

Great Lakes to New England Winter Storm with Coastal Wind and Rain

1 March – 3 March, 2018

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Meteorological Overview:

A powerful winter storm impacted the Mid-Atlantic and Northeast at the beginning of March 2018, causing significant impacts from snow, wind and coastal flooding. While over two feet of snow fell in parts of New York (Fig. 1 and Fig. 2), one of the more impressive effects of the storm was wind. The low pressure center associated with the storm system rapidly intensified on 2 March just southeast of the New England coast resulting in hurricane force winds from southern New England to the Mid-Atlantic region.

A progressive 500 hPa trough axis stretched from Iowa to the southern plains on 1200 UTC 1 March and moved eastward to the northern Mid-Atlantic coast on 1200 UTC 2 March while forming a closed low. As this occurred, two cold fronts that were in place at the surface over the Ohio Valley and Mid-Atlantic region, along with multiple low pressure centers, consolidated into a single, rapidly-deepening surface cyclone roughly 200 kilometers south of New England by 1200 UTC 2 March. The 974 hPa minimum central pressure of the surface low was reached at approximately 2100 UTC 2 March while a 1034 hPa high pressure center was located over Illinois. The strengthened pressure gradient over the eastern United States was coincident with numerous high wind reports from 2-3 March extending from the Mid-Atlantic States to New England.

Bands of moderate to heavy rain moved through Lower Michigan and Ohio on 1 March, followed by a changeover to snow as colder air filled in behind the departing storm system. Heavy precipitation moved into the Northeast by 1200 UTC 2 March but strong onshore flow into New England, noted by 65 kt from the east on Chatham's morning RAOB, kept rain as the predominant precipitation type for central and southern New England except for the higher terrain of western Massachusetts into Vermont. Strong frontogenesis between 850 and 700 hPa was observed over eastern Pennsylvania, southern New York into southern New England at 1200 UTC 2 March. The axis of low level frontogenesis extended into the evening hours when bands of heavy rain and snow were depicted on regional reflectivity across the Northeast.

The absence of a blocking mid-level ridge downstream of the closed 500 hPa low center allowed the storm system to steadily progress off toward the east, reducing precipitation to isolated rain and snow showers by 1200 UTC 3 March across the Mid-Atlantic and Northeast. Strong winds remained however, especially for coastal locations of the Northeast, which continued coastal flooding and beach erosion over several high tide cycles.

Impacts:

The storm system was responsible for over 2 million people losing power in the eastern U.S., some taking a week or more to restore service. Strong winds along the East Coast were responsible for widespread reports of wind damage which extended from North Carolina to Maine with a large number of downed trees and powerlines. While hurricane force wind gusts were reported across large portions of the northern Mid-Atlantic region into New England, many of the strongest wind speeds were recorded in Massachusetts. Gusts of 85-93 mph were reported in coastal Massachusetts with moderate beach erosion (Fig. 3). In addition, moderate coastal flooding occurred along portions of eastern and

southeastern Massachusetts on the morning of 2 March, with Boston Harbor reporting its third highest high tide at 14.67 feet; records dating back to 1921. Strong winds sent trees into homes and onto major transportation routes, closing roadways and railways, with Amtrak suspending rail service between Washington D.C. and Boston, MA. Over 4000 flights were reported to be cancelled on 2 March due to the storm. The highest snowfall reported from the storm was 40 inches in Richmondville, New York, located in Schoharie County in central New York.

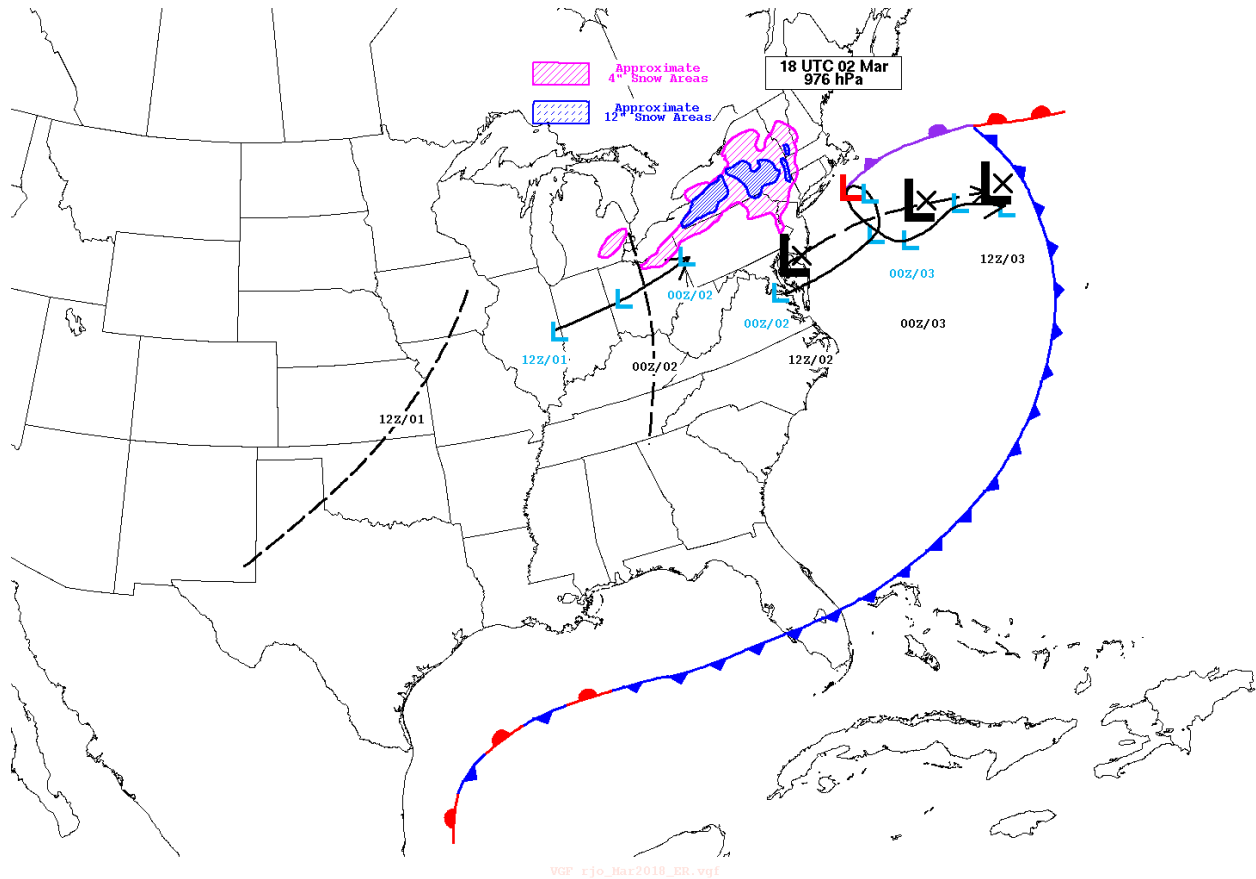


Fig. 1 - 500 hPa trough axes and low centers every twelve hours starting 1200 UTC 01 March (black symbols), surface low tracks every six hours (light blue), surface analysis as the storm neared peak intensity (2100 UTC 02 March), approximate areal coverage of locations receiving 4 inches snow (magenta shading) and 12 inches snow (blue shading) between 1200 UTC 01 March and 0000 UTC 04 March.

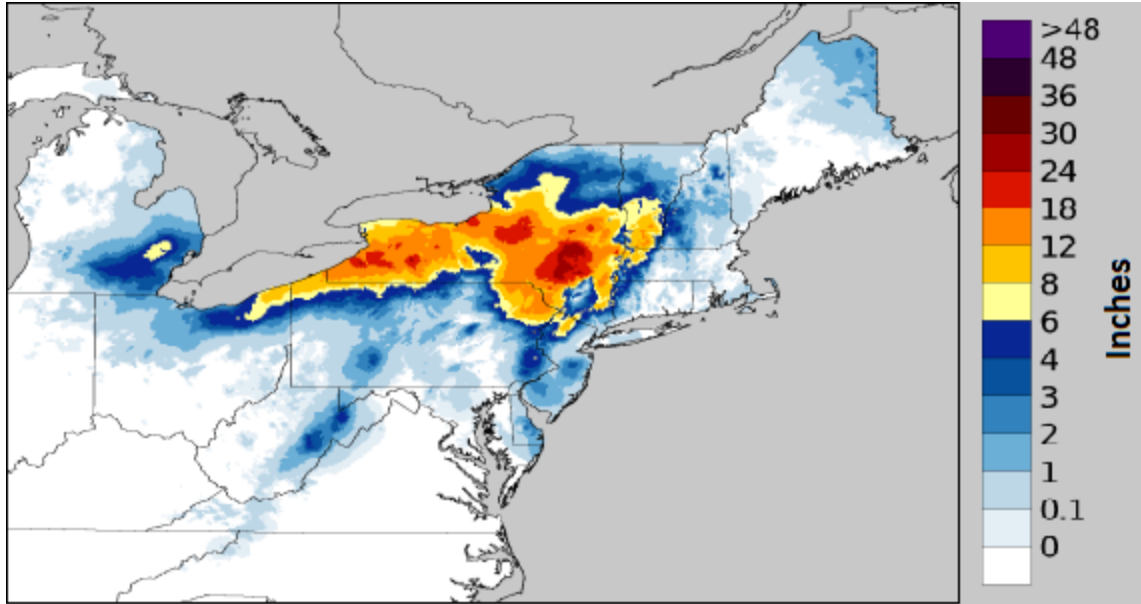


Fig. 2 – 72 hour snowfall accumulation ending 1200 UTC 04 March
Image courtesy – National Operational Hydrologic Remote Sensing Center
(https://www.nohrsc.noaa.gov/snowfall_v2/)



Fig. 2 – Coastal flooding in Peggotty Beach, Scituate, MA on 04 March
Image courtesy – The Weather Channel
(<https://features.weather.com/exodus/chapter/never-the-same-every-year/>)