A Climatological Study of Lake Champlain
Lake-Effect Snow Band Events

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Lake-Effect Snow Studies on Small Lakes


Sobash et al., 2005: An investigation of NYS Finger Lakes snow band events. Preprints, 11th Conf. on Mesoscale Processes.

Watson et al., 1998: High resolution numerical simulations of Finger Lakes snow bands. Preprints, 16th Conf. on Weather Analysis and Forecasting.

Cosgrove et al., 1996: Lake effect snow in the Finger Lakes region. Preprints, 15th Conf. on Weather Analysis and Forecasting.

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Study Region & Primary Data Set

Weather Surveillance Radar 1988 Doppler (WSR-88D)
National Weather Service, Burlington, VT

1996 Radar Installation
1997 Data Archive Began

Primary Source: Level II data
   Radar Reflectivity
   Radial Velocity

Secondary Source: Level III data

Analysis Time Period
   31 days unavailable (0.19%)

67 Events Identified
Start Time and End Time
Duration
Event Type
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Event Type – Lake Champlain Snow Bands
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Event Type – Enhancement of Synoptic Precipitation
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**Frequency Distribution**

**All Identified Events**

**Lake Champlain Band Events**
Total: 48 events

**Enhanced Synoptic Events**
Total: 19 events

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**Legend**
- Winter
- 1997-1998
- 1998-1999
- 1999-2000
- 2000-2001
- 2001-2002
- 2002-2003
- 2003-2004
- 2004-2005
- 2005-2006

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**Graph Details**
- X-axis: Month (OCT, NOV, DEC, JAN, FEB, MAR)
- Y-axis: Number of Events
- Color codes for winter months:
  - Blue: 1997-1998
  - Yellow: 1999-2000
  - Brown: 2000-2001
  - Red: 2001-2002
  - Purple: 2002-2003
  - Teal: 2003-2004
  - Light Green: 2004-2005
  - Light Blue: 2005-2006
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**Event Durations and Timing**

**Event Duration**

- 75% at 12.5 hours
- 90% at 15.0 hours

*Average = 12.05 hours*

**Event Start Time**

**Event End Time**
Northerly Flow – Lake Champlain Snow Band Type
(Wind Direction 271° - 89°)
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**Southerly Flow – Lake Champlain Snow Band Type**

(Wind Direction 91° - 269°)
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**Southerly Flow – Lake Champlain Snow Band Type**
(Webcam Time Lapse - Monthly Weather Review Picture of the Month submission)
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Frequency Distribution - North vs. South Lake Champlain Snow Bands

Northerly Flow Events

Southerly Flow Events

Winter
- 1997-1998
- 1998-1999
- 1999-2000
- 2000-2001
- 2001-2002
- 2002-2003
- 2003-2004
- 2004-2005
- 2005-2006

Total: 32 events
Total: 11 events
Event Durations - North vs. South Lake Champlain Snow Band Events

North Events

South Events

WDirType

75% North Events

Frequency

0 1 2 3 4 5 6
0 10 20 30 40 50
Duration (hours)

South vs. North Lake Champlain Snow Band Events

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**Event Timing - North vs. South Lake Champlain Snow Bands**

**Event Start Time**

- **North Events**
  - Frequency distribution across start times.

- **South Events**
  - Frequency distribution across start times.

**Event End Time**

- **North**
  - Frequency distribution across end times.

- **South**
  - Frequency distribution across end times.
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Surface Wind Conditions – North vs. South Lake Champlain Snow Bands

Plattsburgh, NY

Burlington, VT

Wind speed (mph)

- > 7
- 5 - 7
- 3 - 5
- 2 - 3
- 1 - 2
- 0 - 1
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Temperature Conditions – North vs. South Lake Champlain Snow Bands

Average Temperature at Burlington

North Events

South Events
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Temperature & SLP Composites – North American Regional Reanalysis

Northerly Events

Southerly Events
Summary

• 67 lake-effect events occurred during the 9 year study period (1997 - 2005). These included 48 Lake Champlain lake-effect snow band events and 19 enhanced synoptic lake-effect snow band events.

• January, followed by December, had the largest frequency of Lake Champlain events.

• 90% of all events developed and dissipated during a 25-hour period with start and end times typically occurring in the early morning and afternoon hours, respectively.

• One out of every four isolated lake-effect snow bands occurred under southerly flow conditions.

• Southerly flow events are shorter-lasting than northerly flow events and occur during weaker wind speed conditions with land breezes playing a dominant role in their development and evolution.

• Southerly Lake Champlain events occur under lower temperature conditions when a cold tongue of air extends southward over the Champlain Valley and along the Appalachians.