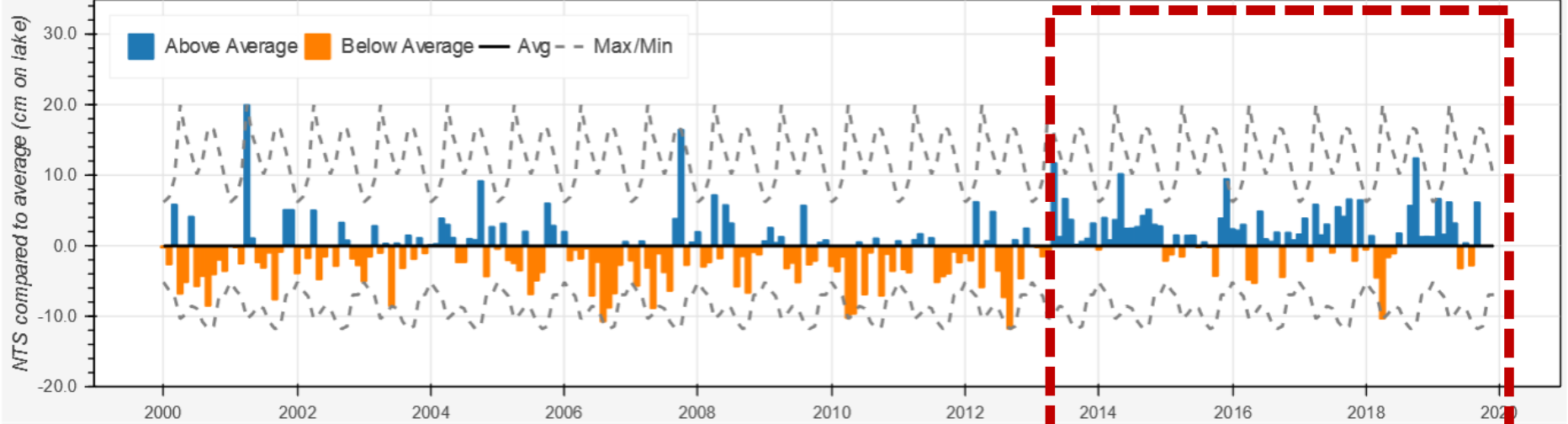


Lake Michigan-Huron Monthly Mean Net Total Supply (NTS) Compared to Average

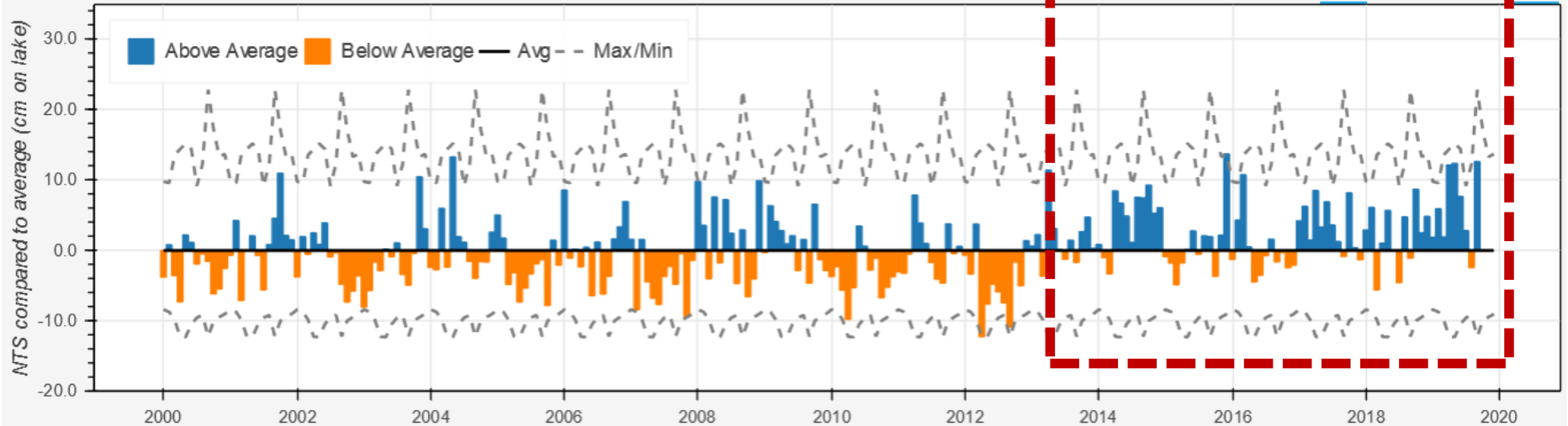


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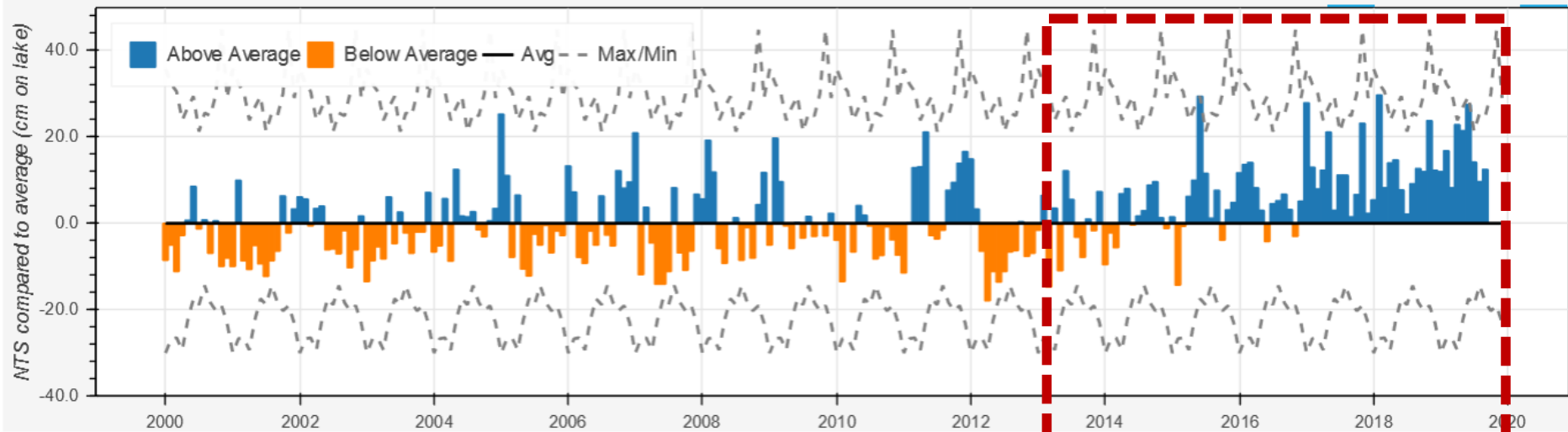


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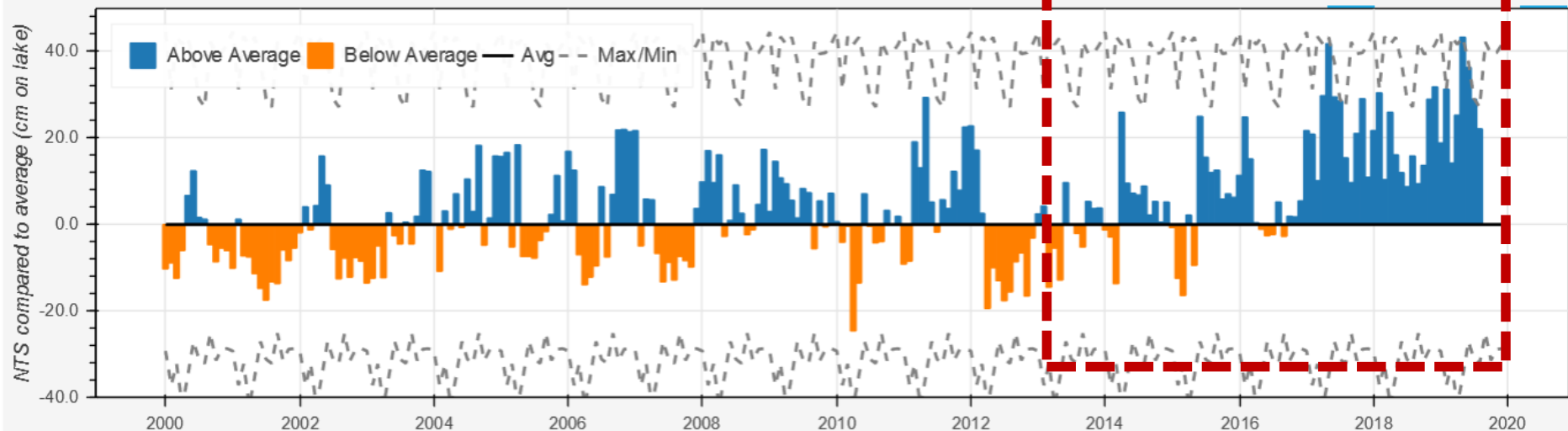


Net Total Supply Compared to Average: Erie/Ontario

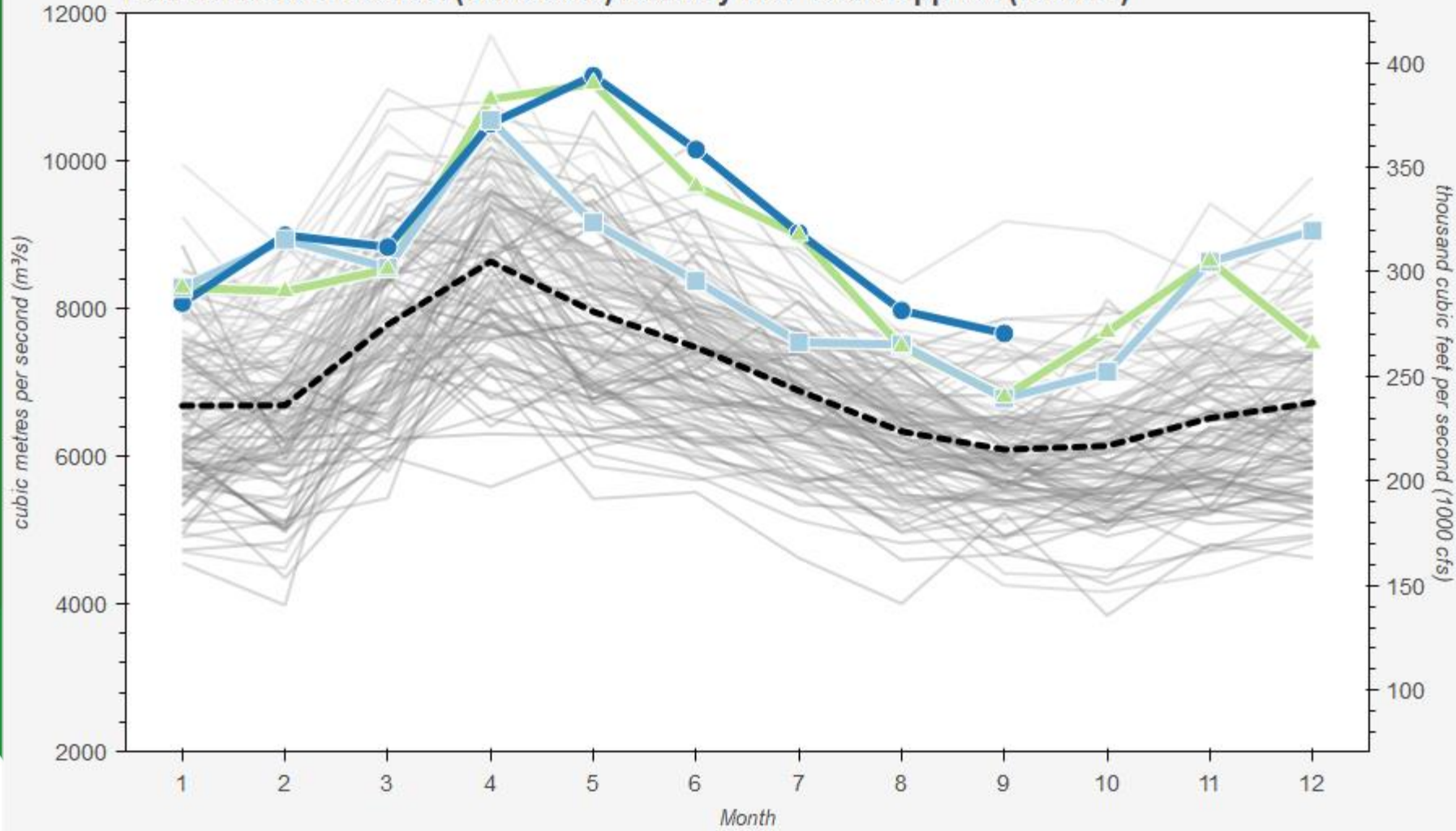
Lake Erie Monthly Mean Net Total Supply (NTS) Compared to Average



Lake Ontario Monthly Mean Net Total Supply (NTS) Compared to Average



Lake Ontario Historical (1900-2019) Monthly Net Total Supplies (Inflows)



Average (1900-2018)
 2019
 2018
 2017
 Other Years



Lake Ontario Total Inflows 2019

- ▶ 6 months Jan–Jun 2019: **record-high total inflows** (same for Nov–Jun)
 - 4th highest Nov
 - 5th highest Dec
 - 2nd highest Feb
 - 8th highest Apr
 - **record** May
 - 2nd highest Jun, Jul, Aug

*Lake Ontario Net Total Supplies (Inflows)
Highest Months Recorded Since 1900*

Rank	Year	Month	Net Total Supply (m ³ /s)
1	1993	April	11700
2	2019	May	11150
3	2017	May	11040
4	1976	March	10970
5	2017	April	10830
6	1973	April	10680
7	1973	March	10800
...
12	2018	April	10550
13	2019	April	10500

Rank based on 1,428 months



Why did the Great Lakes flood in 2019?

- ▶ Basin-wide flooding (monthly records)
 - Superior – record May–July
 - Michigan/Huron – few cm below record
 - Erie – record May–September (June record for any month)
 - Ontario – record June–July (June record for any month)



Why did the Great Lakes flood in 2019?



Looking along Erie Shore Drive in Chatham-Kent, August 27, 2019 (Photo courtesy of Jason Homewood via Twitter)

Lake Erie



Jason Homewood @Jason_Homewood · Oct 27, 2019

Holding back the lake is tough when the winds pick up. #ltvca #ckont



Flooded street in Port Dover, Ont., is seen on Sunday, Oct. 27, 2019. (Source: OPP West)



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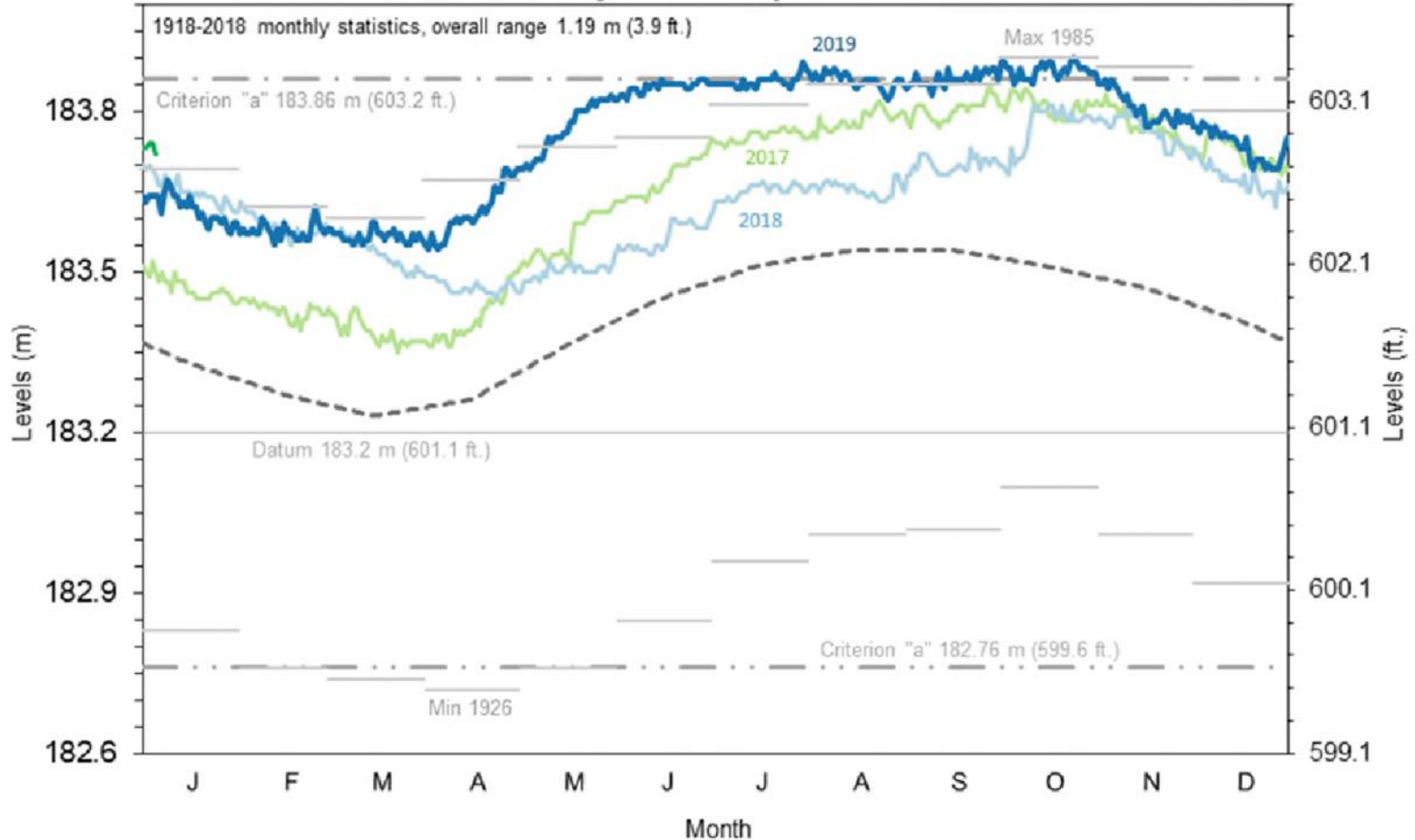
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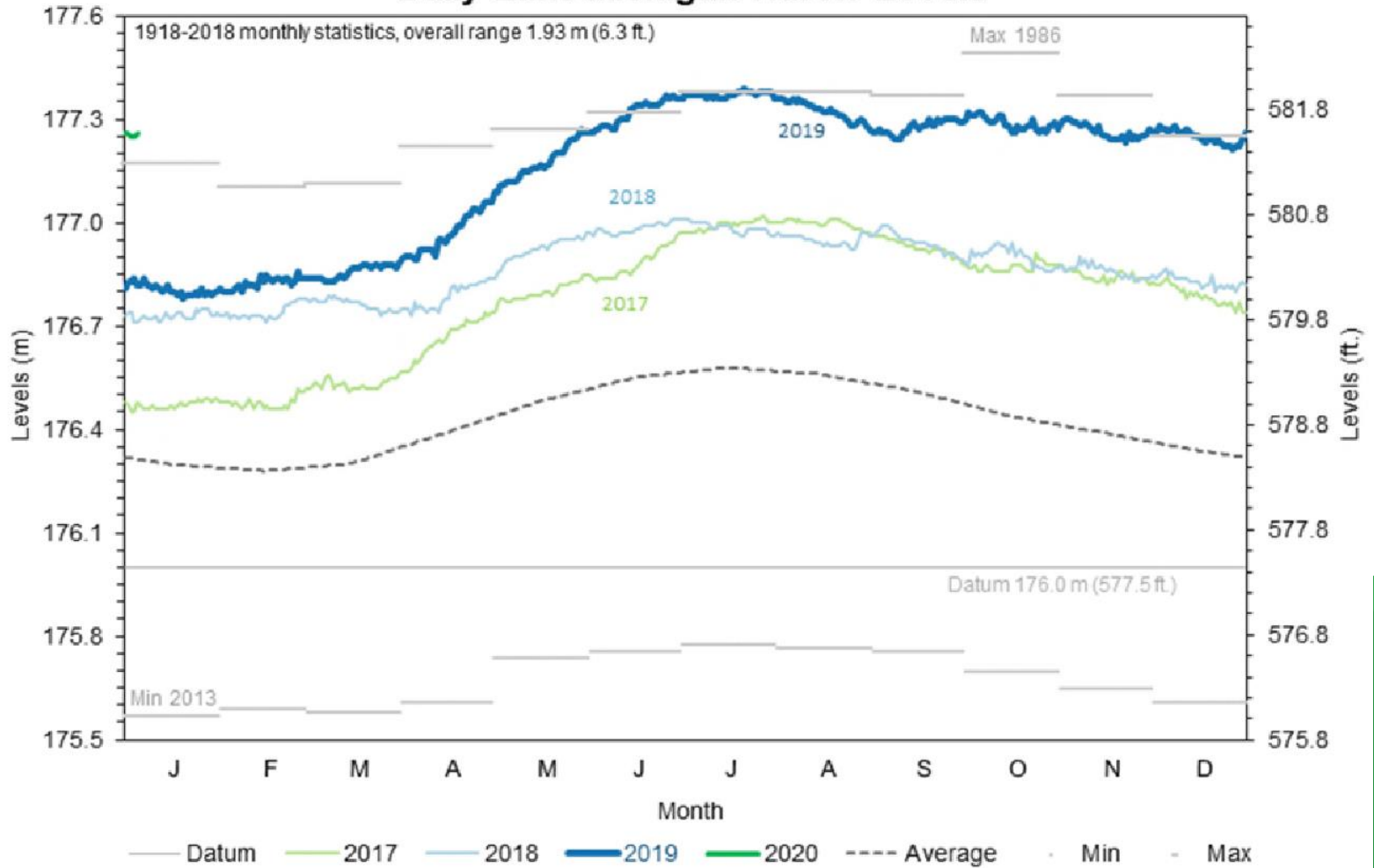


Daily Lake Superior Levels



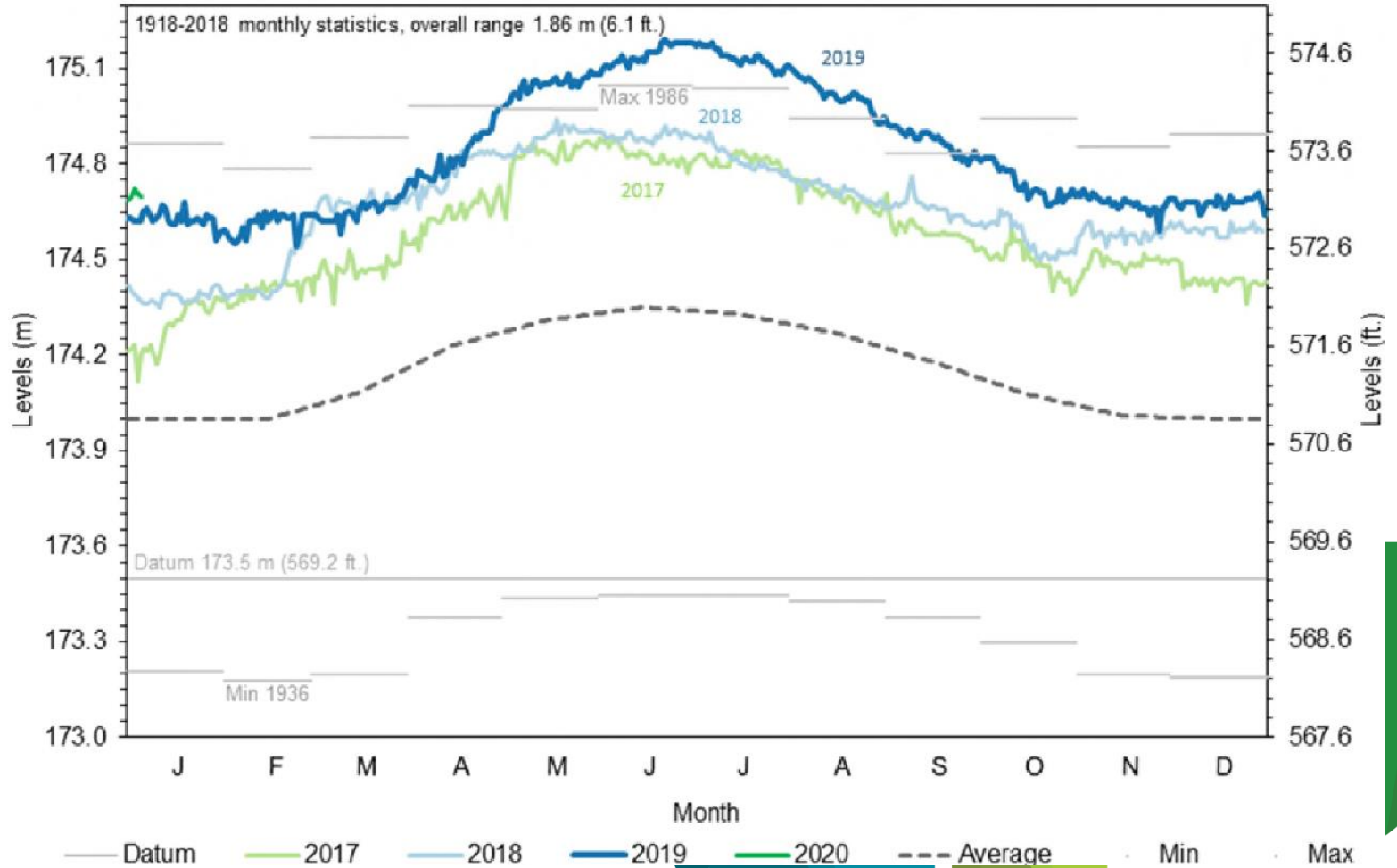


Daily Lake Michigan-Huron Levels



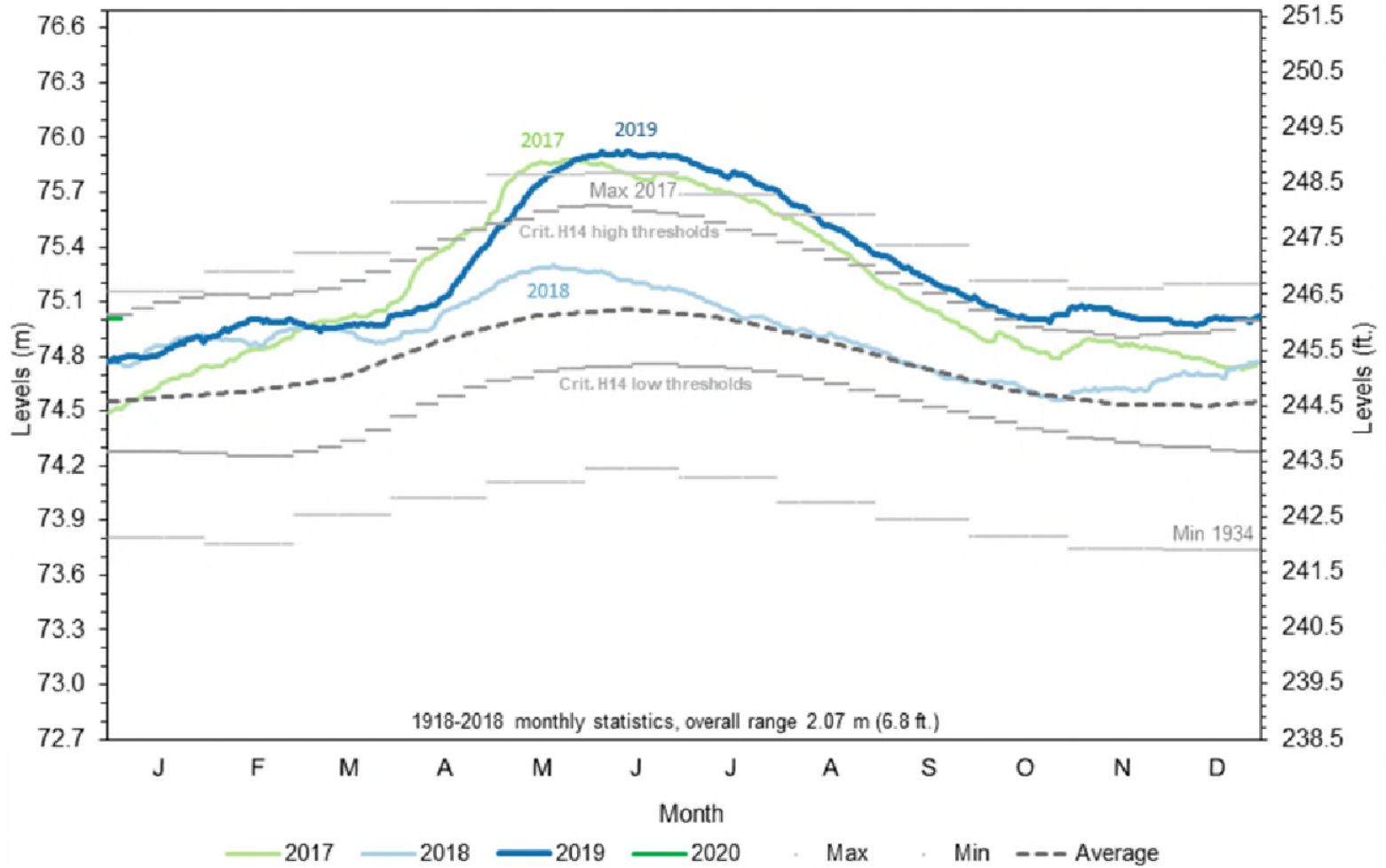


Daily Lake Erie Levels





Daily Lake Ontario Levels



Why did the Great Lakes flood in 2019?

Outlook for 2020?



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Recent Conditions in the System

	Actual <u>1-Jan-20</u>	Compared to	
		<u>Average*</u>	<u>Last Year</u>
Lake Superior	183.74 m	37 cm	9 cm
Lake Michigan-Huron	177.26 m	95 cm	44 cm
Lake Erie	174.66 m	66 cm	4 cm
Lake Ontario	75.02 m	48 cm	24 cm

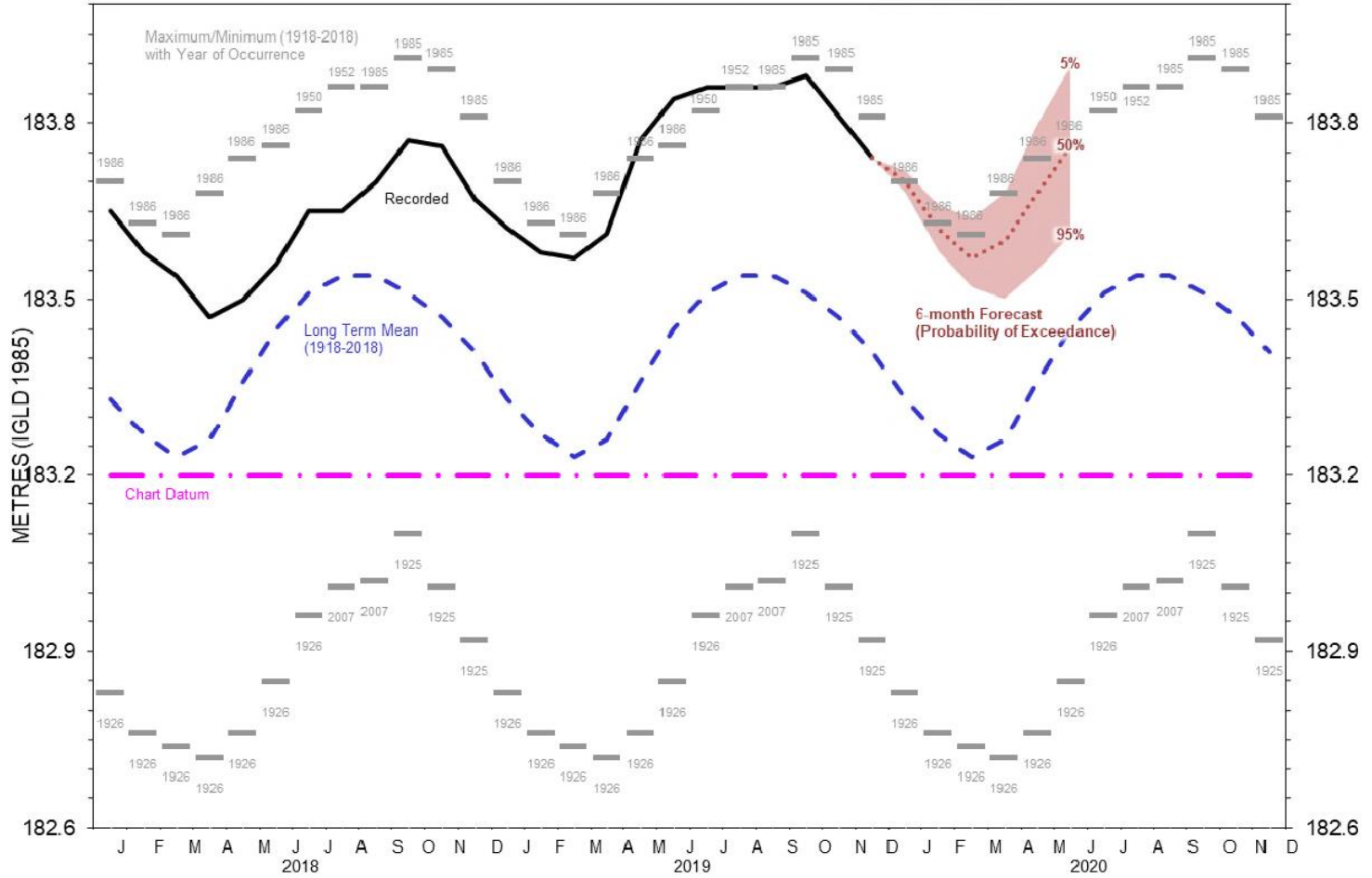
(blue above / red below)

*Statistics: Great Lakes: 1918-2018



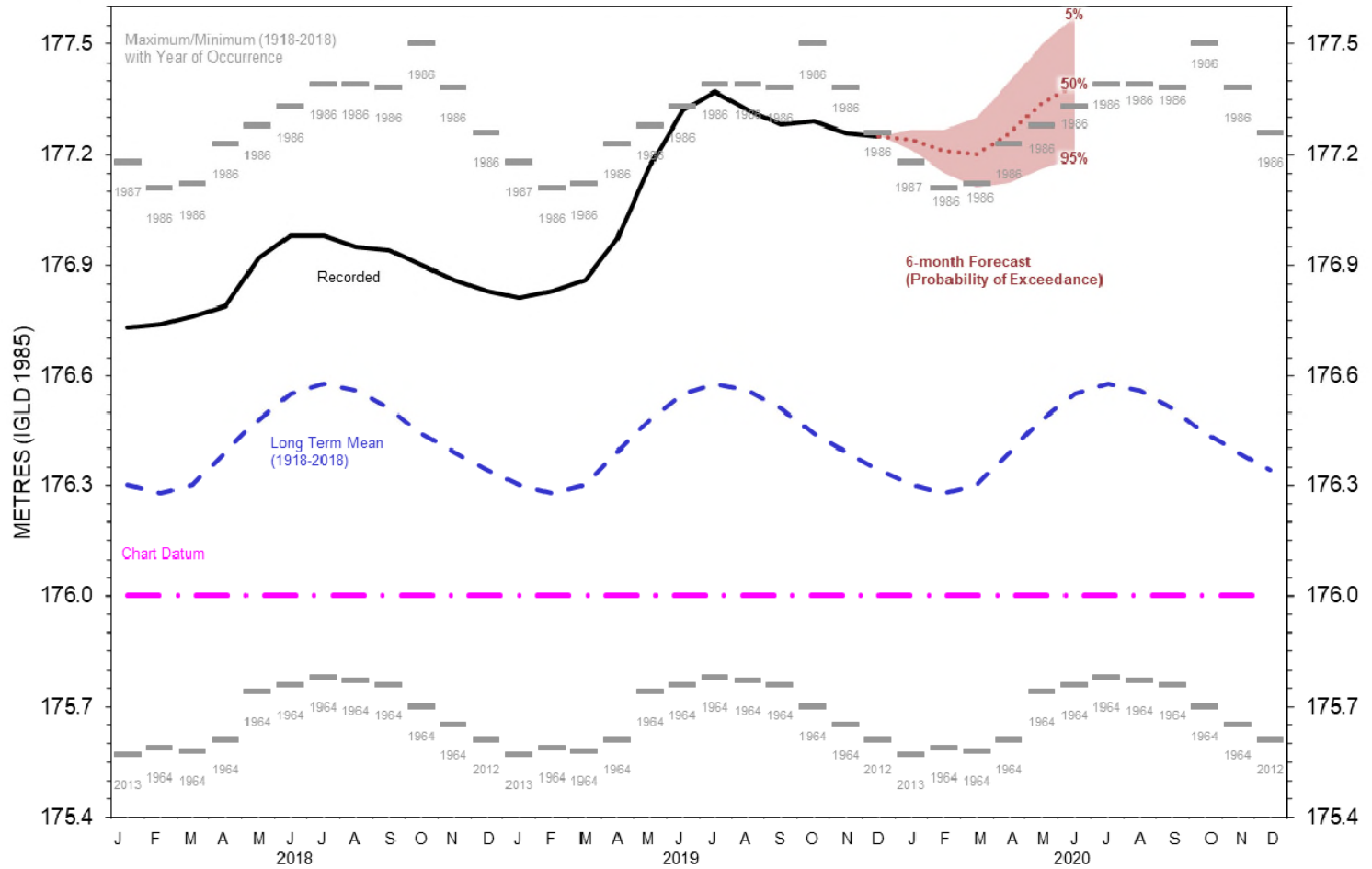


LAKE SUPERIOR MONTHLY MEAN LEVELS



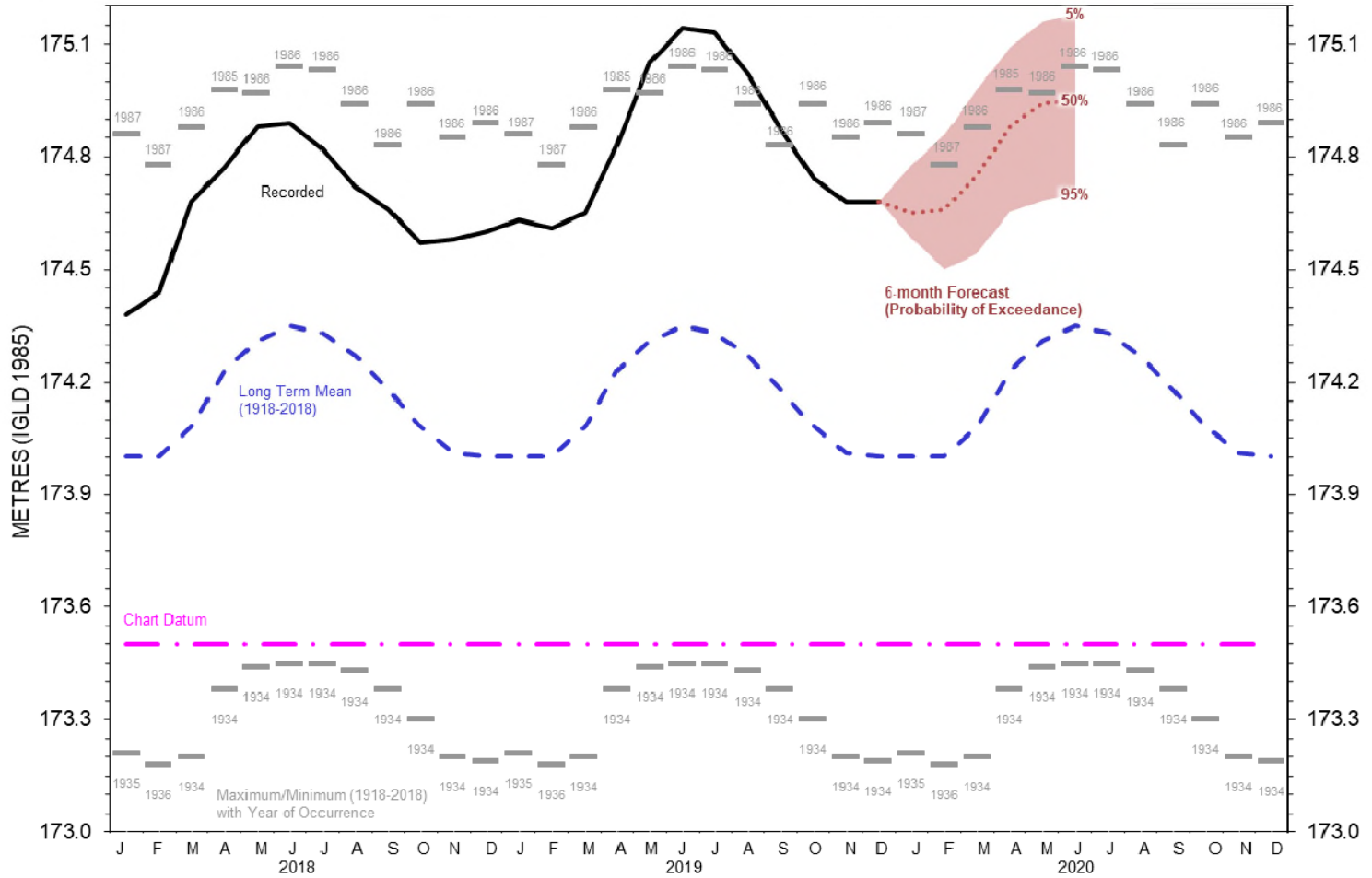


LAKE MICHIGAN-HURON MONTHLY MEAN LEVELS



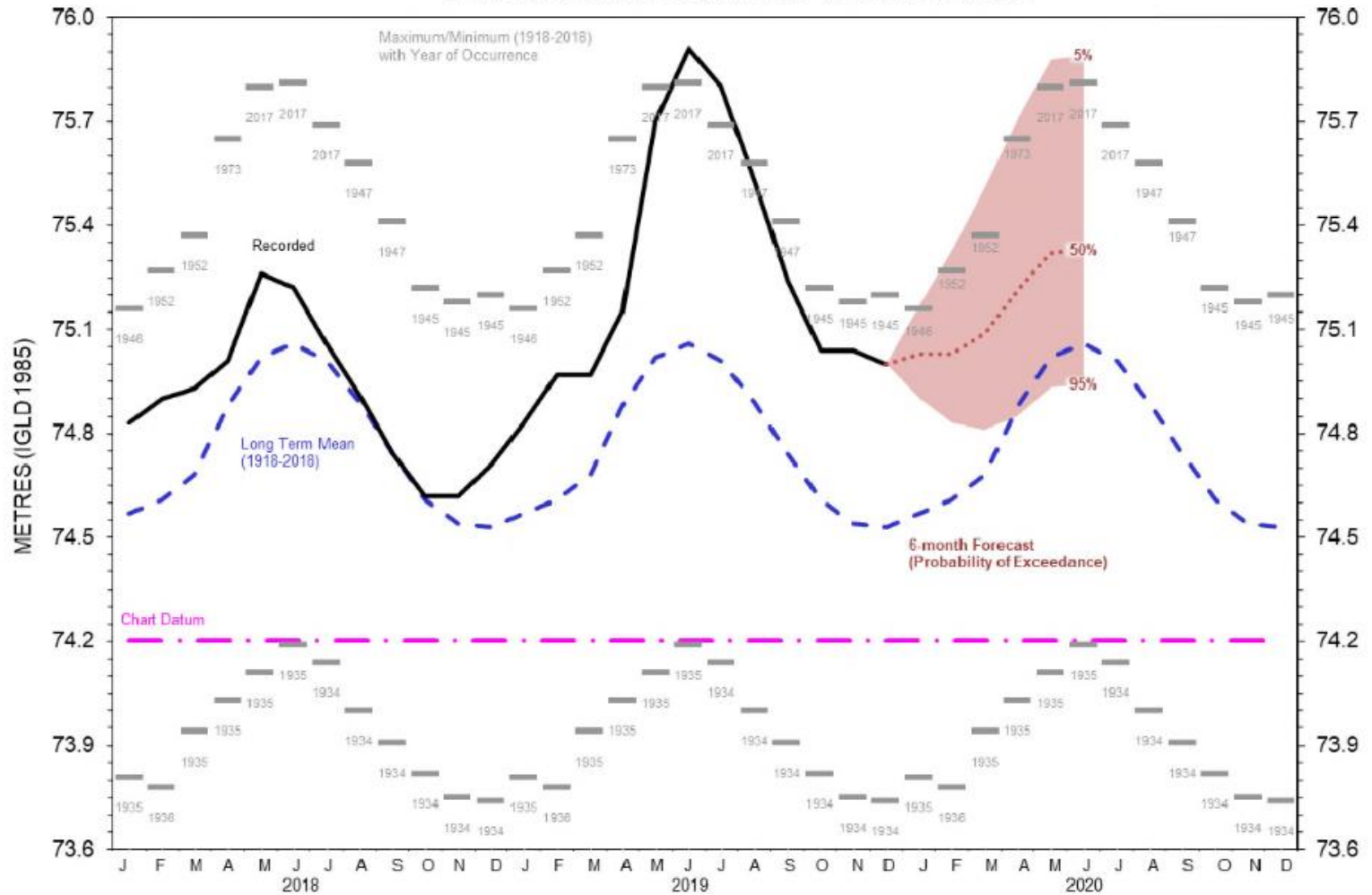


LAKE ERIE MONTHLY MEAN LEVELS





LAKE ONTARIO MONTHLY MEAN LEVELS

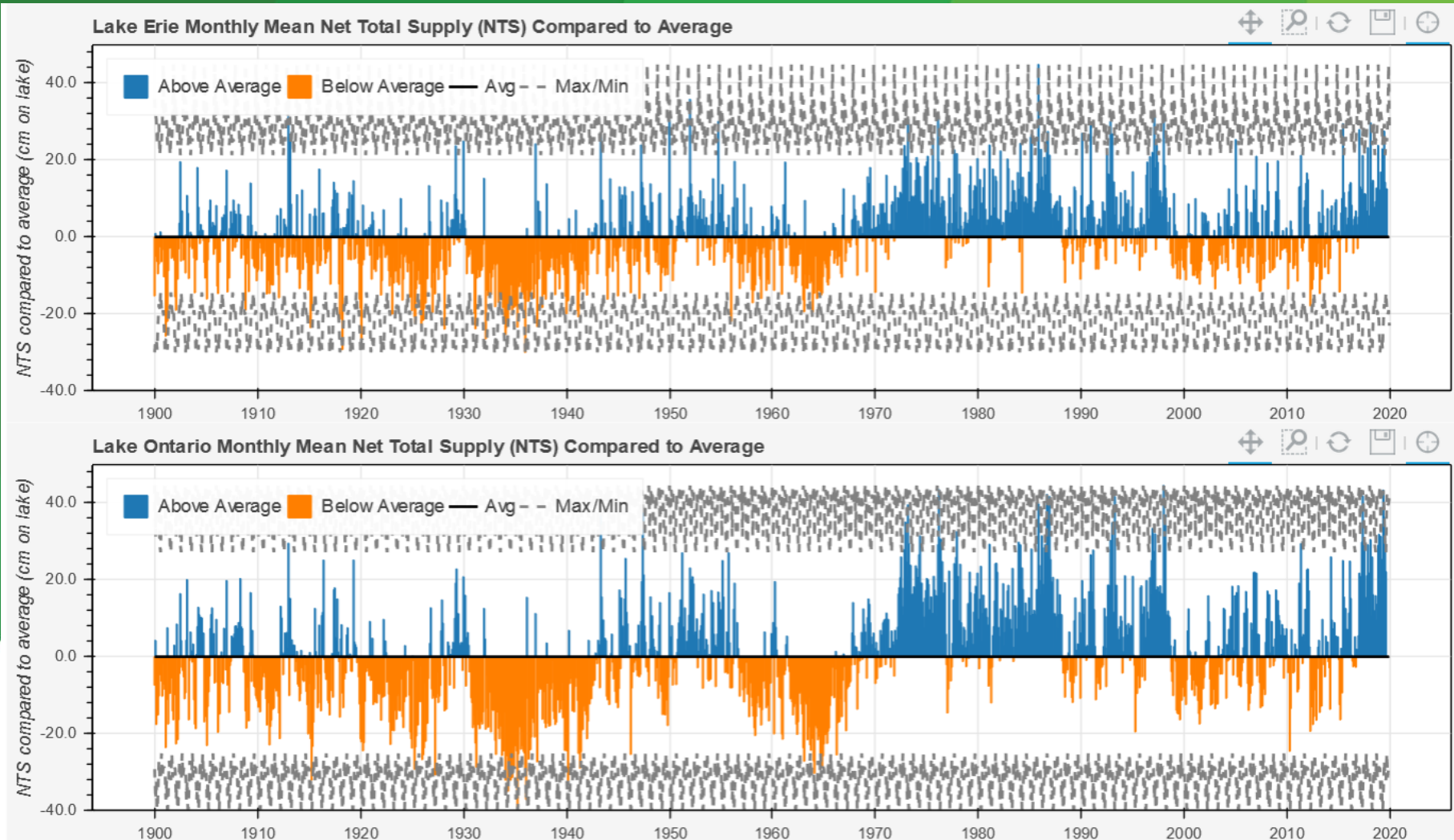


Outlook for 2020?

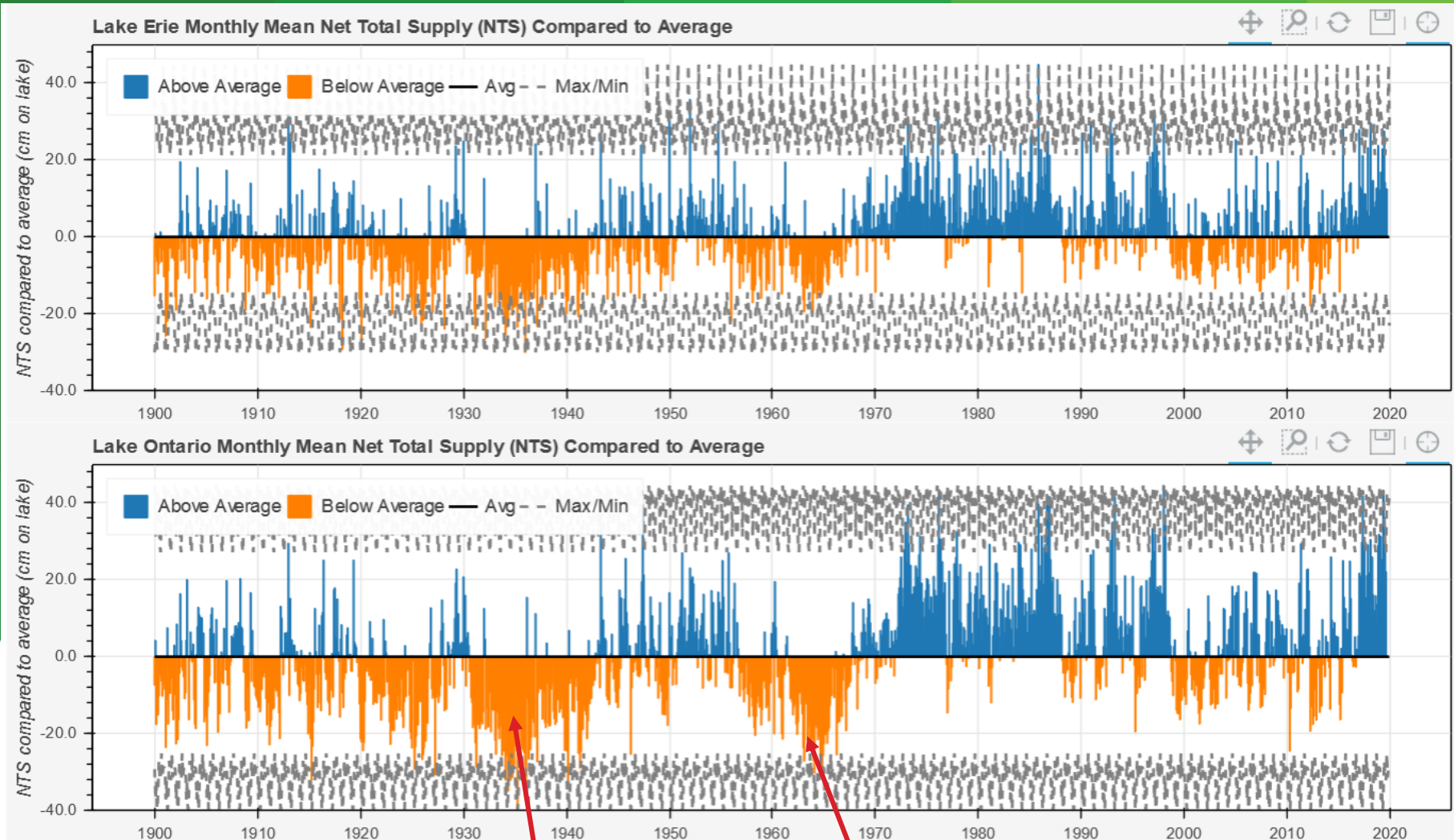
- ▶ Great Lakes levels depend primarily on water supplies
 - difficult to predict, especially long hydrologic response time
- ▶ Outflows from all Great Lakes at or near record-highs & will remain high for several months
- ▶ Very little room through regulation to do more
 - Only Lake Superior and Lake Ontario outflows are regulated (Lake Michigan–Huron and Lake Erie are uncontrolled)
 - Outflows have impacts on water levels and on various interests both upstream and downstream



Net Total Supply compared to average: Erie/Ontario



Net Total Supply compared to average: Erie/Ontario

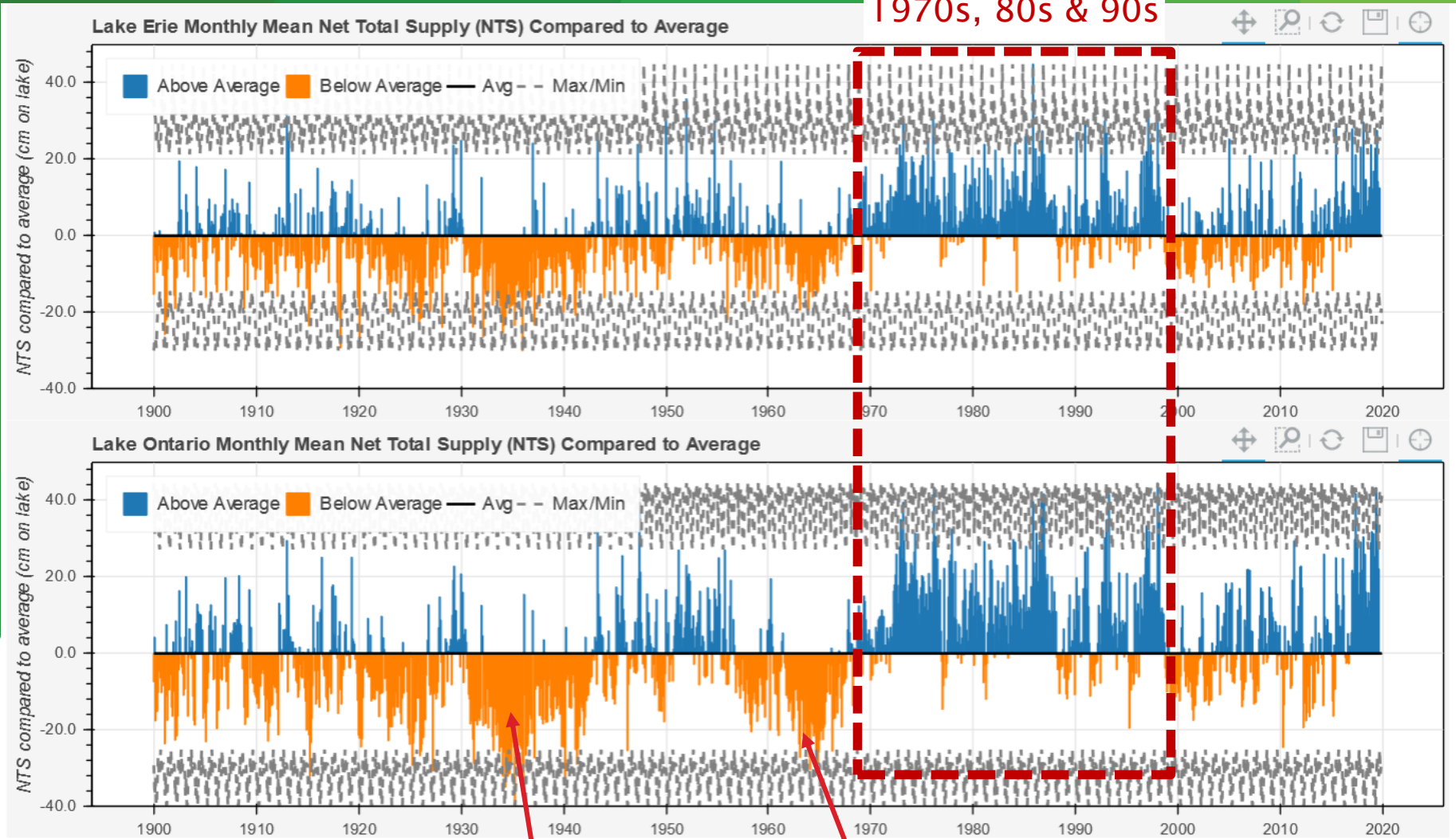


1930s Dust Bowl

1960s Drought

Net Total Supply compared to average: Erie/Ontario

High Water
1970s, 80s & 90s



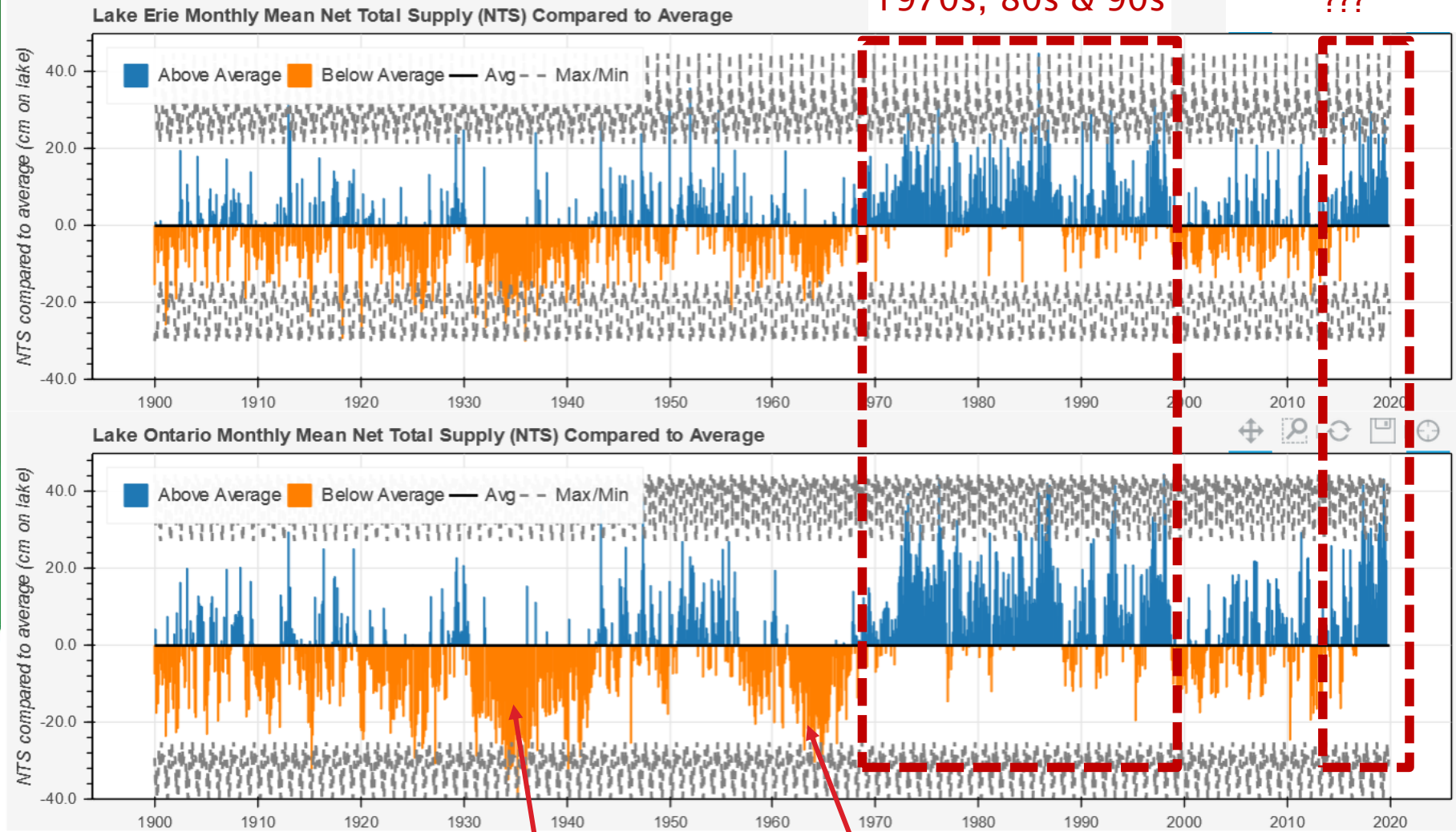
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Net Total Supply compared to average: Erie/Ontario

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???



1930s Dust Bowl

1960s Drought

Key Messages

- ▶ Great Lakes levels depend primarily on water supplies, and high levels similar to recent years have occurred historically
- ▶ Regulation of outflows has a more limited role and cannot prevent high levels during periods of persistent and excessive wet weather
- ▶ Drier weather will help, but if it's wet enough, there is no way to eliminate the risk of high water in 2020 or future years
- ▶ The only reliable means of avoiding high water impacts is through resilience measures



Questions?

