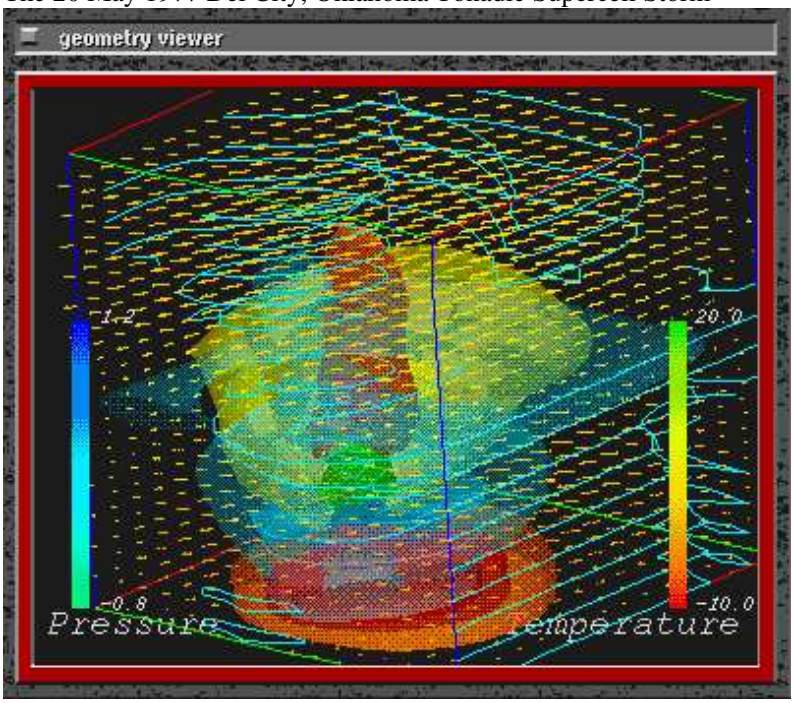
Grand Challenge Tornado Simulation Model

The 20 May 1977 Del City, Oklahoma Tonadic Supercell Storm



SUMMARY

We have implemented a Grand Challenge regional weather prediction model on HPCC systems. This is a message−passing system called mpARPS. Using AVS, we simulate and visualize a tornadic supercell (the 20 May 1977 Del city, Oklahoma storm). The model grid size is 16x16x16, and the grid interval is 3.0 km in the horizontal and 1.0 km in the vertical. The physical domain size is 39x39x13 Km.

The storm was initialed by an isolated thermal bubble, which was centered at x=30 km, y=15 km, z=1.5 km of the domain. The radius of the bubble was 10 km inx and y directions and 1.5 km in vertical direction. The initial potential temperature perturbation was 4 degrees. Other parameters can be refrenced in arps31.input file.

The demostration of tornado simulation will stop after 200 seconds, although the simulation will run for one hour. Each simulation update is 6 seconds. There are temperature, pressure, and wind velocity in the display. User can play around with third mouse button to rotate the bounding box. The temperature and pressure are shown by coloring distribution between maximum and minimun values and also by isosurface.

SIMULATION ON−DEMAND DEMO

REFERENCES

1. N.−T. Lin, K. Mills, Y.C. Chen, K. Droegemeier, and M. Xue, 1993: A Message−Passing Version of the Advanced Regional Prediction System (mpARPS), Technical Report SCCS−529.

2. K. Droegemeier, M. Xue, K. Johnson, M. O'Keefe, A. Sawdey, G. Sabot, S. Wholey, K. Mills, and N.−T. Lin: Design and Implementation of a Scalable Parallel Storm−scale Numerical Weather Prediction Model, High Performance Computing, Nov. 1993 (Technical Report SCCS 576).

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