The October 28 2008 Snow Event: Model Trends and Forecast Implications

Justin Arnott
Motivation

• Difficult event with relatively short lead times
  – No watch issued
  – HWO did not mention event until 08Z27OCT
    • 11 hours before warning issuance
    • ~24 hours before the onset of snow
  – Models did not “catch on” to the event until about T-18hrs.
  – Warnings/advisories issued about 12hrs before event onset
NCEP/EMC Cyclogenesis Tracking Page

-- EMC Cyclogenesis Tracking Page --

Model Cycle: 2008111200

North America: Model Tracks for Mid-Latitude Cyclones

<table>
<thead>
<tr>
<th>Region</th>
<th>Multi-Model</th>
<th>GFS</th>
<th>NAM</th>
<th>NCEP Ensemble</th>
<th>SREF Ensemble</th>
<th>Ukmet</th>
<th>NOGAPS</th>
<th>CMC</th>
<th>CMC Ensemble</th>
<th>ECMWF EST</th>
<th>ECMWF Ensemble</th>
<th>Multi-Model w/ECMWF EST</th>
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<td>U.S. East Coast (Current DTG; NPS)</td>
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<td>Eastern North America (Current DTG; NPS)</td>
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<td>NW Atlantic (Current DTG; NPS)</td>
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http://www.emc.ncep.noaa.gov/gmilftp/track/track/bacntrk/2008111200.html
**Model Forecast Storm Tracks**

*For forecast with initial time = 2008102500*

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**NCEP Low Track**

- **06Z/28**
- **12Z/28**
- **18Z/28**
- **00Z/29**

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- **T-72hr**
- **T-48hr**
- **T-24hr**

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- 25 Oct 00Z
- 26 Oct 00Z
- 27 Oct 00Z
- 28 Oct 00Z

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*Φ*—indicates a position at 00 or 12 UTC

*+-* indicates a position at 06 or 18 UTC

Date (dd/hh) is first time storm was able to be tracked in model

Tim Marchok NOAA/CFDL
Model Forecast Storm Tracks
For forecast with initial time = 2008102512

NCEP Low Track

T-72hr  T-48hr  T-24hr  Event

Model Forecast Storm Tracks
For forecast with initial time = 2008102509

NCEP Low Track

* indicates a position at 00 or 12 UTC
+ indicates a position at 06 or 18 UTC

Date (dd/mm) for first time storm was able to be tracked in model

T-72hr  T-48hr  T-24hr  Event

00Z 00Z 00Z 00Z 00Z

position at 00 or 12 UTC
T+24hr

Tim Marshak NOAA/GFDL
Model Forecast Storm Tracks
For forecast with initial time = 2008102600

NCEP Low Track

- Indicates a position at 00 or 12 UTC
+ Indicates a position at 06 or 18 UTC

Date (dd/hhz) is first time storm was able to be tracked in model

T-72hr  T-48hr  T-24hr  Event

00Z 00Z 00Z 00Z

NCEP Ensemble Perturbation Forecast Storm Tracks
For forecast with initial time = 20DB102600

NCEP Low Track

Event T-24hr T-48hr T-72hr
00Z/28 12Z/28 18Z/28 06Z/28

06Z/28 12Z/28 18Z/28 00Z/29

T-72hr T-48hr T-24hr
00Z 00Z 00Z

25 Oct 26 Oct 27 Oct
NCEP Ensemble Perturbation Forecast Storm Tracks
For forecast with initial time = 2008102612.

NCEP Low Track

- Indicates a position at 00 or 12 UTC
- Indicates a position at 06 or 18 UTC

Date (dd/hh) is first time storm was able to be tracked in model

T-72hr  T-48hr  T-24hr  Event

Model Forecast Storm Tracks
For forecast with initial time = 2008102600

NCEP Low Track

Event

T-72hr

T-48hr

T-24hr

00Z 00Z 00Z

25 Oct 26 Oct 27 Oct

00Z 00Z 00Z

26 Oct 27 Oct 28 Oct

00Z 00Z 00Z

27 Oct 28 Oct
Model Forecast Storm Tracks
For forecast with initial time = 2008102700

NCEP Low Track

00Z/29
18Z/28
12Z/28
06Z/28
00Z/28
12Z/27

T-72hr  T-48hr  T-24hr  Event
00Z  25 Oct  00Z  26 Oct  00Z  27 Oct  00Z  28 Oct  00Z

- Indicates a position at 00 or 12 UTC
+ Indicates a position at 06 or 18 UTC
Date (dd/hh) is first time storm was able to be tracked in model

Tim Marchok NOAA/GFDL

position at 00 or 12 UTC
position at 06 or 18 UTC
first time storm was able to be tracked in model

Tim Marchok NOAA/GFDL
NCEP Ensemble Perturbation Forecast Storm Tracks
For forecast with initial time = 2008/10/27 00Z

NCEP Low Track

Event

T-72hr  T-48hr  T-24hr

00Z  00Z  00Z
25 Oct 26 Oct 27 Oct

00Z  00Z  00Z
28 Oct
Tidbits

• Operational guidance on the western edge of the “ensemble envelope”.
  – Interesting given higher resolution of control GFS simulation (what is it seeing?).
• Ensembles lagging trend of operational guidance.
NCEP Ensemble Perturbation Forecast Storm Tracks
For forecast with initial time = 2009/02/06

NCEP Low Track

T-72hr  T-48hr  T-24hr  Event

00Z  25 Oct  00Z  26 Oct  00Z  27 Oct  00Z  28 Oct  00Z
Tidbits

• Now, some SREF members catching on to eventual track and adding valuable information to the deterministic runs.
Model Forecast Storm Tracks
For forecast with initial time = 2008102712

NCEP Low Track

T-72hr  T-48hr  T-24hr  Event

00Z 00Z 00Z 00Z
NCEP Ensemble Perturbation Forecast Storm Tracks
For forecast with initial time = 2003102712

NCEP Low Track

- Indicates a position at 00 or 12 UTC
++ Indicates a position at 06 or 18 UTC

Date (dd/mm) is first time storm was able to be tracked in model

Tim Marshak NOAA/GFDL

Event

T-72hr
T-48hr
T-24hr

00Z 25 Oct 00Z 26 Oct 00Z 27 Oct 00Z 28 Oct 00Z
Tidbits

• Eventual track still on the western edge of the guidance envelope, but the models pretty much “have it” now.
Possible Explanation
Summary/Conclusions

• In the watch timeframe, guidance indicated potential for storm near or just west of the benchmark

• 42-54 hr guidance showed no improvement (i.e. the trend was not your friend!)

• dprog/dt again helps from 42→30→24→18hrs
Discussion

• How to handle these watch period systems forecast to develop near the benchmark?
  – Deterministic/Ensemble simulations suggest NO chance of a high impact event.
  – Surface forcing (sensible/latent heat fluxes) indicate possible low track much further west
    • Upper dynamics vs. surface forcing for low placement
  – So, actual “probability” of an event may be higher?