

# **WIND FIELDS IN NORTHERN CALIFORNIA**

## **DURING THE 2008 WILD FIRES**

### **Introduction:**

The MM5 model was used to develop wind fields to assess the transport of smoke originating from wildfires that occurred in Northern California in June and July 2008. The MM5 model was set up with three nested grids to study the meteorology.

### **Synoptic conditions:**

A large scale pressure system located off the coast of California had dominated the area and induced subsidence motion and associated high temperatures that were conducive the occurrence of wildfire events (Figure 1). Dominant wind over California was from the northwest while the local scale winds had changing wind direction, owing to topography as well as local temperature differences.

### **Model Simulations:**

June 23 and 26, 2008 and July 11, 19, and 23, 2008 were chosen as smoke episodes that affected the Sacramento Valley during the summer of 2008. Two model simulations were carried out; with one starting on June 21, 2008 00Z and ending on June 27, 2008 00Z, and another starting on July 9, 2008 00Z and ending on July 24, 2008 12Z.

### **Results:**

Wind vectors and associated streamlines predicted by the model near the surface on June 23 and 26, and July 11, 19, and 23 were plotted and hourly variations were examined. The wind vectors (Figures 2, 4, 6, 8, 10) and streamlines (Figures 3, 5, 7, 9, 11) confirmed the hourly surface observations that downslope winds, generated by

cooling of air near the surface on the western sides of Sierra Nevada Mountains in northern California, were largely responsible in carrying the smoke plumes originating from the wildfires burning in Northern California.

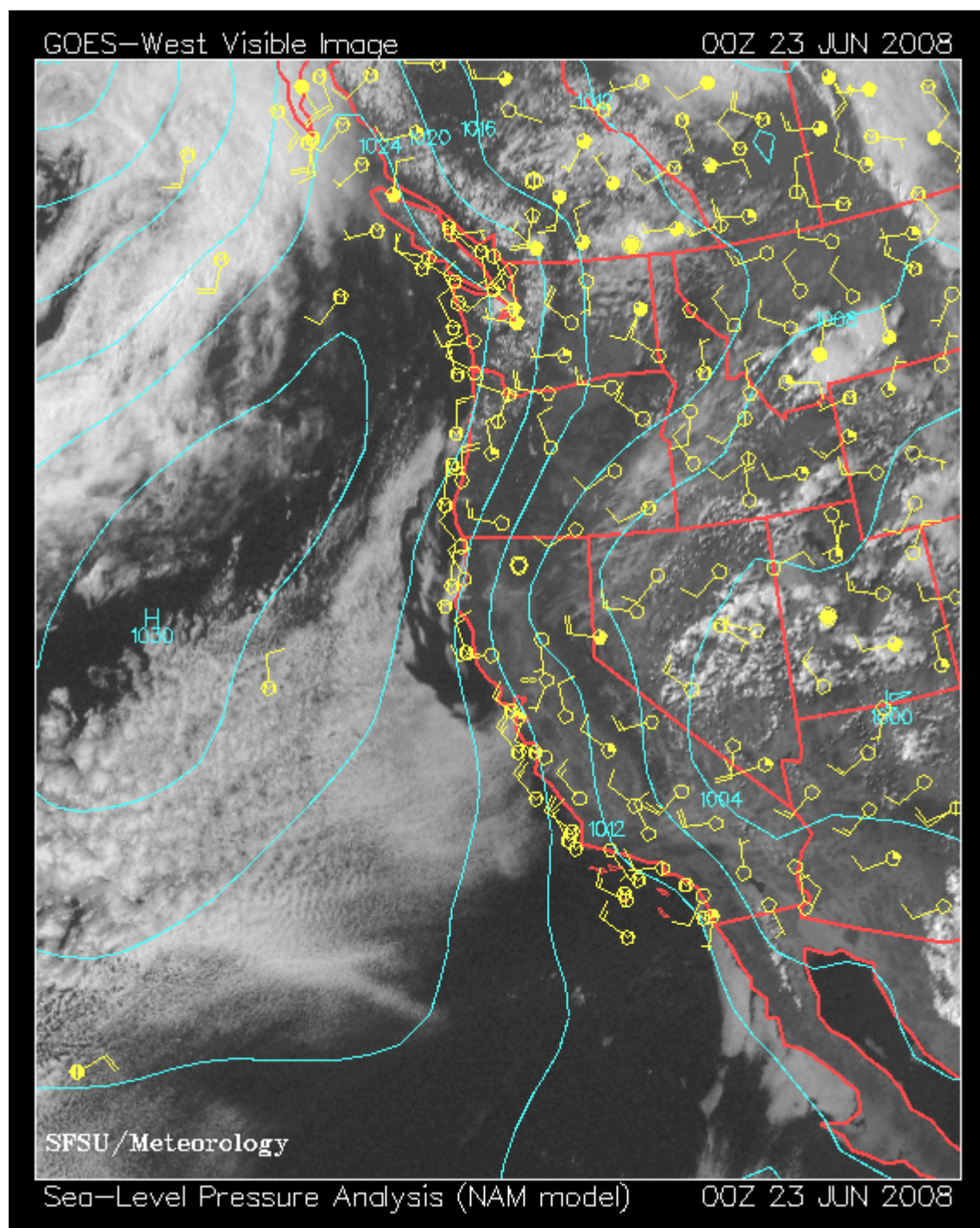


Figure 1: Sea level pressure affecting the area on June 23, 2008 at 00Z.

NARR  
Fest: 63.00 h  
Horizontal wind (x-comp)  
Horizontal wind vectors  
Init: 0000 UTC Sat 21 Jun 08  
Valid: 1500 UTC Mon 23 Jun 08 (0900 MDT Mon 23 Jun 08)  
at k-index = 30  
at pressure = 1000 hPa

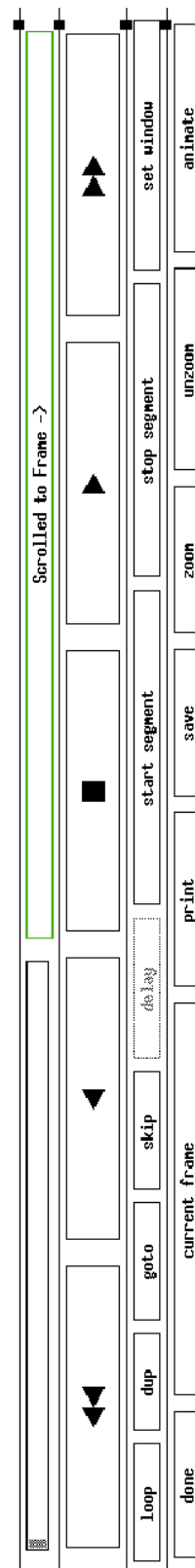
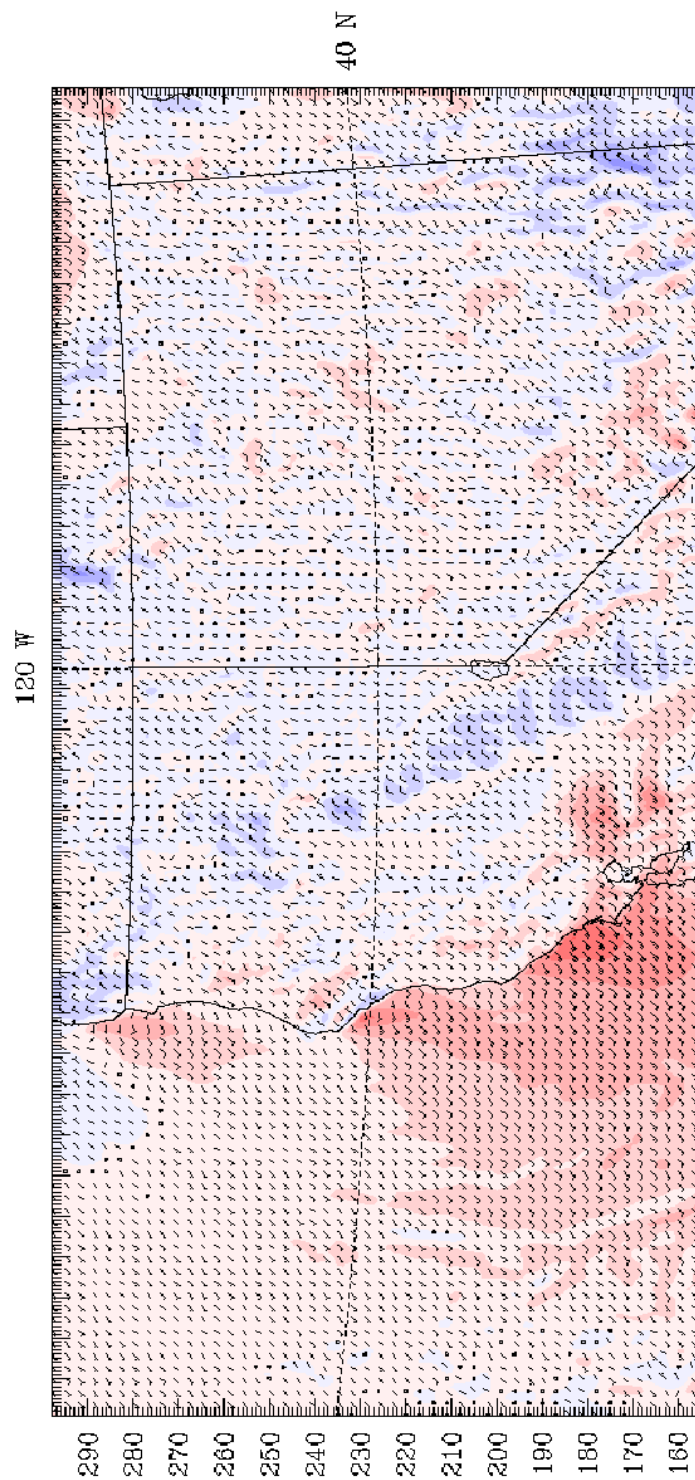
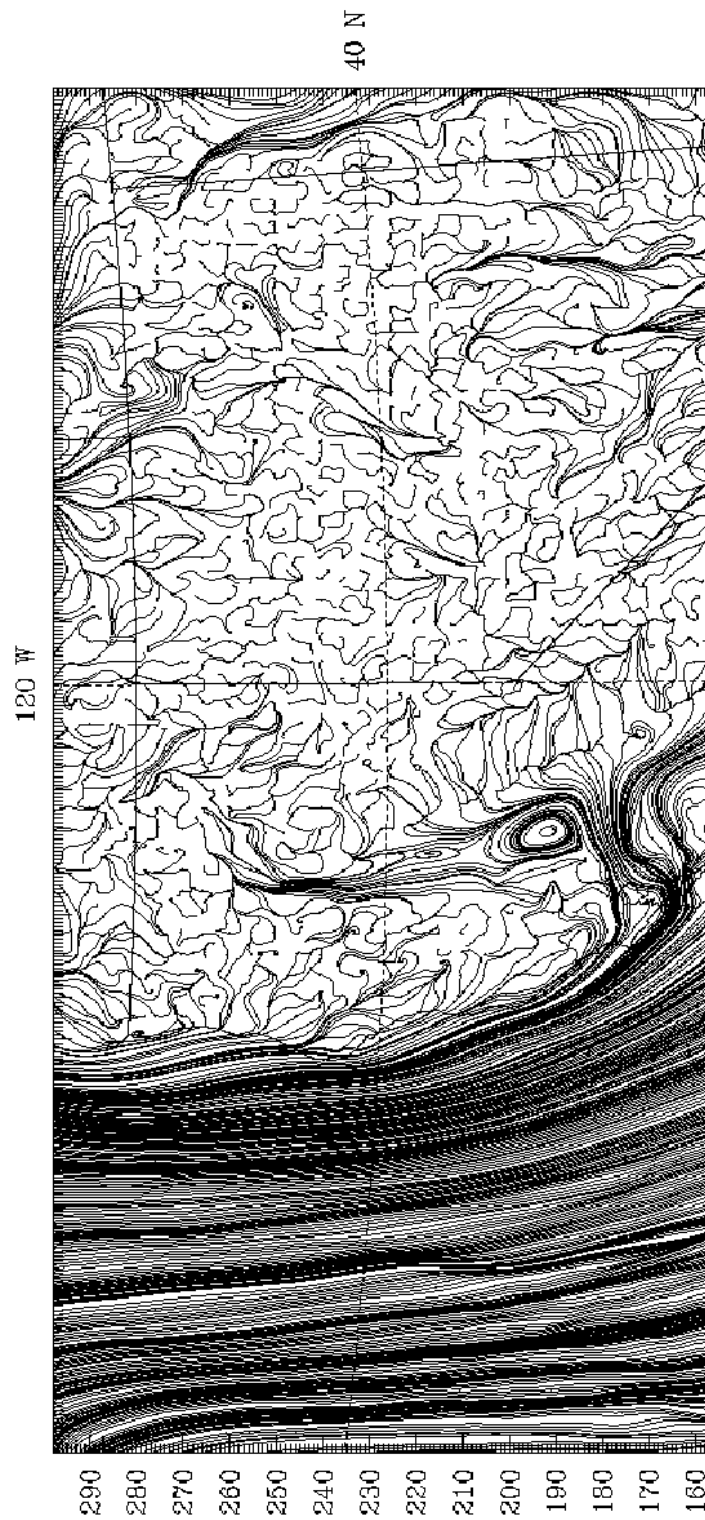


Figure 2: Wind vectors predicted by the model at 15Z on June 23, 2008.

NARR                      Init: 0000 UTC Sat 21 Jun 08  
 Fest: 63.00 h            Valid: 1500 UTC Mon 23 Jun 08 (0900 MDT Mon 23 Jun 08)  
 Horizontal wind streamlines    at pressure = 1000 hPa



Scrolled to Frame ->

loop   dup   goto   skip   delay   start segment   stop segment   set window   animate  
 done   current frame   print   zoom   unzoom

Figure 3: Streamlines predicted by the model at 15Z on June 23, 2008.



Init: 0000 UTC Sat 21 Jun 08

Valid: 1200 UTC Thu 26 Jun 08 (0600 MDT Thu 26 Jun 08)

at k-index = 30

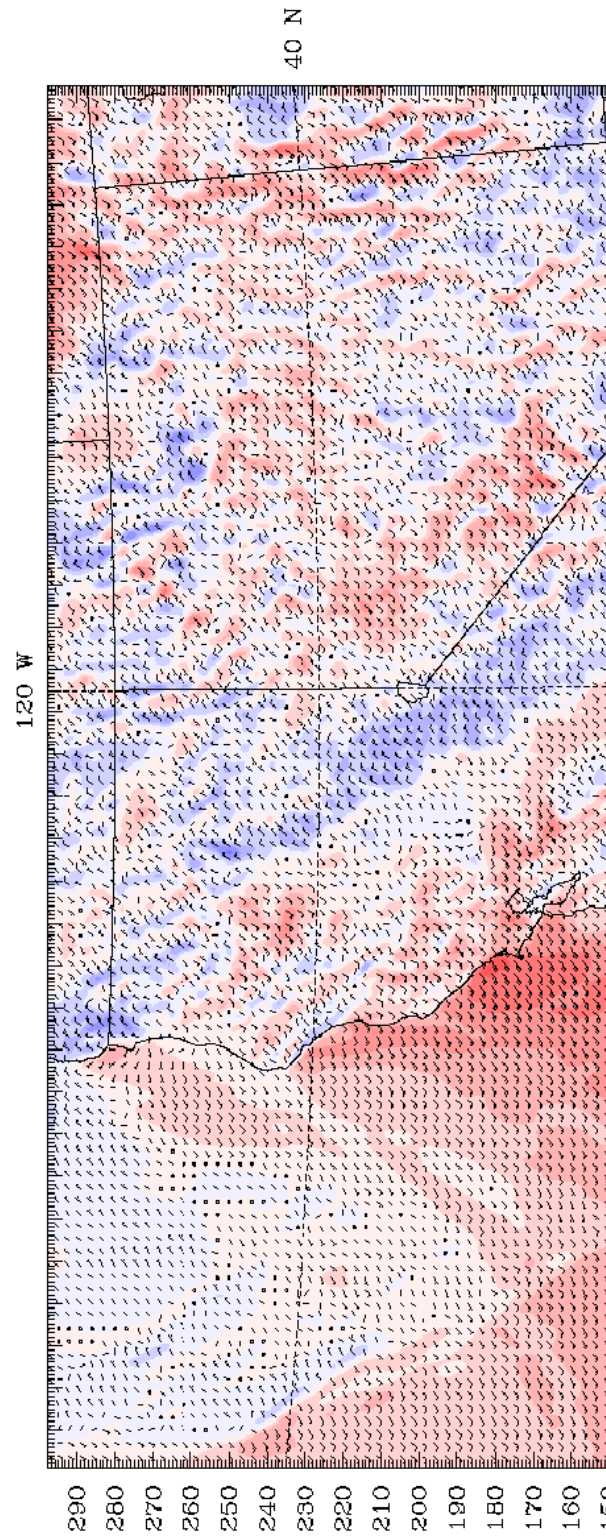
at pressure - 1000 hPa

Init: 0000 UTC Sat 21 Jun 08

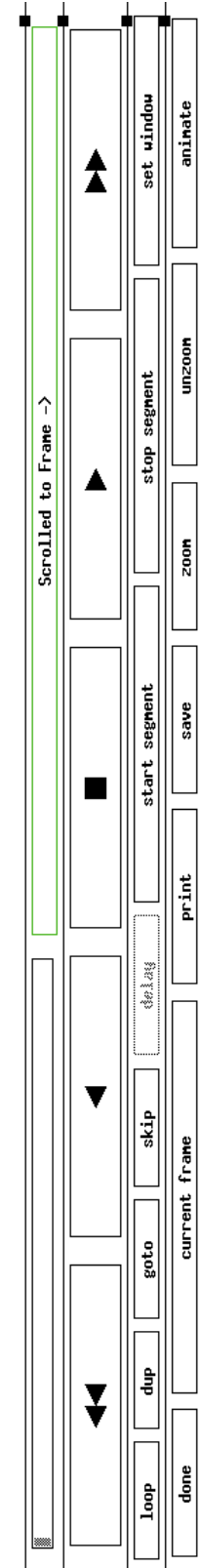
Valid: 1200 UTC Thu 26 Jun 08 (0600 MDT Thu 26 Jun 08)

at  $k$ -index = 30

at pressure - 1000 hPa



NARR  
Fest: 132.00 h  
Horizontal wind streamlines  
Init: 0000 UTC Sat 21 Jun 08  
Valid: 1200 UTC Thu 26 Jun 08 (0600 MDT Thu 26 Jun 08)  
at pressure = 1000 hPa



7

NARR  
 Fcst: 63.00 h  
 Horizontal wind (x-comp.)  
 Horizontal wind vectors  
 Init: 0000 UTC Wed 09 Jul 08  
 Valid: 1500 UTC Fri 11 Jul 08 (0900 MDT Fri 11 Jul 08)  
 at k-index = 30  
 at pressure = 1000 hPa

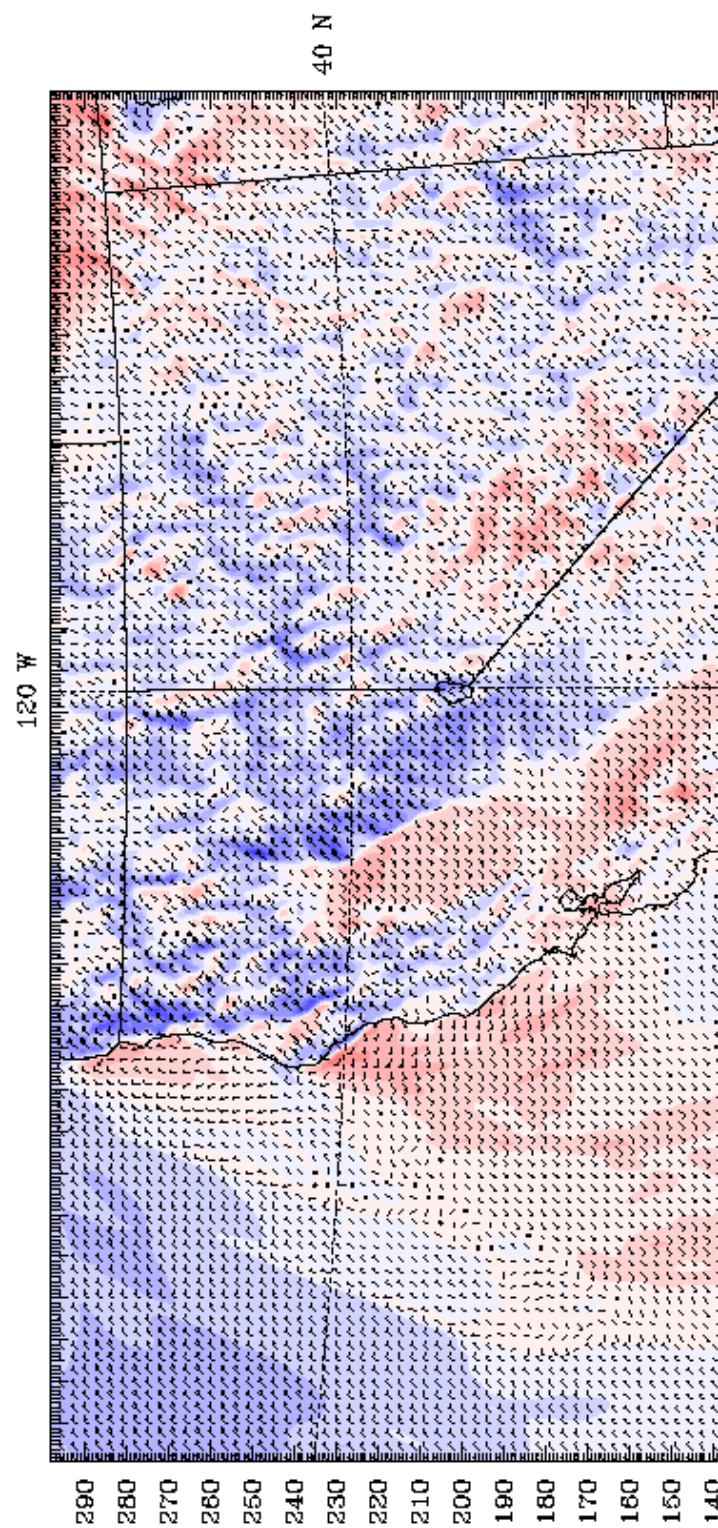


Figure 6: Wind vectors predicted by the model at 15Z on July 11, 2008.



NARR

Fcst: 63.00 h

Valid: 1500 UTC Fri 11 Jul 08 (0900 MDT Fri 11 Jul 08)  
Init: 0000 UTC Wed 09 Jul 08  
at pressure = 1000 hPa

Horizontal wind streamlines

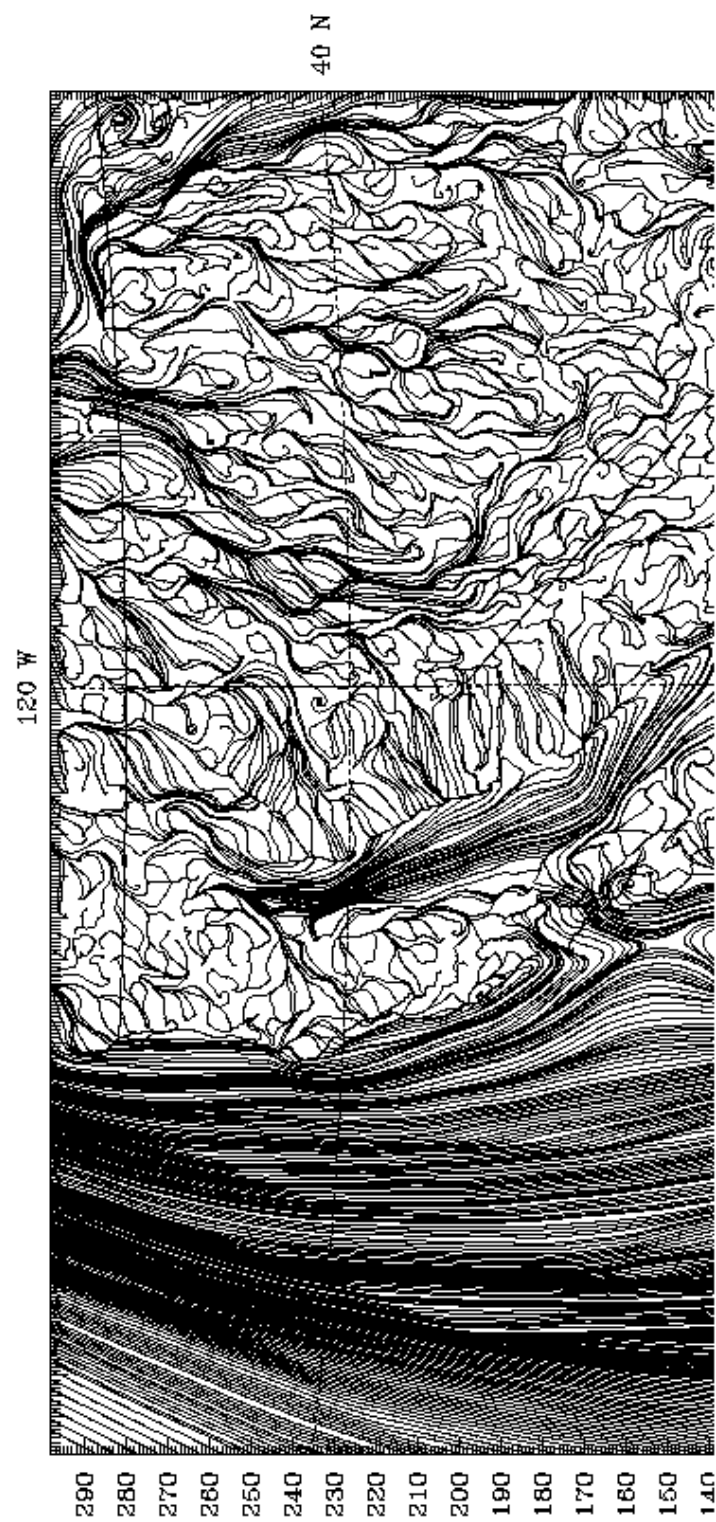


Figure 7: Streamlines predicted by the model at 15Z on July 11, 2008.

NARR  
 Fcst: 253.00 h  
 Horizontal wind (x-comp.)  
 Horizontal wind vectors  
 Init: 0000 UTC Wed 09 Jul 08  
 Valid: 1300 UTC Sat 19 Jul 08 (0700 MDT Sat 19 Jul 08)  
 at k-index = 30  
 at pressure = 1000 hPa

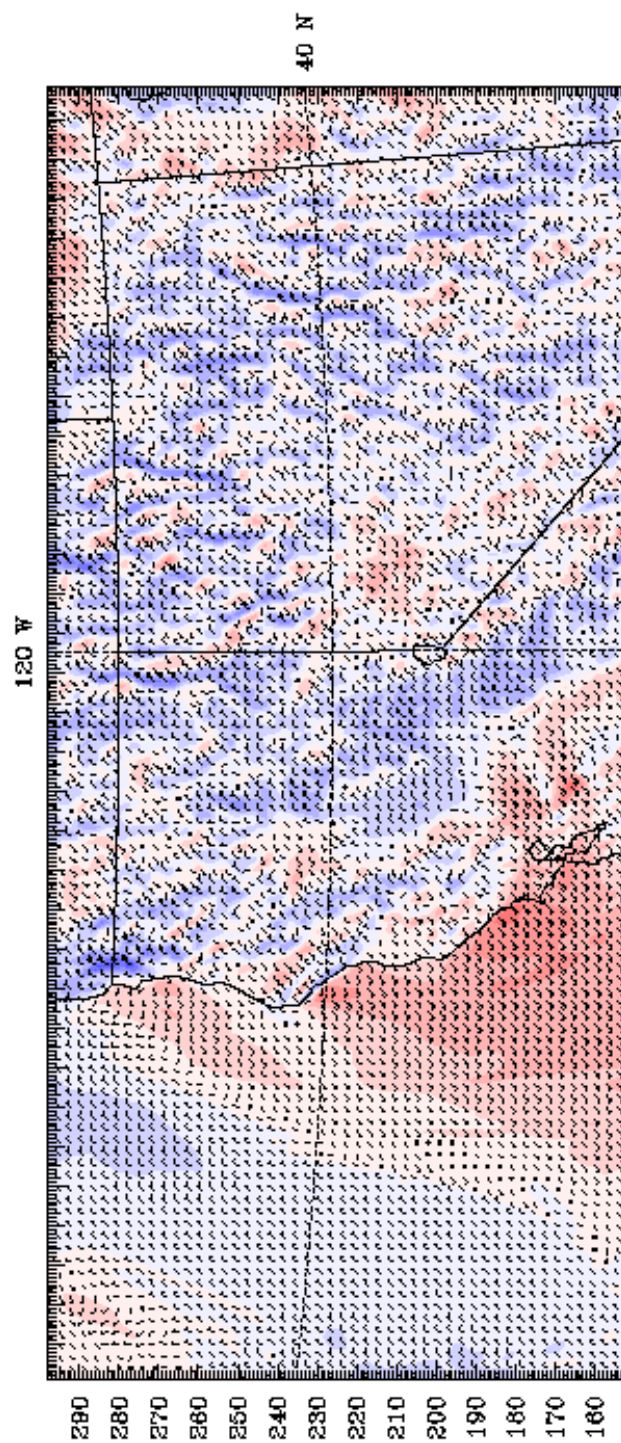


Figure 8: Wind vectors predicted by the model at 13Z on July 19, 2008.

NARR

Fcst: 253.00 h

Horizontal wind streamlines

Init: 0000 UTC Wed 09 Jul 08  
Valid: 1300 UTC Sat 19 Jul 08 (0700 MDT Sat 19 Jul 08)  
at pressure = 1000 hPa

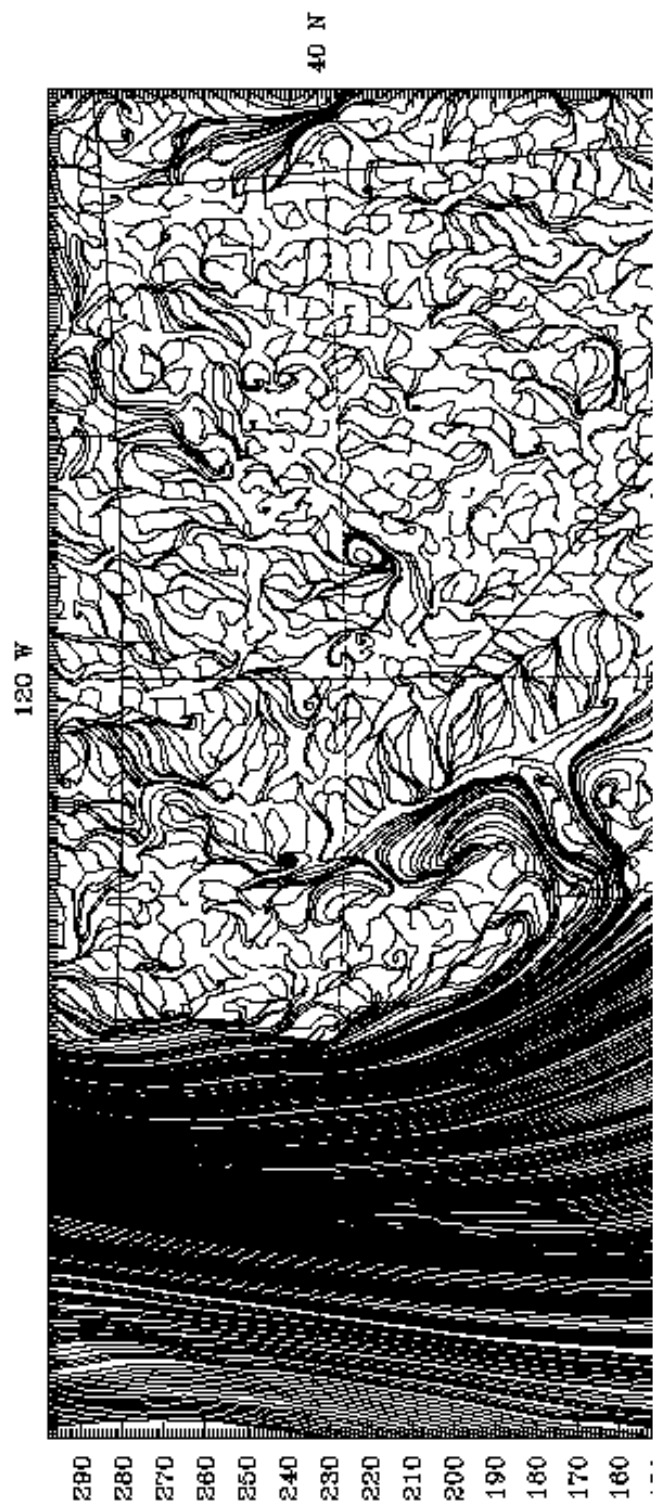


Figure 9: Streamlines predicted by the model at 13Z on July 19, 2008.

NARR

Fcst: 348.00 h

Horizontal wind (x-comp.)

Horizontal wind vectors

Init: 0000 UTC Wed 09 Jul 08

Valid: 1200 UTC Wed 23 Jul 08 (0600 MDT Wed 23 Jul 08)

at k-index = 30

at pressure = 1000 hPa

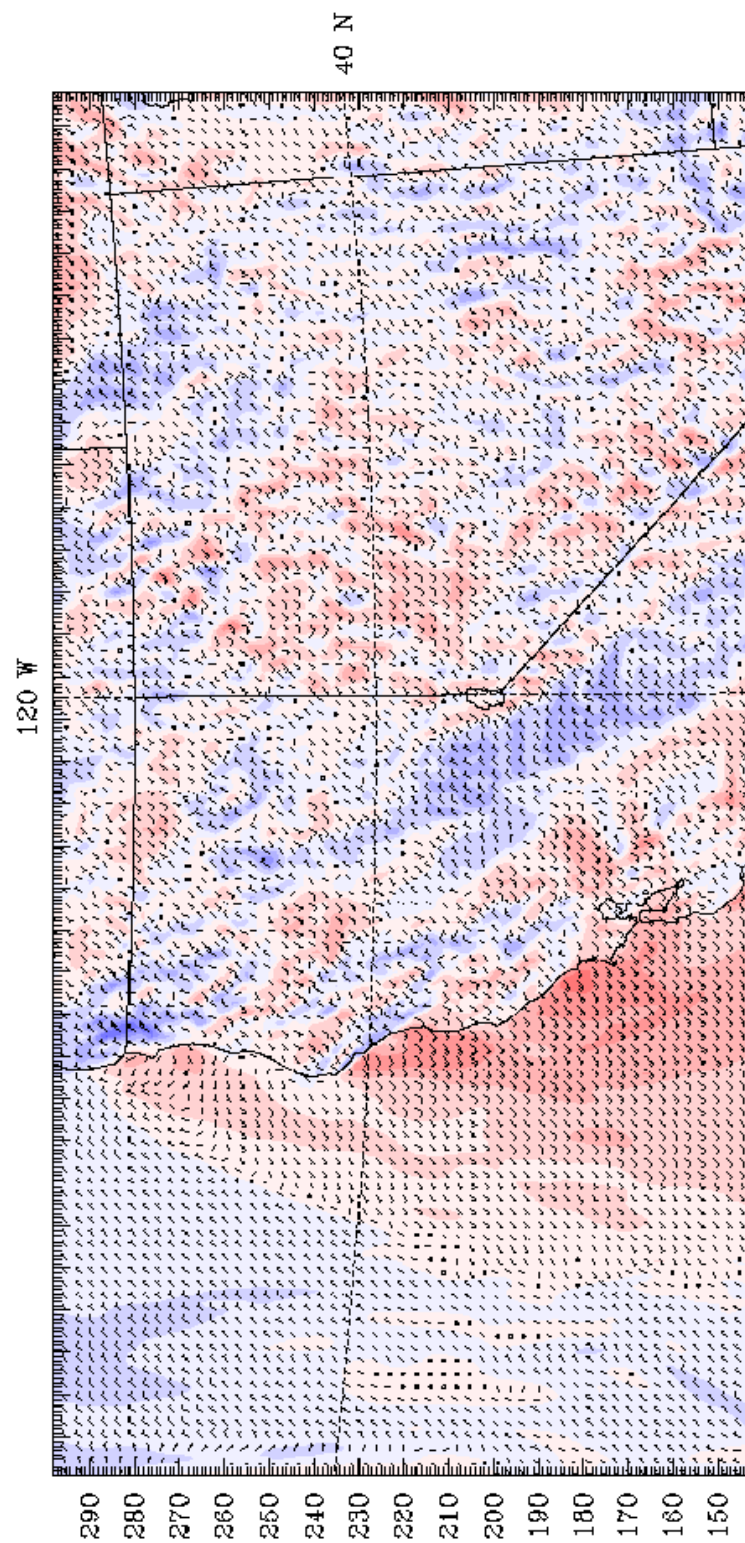


Figure 10: Wind vectors predicted by the model at 12Z on July 23, 2008.



NARR

Fcst: 348.00 h

Horizontal wind streamlines

Init: 0000 UTC Wed 09 Jul 08

Valid: 1200 UTC Wed 23 Jul 08 (0600 MDT Wed 23 Jul 08)

at pressure = 1000 hPa

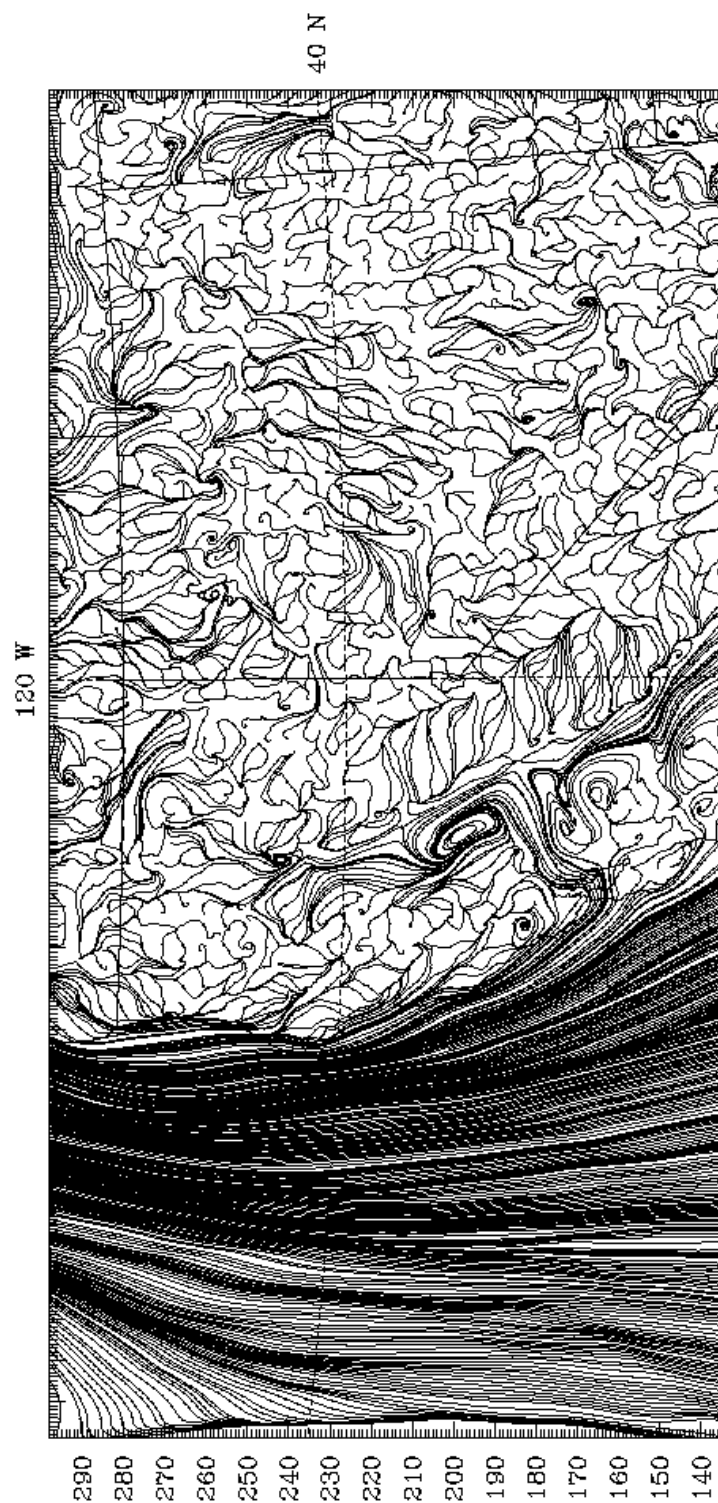


Figure 11: Streamlines predicted by the model at 12Z on July 23, 2008.