Summary of the Christmas 2010 Snowstorm

Synopsis: An upper level disturbance crossed the Rocky Mountains of Idaho and Montana on Thursday and headed towards Iowa. This disturbance caused a prolonged period of light to moderate snowfall to occur across Iowa beginning Thursday night and lasting through Friday evening. Snowfall totals ranged from 2 to 5 inches in the south western half of the state, and from 4 to 8 inches across the north eastern half of the state, with a narrow band of 8+ inches extended along a line from about Mason City, through Waterloo, down toward Davenport (Fig 1).

The snow was generally light to moderate, but there were a few embedded bands of heavier snowfall with this system that reduced visibilities to around a mile or less at times. A radar image from 10 AM Friday morning shows a couple of the heavier bands across Iowa. One is located just to the northwest of Des Moines, while the other is located over Southeastern Iowa and Northern Missouri (Fig 2). A large scale view from the exact same time shows the snowfall across the Midwest, with the single snowflake next to the observation station indicating that snow is occurring at those locations (Fig 3). The visible satellite image from Friday morning at 10AM shows how the entire Midwest was blanketed by clouds (Fig 4). Finally, the last image shows the upper level disturbance (also known as a "shortwave") that was responsible for the snowfall across Iowa (Fig 5). Both satellite images are valid around 10AM Friday morning.

Light winds accompanied this system, so there was minimal blowing and drifting of snow. Rather snow tended to gather on trees and other objects creating a picturesque Christmas scene (Fig 6).

SNOW REPORTS SORTED BY AMOUNT

INCHES	LOCATION	ST	COUNTY	TIME
10.50	1 ESE WATERLOO	IA	BLACK HAWK	0600 PM
10.50	WATERLOO	IA	BLACK HAWK	0506 PM
10.00	GARNER	IA	HANCOCK	0745 PM
9.50	MASON CITY	IA	CERRO GORDO	0600 PM
9.00	READLYN	IA	BREMER	0454 PM
8.00	LA PORTE CITY	IA	BLACK HAWK	0448 PM
7.50	2 ESE WEBSTER CITY AIRP	IA	HAMILTON	0310 PM
7.50	BEAMAN	IA	GRUNDY	0225 PM
7.20	AMES	IA	STORY	0627 PM
6.50	RINGSTED	IA	EMMET	0343 PM
6.40	6 W BELMOND	IA	WRIGHT	0503 PM
5.80	4 NNW ANKENY AIRPORT	IA	POLK	0610 PM
5.30	1 SSW POLK CITY	IA	POLK	0600 PM
4.70	3 W NEWTON AIRPORT	IA	JASPER	0316 PM
4.30	WINDSOR HEIGHTS	IA	POLK	0254 PM
4.10	2 SW GRIMES	IA	DALLAS	0319 PM
4.00	1 W NEW VIRGINIA	IA	WARREN	0702 PM
3.80	DES MOINES INT AIRPORT	IA	POLK	0600 PM
3.60	6 E FLORIS	IA	DAVIS	0500 PM
3.50	CUMBERLAND	IA	CASS	0410 PM
3.30	3 ESE ADEL	IA	DALLAS	0430 PM
3.10	1 E CLIVE	IA	POLK	0500 PM
3.00	3 SW CLIVE	IA	DALLAS	0300 PM
2.60	2 NNW CENTERVILLE	IA	APPANOOSE	0330 PM

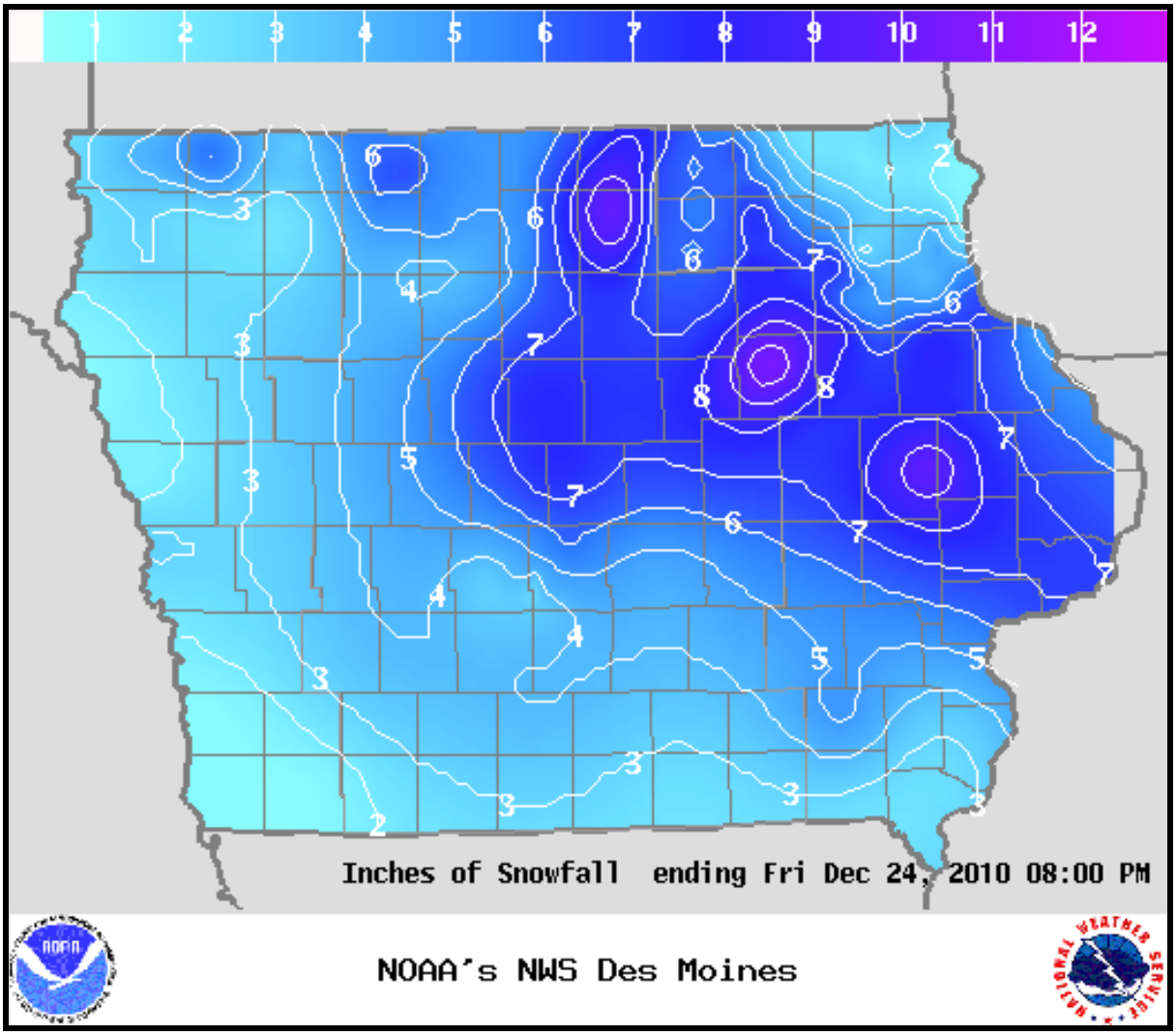

Figure 1: The image above shows the preliminary snowfall totals that were reported as of 8PM on Friday evening. The heaviest snow fell along a line from Mason City, through Waterloo, to Davenport.

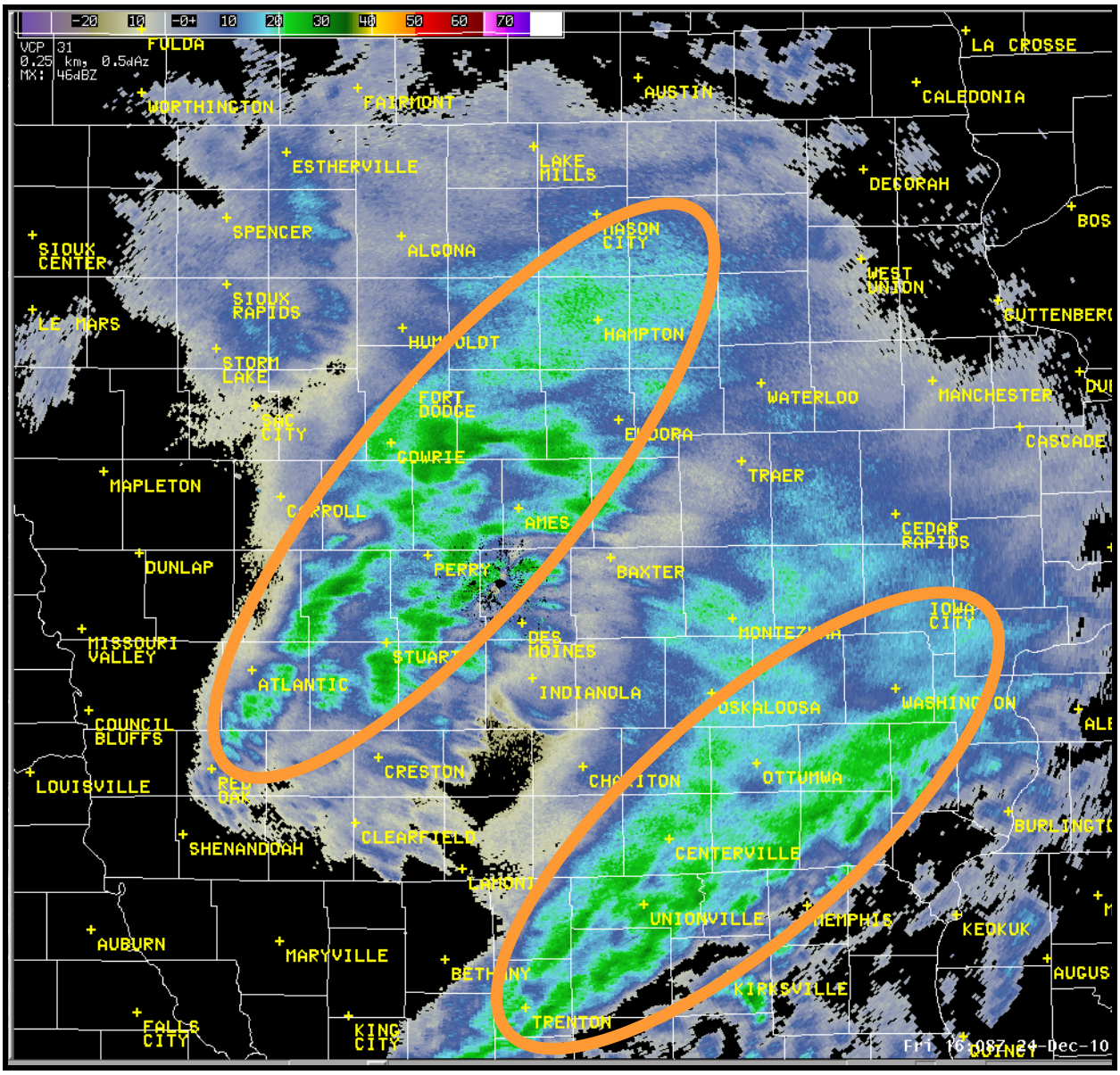

Figure 2: The radar image above shows the heavier bands (orange circles) within the area of widespread snowfall. Counties are outlined in white, and the city names are listed in yellow. This image is from 10AM on Friday morning.

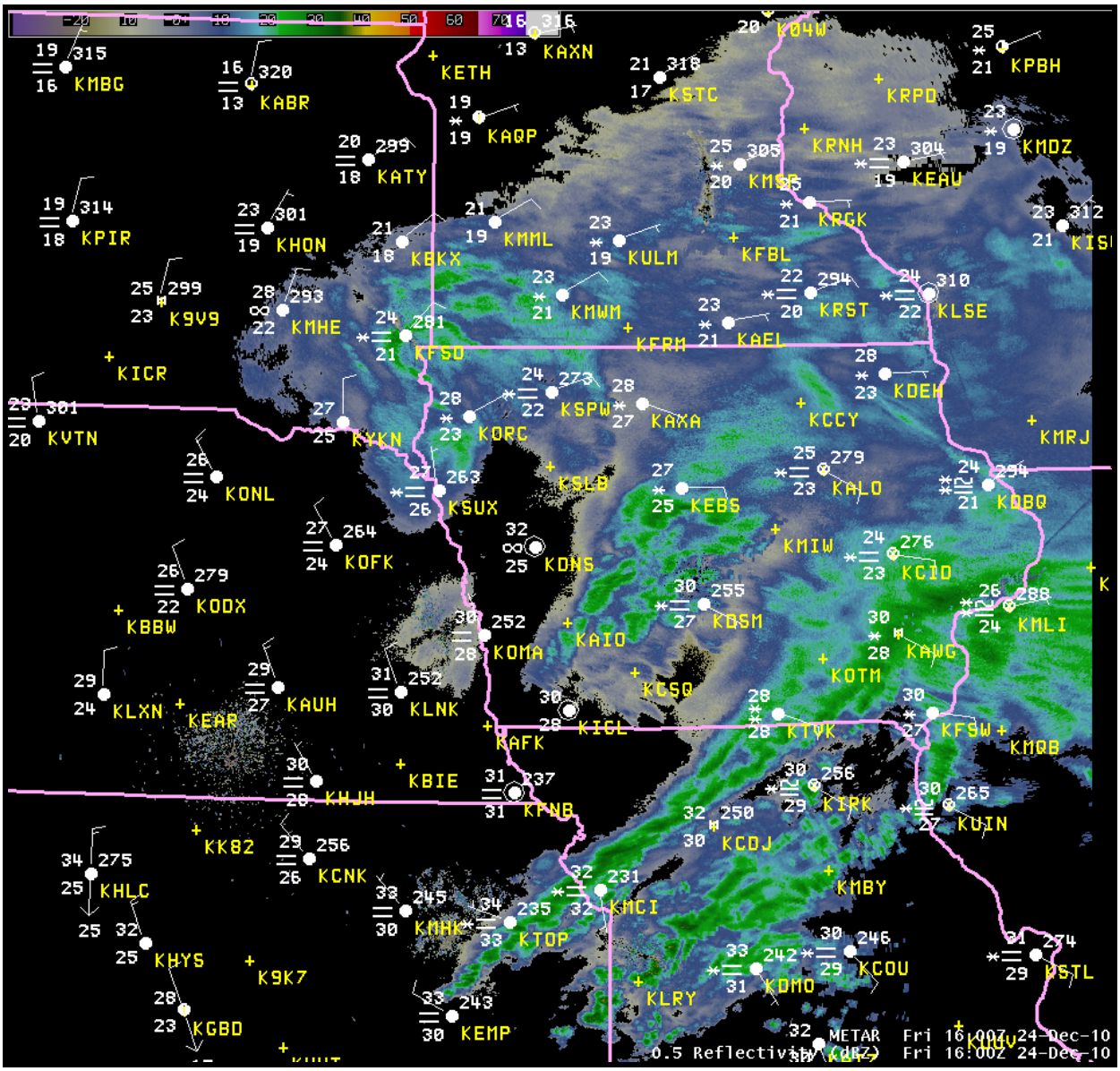

Figure 3: The mosaic radar image above shows a large scale depiction of radar reflectivity centered around Iowa. The state borders are in pink, the observation abbreviations are listed in yellow, and the current weather is indicated by the white symbols. This image is also from 10AM on Friday morning.

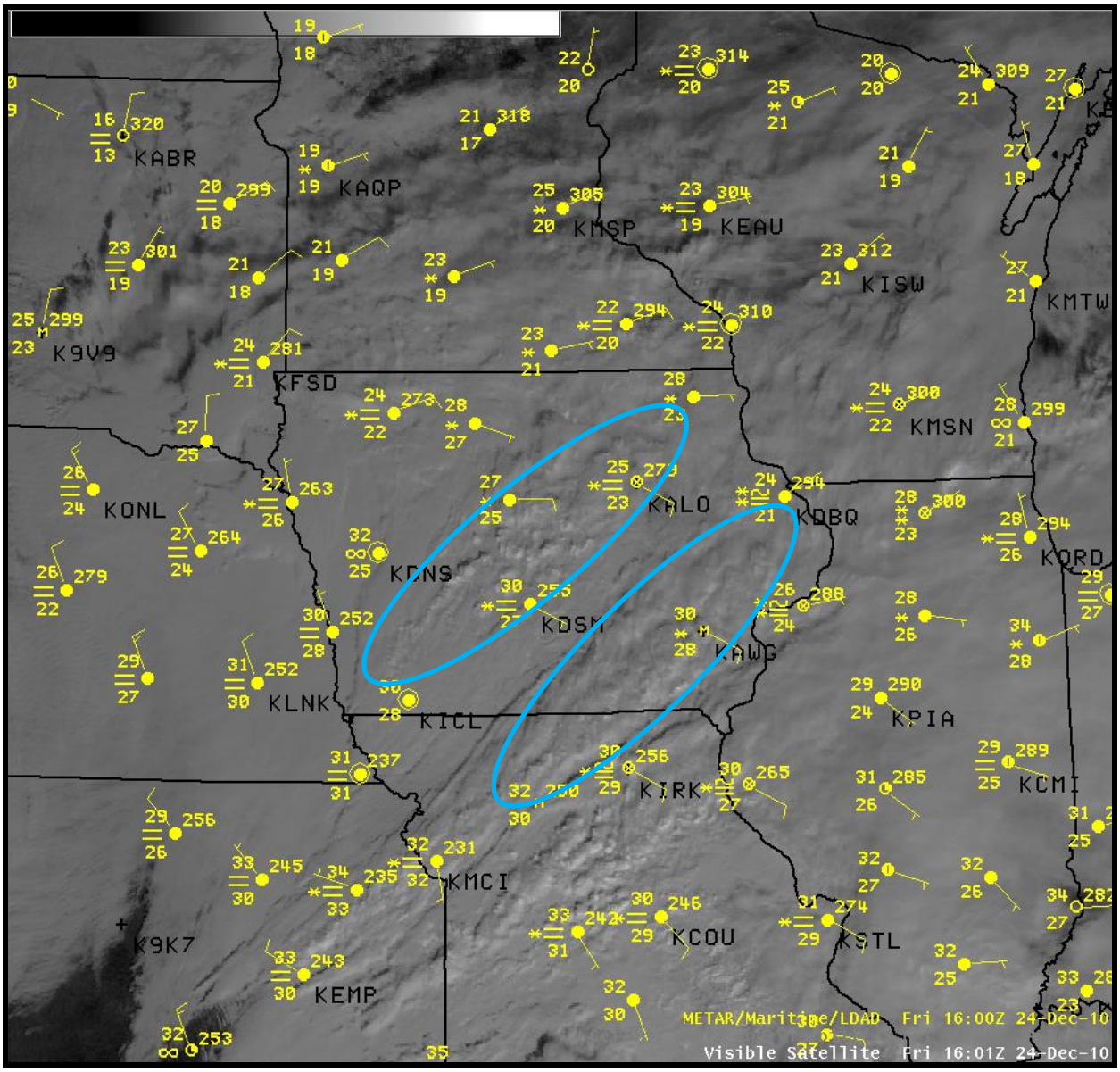

Figure 4: The visible satellite image above shows how clouds have blanketed nearly the entire upper Midwest. The area of clouds with the most texture (blue line) is in the exact location of the heaviest snow band. The clouds in this region extend deeper into the atmosphere and are able to produce more snow. This image is also valid from 10AM Friday morning.

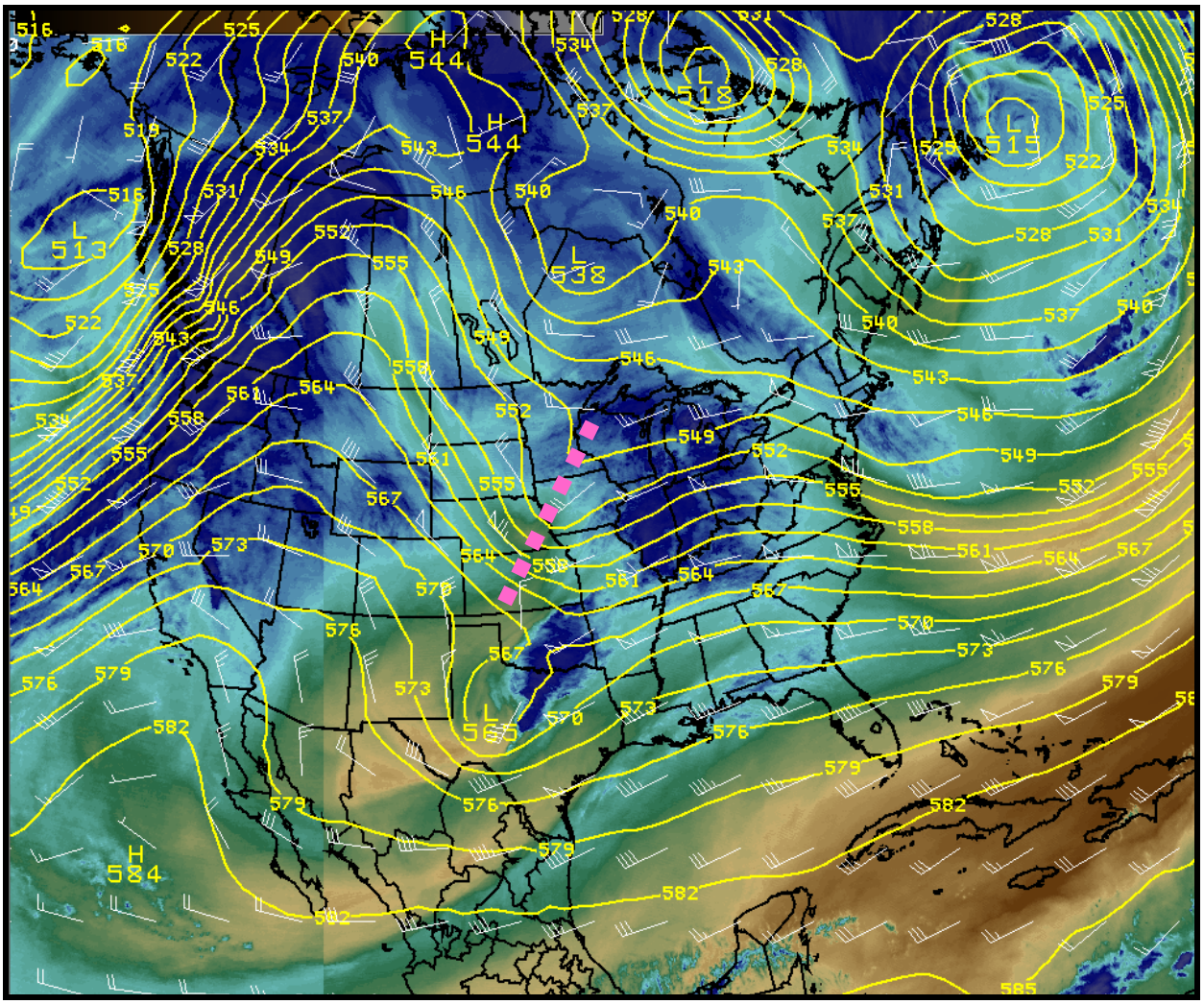

Figure 5: The image above shows the amount of water vapor in the air in the upper levels of the atmosphere. The brown colors indicate drier air, while the blue colors shows air that contains a lot of moisture. The yellow lines show the height of the 500mb level, which is roughly about 3 miles above the surface. Overlaying the 500mb heights with the water vapor imagery is a useful way to identify upper level disturbances such as shortwave troughs (pink dashed line) which in this case was responsible for producing the snowfall. This image is also valid from 10AM Friday morning.

Figure 6: The pictures above show the snowfall in central Iowa Friday afternoon. Since the winds with this storm were not very strong, the snow tended to pile up on whatever objects it fell on.