# Model Performance 24-48 Hours Prior to the October 26-27, 2011 Snow Event

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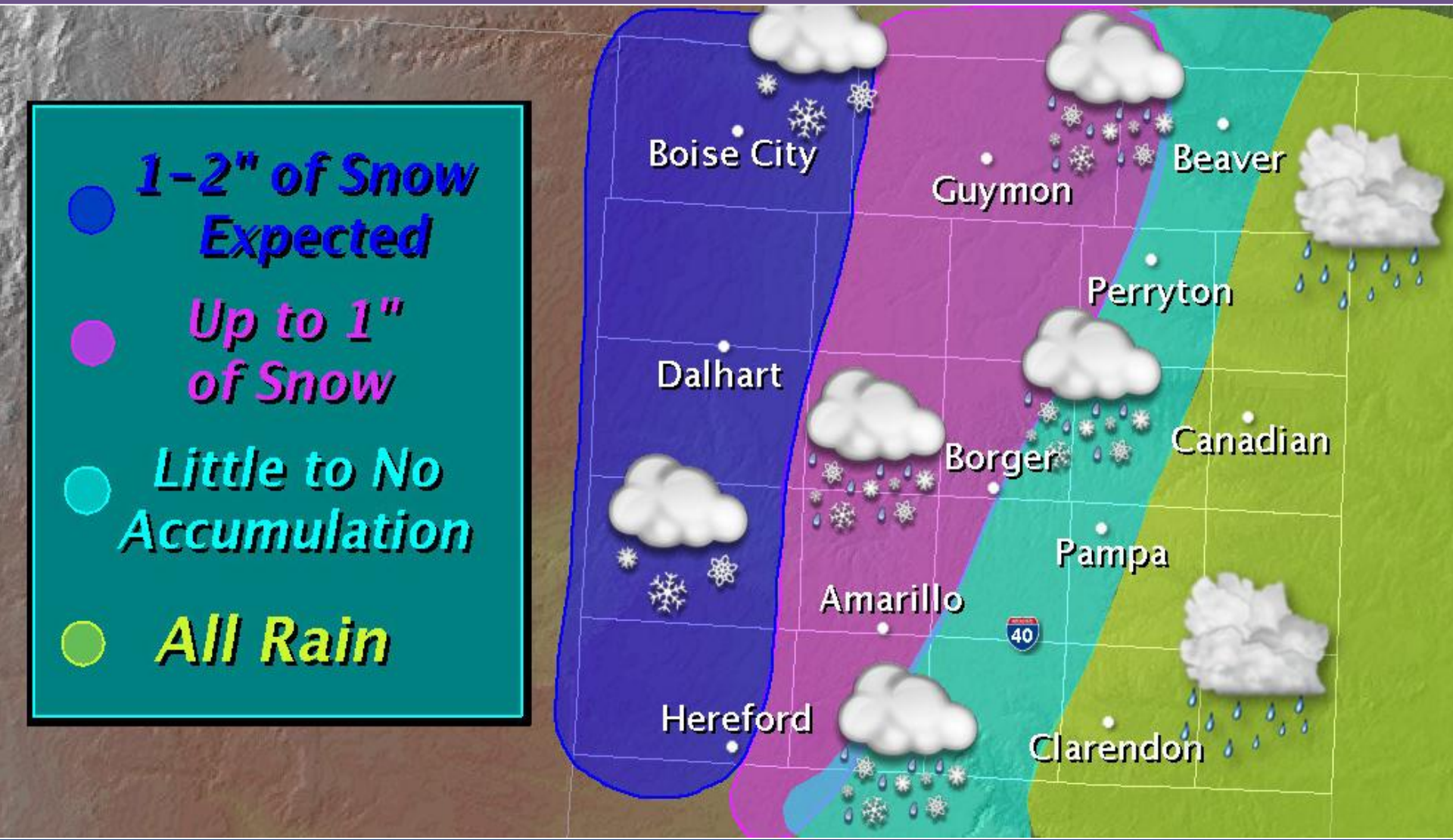
# Why Study?

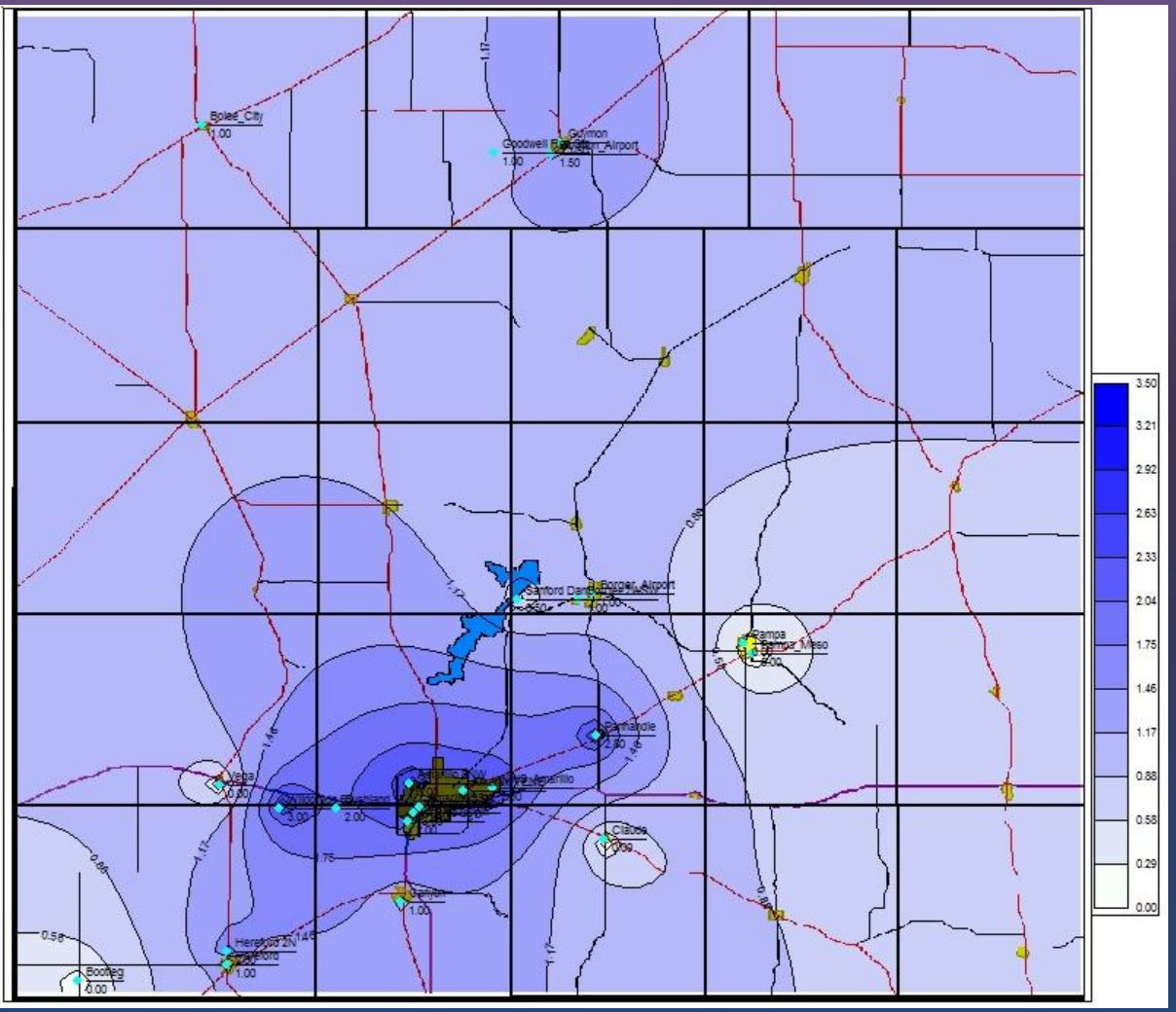
- More snow fell near Amarillo (3.1”) and Guymon (1.5”) than forecast 24-48 hours prior to the event, while very little snow occurred near Dalhart (T) where 1-2” were forecast.

- Compare model precipitation type and QPF at Amarillo, Dalhart, and Guymon 24-48 hours prior to the event with actual observations to determine how the models performed.

# Forecast 4 am CDT October 26



# Total Observed Snow Amounts October 26-27




- 3-5” across Potter, Randall, and Deaf Smith counties
- 1-2” from Guymon to Borger to Pampa to Claude as well as Boise City
- Only a trace at Dalhart
- No snow accumulation across the east Panhandles mainly off the Caprock

# Data/Methods

- The following precipitation types were determined subjectively by me using the Top-Down Approach methodology on model soundings at point locations in AWIPS.

- The following model QPF amounts were subjectively determined from Plan View displays in AWIPS.

# KAMA Precipitation Type

| Time / Model | 27/00z | 27/03z | 27/06z | 27/09z | 27/12z | 27/15z | 27/18z |
|---|---|---|---|---|---|---|---|
| 26/00z NAMBufr | Dry | RA | RA/SN Mix | SN | SN | Dry | Dry |
| 26/00z GFSBufr | Dry | RA | RA | RA/SN Mix | RA/SN Mix | RA/SN Mix | RA |
| 25/21z SREF | Dry | RA | RA/SN Mix | SN | SN | DZ | Dry |
| 26/00z CMC | Dry | | RA | | SN | | DZ |
| 25/12z ECMWF | Dry | | RA | | DZ | | DZ |
| **ACTUAL OBS** | **Dry** | **Dry** | **RA** | **Dry** | **SN** | **SN** | **SN** |

# KDHT Precipitation Type

| Time / Model | 27/00z | 27/03z | 27/06z | 27/09z | 27/12z | 27/15z | 27/18z |
|---|---|---|---|---|---|---|---|
| 26/00z NAMBufr | RA | RA | RA/SN Mix | SN | Dry | Dry | Dry |
| 26/00z GFSBufr | Dry | RA | RA/SN Mix | SN | DZ | Dry | Dry |
| 25/21z SREF | RA | RA/SN Mix | SN | SN | Dry | Dry | Dry |
| 26/00z CMC | Dry | | SN | | SN | | DZ |
| 25/12z ECMWF | RA | | RA/SN Mix | | DZ | | Dry |
| **ACTUAL OBS** | **Dry** | **Dry** | **SN** | **SN** | **Dry** | **Dry** | **Dry** |

# KGUY Precipitation Type

| Time / Model | 27/00z | 27/03z | 27/06z | 27/09z | 27/12z | 27/15z | 27/18z |
|---|---|---|---|---|---|---|---|
| 26/00z NAMBufr | RA | RA | SN | Dry | Dry | Dry | Dry |
| 26/00z GFSBufr | Dry | Dry | RA/SN Mix | Dry | Dry | Dry | Dry |
| 25/21z SREF | RA | RA/SN Mix | SN | SN | Dry | Dry | Dry |
| 26/00z CMC | Dry | | SN | | SN | | Dry |
| 25/12z ECMWF | RA | | SN | | DZ | | Dry |
| **ACTUAL OBS** | **Dry** | **RA** | **SN** | **Dry** | **Dry** | **Dry** | **Dry** |

# KAMA QPF

| Time / Model | 27/00-06z | 27/06-12z | 27/12-18z | Total |
|---|---|---|---|---|
| 26/00z NAM12 | 0.17” | 0.12” | 0.06” | **0.35”** |
| 26/00z GFS | 0.05” | 0.08” | 0.04” | **0.17”** |
| 25/21z SREF | 0.16” | 0.11” | 0.02” | **0.29”** |
| 26/00z CMC | 0.51” | 0.35” | 0.07” | **0.93”** |
| 25/12z ECMWF | 0.04” | 0.08” | 0.13” | **0.25”** |
| **ACTUAL OBS** | **0.15”** T | **0.41”** 2.5” | **0.19”** 0.6” | **0.75” Precip** 3.1” Snow |

# KDHT QPF

| Time<br>Model | 27/00-06z | 27/06-12z | 27/12-18z | Total |
|---|---|---|---|---|
| 26/00z NAM12 | 0.29” | T | 0 | **0.29”** |
| 26/00z GFS | 0.45” | 0.02” | 0 | **0.47”** |
| 25/21z SREF | 0.26” | 0.05” | 0.01” | **0.32”** |
| 26/00z CMC | 0.67” | 0.04” | T | **0.71”** |
| 25/12z ECMWF | 0.18” | 0.02” | 0.02 | **0.22”** |
| **ACTUAL OBS** | **T**<br>T | **T**<br>T | **0**<br>0 | **T Precip**<br>T Snow |

# KGUY QPF

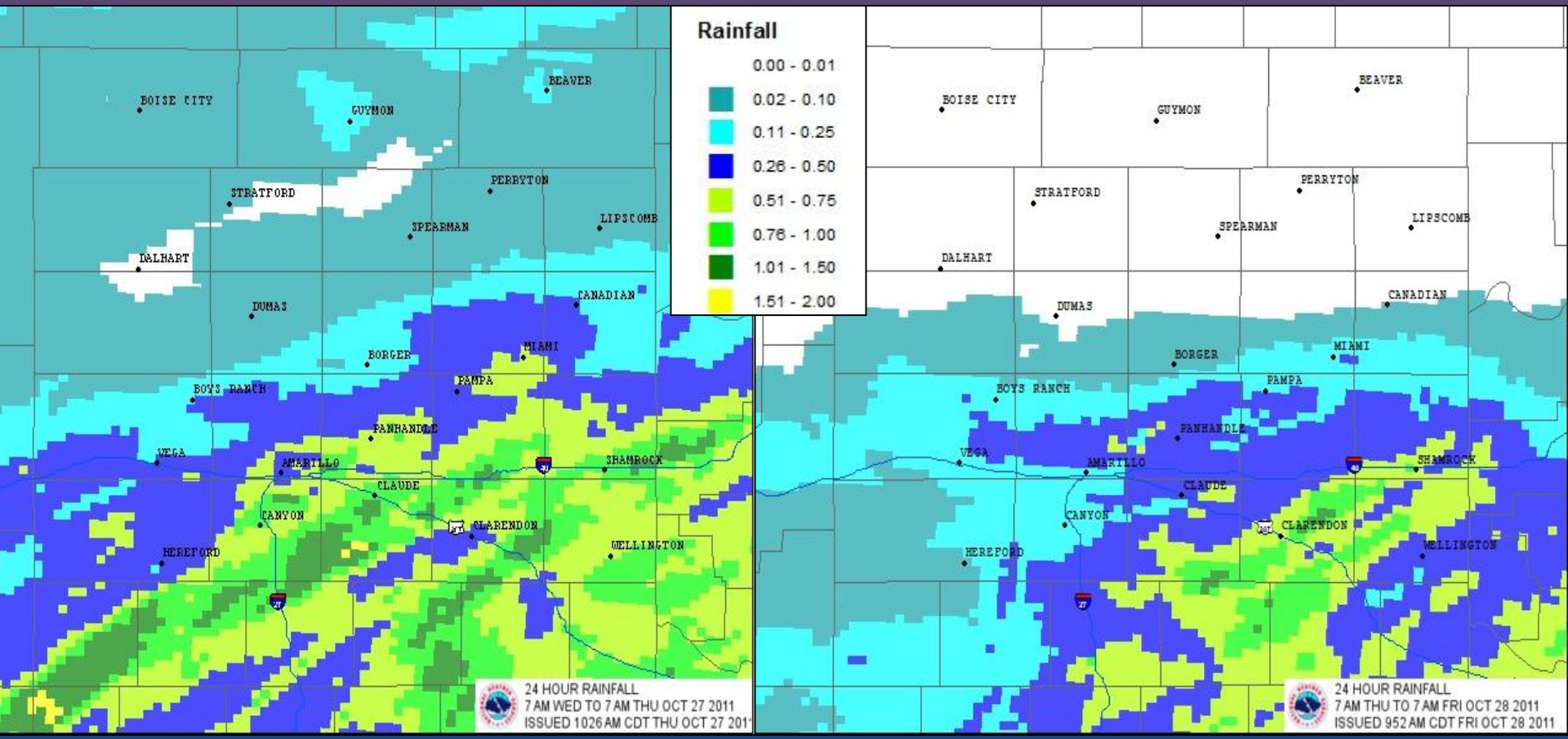
| Time / Model | 27/00-06z | 27/06-12z | 27/12-18z | Total |
|---|---|---|---|---|
| 26/00z NAM12 | 0.41” | 0.04” | 0 | **0.45”** |
| 26/00z GFS | 0.41” | 0.05” | 0 | **0.46”** |
| 25/21z SREF | 0.23” | 0.04” | 0.01” | **0.28”** |
| 26/00z CMC | 0.31” | 0.02” | T | **0.33”** |
| 25/12z ECMWF | 0.23” | 0.03” | 0.03” | **0.29”** |
| **ACTUAL OBS** | **0.17”** 1.0” | **0.03”** 0.5” | **0** **0** | **0.20” Precip** 1.5” Snow |

# Results

- **Precipitation Type**
  - 26/00z CMC (Canadian) model seemed to perform best while the other models performed fairly well.

- **Precipitation Amounts**
  - All models generally performed poorly.
  - The wetter 26/00z CMC performed best at KAMA while the 25/21z SREF and 25/12z ECMWF performed best at KDHT and KGUY.

# Total Event Precipitation Amounts Based on KAMA WSR-88D



# Why Much More Precipitation Over South Texas Panhandle?

- Showery radar returns as well as RUC13 MUCAPE 0-150 J/kg indicating weak instability (possible thunder reported near Canyon) enhanced precipitation rates and dynamic cooling over the south Texas Panhandle.

- The center of the 500 mb low tracked across from Albuquerque to Lubbock, farther south and slower than 25/12z and 26/00z model forecasts allowing for the best lift to occur farther south.

# Lessons Learned

- **The CMC (Canadian) model may be best for determining precipitation type, though a consensus of all model data is preferred.**

- **Models can greatly underestimate/overestimate precipitation amounts and location.**
  - Any instability can greatly increase precipitation rates and enhance dynamic cooling.
  - Mesoscale banding can enhance precipitation rates as well.
  - The exact track of mid/upper trough/low can significantly affect precipitation amounts and location.

# Resources

- Worksheets for forecasting precipitation type and amounts can be found at X:\Winter\PrecipTypeAmounts.xls.

- These worksheets may help to better organize model precipitation type, QPF, and snowfall amounts during complex winter weather events.