# SOUTHERLY SURGE CAPTURED BY KMUX 88D&#65533;

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On October 5, 1995 a surge of stratus (Mass and Albright, 1986) moved up the central California coast. This is seen in the 1 km.

NOAA 14 AVHRR visible image from 2133 UTC (Figure 1) showing the leading edge just passing the Monterey Peninsula and moving into Monterey Bay.

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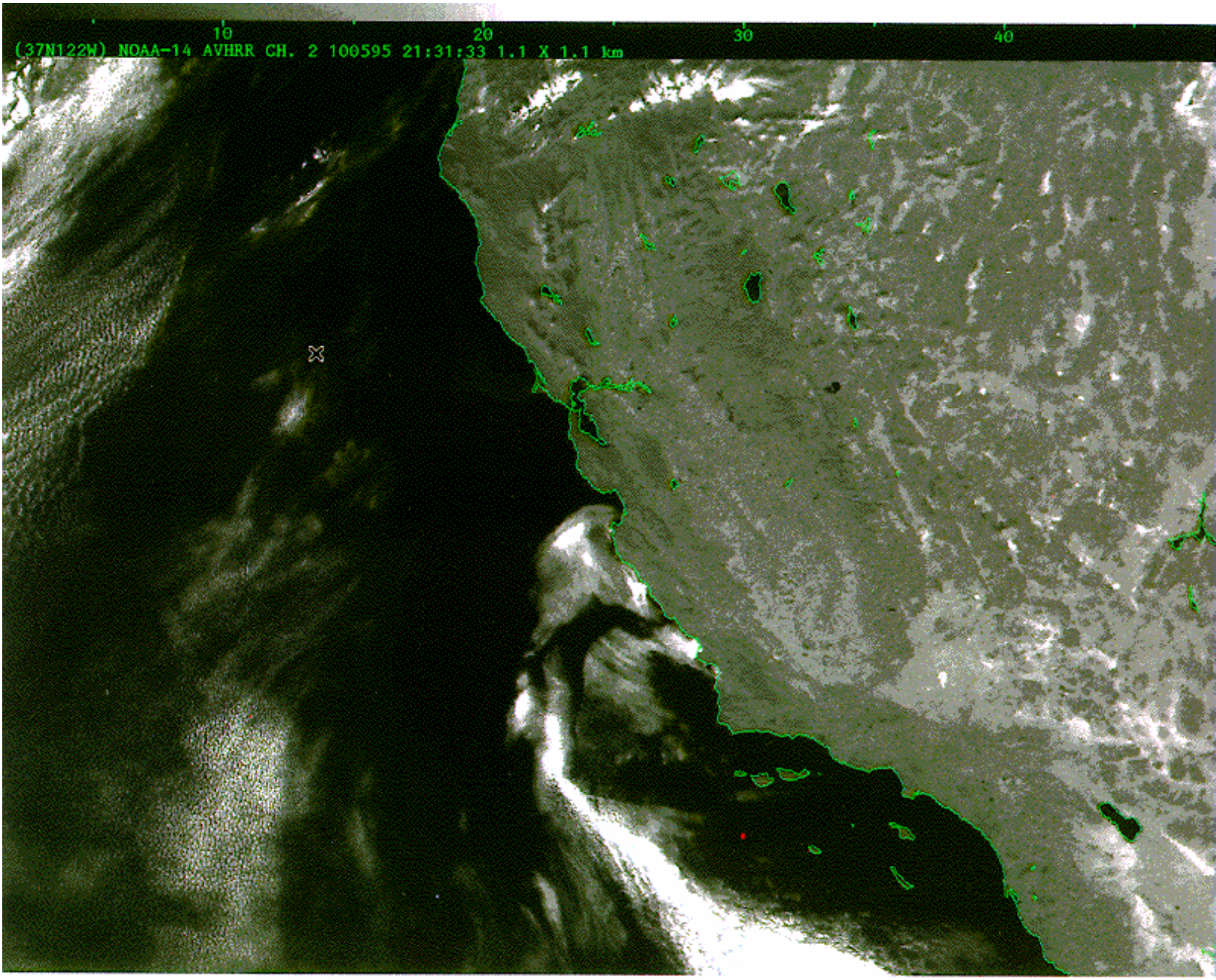


Figure 1 NOAA&#65533;14 visible 1 km AVHRR image for 2131 UTC 5 October, 1995 showing stratus surge moving up along the central California coast with the leading edge into Monterey Bay.

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The shape of the leading edge of the stratus appears like a wave front. Mass talks about these stratus surges as coastally trapped phenomena moving north in the flow field like a dynamic head. Felsch (1990) reviews the physics of this meteorological phenomena and so it will not be discussed here.

The KMUX 88D .5 degree reflectivity data from 2149 UTC (Figure 2) shows a zone of relatively high reflectivity of up to 28 DBz associated with the leading edge of the stratus.

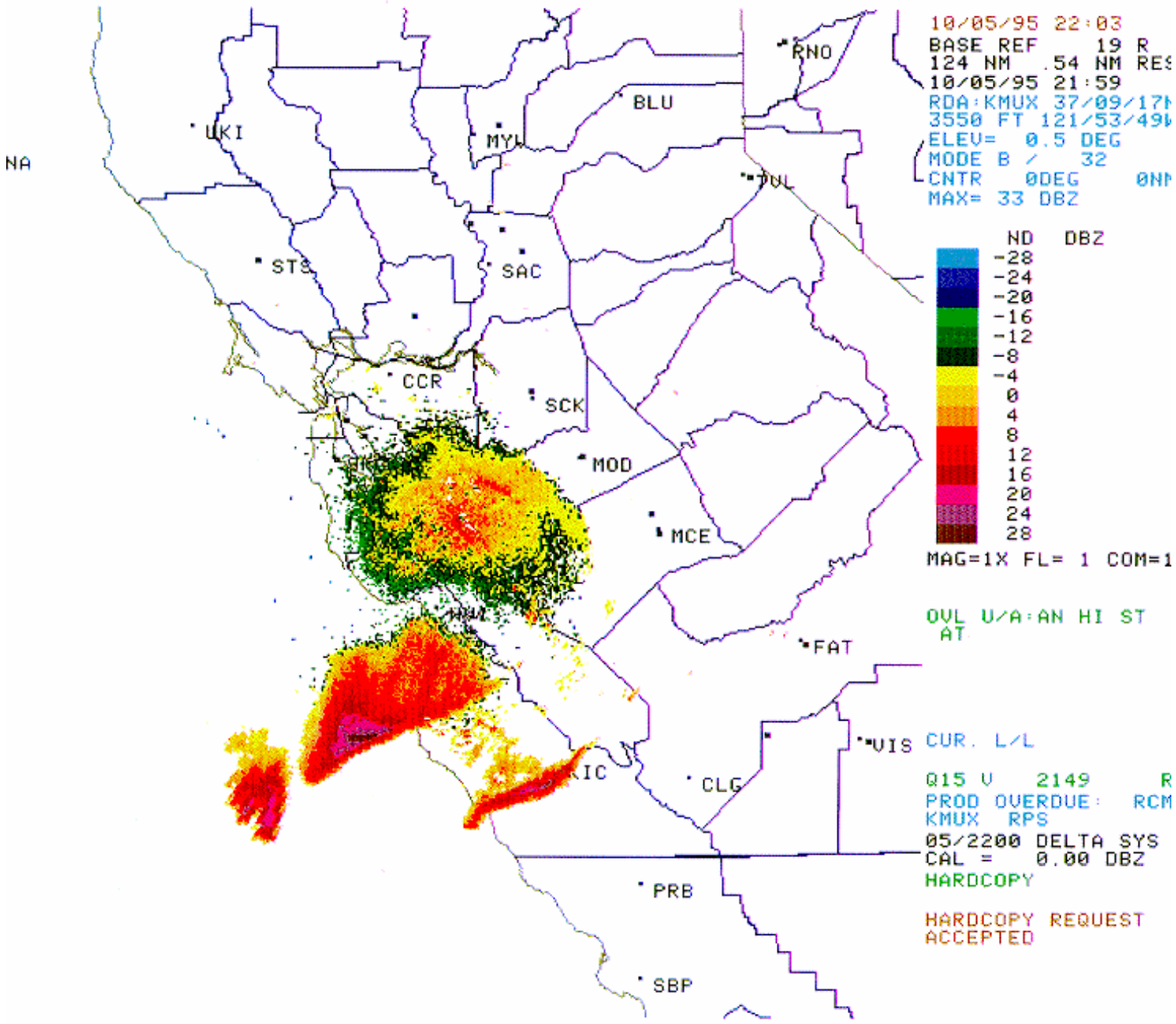


Figure 2 KMUX 88D .5 degree elevation reflectivity data for 5 October, 1995 at 2159 UTC. Radar was operating in clear air mode and shows reflectivities up to 28 DBz above the low level stratus.

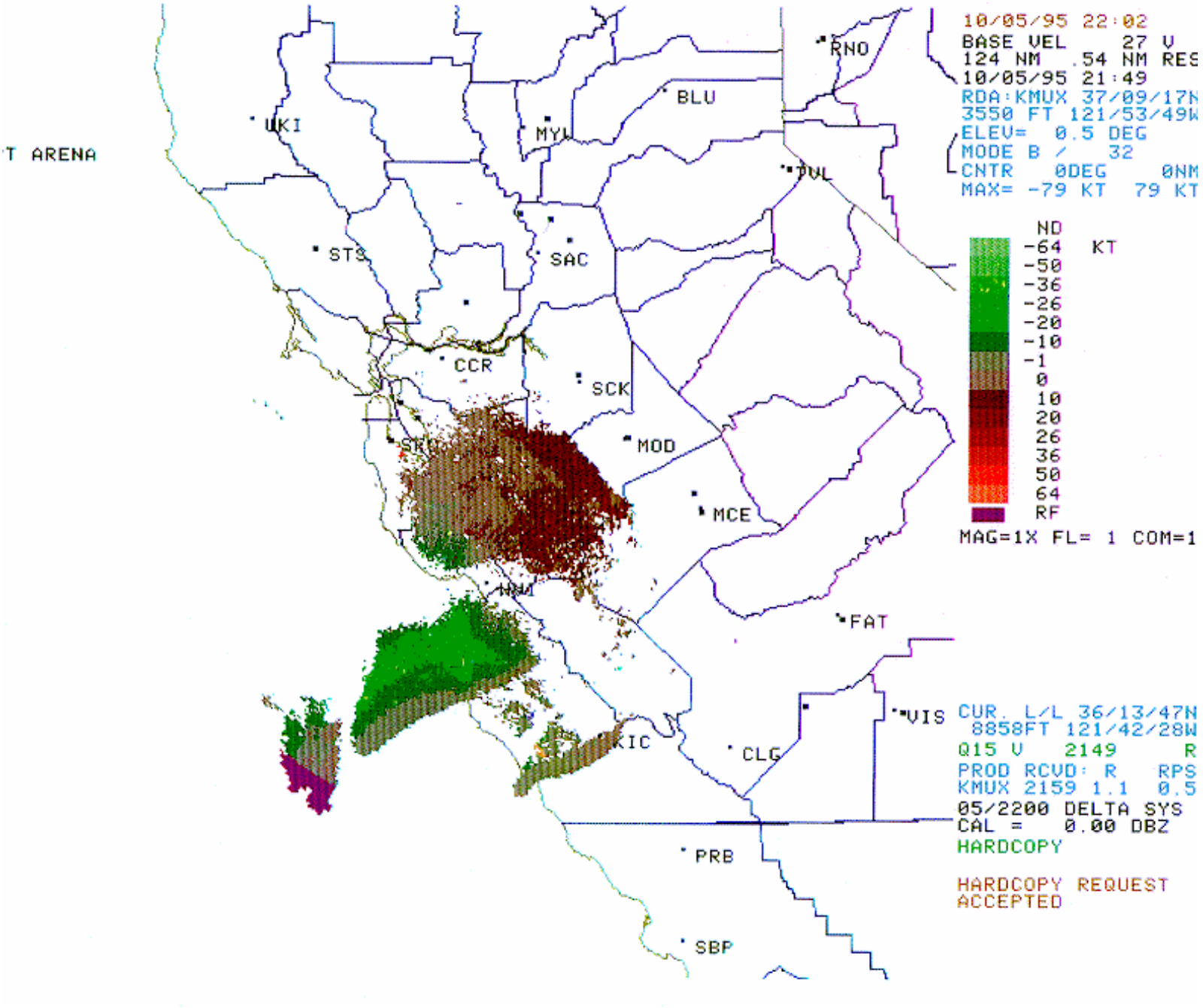


Figure 3 Velocity data from 2149 UTC as per Figure 2.

Coastal observations as well as visual observations by the author showed the stratus to be very shallow, with cloud bases at the surface and cloud tops at 100 to 200 ft. The radar beam over Monterey is centered at an elevation of 6200 ft. with the base of the beam at 4000 ft. and the top of the beam at 8200 ft. There was no inversion at or above the radar so no beam bending is expected. Thus the high reflectivity values are not associated with the stratus cloud itself but with scatters located above the stratus at the leading edge of the surge. It has been noted by Mass and Albright that southerly surges are deep, sometimes up to 5 km. The corresponding velocity from 2159 UTC shows inbound velocities of 20 to 25 kts at this level. The 915 MHz profiler data from Ft. Ord (Figure 4) shows a rather dramatic shift from offshore flow to strong onshore flow between 1900 UTC and 2100 UTC.

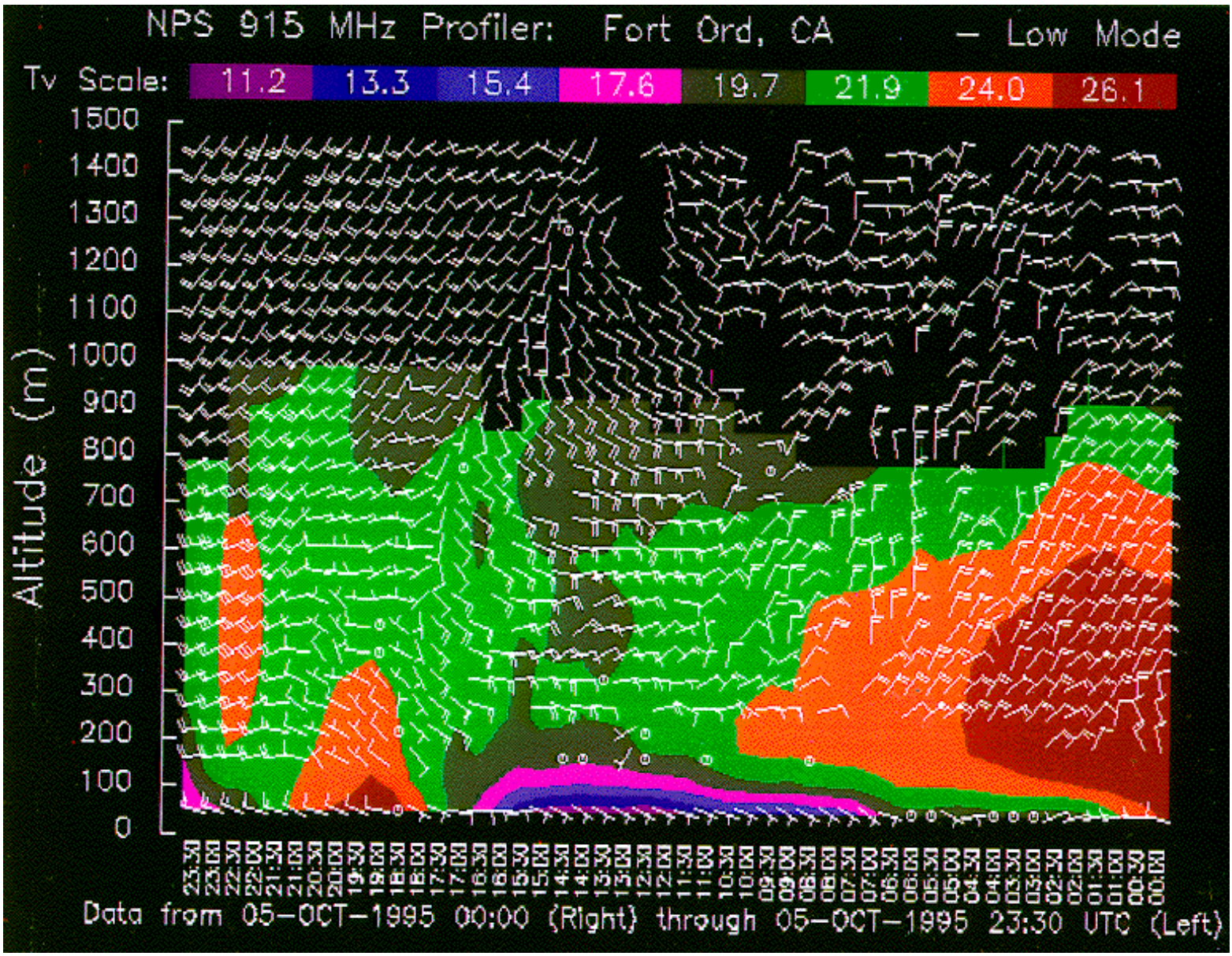


Figure 4 Wind Profiler and RASS data form the 915 MHz profiler located at Ft. Ord, California. Virtual temperature scale is denoted by the color bar along the top of the image.

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Interestingly the winds turn southwesterly sooner at higher elevations ( above 3000 ft.) indicating a north-south tilt of the surge with height.

The higher reflectivity associated with the leading edge of the surge are necessarily particles larger than 1 mm in diameter. This would suggest the scatterers might be insects that are migrating within this southerly surge of air. It should be noted that up to half a dozen southerly surges occurred during the summer months with none of these having signatures on the 88D. For this case these scatterers provide a unique opportunity to document the fact that these surges have vertical depth and slope with height as observed by Mass and Albright using in-situ aircraft data.

Model output produced from the Meso Eta (Figure 5) and the RUC (Figure 6) were able to capture this southerly reversal of winds along the central coast.

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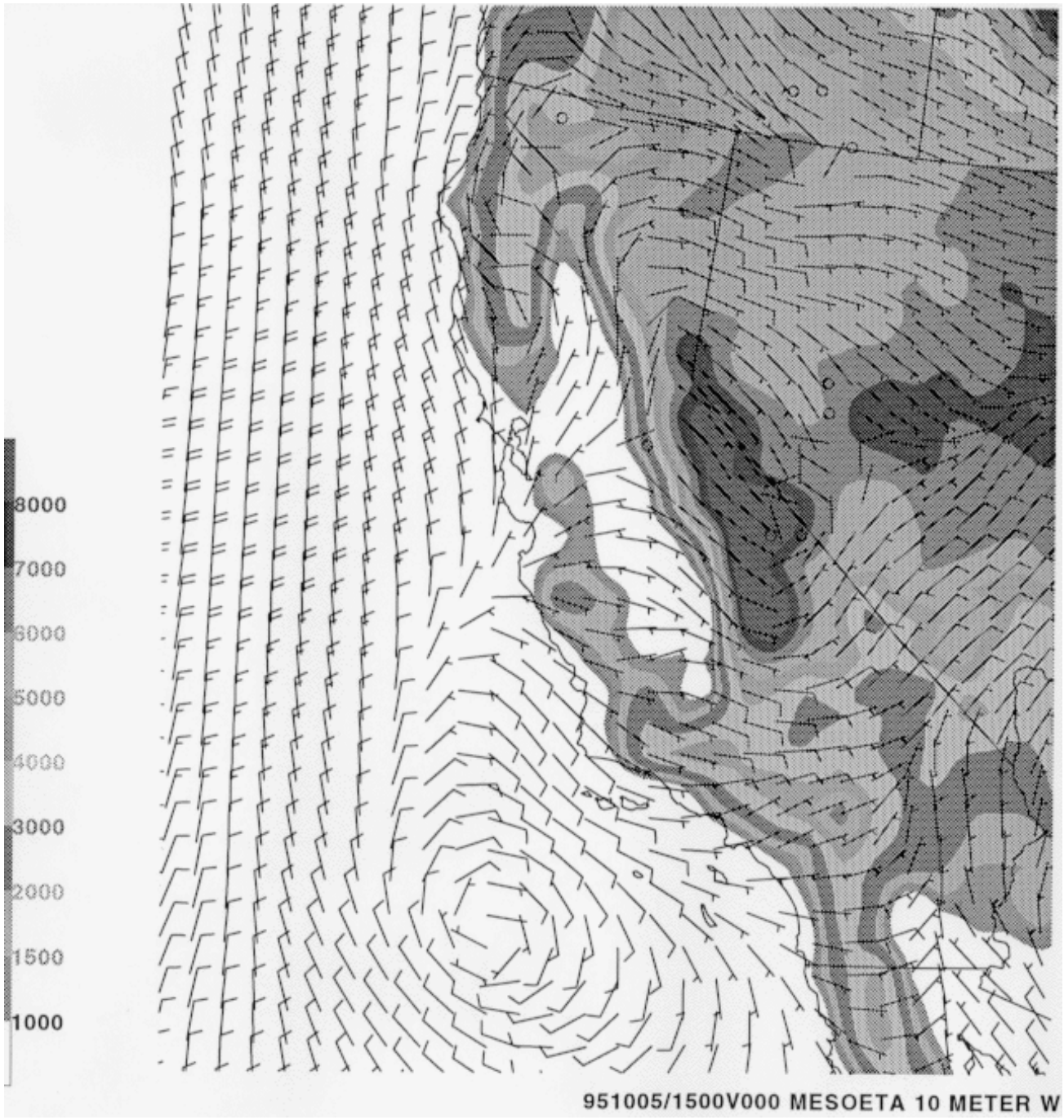


Figure 5 Meso eta 10 m wind field showing the initial conditions for October 5 at 1500 UTC.

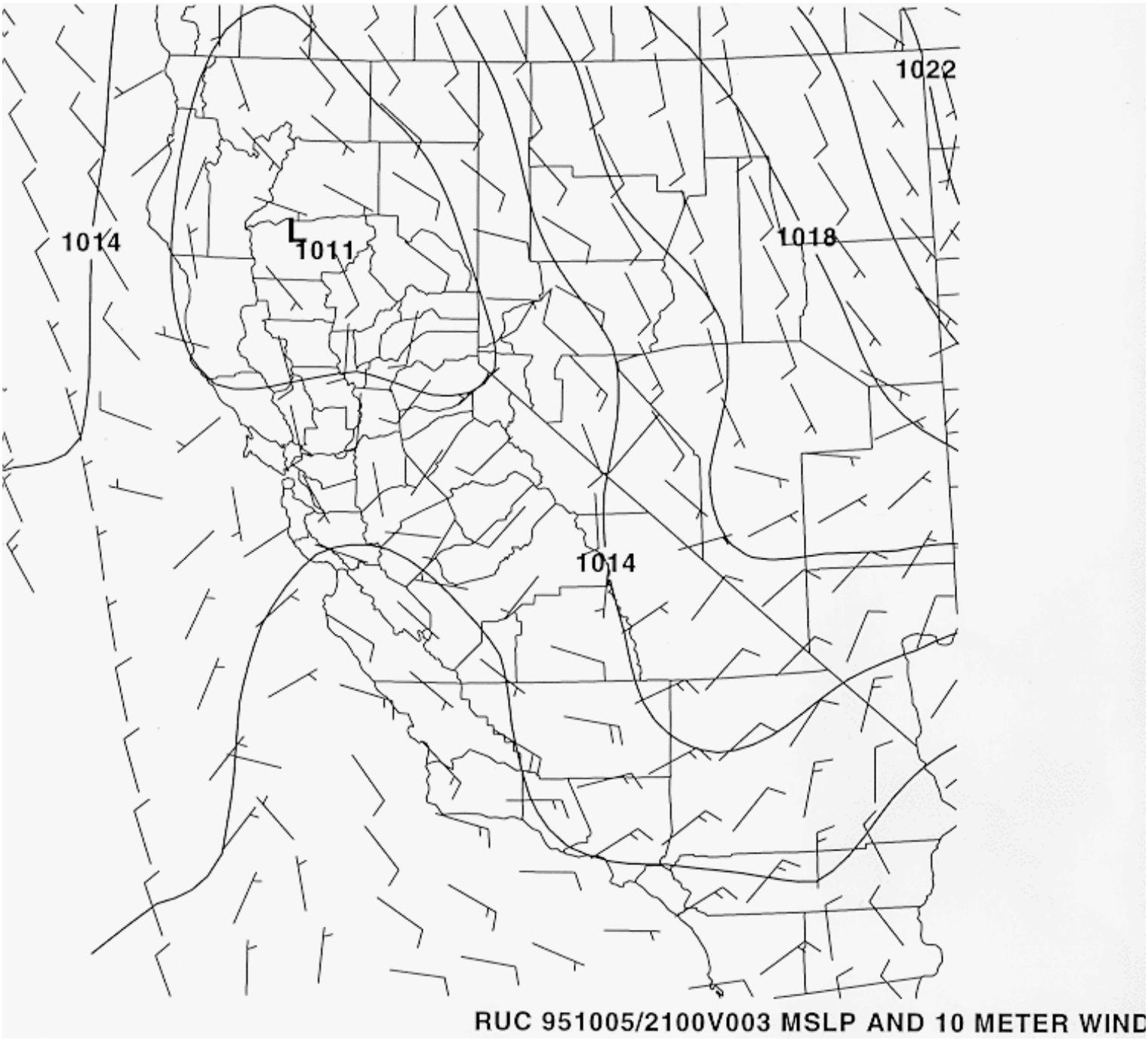

Figure 6 RUC model output for 2100 UTC 5 October showing 10 m winds and mean sea-level pressure.

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Note the region of south to southeast winds correspond fairly well to the stratus boundary shown in the high resolution AVHRR visible imagery.

This brief note has attempted to show how some of the observations available in real time within the forecast office are providing forecasters with a unique opportunity to observe mesoscale phenomena heretofore only documented during detailed field experiments incorporating in-situ research aircraft.

**Bibliography**

Mass, C. F. and M.D. Albright, 1986: Coastal southerlies and along shore surges of the west coast of North America: evidence of mesoscale topographically trapped response to topographic forcing. Mon. Wea. Rev. 115, 1707-1738.

Felsch, P., 1990: Stratus surge prediction along the central California Coast. NOAA Technical Memorandum NWS WR 209. 17pFigure Captions

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