

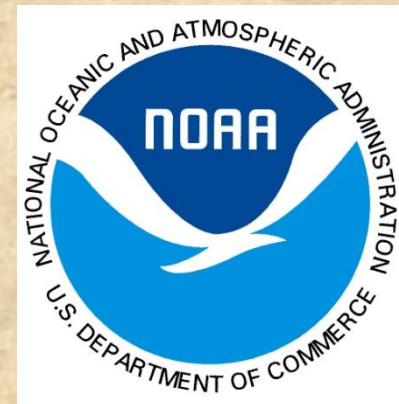
Exploring the Relevance of Cattle Heat Stress and a Review of Past Heat Waves

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Relevance of cattle heat stress to the jobs of NWS forecasters

*Although these weather events are unavoidable, **advance notice** combined with heat stress management strategies can help mitigate the impact of heat waves*

NWS Mission Statement:

"The National Weather Service (NWS) provides weather, hydrologic, and climate forecasts and warnings for the United States, its territories, adjacent waters and ocean areas, for the protection of life and property and the enhancement of the national economy. NWS data and products form a national information database and infrastructure which can be used by other governmental agencies, the private sector, the public, and the global community."

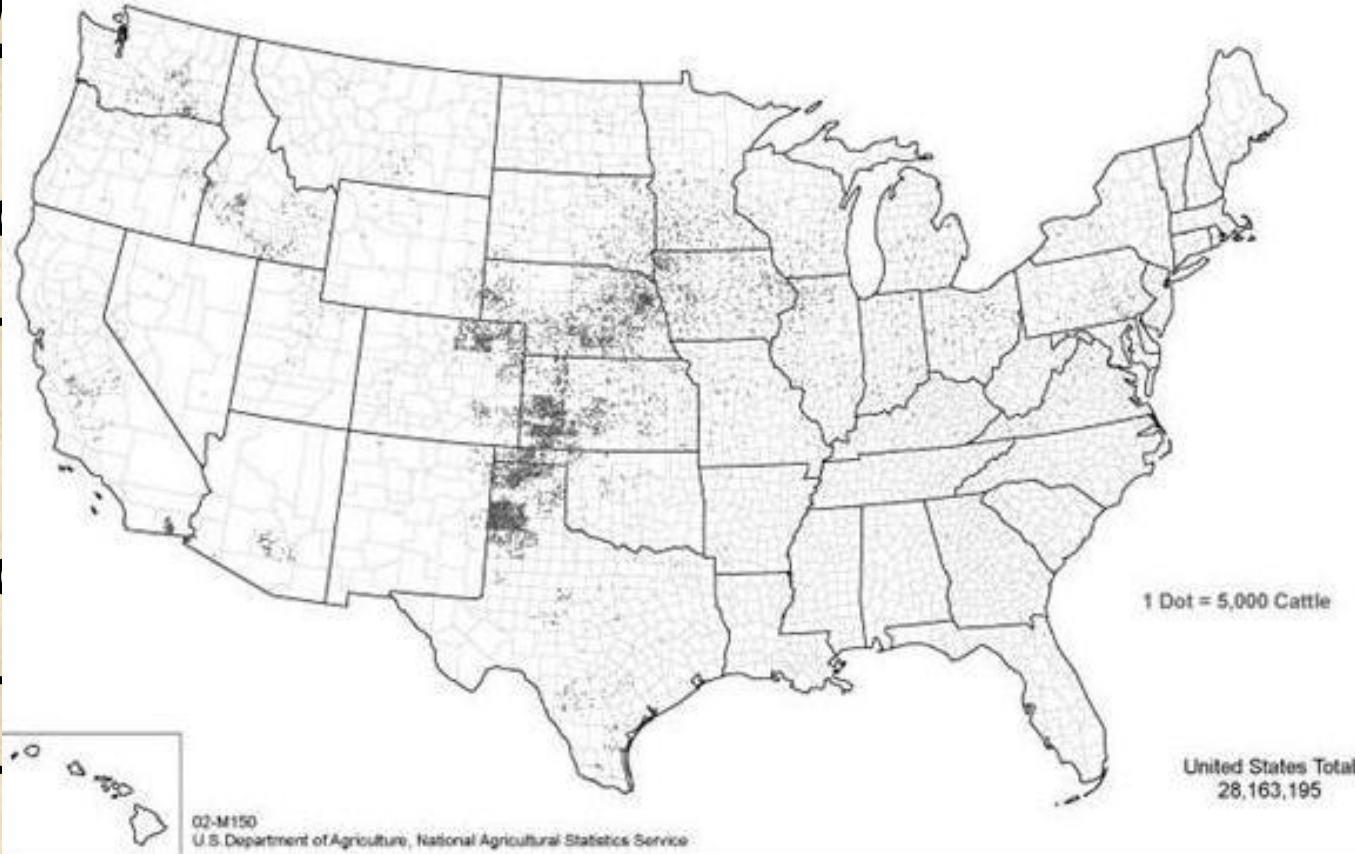
Relevance of cattle heat stress to the jobs of NWS forecasters

- **The 2010 retail equivalent value of the U.S. beef industry was \$74,000,000,000 ***
- **The value of U.S. cattle and calf production in 2010 was \$37,000,000,000 ***

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Number of Cattle on Feed Sold: 2002



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- Feedlots with 32,000 or more head of capacity house around 40% of total fed cattle across the U.S. *
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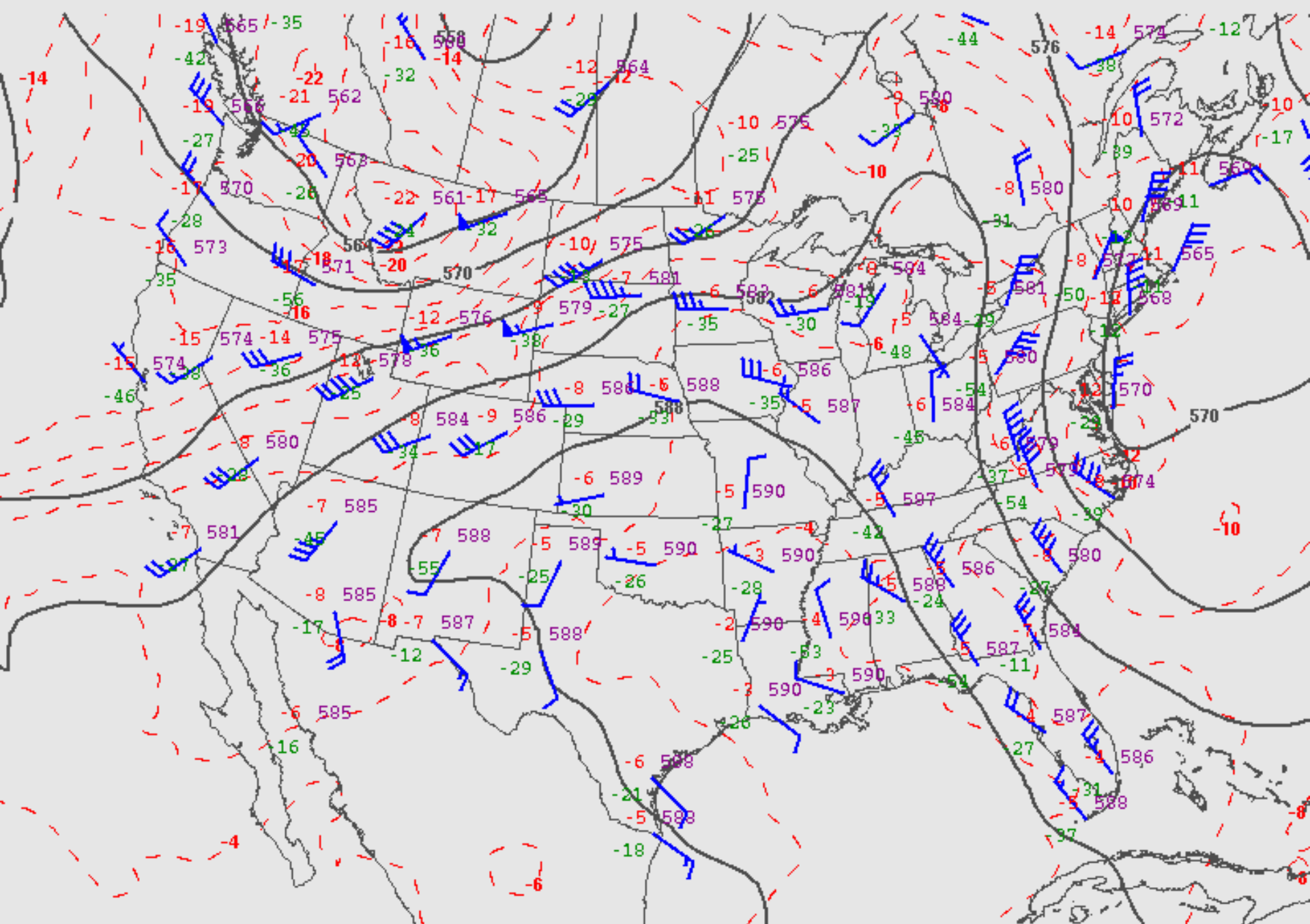
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* <http://www.ers.usda.gov/briefing/cattle/background.htm>

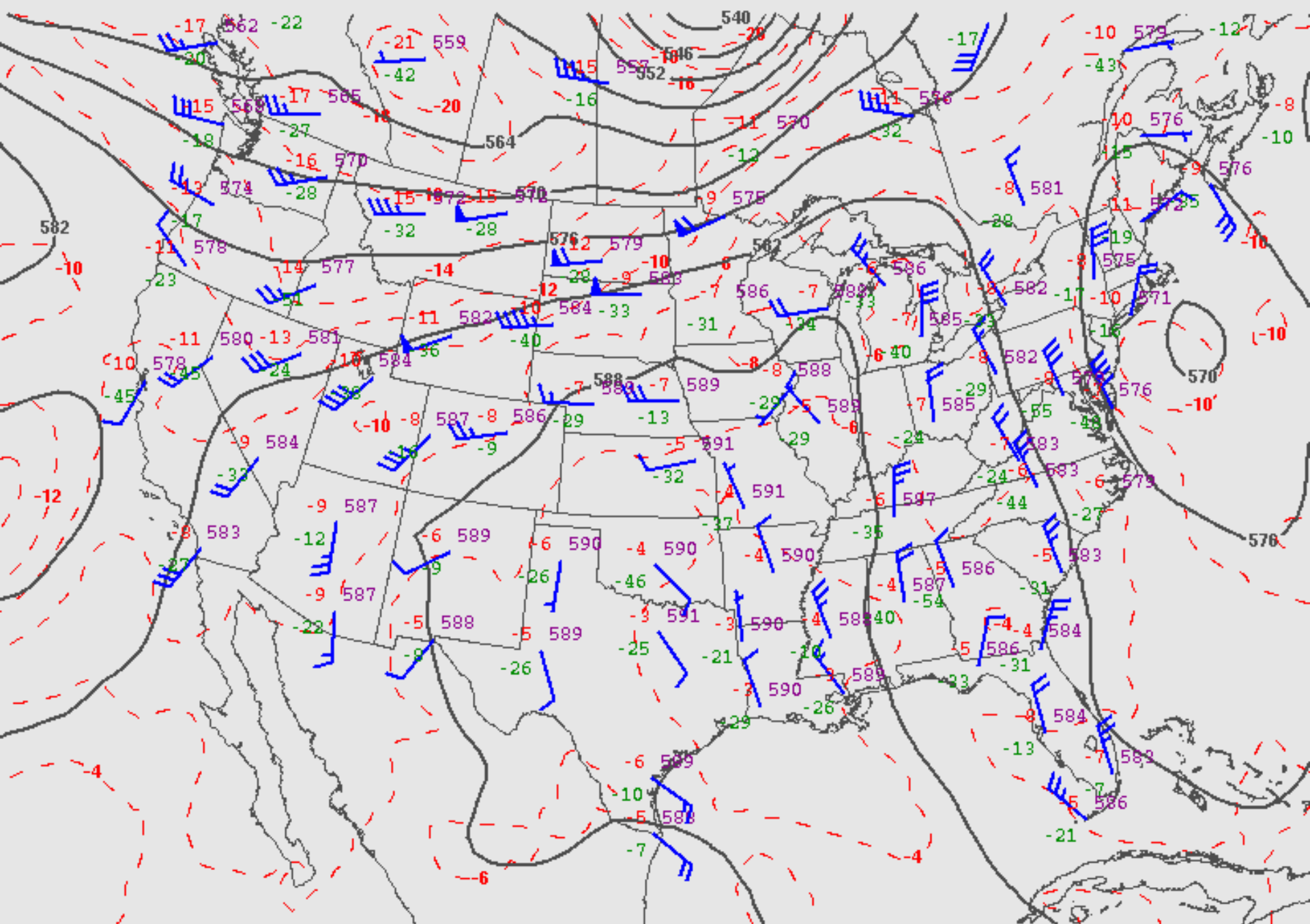


Satellite

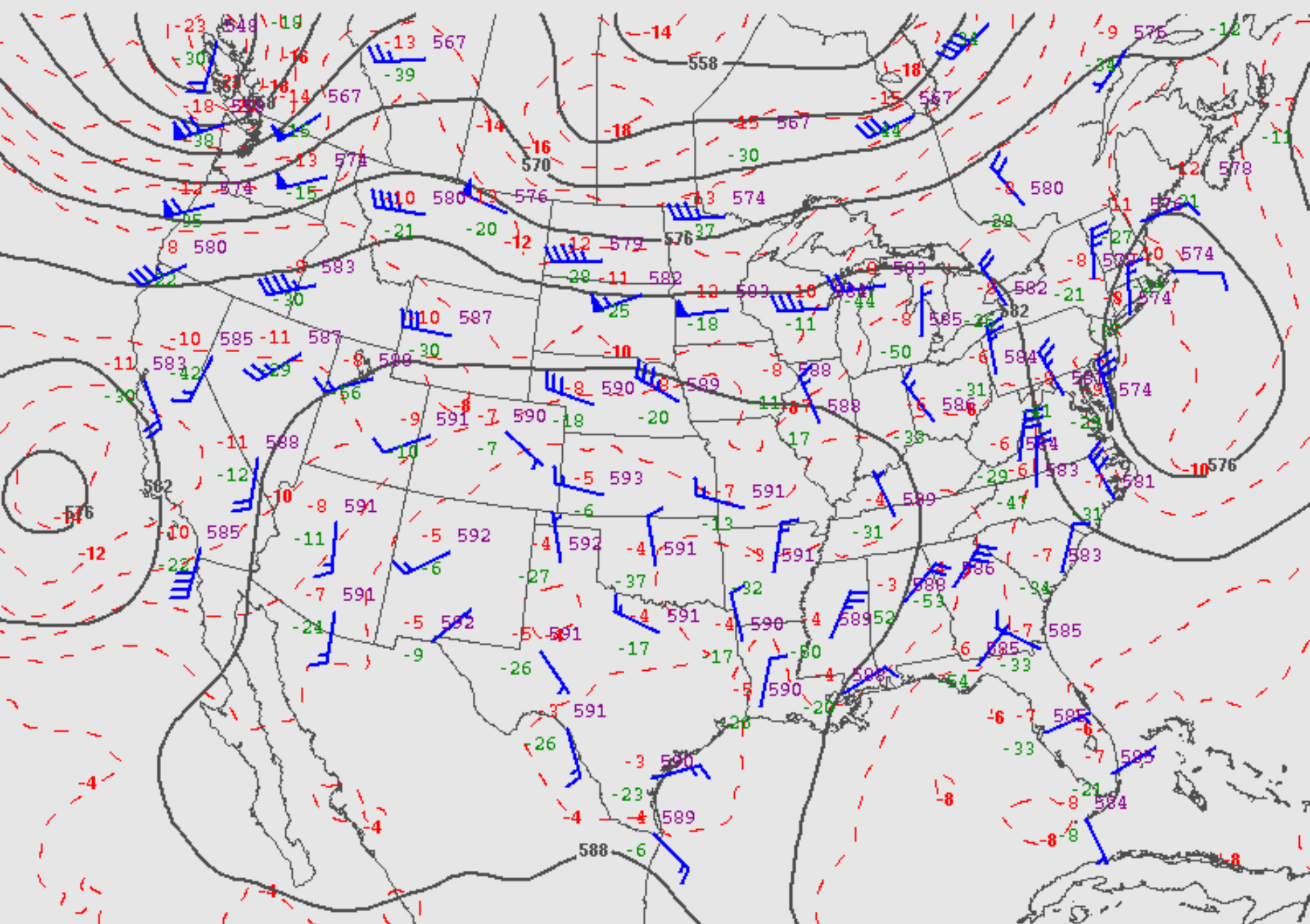
Traffic



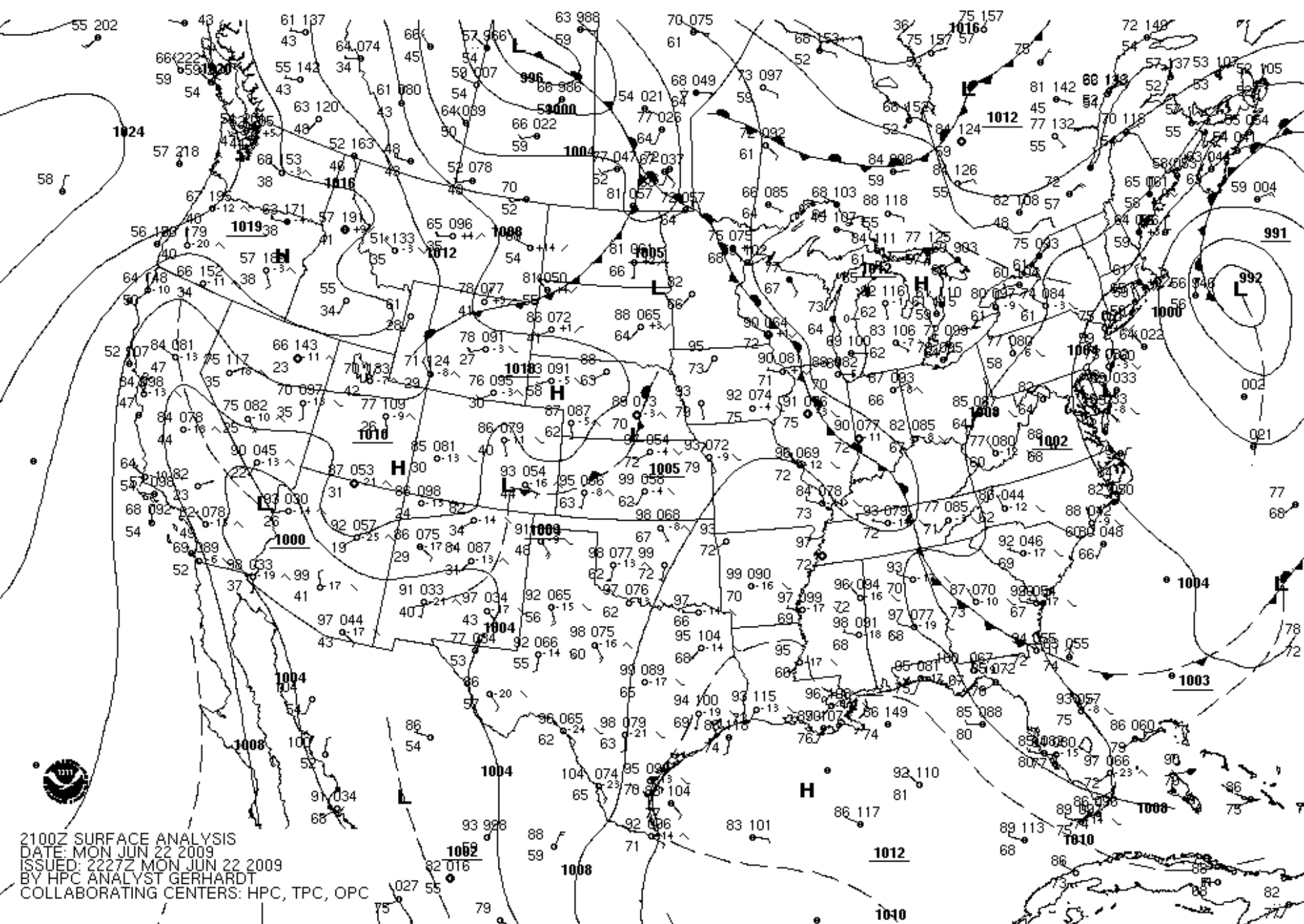
090623/0000 500 MB UA OBS, HGHTS, and TEMPS



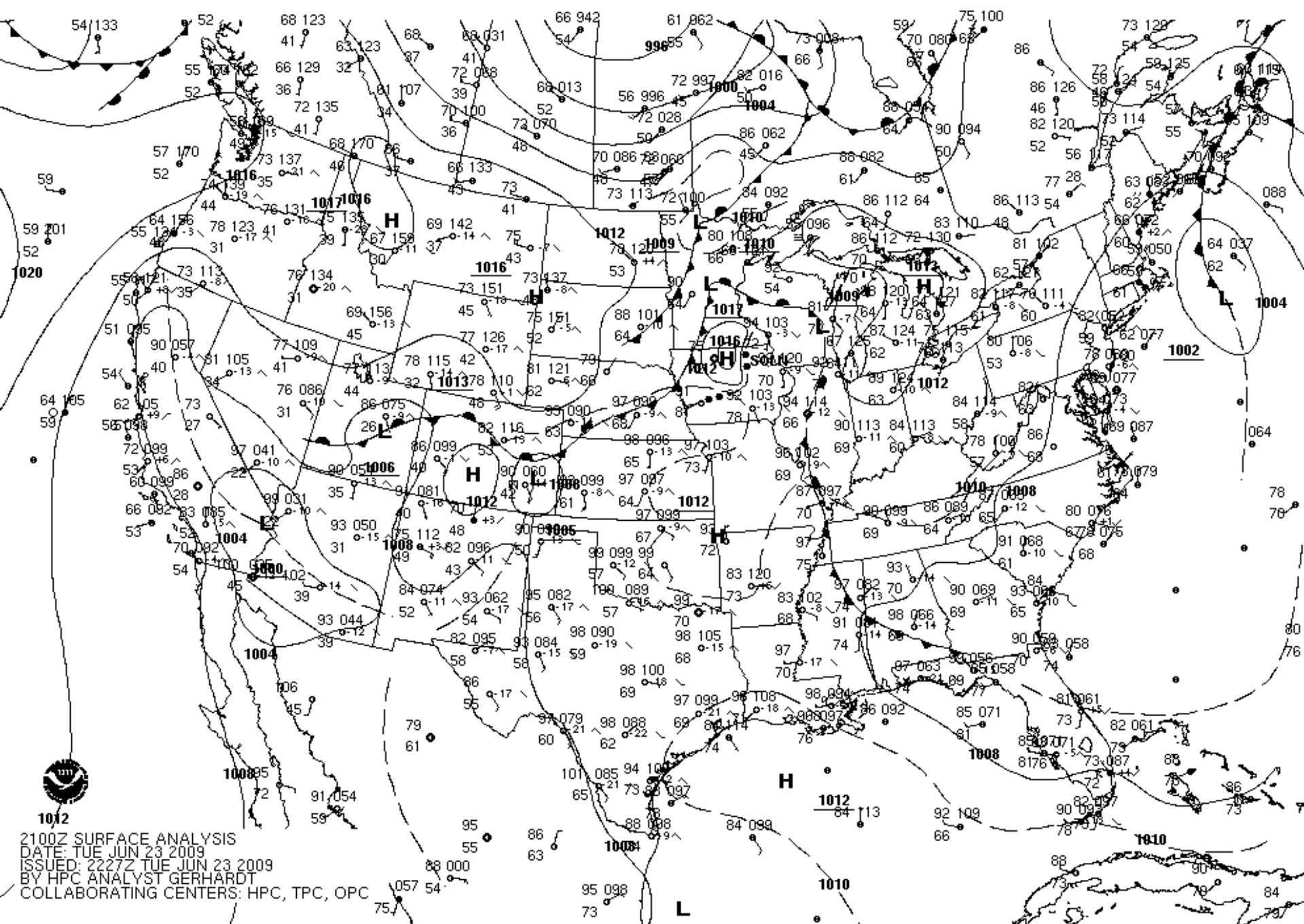
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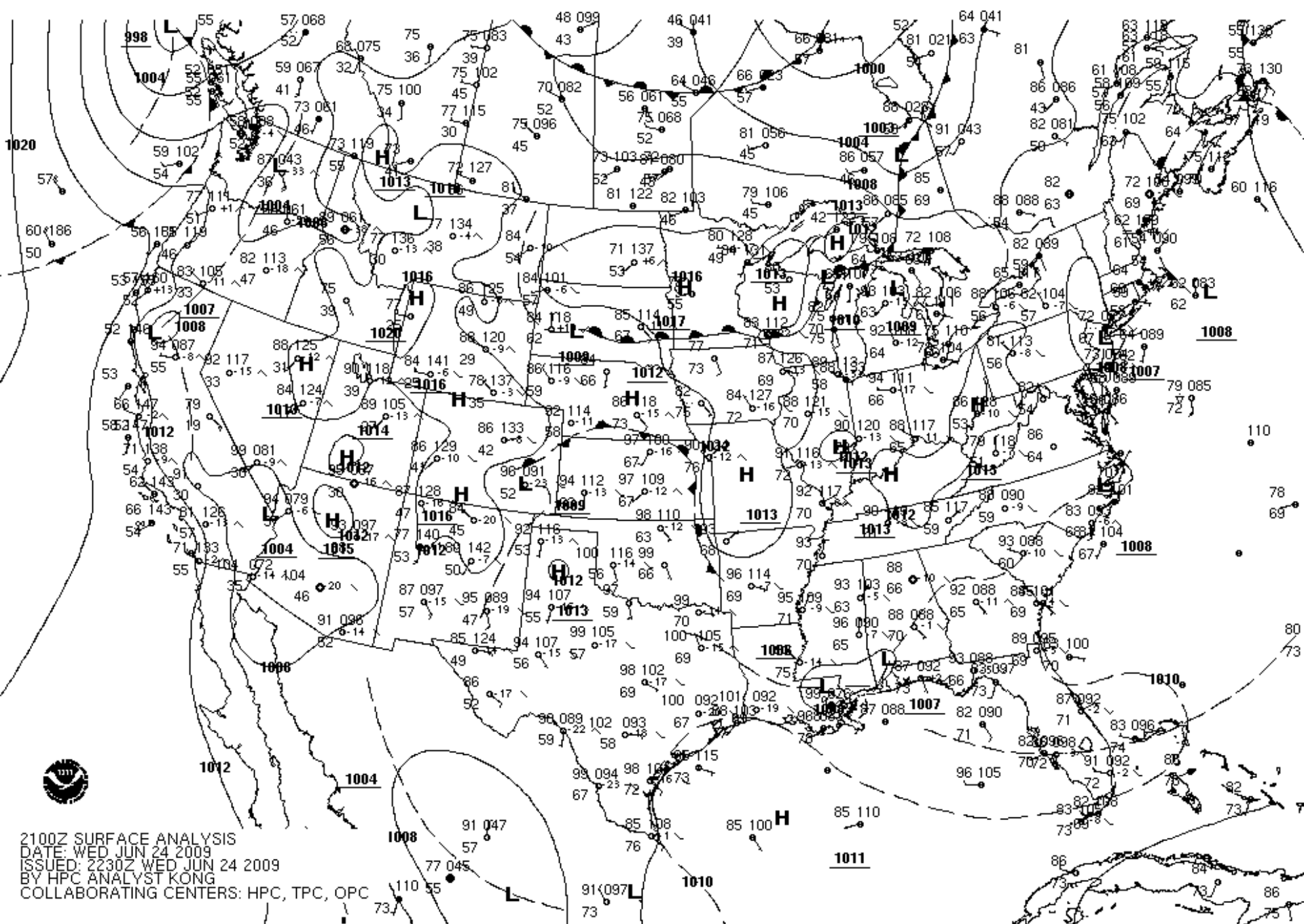


090625/0000 500 MB UA OBS, HGHTS, and TEMPS

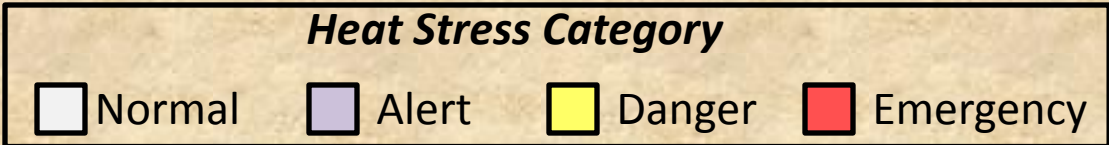
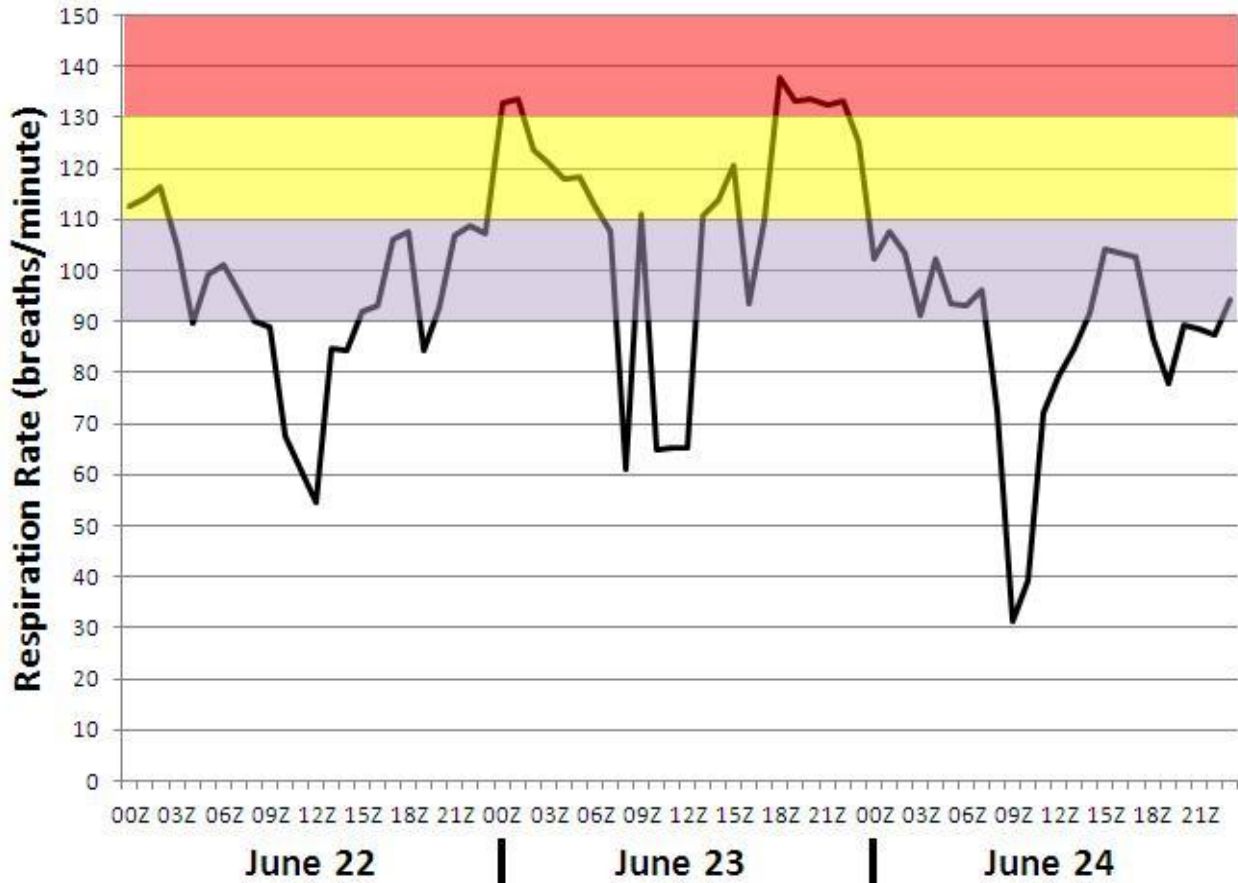


2100Z SURFACE ANALYSIS
 DATE: MON JUN 22 2009
 ISSUED: 2227Z MON JUN 22 2009
 BY HPC ANALYST GERHARDT
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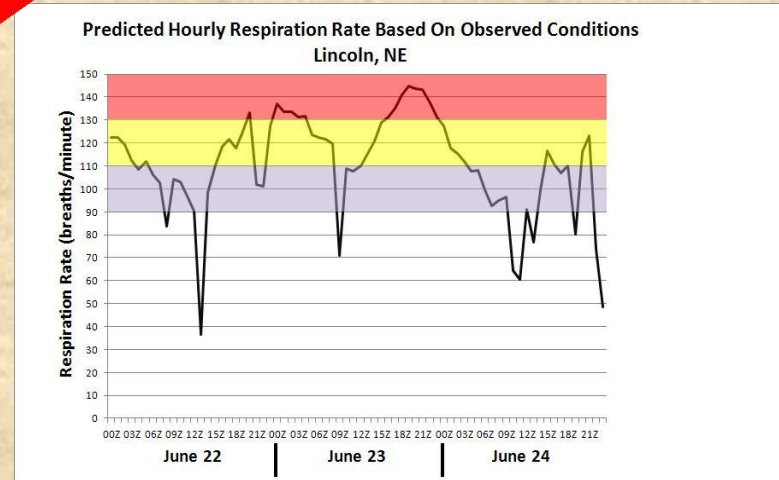
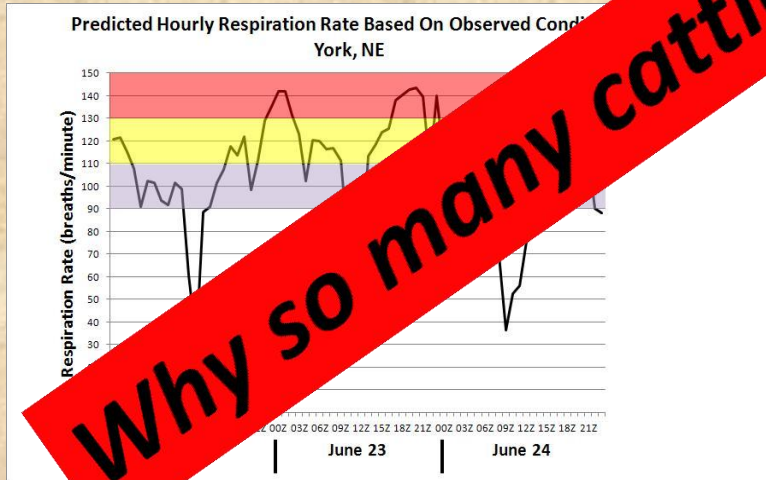
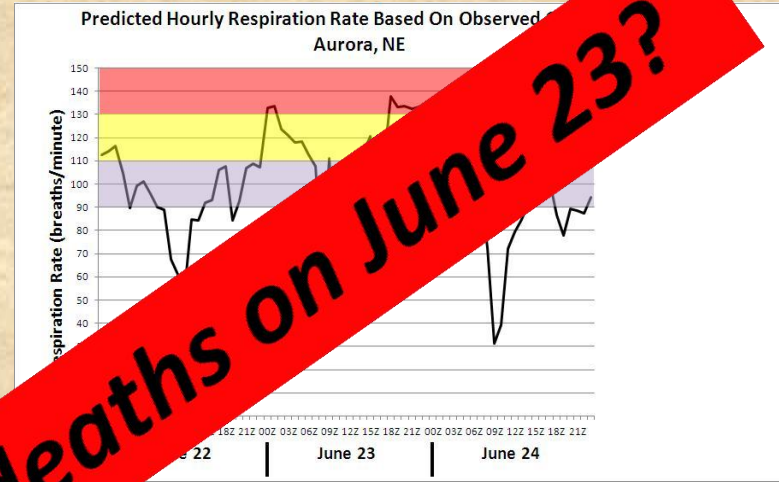
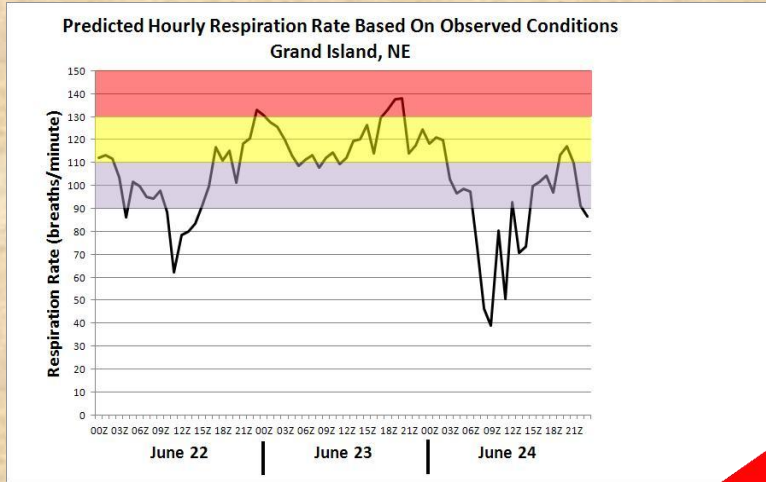




Predicted Hourly Respiration Rate Based On Observed Conditions Aurora, NE



Heat stress levels on June 22 and June 23 were very similar...



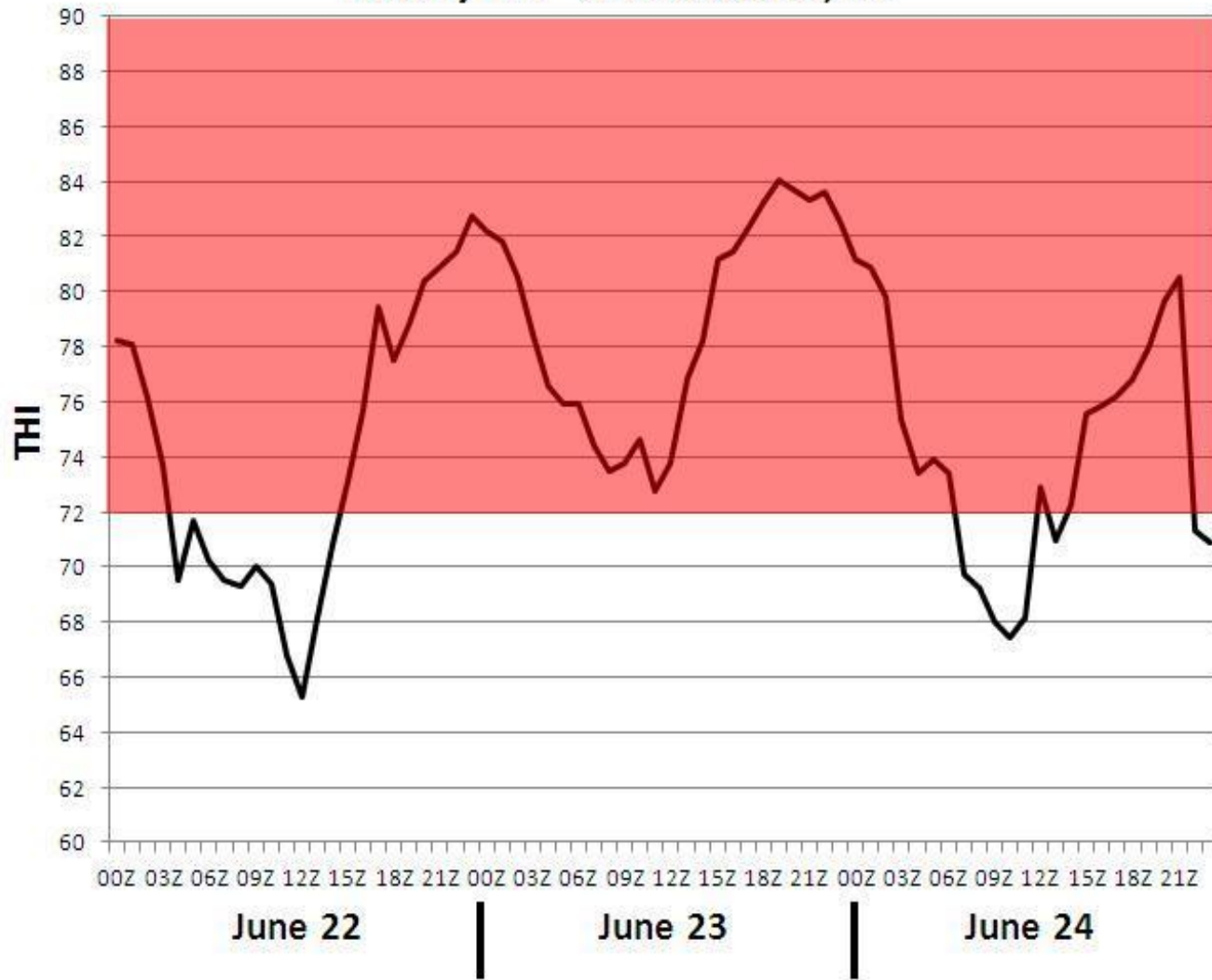
Why so many cattle deaths on June 23?

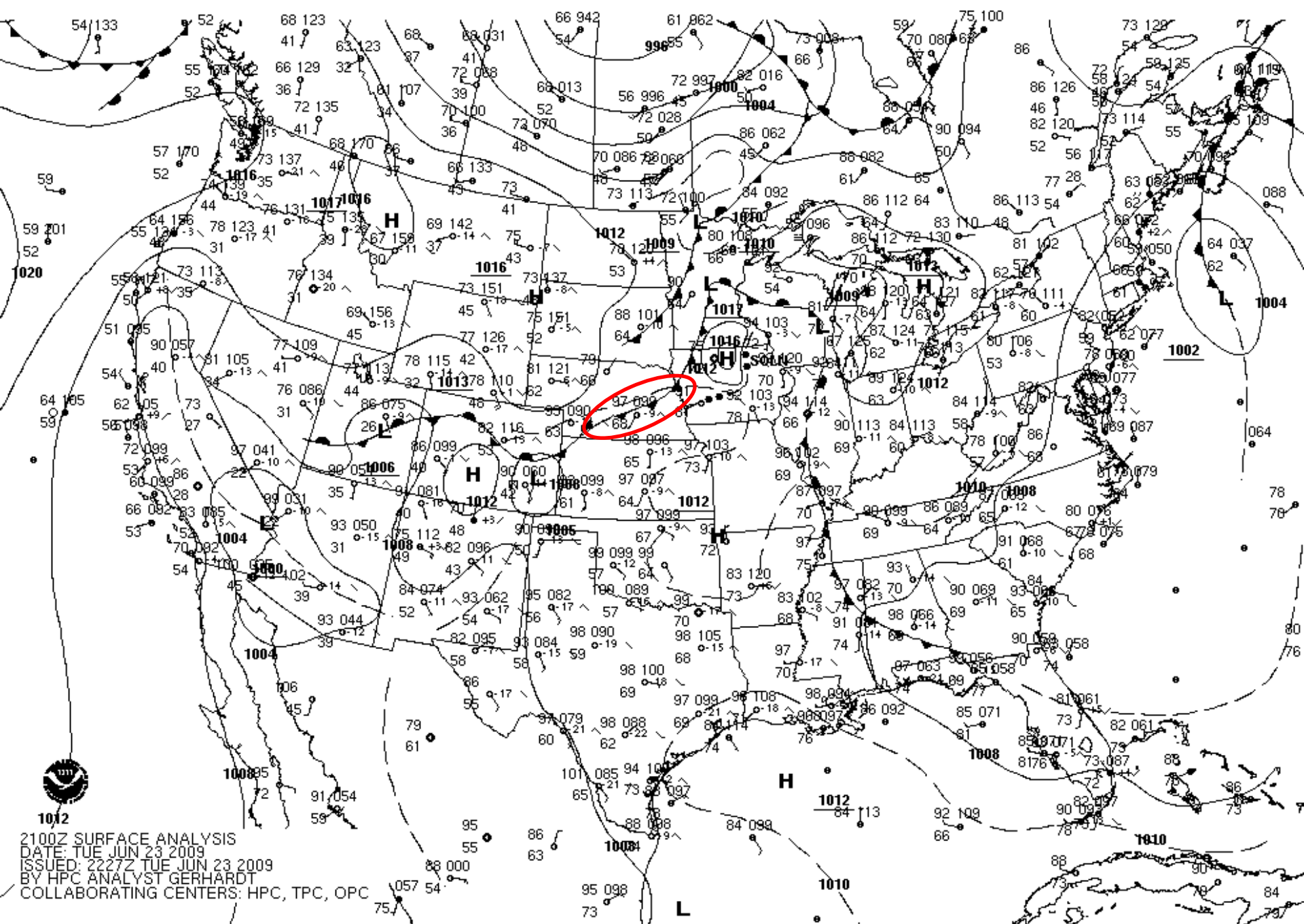
Overnight recovery time is critical

Temperature Humidity Index (THI)

$$***THI = 0.8(T) + RH(T - 14.4) + 46.2***$$

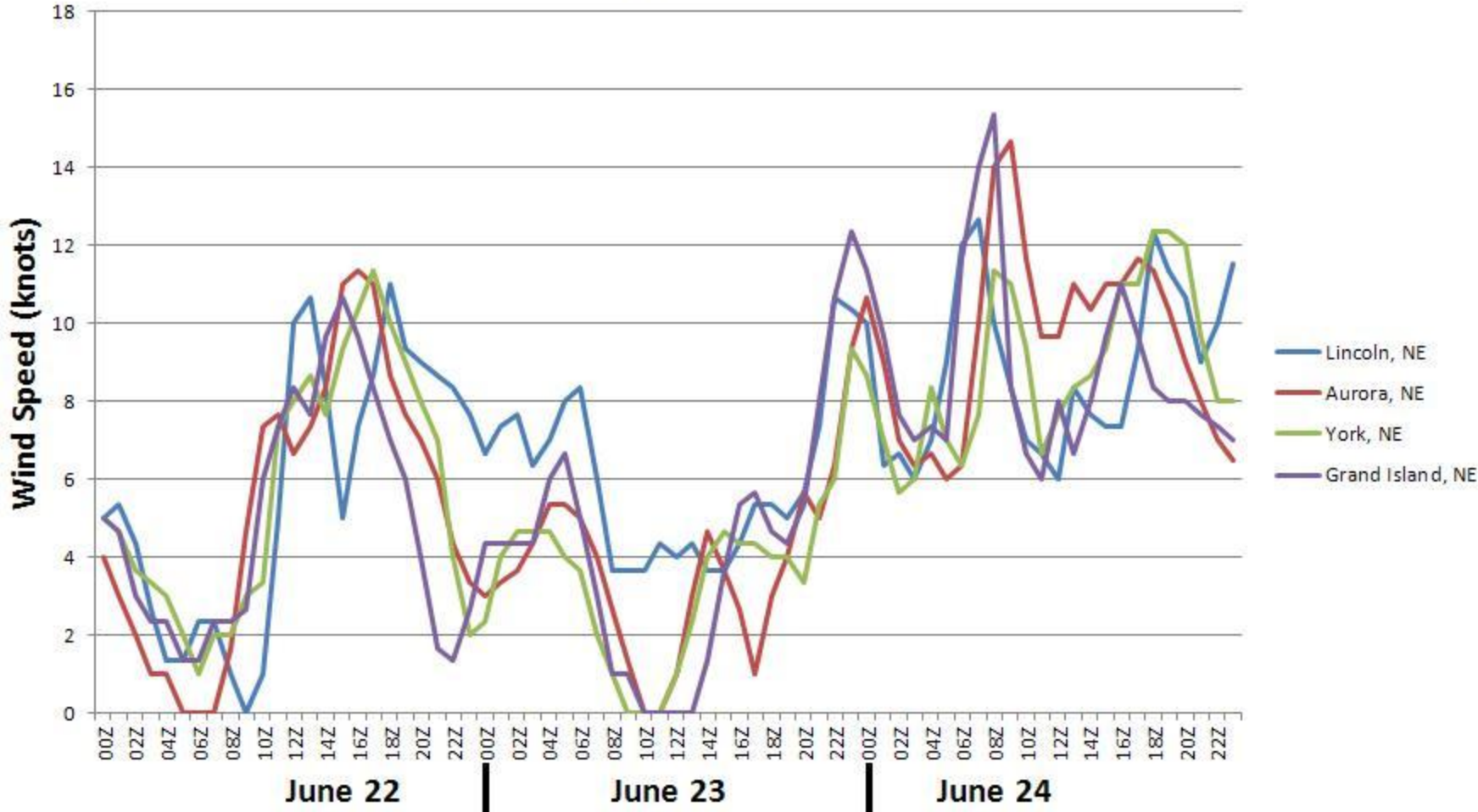
Hourly THI - Grand Island, NE





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Observed Surface Winds



Conclusions

- **Typical synoptic setup conducive for high heat stress**
 - **Mid and upper level ridging**
 - **Abundant low level moisture**
 - **Limited cloud cover**
- **Light winds due to a lingering frontal boundary helped maximize heat stress and resultant cattle loss along the I-80 corridor across eastern Nebraska**
- **Increased values of THI during the early morning hours of June 23 suggest the cattle had very little or no “recovery time” between June 22 and June 23**

Thank You...

Tami Brown-Brandl – USDA, Clay Center, NE

Roger Eigenberg – USDA, Clay Center, NE

Rick Ewald – NWS, Hastings, NE