



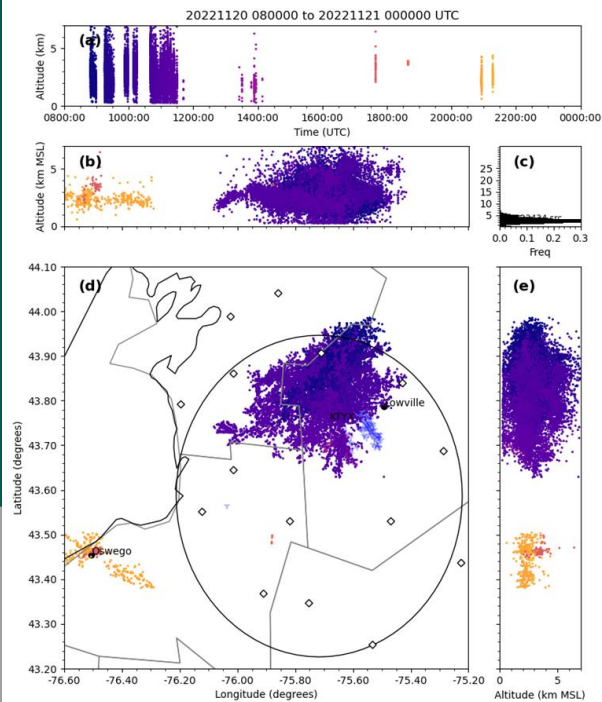
Project LEE Data Analysis ~Special~

Thomas Weist

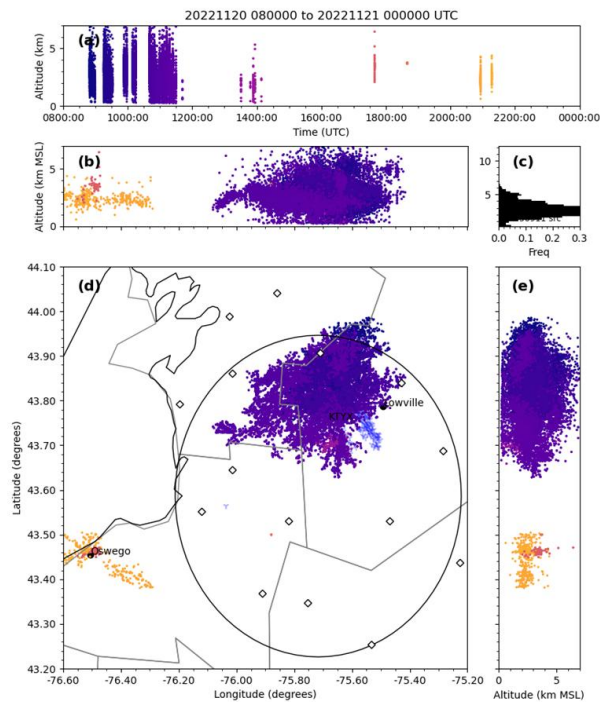


Our Process

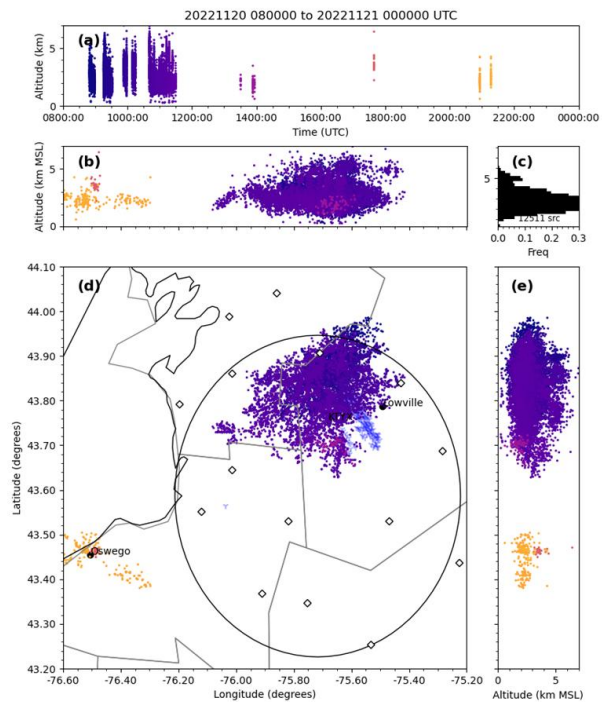
1. Create an .nc file and LMA plot for an IOP using LMA data files and Python code
 - a. IOP time based on lake-effect band duration
 - b. Made a file for stationmin=5; 6; 7
 - c. $\chi^2=1$; min_sources=5
2. Look for vertical section of sources on Altitude vs. Time plot (Figure A)
3. Record flash's start time (rounded down to the nearest second; rounded to the nearest hundredth of a second for several flashes within a second)



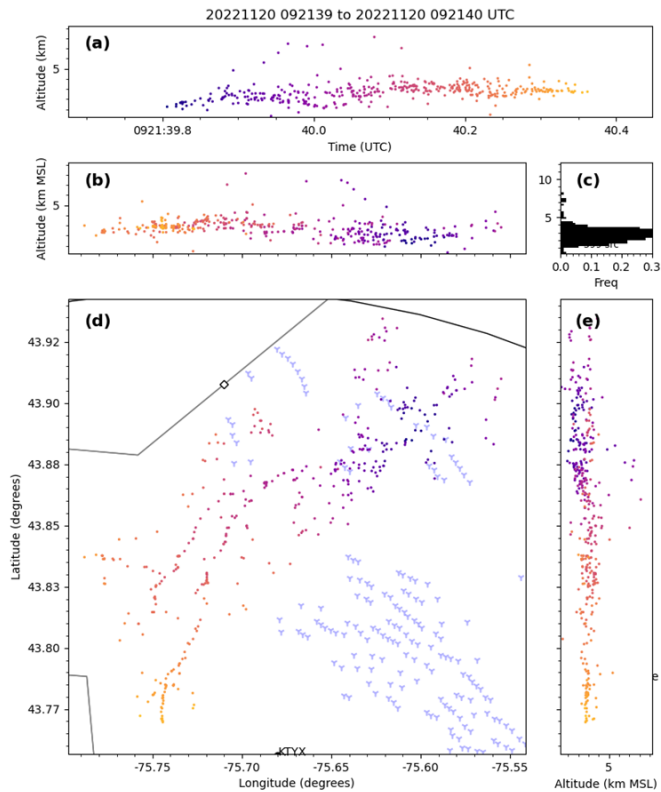
IOP 3 (11/20/2022 08Z -
11/21/2022 00Z)
stationmin=5



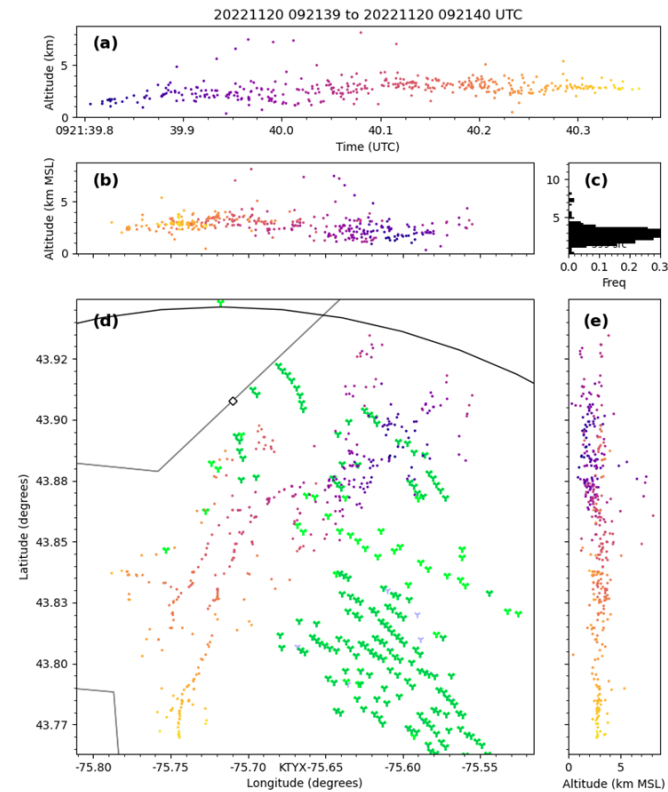
IOP 3 (11/20/2022 08Z -
11/21/2022 00Z)
stationmin=6



IOP 3 (11/20/2022 08Z -
11/21/2022 00Z)
stationmin=7



IOP 3 Flash 0939:40Z LMA Plot
(Turbines)



IOP 3 Flash 0939:40Z LMA Plot
(Turbines & Obstacles)

Old Spreadsheet

E	F
IOP 3	IOP 4
2022-11-20 @ 10:00 to 2022-11-20 @ 22:30	2022-12-17 @ 23:00 to 2022-12-18 @ 15:00
2022-11-20 @ 08:00 to 2022-11-21 @ 13:30	2022-12-17 @ 09:30 to 2022-12-19 @ 05:00
16 Stations (code) 15 Stations (report)	15 Stations (code) 14 Stations (report)
2022-11-20 @ 08:39 2022-11-20 @ 11:21	2022-12-18 @ 22:00
	5 Flashes
2022-11-20 @ 08:49:23	

E	F
2022-11-20 @ 08:49:23 2022-11-20 @ 08:51:37 2022-11-20 @ 08:52:44 2022-11-20 @ 08:53:22 2022-11-20 @ 08:54:31 2022-11-20 @ 08:55:28 2022-11-20 @ 08:56:24 2022-11-20 @ 08:57:55 2022-11-20 @ 08:58:53 2022-11-20 @ 08:59:14 2022-11-20 @ 09:15:30 2022-11-20 @ 09:16:18 2022-11-20 @ 09:17:22 2022-11-20 @ 09:18:08 2022-11-20 @ 09:19:04 2022-11-20 @ 09:19:36	2022-12-18 @ ~2035:20 2022-12-18 @ ~2206:22 2022-12-19 @ ~0419:16 2022-12-19 @ ~0422:43 2022-12-19 @ ~0424:32
#Source to flash chi2max=1.0 stationsmin=7 min_events_per_flash=5	#Source to flash chi2max=1.0 stationsmin=6 min_events_per_flash=5
stationmin=6	



Thomas Weist

3:10 PM Jun 28

***Note: these are estimated times (I mostly rounded down to the nearest second (there are a few I rounded up for the 1st clump)

~93 Flashes Counted Manually~

From 08Z to 12Z there are 5 clumps of flashes

*1st Clump: 10 flashes (0849:23 - 0859:14); flashes generally move eastward over time - 0849:23; 0851:37; 0852:44; 0853:22; 0854:31; 0855:28; 0856:24; 0857:55; 0858:53; 0859:14

*2nd Clump: 22 flashes (0915:30 - 0931:59); flashes generally move eastward over time

- 0915:30; 0916:18; 0917:22; 0918:08; 0919:04; 0919:36; 0920:04; 0921:39; 0922:56; 0923:28; 0924:27; 0925:02; 0925:32; 0926:22; 0926:58; 0927:23;

Lightning Mapping Array (LMA), Geostationary Lightning Mapper (GLM), & National Lightning Detection Network (NLDN) Data for Project LEE

IOP 1
IOP Duration:
2022-11-13 @ 1000Z to
2022-11-13 @ 1700Z
LES Duration:
2022-11-12 @ 2100Z to
2022-11-14 @ 1000Z

IOP 2a
IOP Duration:
2022-11-17 @ 0800Z to
2022-11-17 @ 1600Z
LES Duration:
2022-11-17 @ 0330Z to
2022-11-18 @ 0100Z

IOP 2
IOP Duration:
2022-11-17 @ 1900Z to
2022-11-19 @ 0600Z
LES Duration:
2022-11-18 @ 0100Z to
2022-11-20 @ 0800Z

IOP 3
IOP Duration:
2022-11-20 @ 0800Z to
2022-11-21 @ 0500Z

Key & Notes

Lightning Intensive Event

Lightning Absent Event

Redundant Flash

Canadian Turbine Flash
Note: all times are in UTC

Note: all LMA data for "Overview" sheet has a station min of 6 (besides IOPs 1(5), 6(15), ET Cyclone (7), 7(5), 9(5), & 10(5))

Note: Flash times are rounded down to the nearest second unless there are several flashes within a second

LMA **GLM** **NLDN**

LMA **GLM** **NLDN**

LMA **GLM** **NLDN**

LMA **GLM** **NLDN**

LMA **GLM** **NLDN**

LMA **GLM** **NLDN**

LMA **GLM** **NLDN**

New Spreadsheet

IOP 3
IOP Duration:
2022-11-20 @ 1000Z to
2022-11-20 @ 2200Z
LES Duration:
2022-11-20 @ 0800Z to
2022-11-21 @ 0500Z

LMA Station Minimum 5

LMA Station Minimum 6

LMA Station Minimum 7

Code Counted Flashes (5; 6; 7)

Manually Coded Flashes (5; 6; 7)

Operational LMAs (code)

Operational LMAs (LMA Mission Summary)

Flash Notes:

There are several groups of flashes that appear on the LMA plot (6 clumps of flashes over the turbines, and a small group of flashes over Oswego).
Several(?) Flashes (possibly multiple flashes, but counted as 1 due to criteria (<0=15, <3km): 1040-56, 1049-27, 1112-30, 1117-31, 1125-49, 2056-11
Small Flashes (less sources compared to the majority of flashes): 1108-52, 1110-00, 1141-42
Tiny Flashes (small number of sources close to min): 1047-49, 1107-55, 1408-36
Station min 5 has the same number of flashes, but generally has more noise than station min 6, with some notable noise being in between flashes 0856-24 & 0857-55, just before 1040-56

Key & Notes

Lightning Intensive Event

Lightning Absent Event

Missing LMA Flash

Redundant Flash

Canadian Turbine Flash
Note: all times are in UTC

Note: the GLM and NLDN data is the same for all

Note: LMA, GLM, & the minimum events per flash is 5

Note: Flash times are rounded down to the nearest second unless if there are several flashes within a second

LMA **GLM** **NLDN**

LMA **GLM** **NLDN**

LMA **GLM** **NLDN**

326; 107; 104

93; 93; 88

16

15

Flash Notes: