

Figure 1: Assumed error profiles for the background (RUC2; dashed line, default denoted by circle) and upper air data (sonde/wind profiler; solid line, default denoted by square) a) pressure (mb), b) temperature (K), relative humidity, and wind speed ($m s^{-1}$).

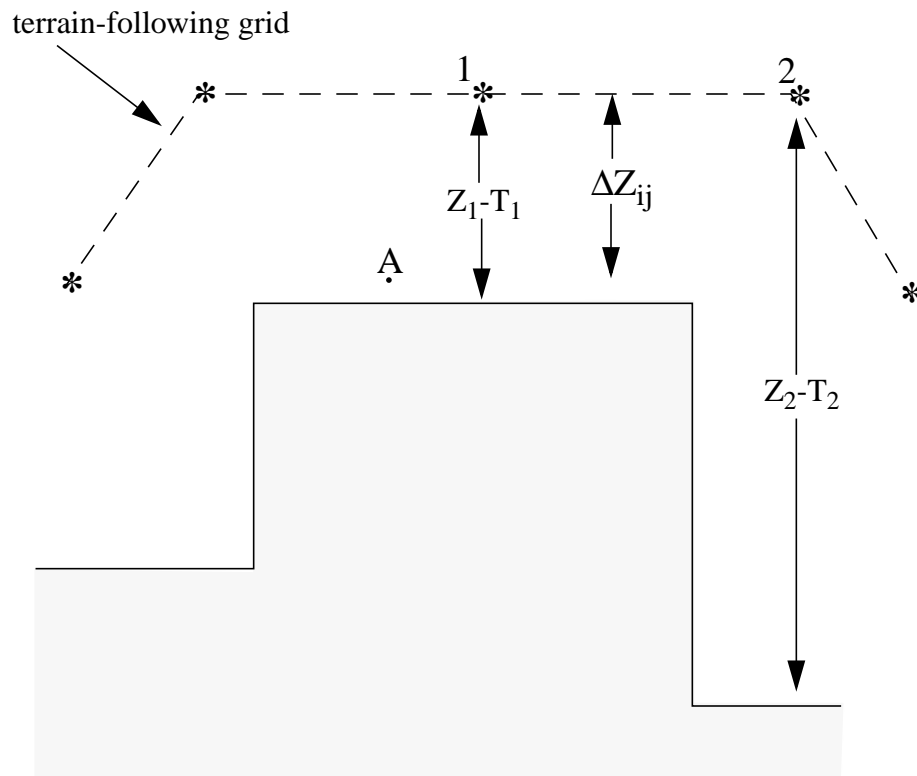


Figure 2: Idealized depiction of ADAS surface (hatched area) and lowest grid level (dashed line). Grid points are denoted by asterisks, the i^{th} grid point elevation by Z_i , the i^{th} grid point *underlying* terrain height T_i , and the vertical distance between the observation A and grid point by ΔZ_{ij} .

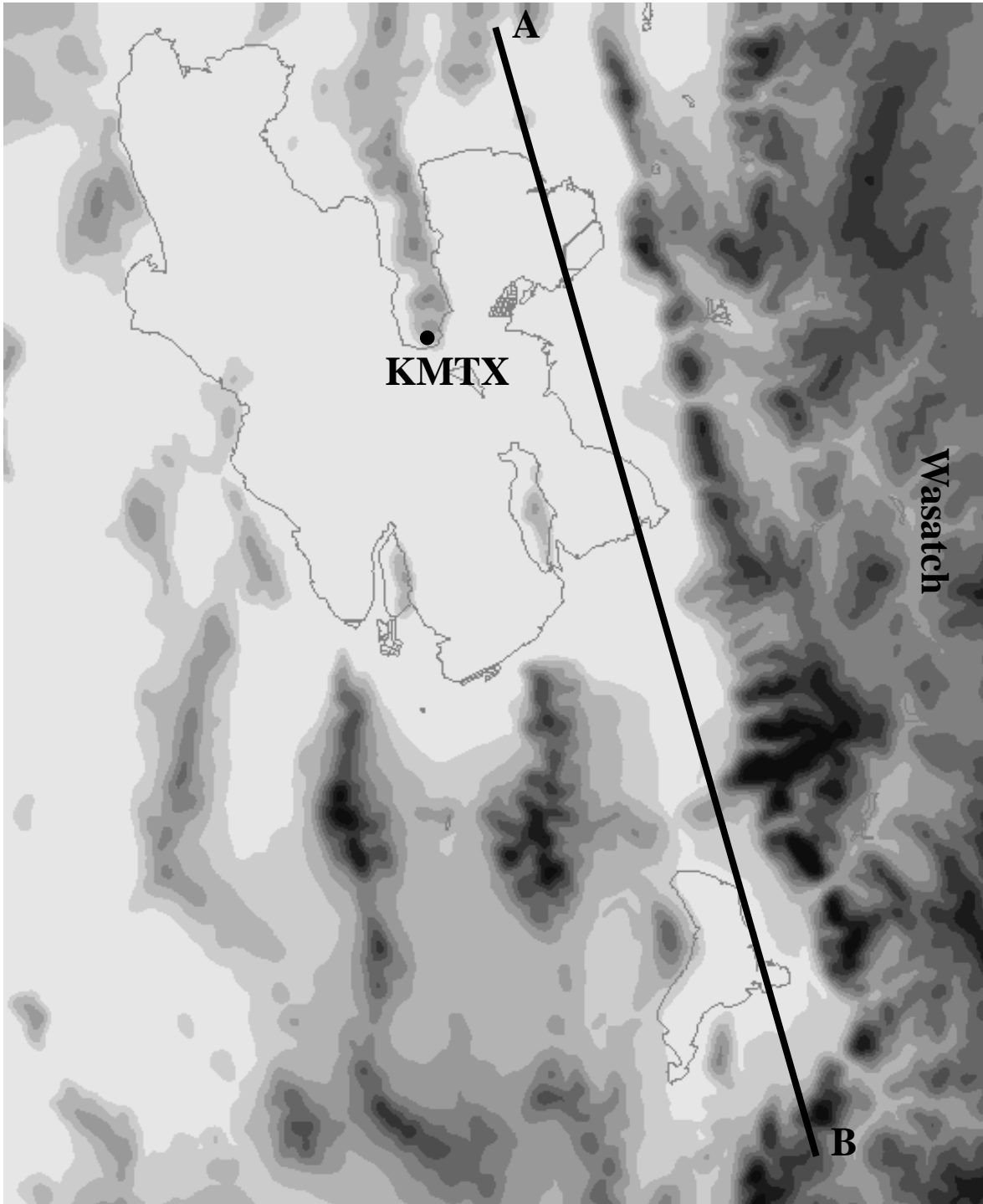


Figure 3: Northwest Utah ADAS domain. Domain dimensions are 218 km x 218 km. The WSR-88D (KMTX) is located at Promontory Point (elevation 2004 m). Line segment AB denotes the vertical cross-sections in Figures 17a-b. Terrain elevations range from 1250 m to the west of the Great Salt Lake to 3300 m over the Wasatch mountains to the east. Light (dark) shading indicates lower (higher) elevations.

ADAS Forecast Cycle for 3-D NW Utah Domain

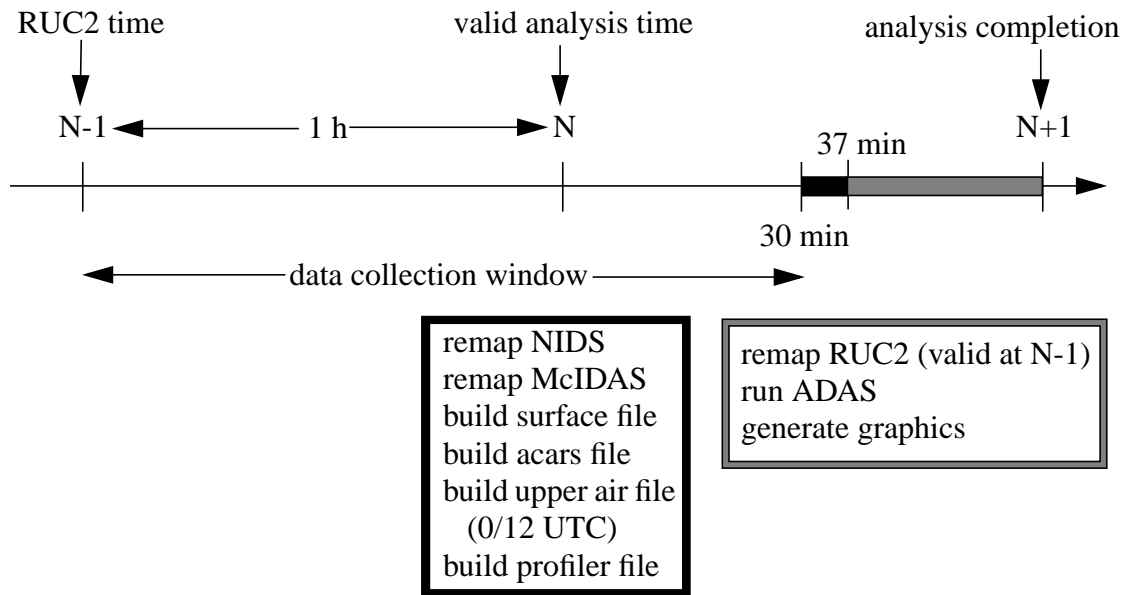


Figure 4: Flow chart for one analysis cycle for the 1km three-dimensional ADAS. Analysis is valid at time N. Total window from N-1 to N+1 is two hours. Note that the RUC2 used for the analysis is from the previous hour.

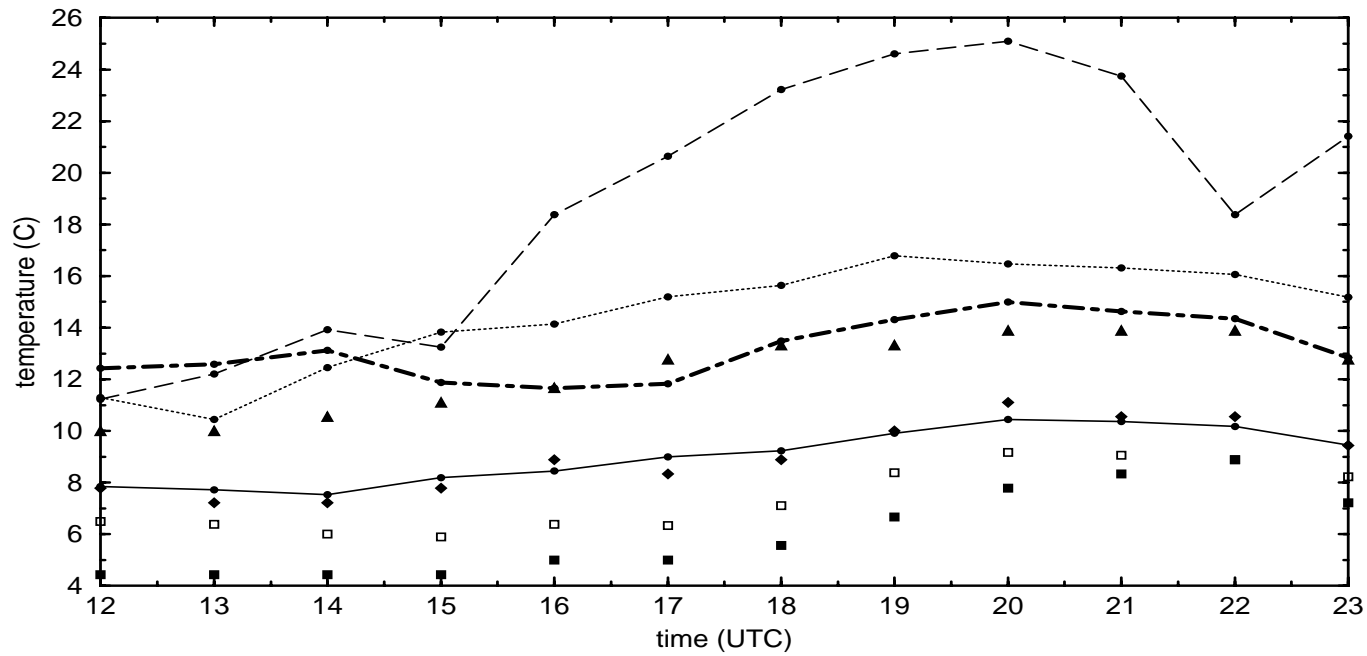


Figure 5: Observed temperature (C) timeseries on 28 April 2001 for Hidden Peak (filled squares), Alta-Collins (diamond), Alta/Germania (open squares), and Alta-Guard House (solid triangles), RUC2 three-dimensional background at surface (dash/dot line), RUC2 surface field (long dash line), ADAS 10 km analysis interpolated to Hidden Peak (dotted line), and ADAS 1km interpolated to Hidden Peak (solid line).

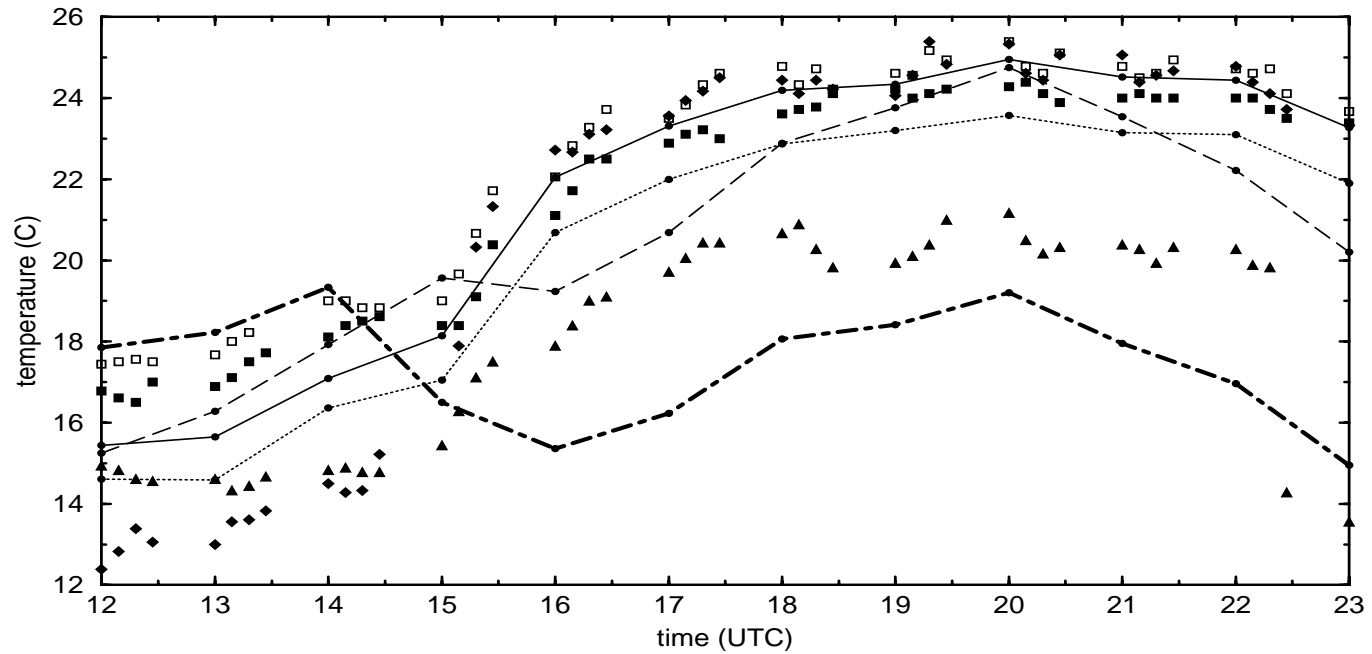


Figure 6: Observed temperature (C) timeseries on 28 April 2001 for Toelle Valley Utah stations MS8 (solid squares), Clover-Russell Lane (diamond), Pennys (open squares), and South Mountain (triangle), and RUC2 three-dimensional background at surface (dot/dash line), RUC2 surface field (long dash line), ADAS 10 km analysis interpolated to MS8 (dotted line), and ADAS 1km interpolated to MS8 (solid line).

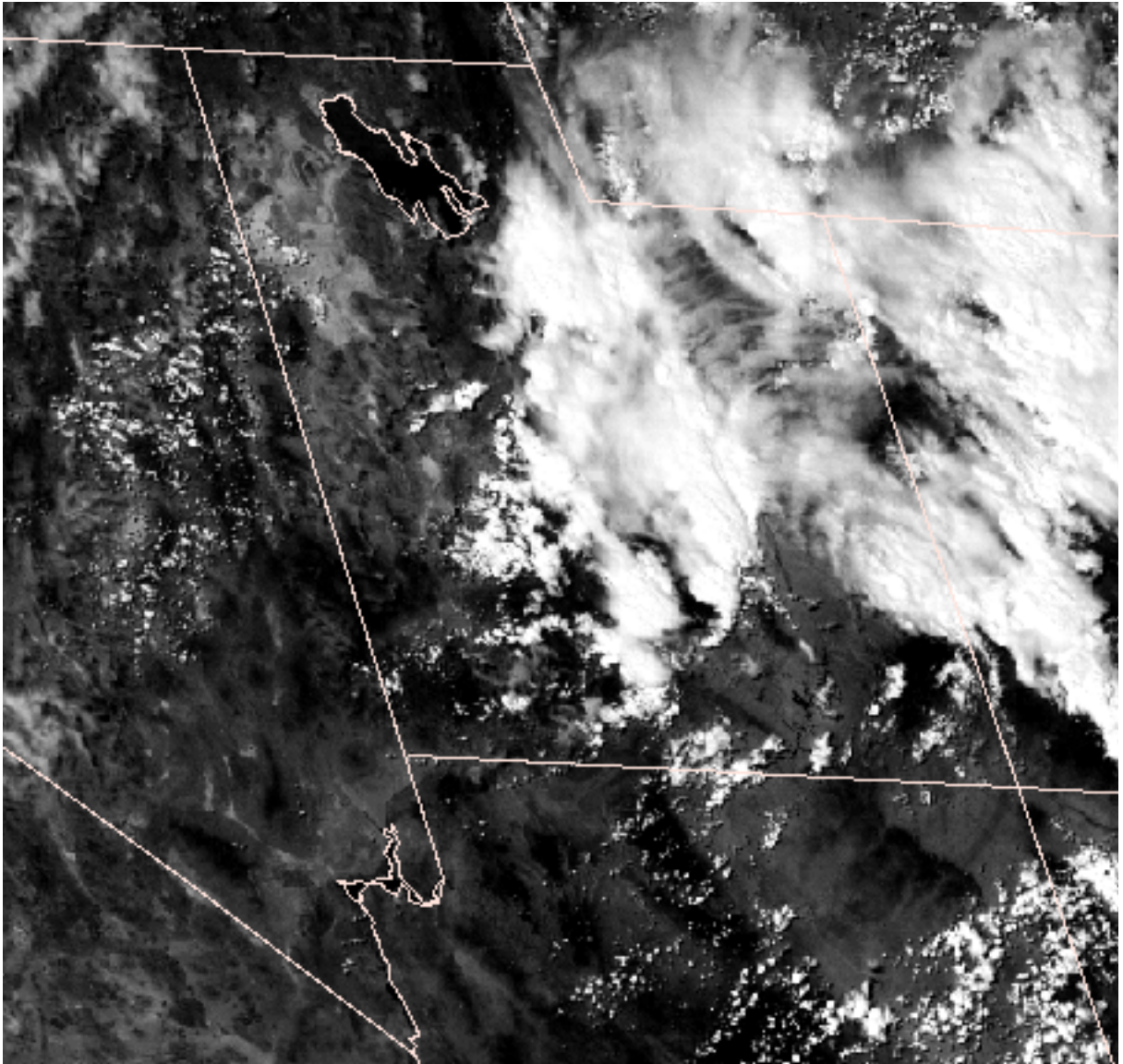


Figure 7: 1 km resolution GOES visible satellite image for 22 UTC 8 September 2000.

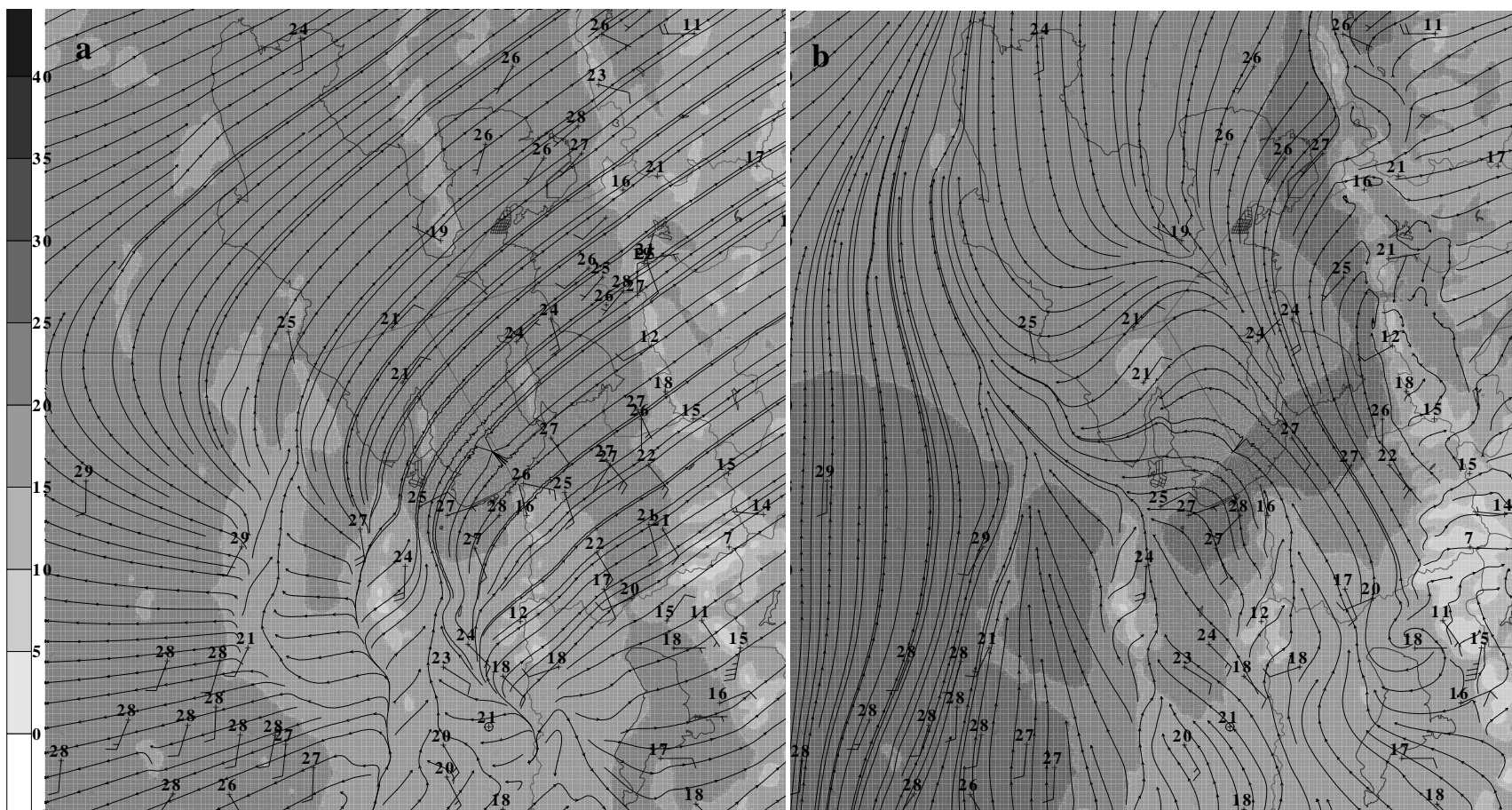


Figure 8: NW Utah domain temperature (C) and streamlines for a) 21 UTC RUC2 interpolated to the ADAS grid, and b) ADAS analysis valid at 22 UTC. 22 UTC surface temperatures (C) are filtered for viewing purposes. Full wind barb is 5 ms⁻¹.

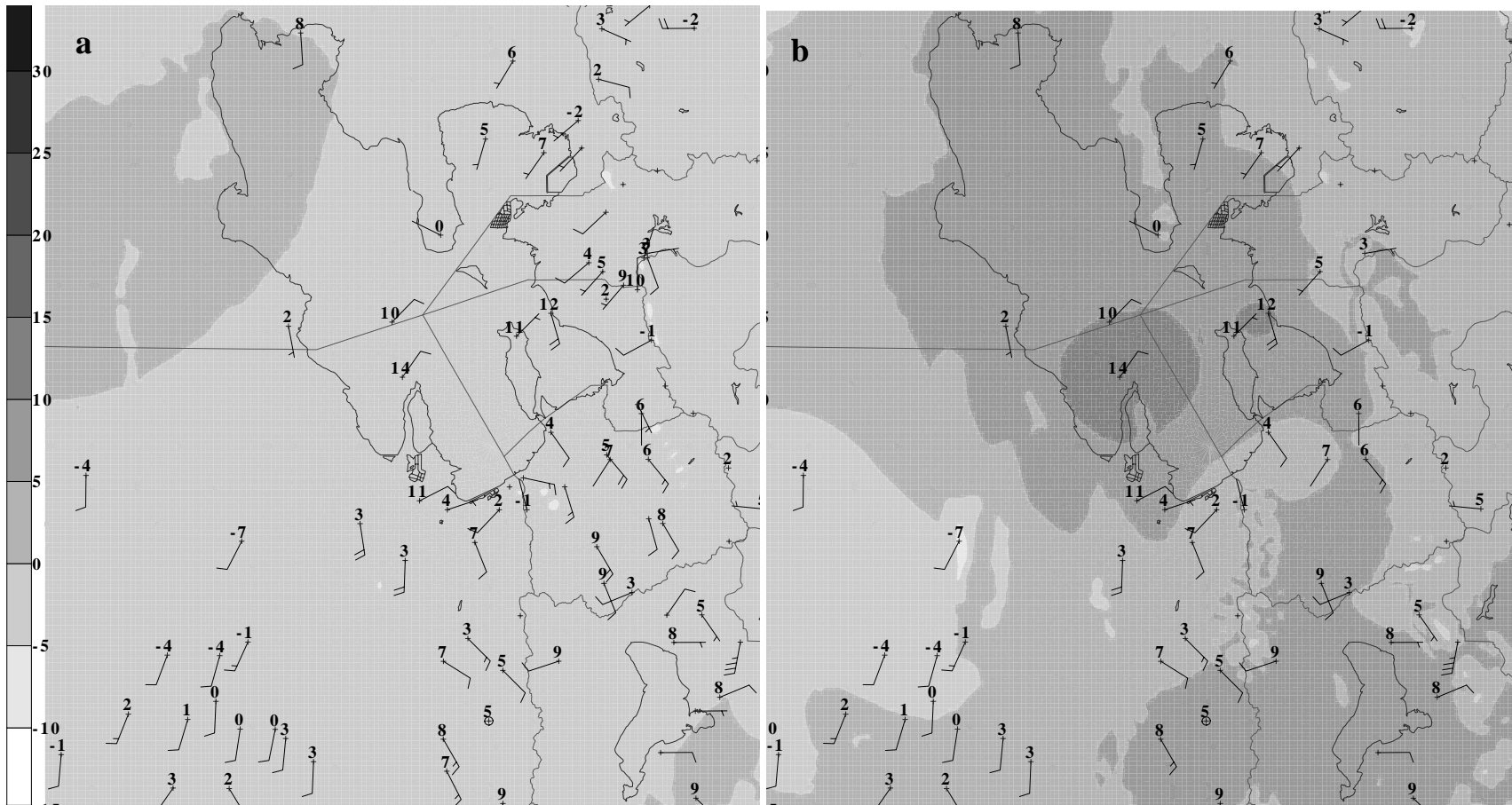


Figure 9: Same as Figure 8 but for dew point temperature (C) for a) 21 UTC RUC2 interpolated to the ADAS grid, and b) ADAS analysis valid at 22 UTC. 22 UTC dew point temperature and wind barbs are plotted.

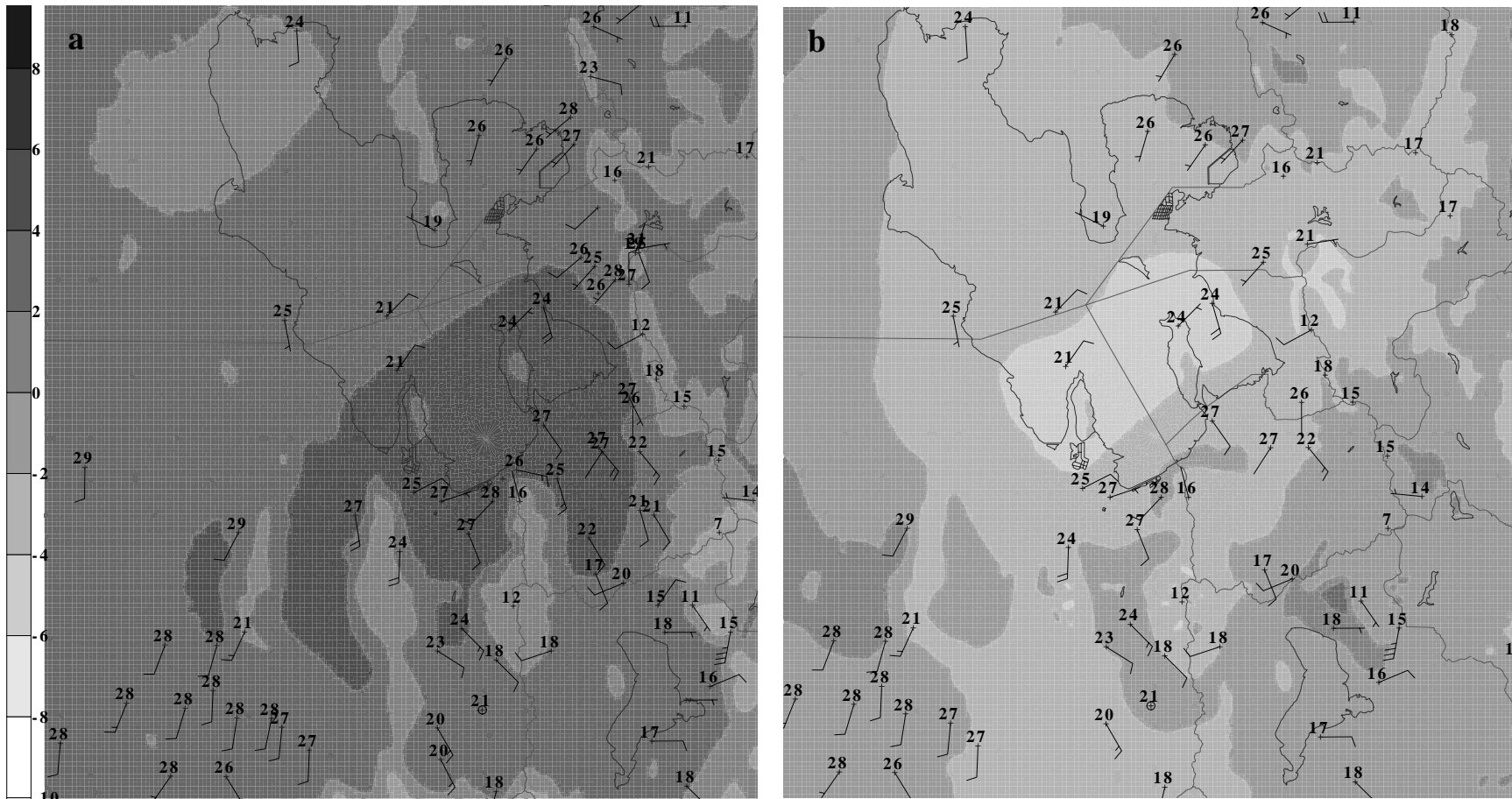


Figure 10: Same as Figure 8 but for lifted index for a) 21 UTC RUC2 interpolated to the ADAS grid, and b) ADAS analysis valid at 22 UTC. 22 UTC surface temperature and wind barbs are plotted.

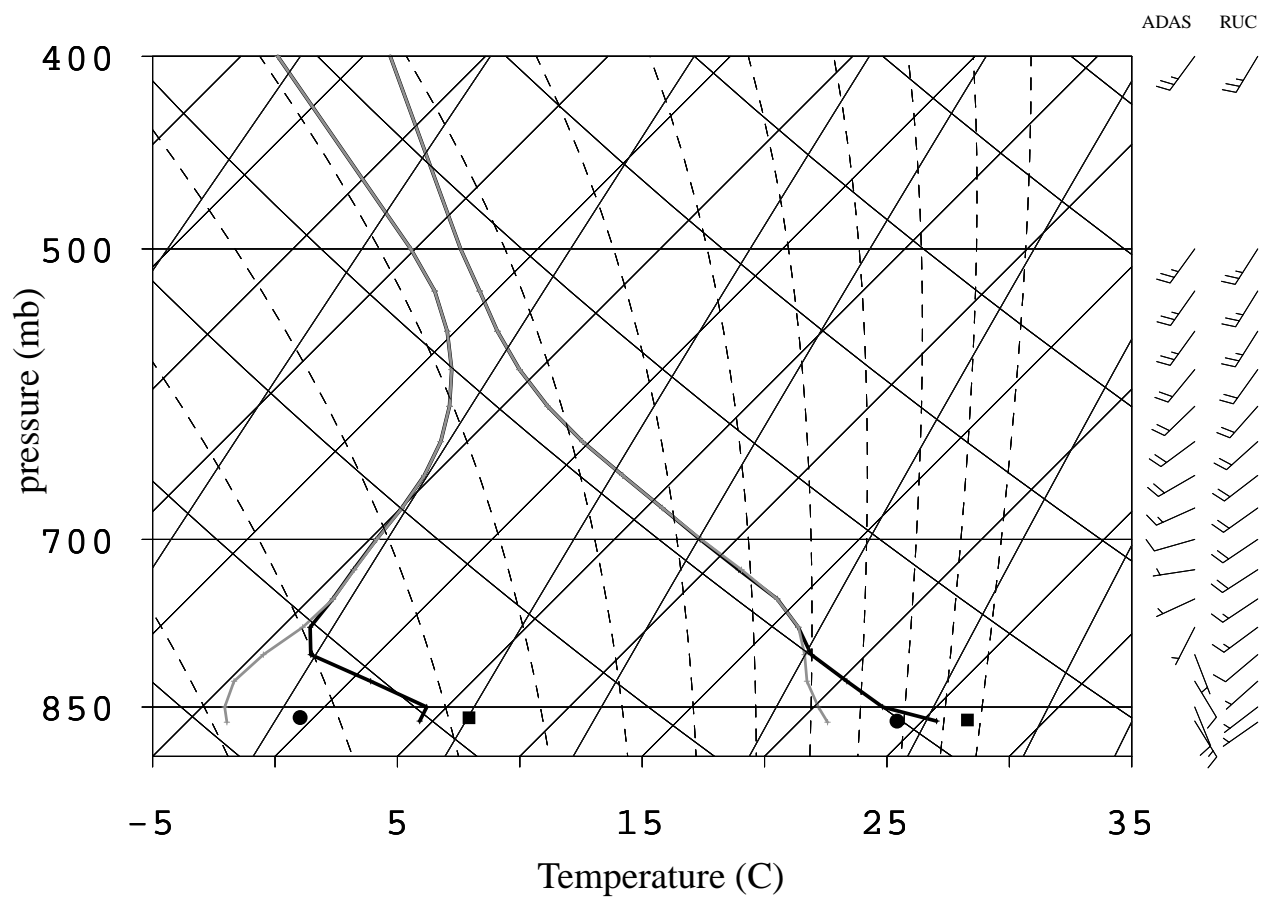


Figure 11: Salt Lake City sounding taken from 8 September 2000 21 UTC RUC2 (gray) interpolated to the ADAS grid and 22 UTC ADAS (black). Circles (squares) indicate 21 (22) UTC RUC2 2 m (Salt Lake City observed) temperature and dew point. RUC winds are given by the far right profile.

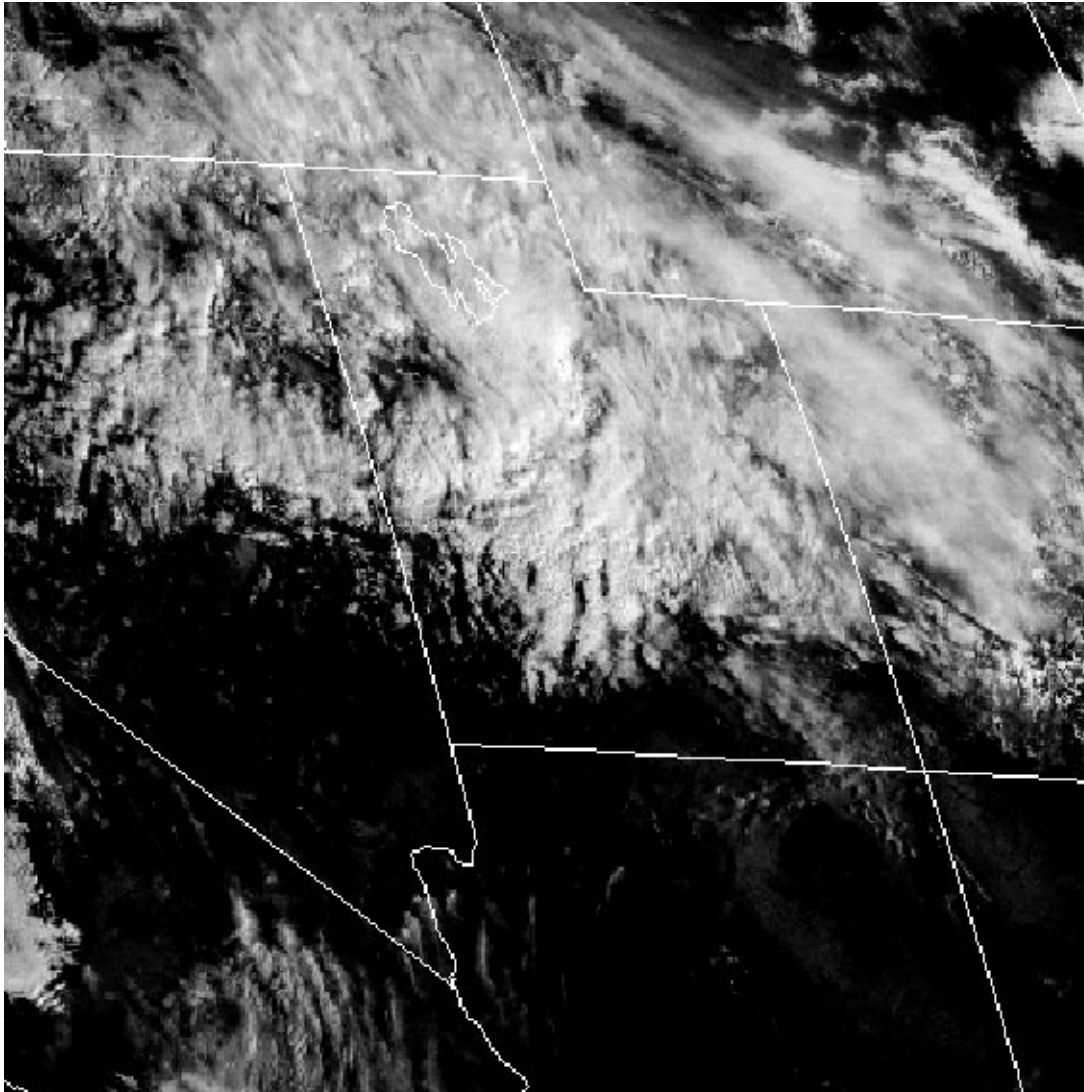


Figure 12: 1 km resolution GOES visible satellite image for 17 UTC 16 March 2001.

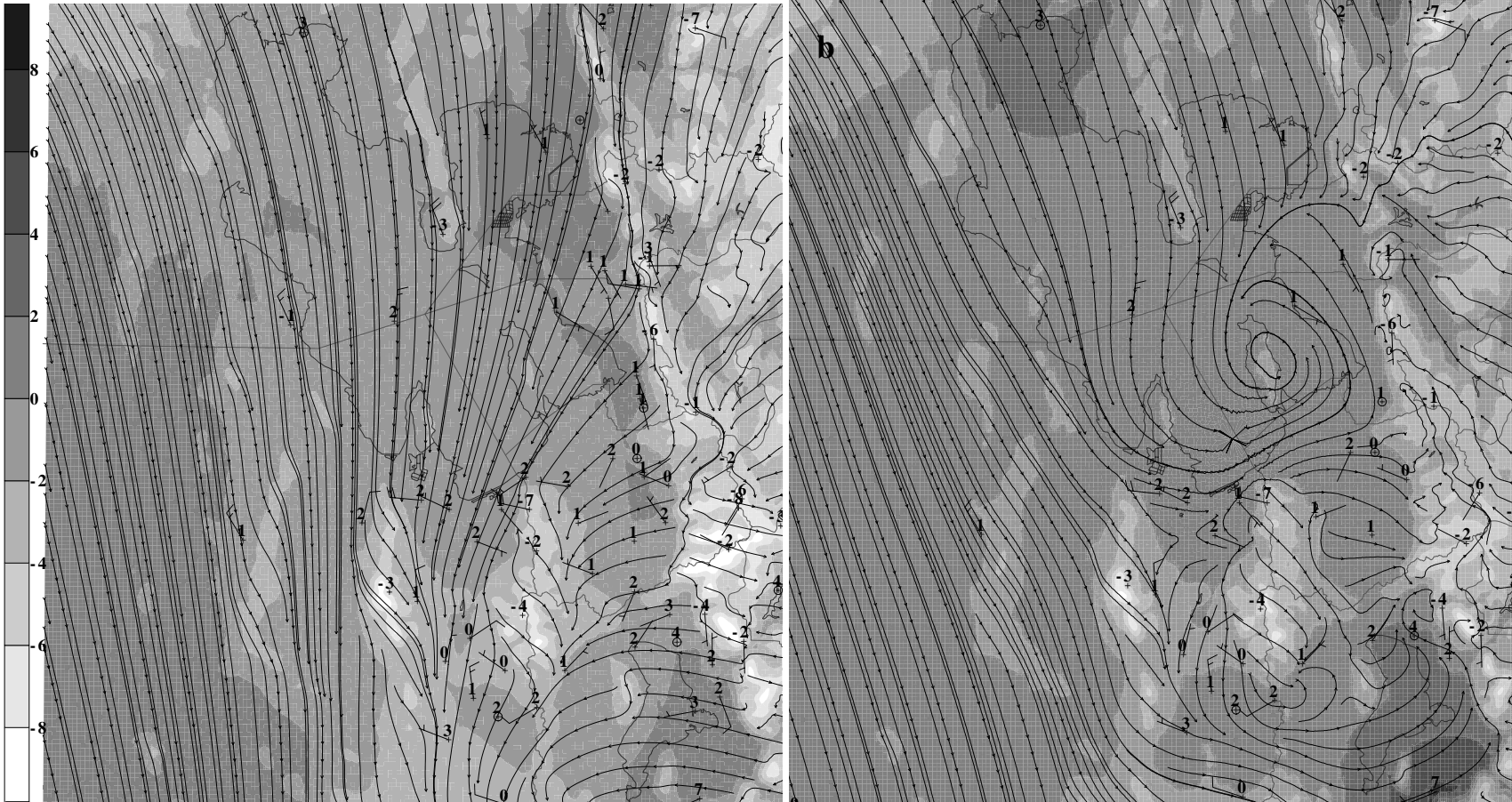


Figure 13: Same as in Fig. 8 but for 16 March 2001 temperature (C) for a) 18 UTC RUC2 interpolated to the ADAS grid, and b) 19 UTC ADAS analysis. 19 UTC temperature and wind barbs are plotted.

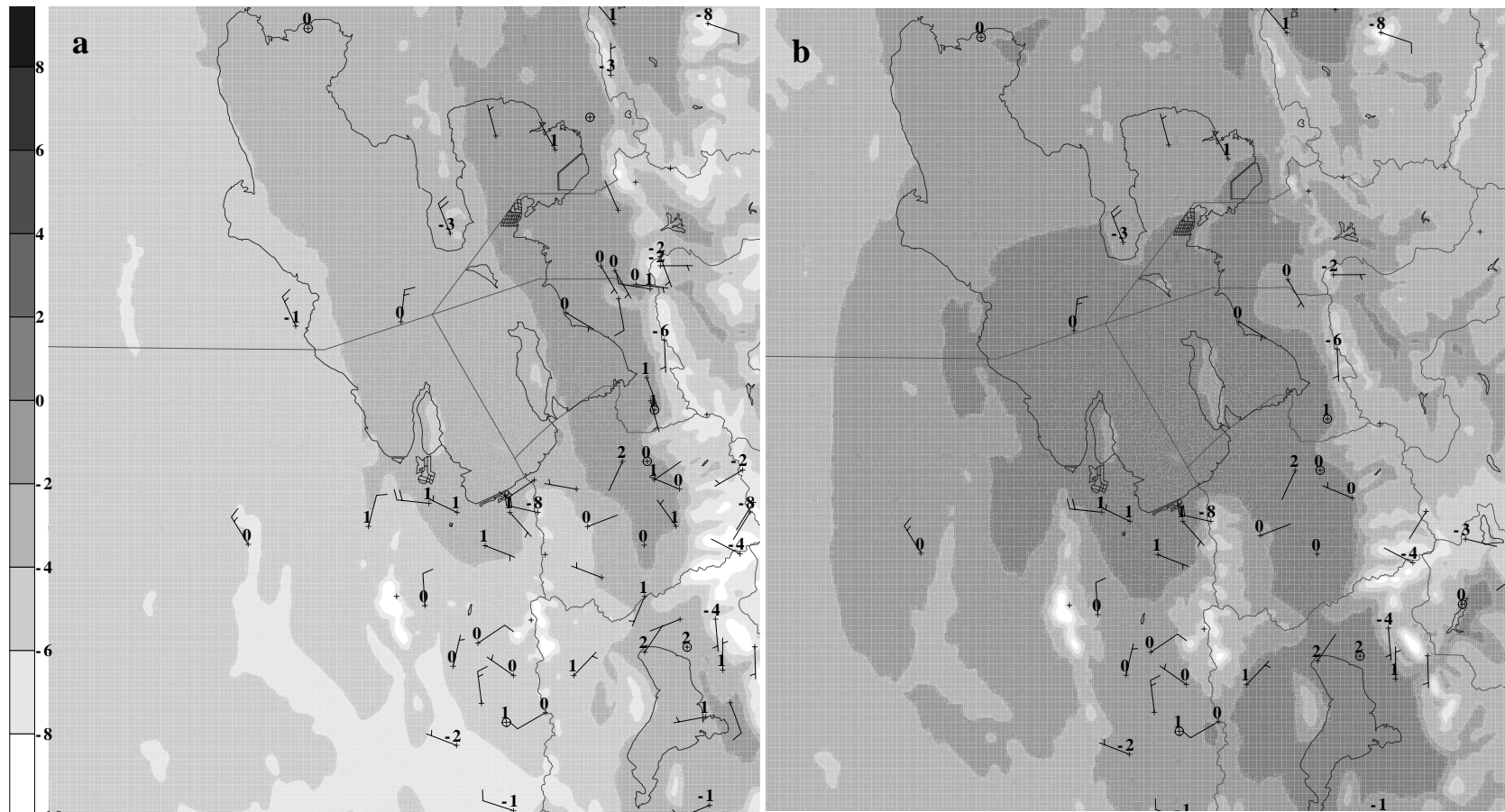


Figure 14: Same as Figure 9 but for 16 March 2001 dew point temperature (C) for a) 18 UTC RUC2 interpolated to the ADAS grid, and b) ADAS analysis valid at 19 UTC. 19 UTC dew point temperature and wind barbs are plotted.

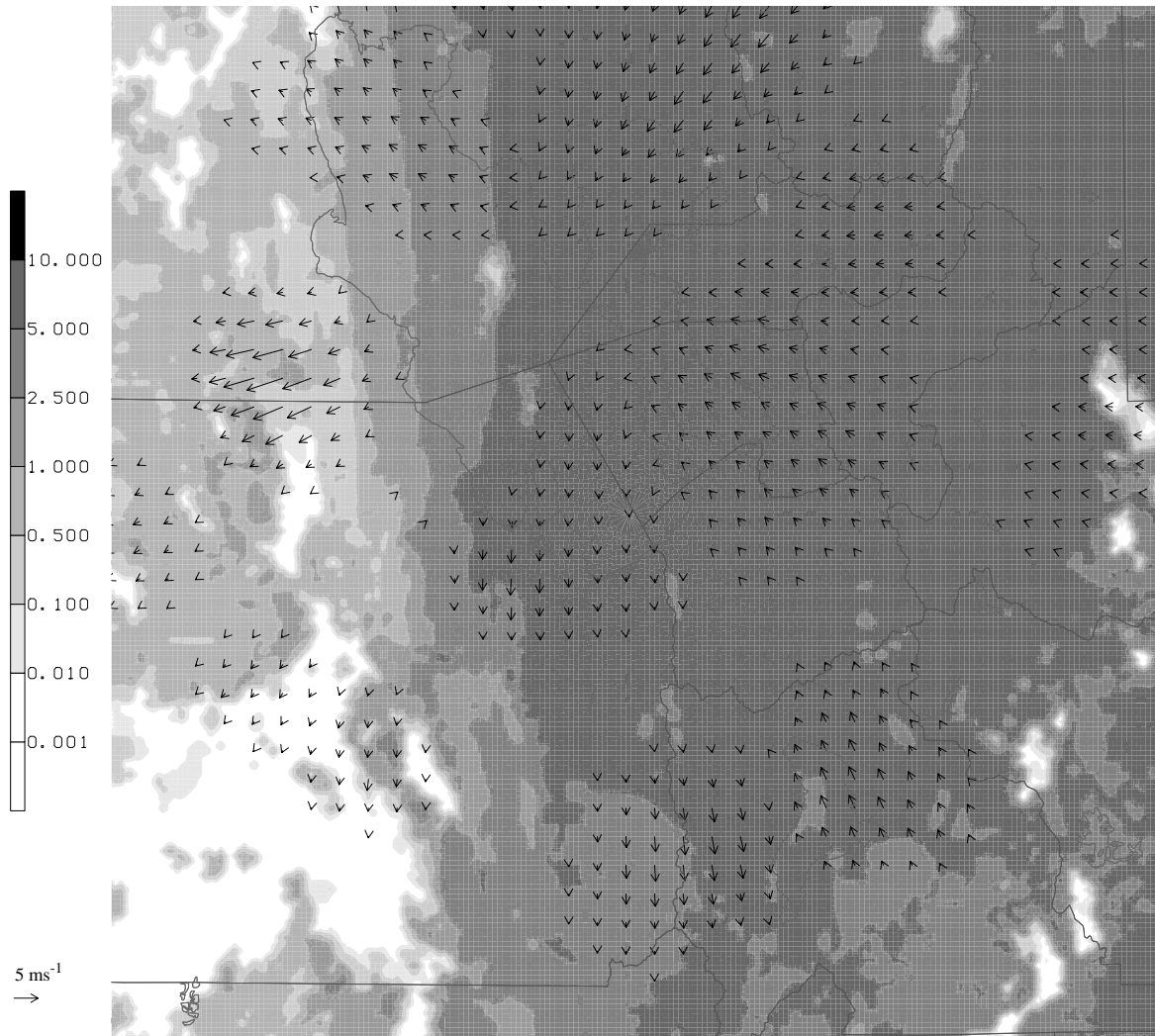


Figure 15: 600 mb total water q_t (cloud ice + cloud water + rain + snow + graupel, g kg^{-1}) from cloud analysis and difference winds (m s^{-1}) for ADAS with and without radar radial winds. Analysis valid for 17 UTC 16 March 2000.

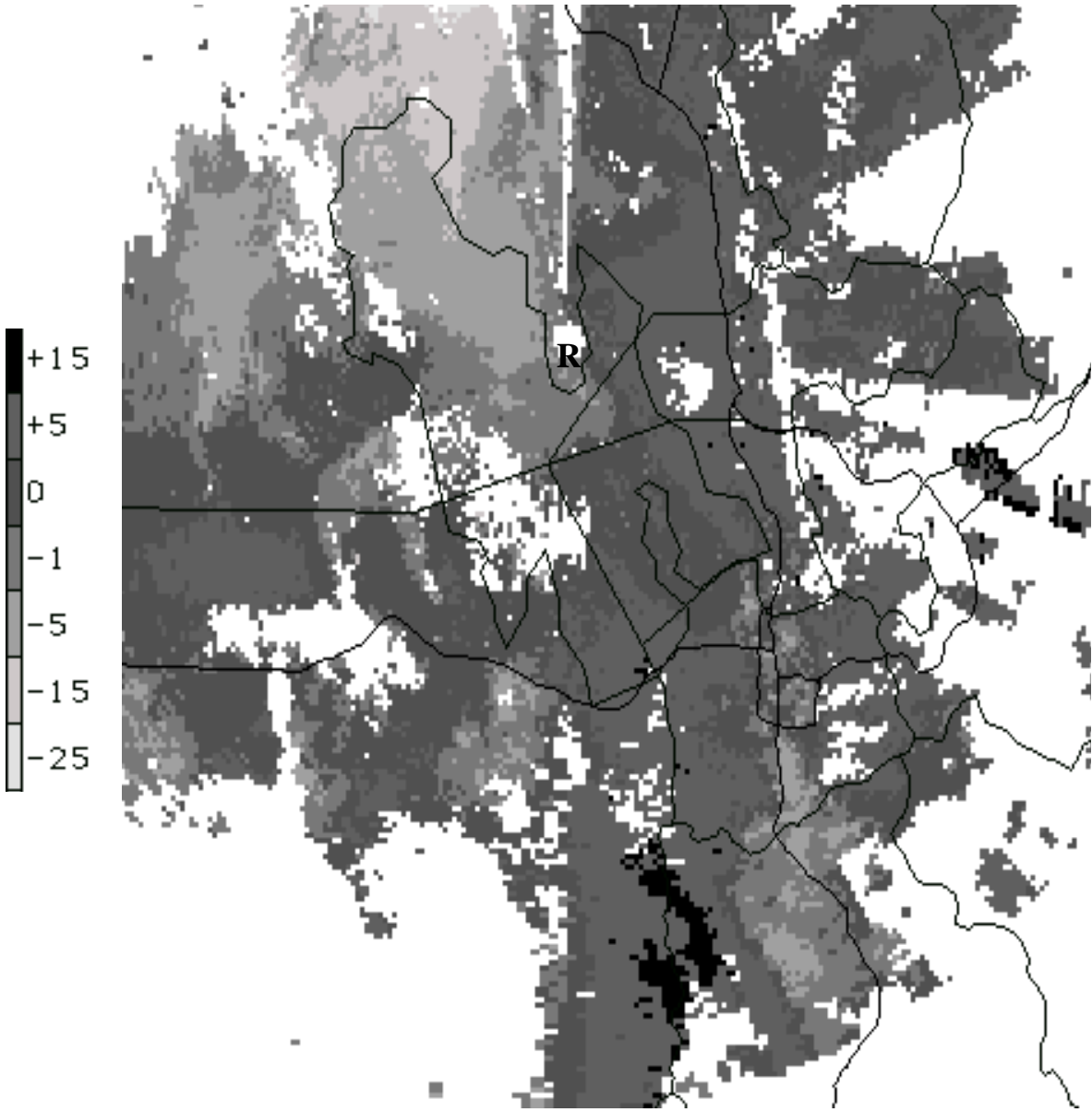


Figure 16: Radial velocity (m s^{-1}) from WSR-88D KMTX radar for 1645 UTC 16 March 2001. Inbound winds are indicated by values < 0 (lighter shading) and outbound by values > 0 (darker shading). Cross-section is at an elevation of 0.5 degrees with the radar location given by an 'R'.

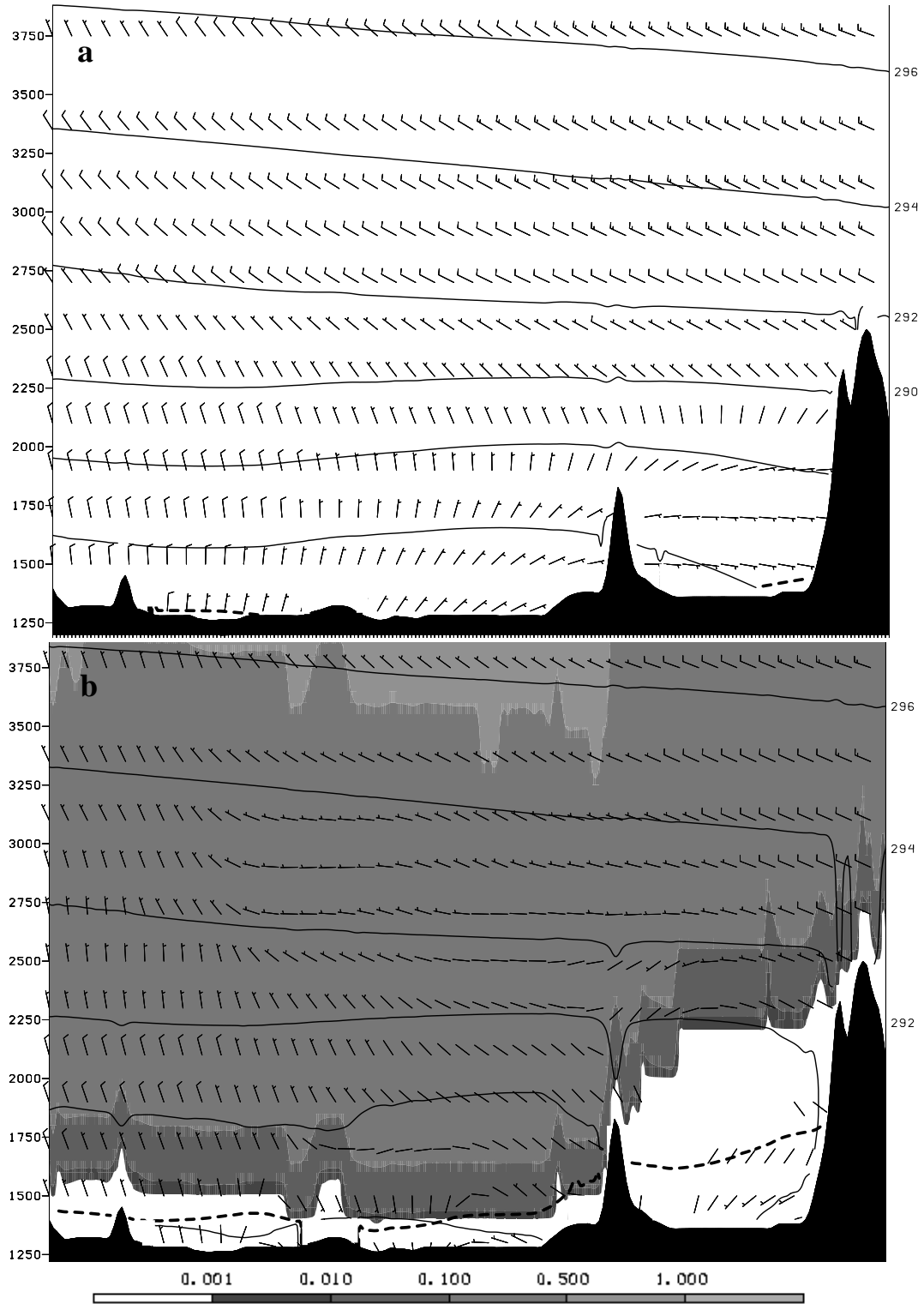


Figure 17: North-south vertical cross-section along the Wasatch front (line segment AB in Fig. 2) 16 March 2001 for a) 18 UTC RUC2 interpolated to the ADAS grid, and b) ADAS analysis valid at 19 UTC. Gray shading represents total cloud water/ice (g kg^{-1}) as indicated by scale. The freezing isotherm is depicted as a thick dashed line and potential temperature (K) as thin lines. Full wind barb is 5 m s^{-1} .

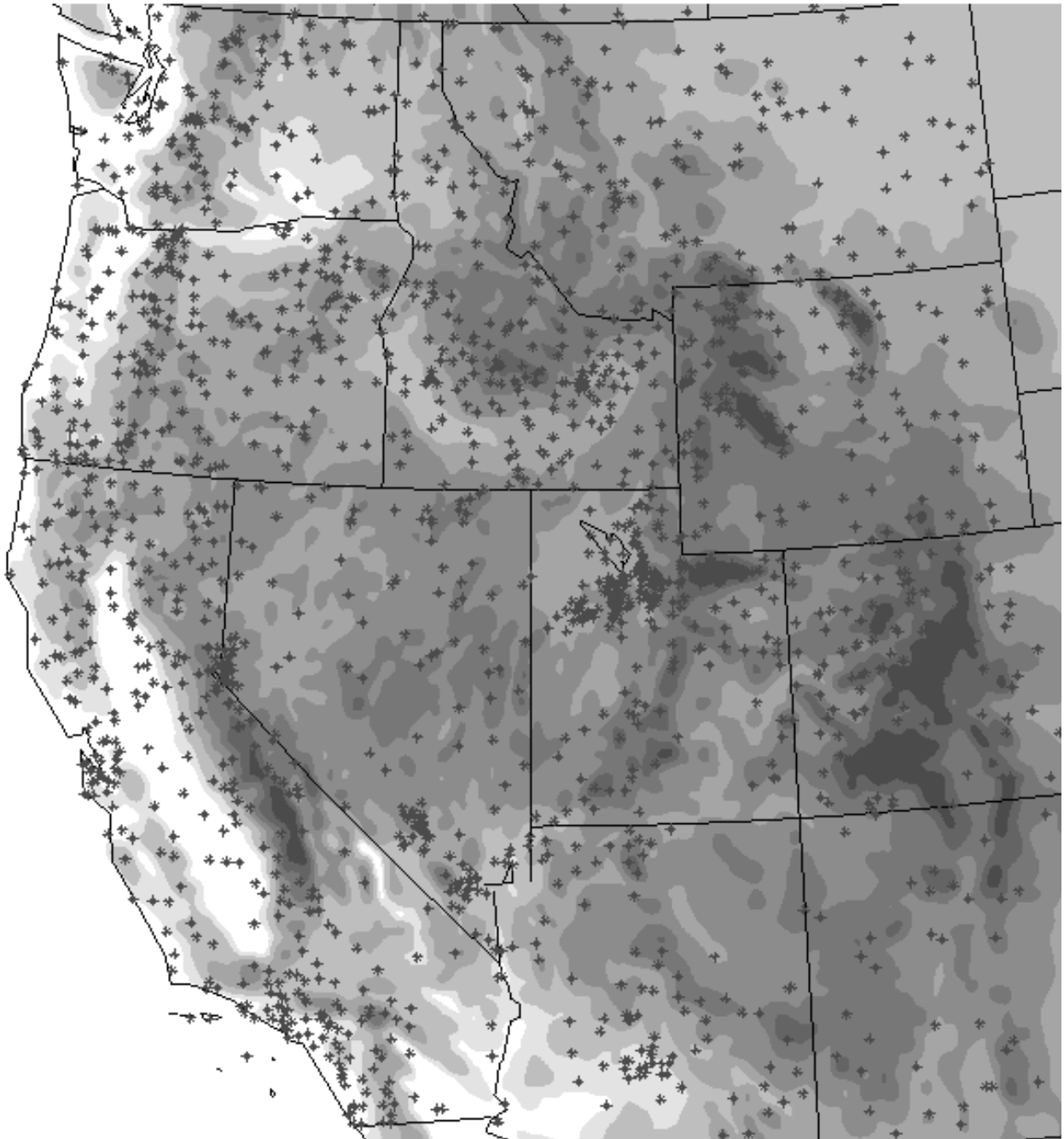


Figure 19: ADAS terrain over the western United States at 10 km resolution (m; darker shading indicates higher elevation). Surface observations valid between 2000-2100 UTC 28 April 2000 are indicated by asterisks

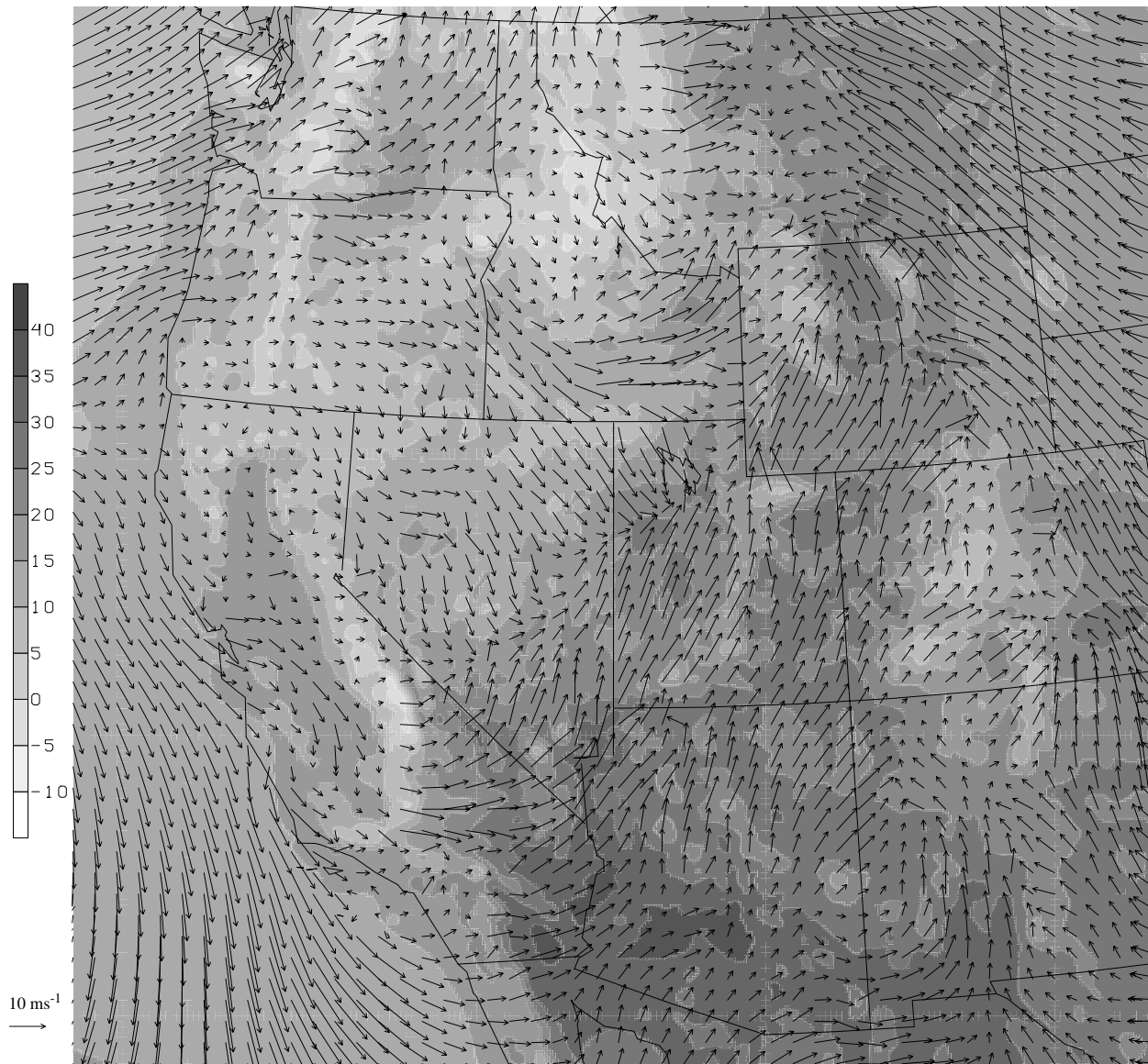


Figure 20: ADAS analysis of surface temperature (C according to the scale) and wind (m/s; scale in lower left; every fourth vector plotted) at 2100 UTC 28 April 2000.

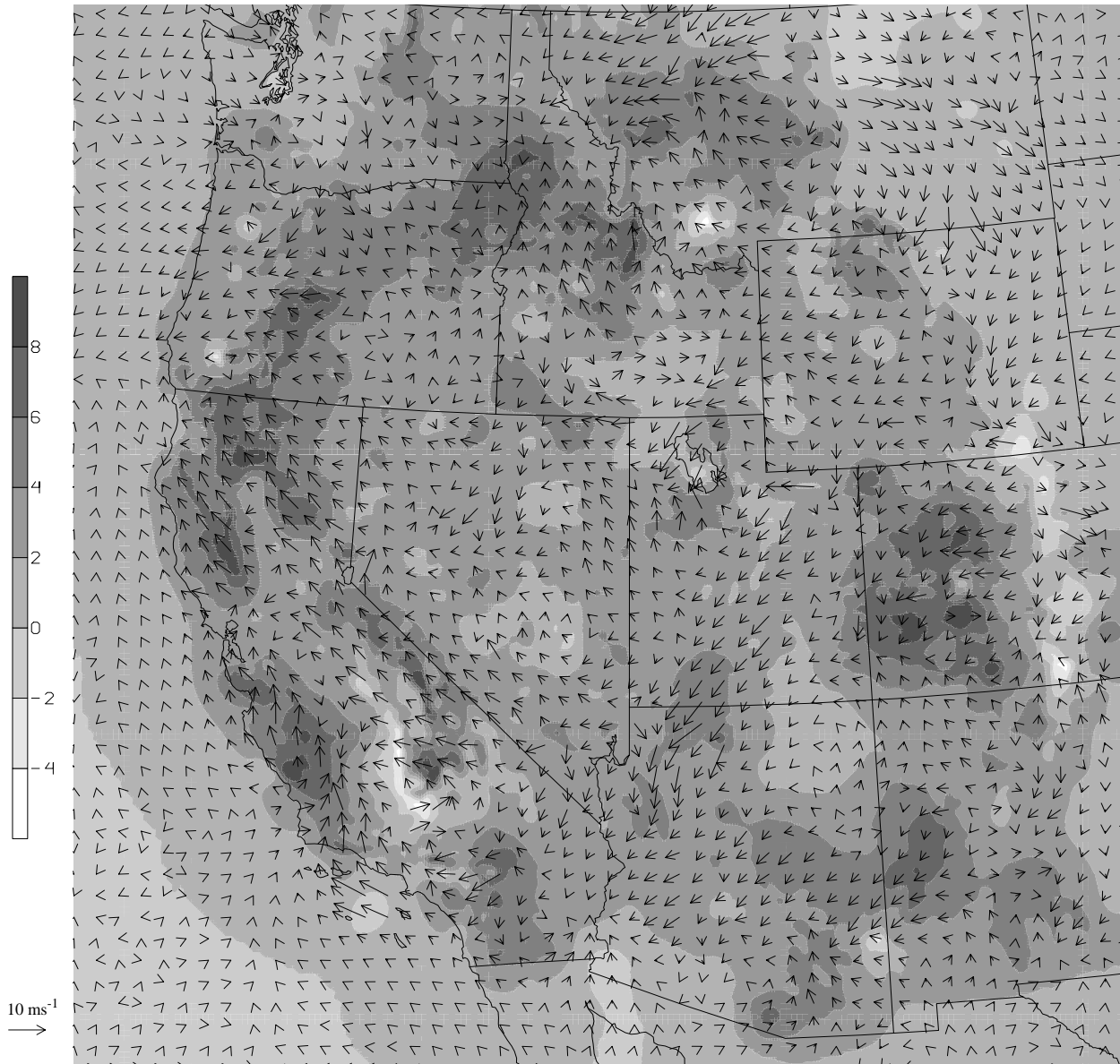


Figure 21: Difference between ADAS analysis and RUC2 background of surface temperature (C, according to the scale) and wind (m/s; scale given by vector length in lower left; every fourth vector plotted) at 2100 UTC 28 April 2000.

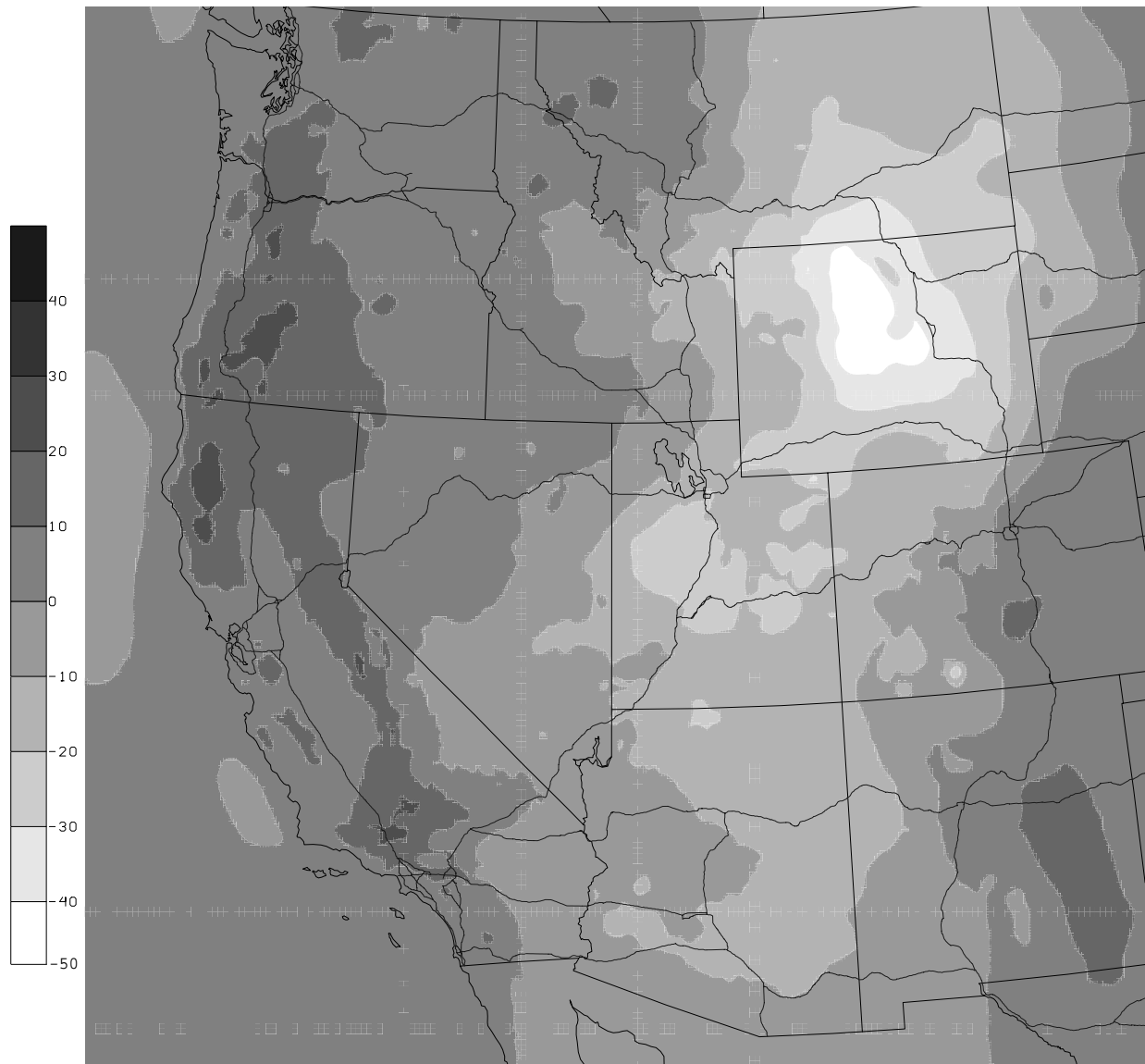


Figure 22: 24-h change in surface temperature (C) as analyzed by ADAS between 2100 UTC 28-29 April 2000.