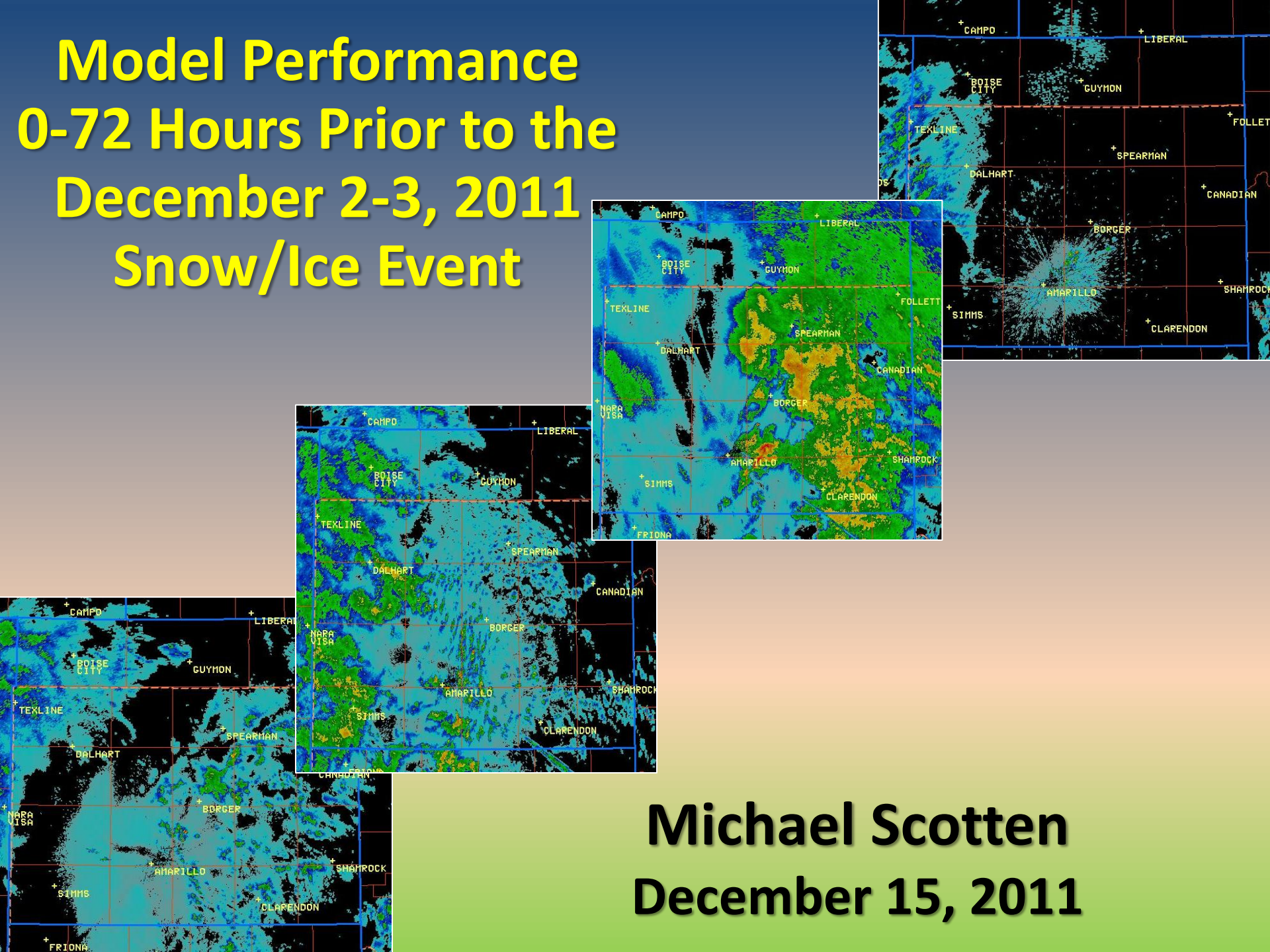


Model Performance 0-72 Hours Prior to the December 2-3, 2011 Snow/Ice Event

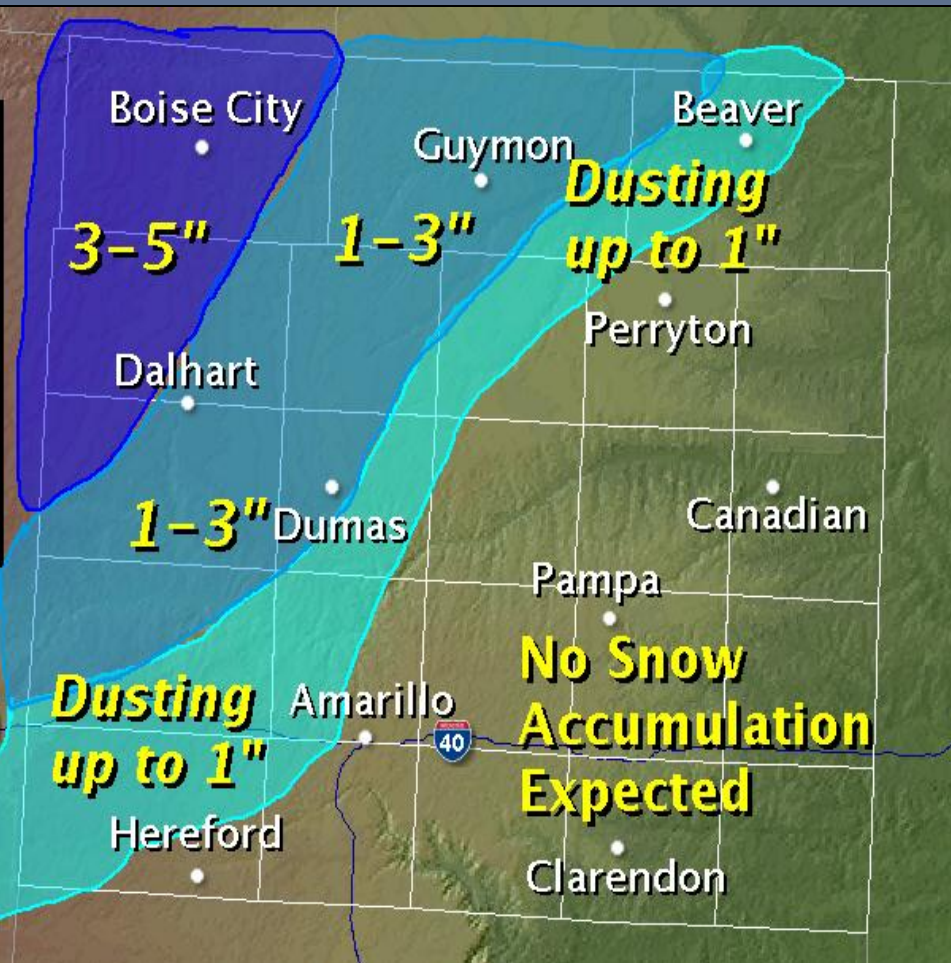


**Michael Scotten
December 15, 2011**

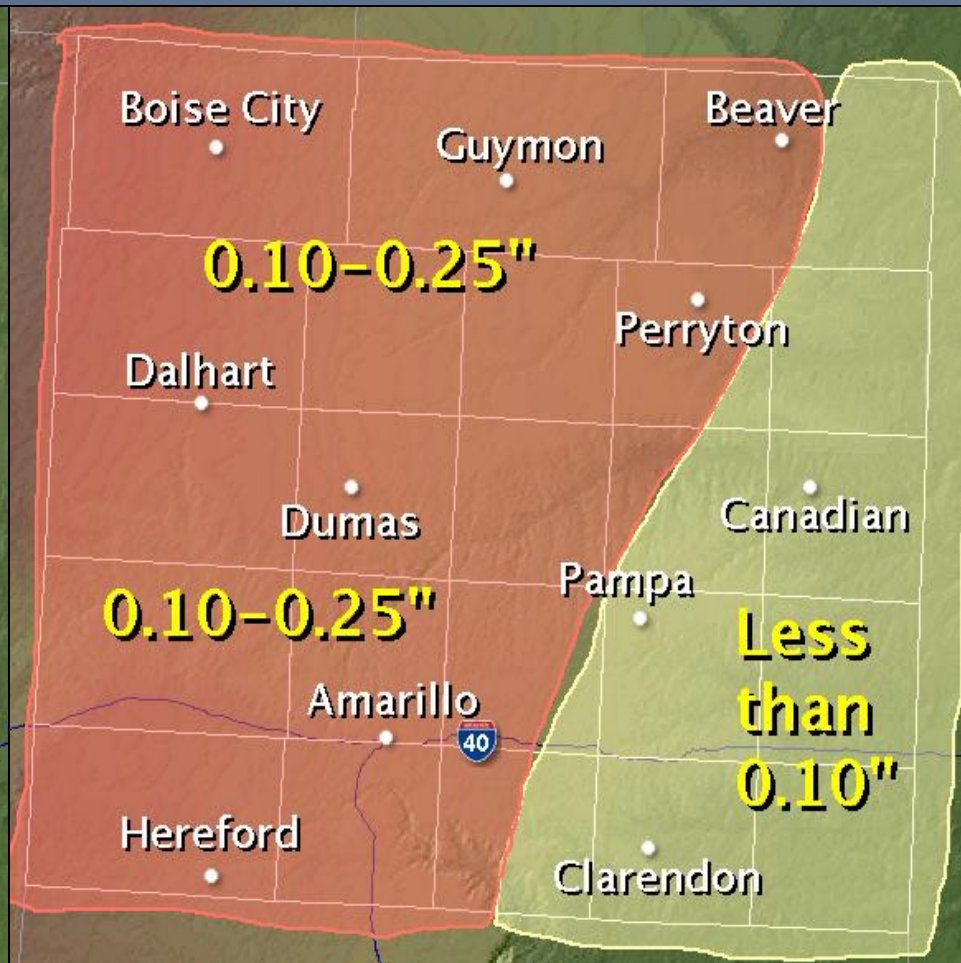
Why Study?

- **Compare model precipitation type and QPF at Amarillo and Dalhart 0-72 hours prior to the event with actual observations to determine how the models performed.**
- **Much less precipitation (0.08" including 0.3" of snow) occurred at Dalhart than models forecast.**

WFO Amarillo Forecast Day Shift 11/30

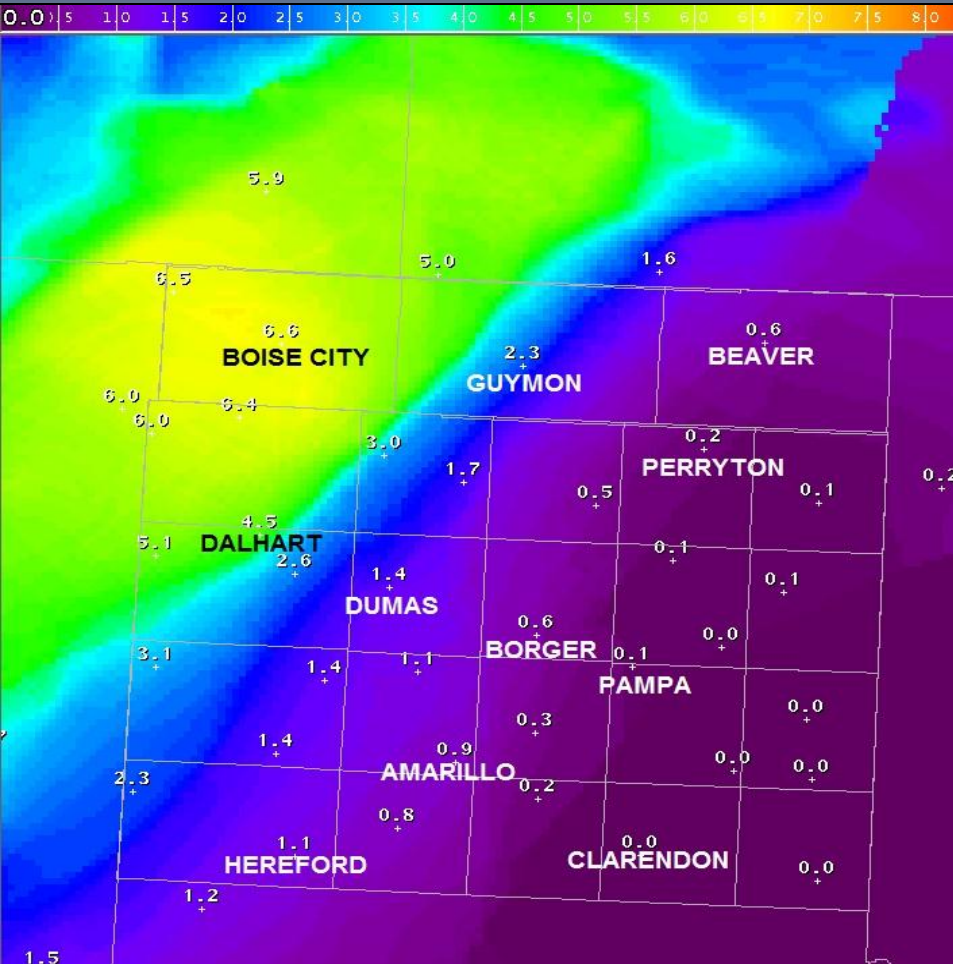


Snow Accumulations

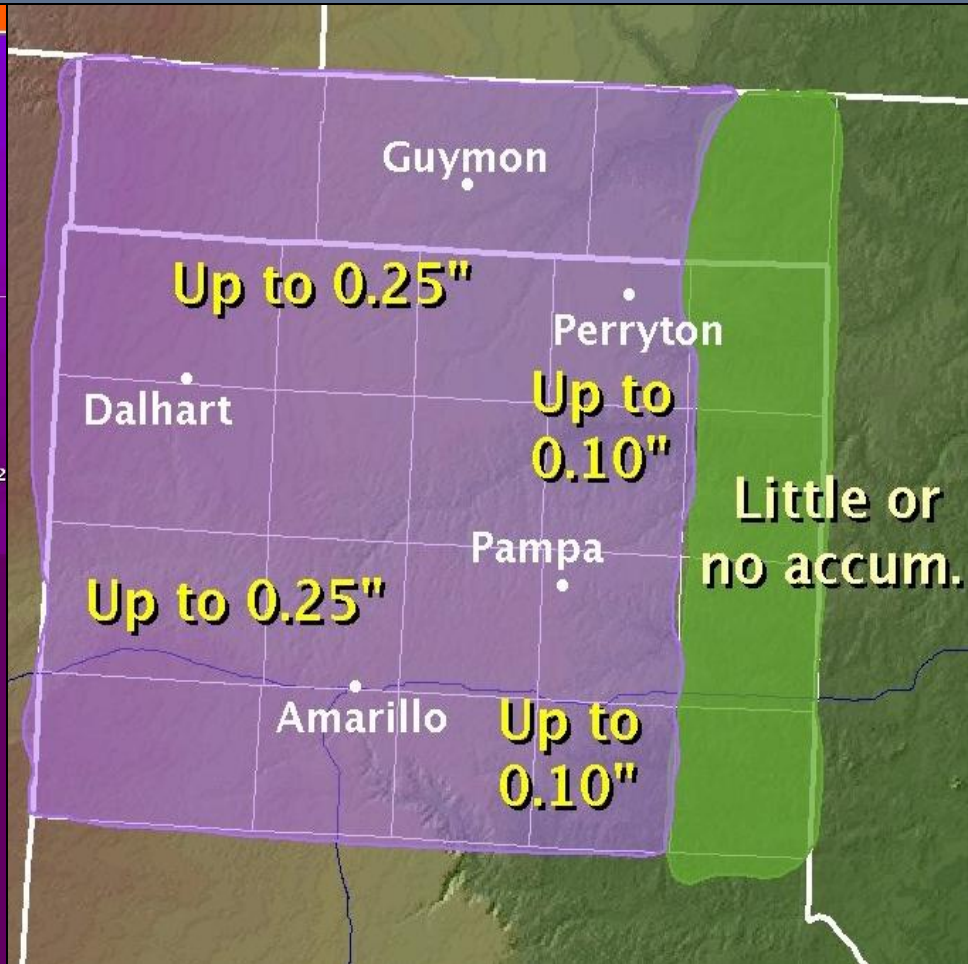


Ice Accumulations

WFO Amarillo Forecast Day Shift 12/1

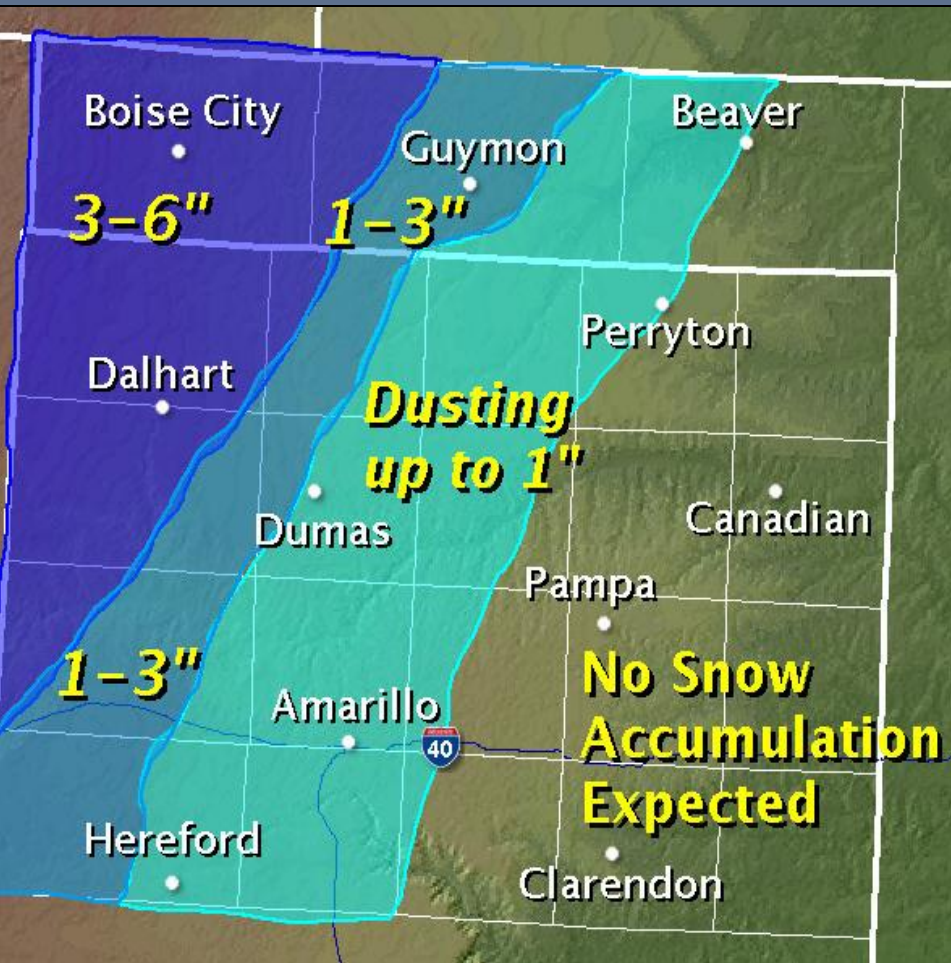


Snow Accumulations

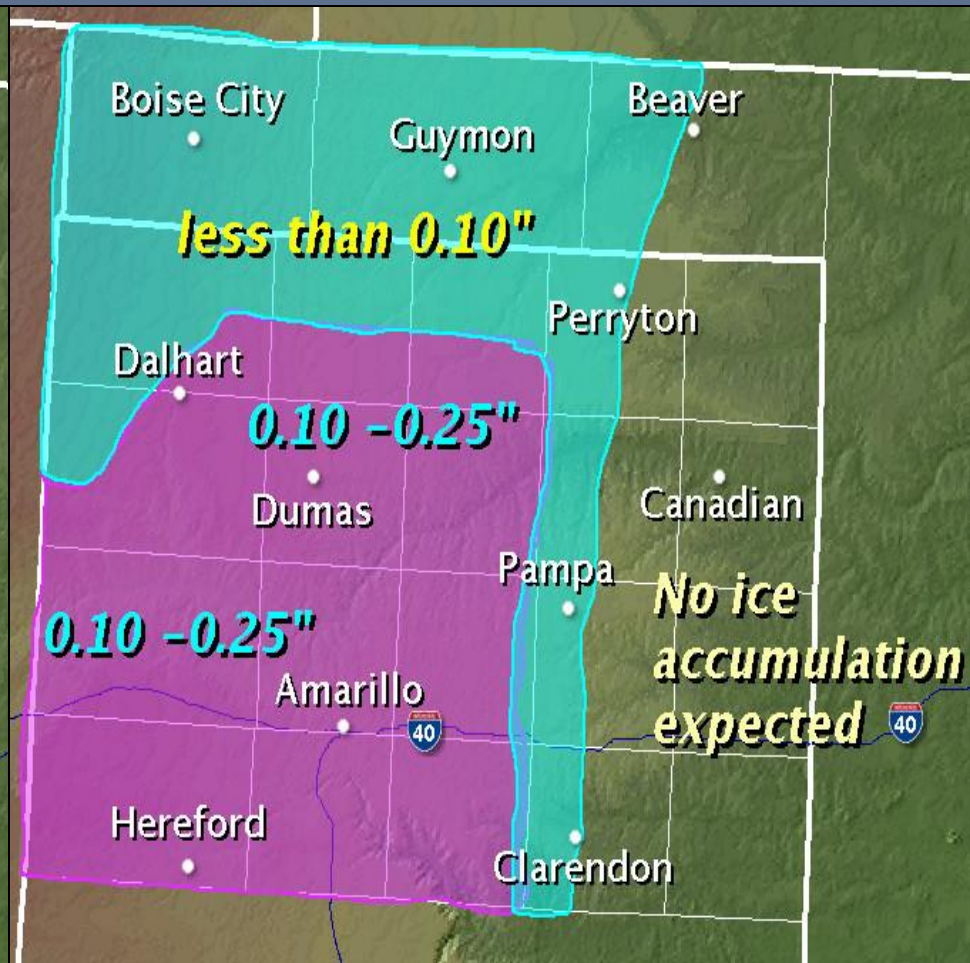


Ice Accumulations

WFO Amarillo Forecast Day Shift 12/2

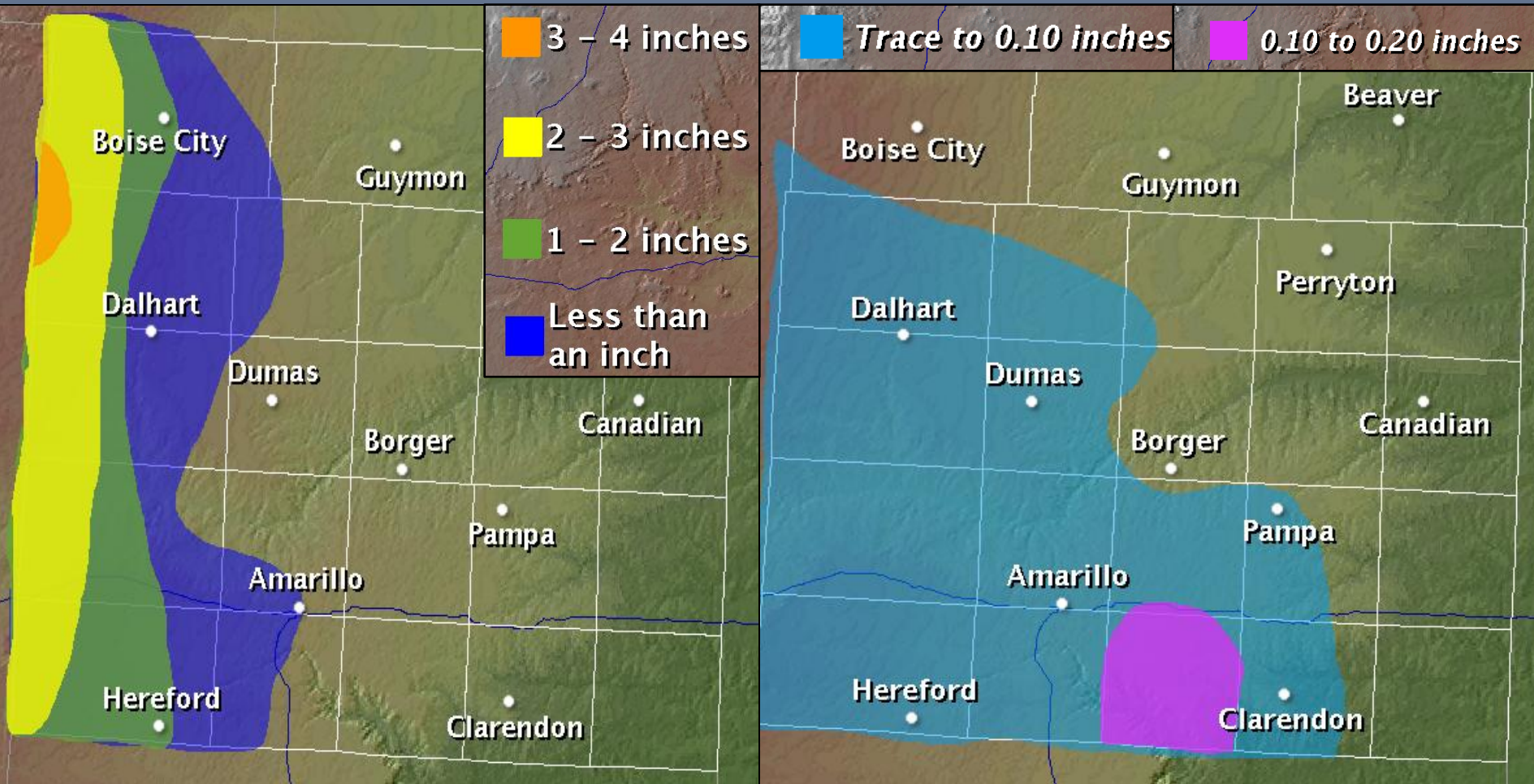


Snow Accumulations



Ice Accumulations

Total Observed Snow/Ice 12/2-3/2011



Snow Accumulations

Ice Accumulations

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

Model	Time	02/18z	02/21z	03/00z	03/03z	03/06z	03/09z	03/12z
30/12z NAMBufr		FZRA		FZRA		SN		Dry
01/12z NAMBufr		FZDZ	FZDZ	FZDZ	FZRA	TSFZRA	TSRA	RA/SN/IP
02/12z NAMBufr		FZDZ	DZ	DZ	TSRA	TSRA	TSRA	TSRA
30/12z GFSBufr		FZRA		RA		TSRA		Dry
01/12z GFSBufr		DZ	DZ	DZ	DZ	TSRA	TSRA	DZ
02/12z GFSBufr		DZ	Dry	DZ	DZ	RA	TSRA	DZ
30/09z SREF		FZDZ		FZDZ		FZRA/SN/IP		DZ
01/09z SREF		FZDZ	FZDZ	FZDZ	FZDZ	FZDZ	RA	TSRA
02/15z SREF		Dry	Dry	Dry	Dry	DZ	RA	RA
30/12z CMC		FZRA		FZRA		TSFZRA/SN		TSRA/IP
01/12z CMC		Dry		DZ		TSRA		TSRA
02/12z CMC		Dry		DZ		RN/SN/IP		RA
30/00z ECMWF		FZRA		RA		RA		TSRA
01/00z ECMWF		FZDZ		DZ		RA		RA
02/12z ECMWF		Dry		DZ		RA/SN/IP		RA
ACTUAL OBS		Dry	FZDZ	Dry	Dry	FZRA	FZRA	SN

KDHT Precipitation Type

Model	Time	02/18z	02/21z	03/00z	03/03z	03/06z	03/09z	03/12z
30/12z NAMBufr		SN/IP/FZRA		FZRA		Dry		Dry
01/12z NAMBufr		FZDZ	FZDZ	FZDZ	FZDZ	SN/IP	SN	SN/IP
02/12z NAMBufr		DZ	Dry	Dry	Dry	DZ	SN/IP	SN
30/12z GFSBufr		FZRA		RA		SN/RA/IP		RA
01/12z GFSBufr		DZ	Dry	Dry	Dry	RA	SN	SN/IP
02/12z GFSBufr		Dry	Dry	Dry	RA	RA/IP	IP/RA	IP/SN/RA
30/09z SREF		FZRA		FZRA		FZRA/SN		FZDZ
01/09z SREF		FZDZ	FZDZ	Dry	Dry	SN/FZRA	SN	SN
02/15z SREF		Dry	Dry	Dry	SN/IP	SN/IP	SN/IP	SN/IP
30/12z CMC		FZRA/IP		FZRA		TSSN/FZRA		TSSN/FZRA
01/12z CMC		Dry		FZDZ		TSSN		SN/RA/IP
02/12z CMC		Dry		Dry		SN		SN
30/00z ECMWF		FZDZ		FZDZ		SN		Dry
01/00z ECMWF		FZDZ		DZ		SN		SN
02/12z ECMWF		Dry		Dry		SN		SN
ACTUAL OBS		Dry	Dry	Dry	Dry	Dry	FZRA	SN

KAMA QPF

Model	Time	02/18-24z	03/00-06z	03/06-12z	Total
01/12z NAM12		0.04"	0.01"	0.26"	0.31"
02/12z NAM12		0.02"	0.04"	0.21"	0.27"
30/12z GFS40		0.02"	0.03"	0.14"	0.19"
01/12z GFS40		0.01"	0.07"	0.25"	0.33"
02/12z GFS40		0.00"	0.03"	0.15"	0.18"
30/09z SREF		0.04"	0.08"	0.19"	0.31"
01/09z SREF		0.03"	0.04"	0.16"	0.23"
02/15z SREF		T	0.06"	0.18"	0.24"
30/12z CMC		0.03"	0.05"	0.32"	0.40"
01/12z CMC		0.01"	0.02"	0.11"	0.14"
02/12z CMC		0.01"	0.02"	0.20"	0.23"
30/12z ECMWF		0.04"	0.11"	0.54"	0.69"
01/00z ECMWF		0.03"	0.04"	0.31"	0.38"
02/12z ECMWF		0.01"	0.03"	0.40"	0.44"
ACTUAL OBS		T 0	0.02" 0	0.25" T	0.27" Precip T Snow

KDHT QPF

Model	Time	02/18-24z	03/00-06z	03/06-12z	Total
01/12z NAM12		0.04"	0.05"	0.39"	0.48"
02/12z NAM12		0.00"	T	0.26"	0.26"
30/12z GFS40		0.00"	0.20"	0.55"	0.75"
01/12z GFS40		0.00"	0.22"	0.27"	0.49"
02/12z GFS40		0.00"	0.08"	0.25"	0.33"
30/09z SREF		0.05"	0.10"	0.26"	0.41"
01/09z SREF		0.03"	0.05"	0.30"	0.38"
02/15z SREF		T	0.09	0.23"	0.32"
30/12z CMC		0.02"	0.01"	0.07"	0.10"
01/12z CMC		0.02"	0.03"	0.29"	0.34"
02/12z CMC		0.01"	0.01"	0.22"	0.24"
30/12z ECMWF		0.03"	0.06"	0.33"	0.42"
01/00z ECMWF		0.02"	0.09"	0.30"	0.41"
02/12z ECMWF		T	0.07"	0.30"	0.37"
ACTUAL OBS		0.00" 0	0.00" 0	0.08" 0.3"	0.08" Precip 0.3" Snow

Results

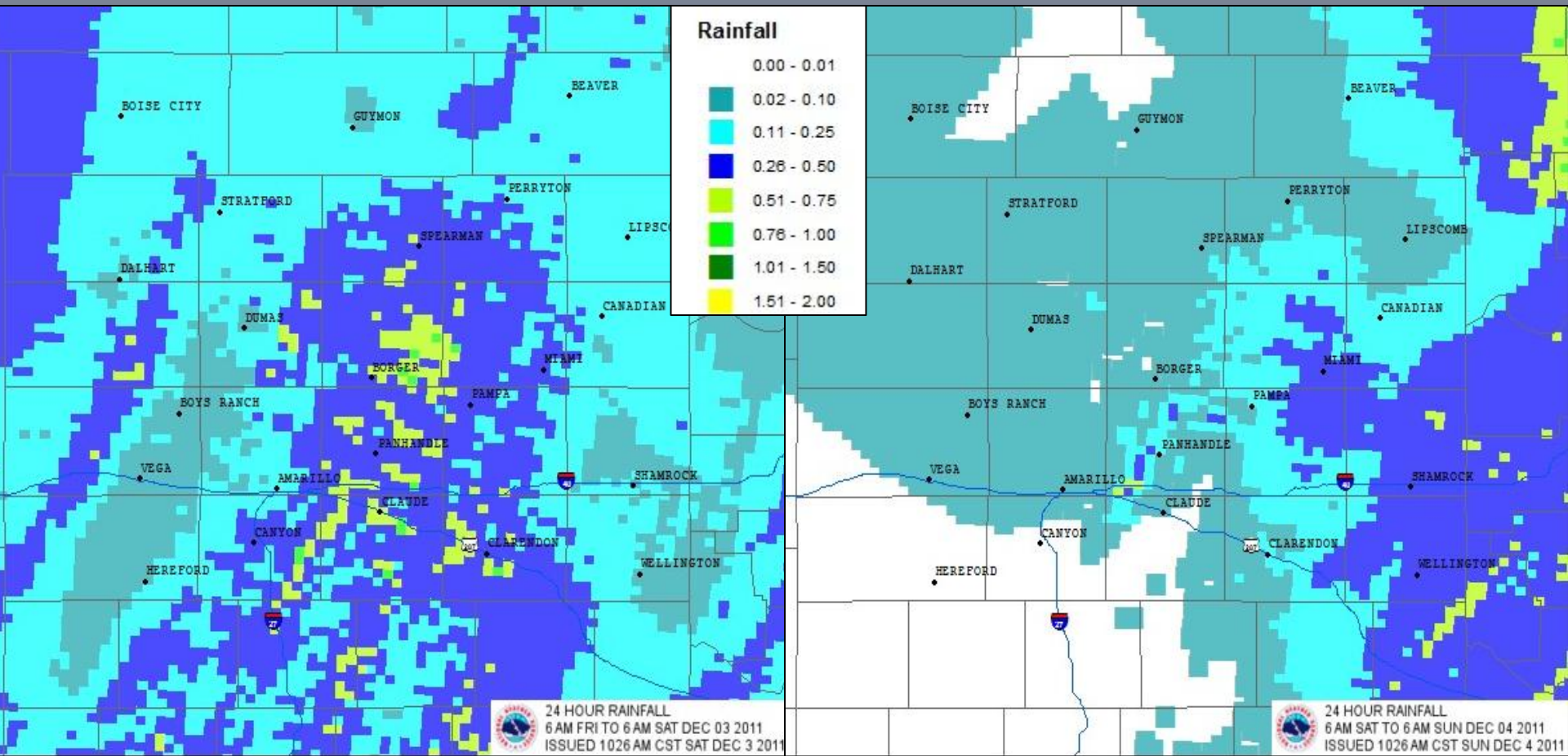
- **Precipitation Type**

- None of the models did great, having the main biases of being too warm and moist near the surface (especially the GFSBufr soundings).
- SREF/CMC overall did best and improved with each successive model run.

- **Precipitation Amounts**

- Most models performed very well at Amarillo and very poorly at Dalhart.
- The drier CMC overall was best while the ECMWF was way too wet.
- The SREF was most consistent and improved with each succeeding run.

Total Event Precipitation Amounts Based on KAMA WSR-88D



Lessons Learned

- **The CMC/SREF models may be best for determining precipitation types in complex winter precipitation events, though a consensus of all model data is preferred.**
 - The GFS/ECMWF models may be too warm near the surface in some winter weather events.
- **The CMC/SREF models may be best for determining precipitation amounts and location.**
 - Without instability or mesoscale banding, precipitation amounts/rates may be overestimated by models during winter weather events.

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.**