

1. Title: Analysis of Doppler Lidar Wind Measurements

2. Research Investigators Involved:

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3. Significant Accomplishments:

New analysis methods were developed and refined for the synthesis of wind fields from multiple Doppler radar data. Considerable software was written and debugged for wind field synthesis. The analysis methods have been applied to radar data collected during the CCOPE experiment in which lidar wind measurements were also made.

The analysis method differs from existing methods in that interpolation (using filters with assigned weights) and advection of data, to account for time differential between data acquisition at different points, are not used. Instead, we use functional fits in space and time coordinates to transfer radial velocity data to a space-time grid. Subsequently the wind synthesis is performed. This method gives better space resolution in the synthesized winds, compared to other methods in common use, by better preserving the gradients of velocities.

The CCOPE Doppler radar data analyzed pertain to observations in the clear air in the well-mixed convective boundary layer. Radar chaff was used as a tracer of the air motions. A few sample wind fields obtained by the method are shown. The radar baselines are shown by the straight lines.

The wind fields show the cellular structure characteristic of boundary-layer convection. Also evident in the analysis are the sharp transitions and gradients in the wind field which have been preserved by the synthesis.

4. Focus of Current Research Activities:

- Compilation of a complete set of high resolution wind data, similar to the ones attached, from an analysis of the radar data.
- Calculations of divergence and vertical air velocity fields.
- Calculation of trajectories of air particles.

5. Plans for FY-85:

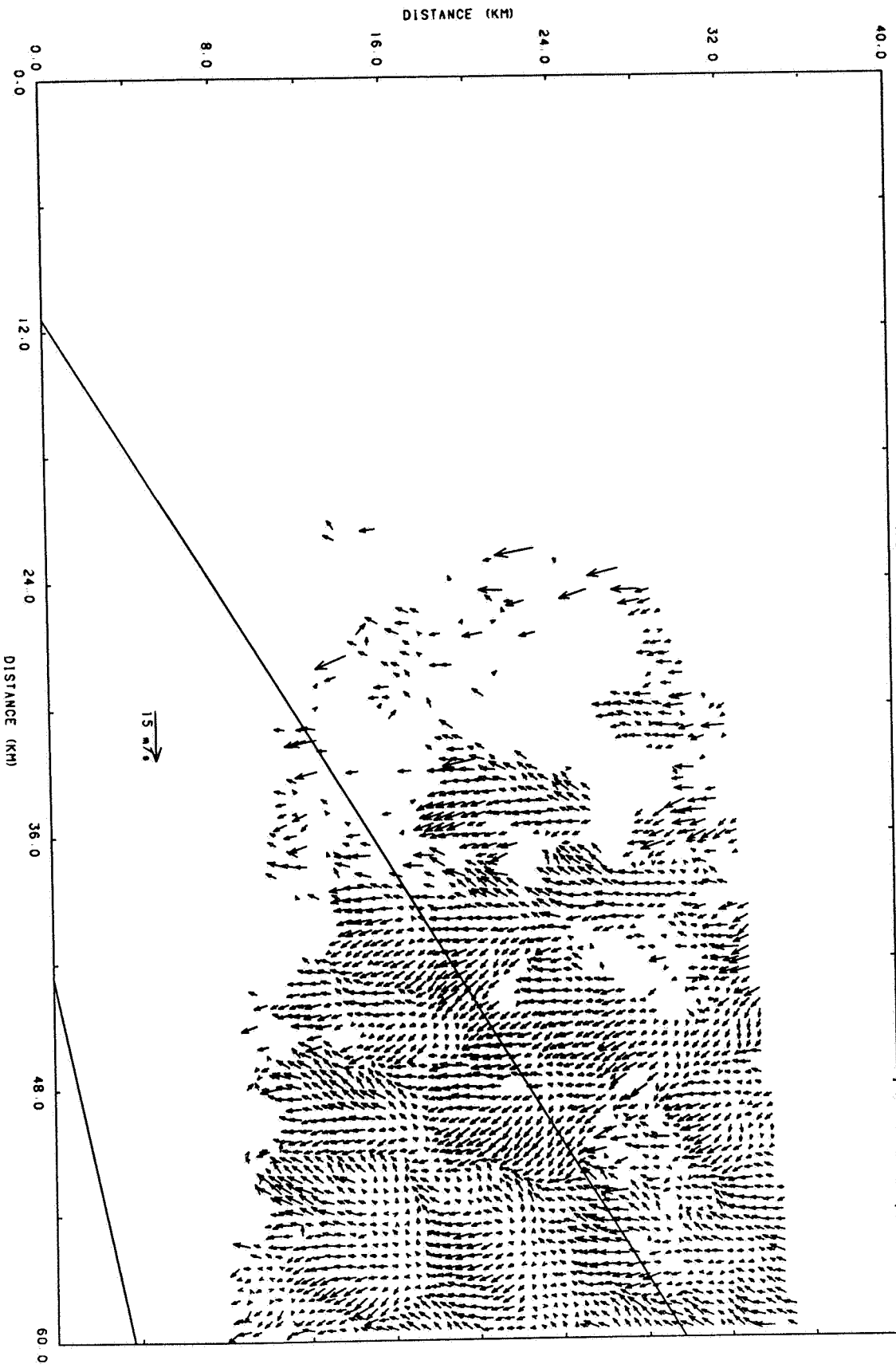
- Interpretation of the above wind data in terms of the physics of turbulent convection in the boundary layer.
- Spectral and moment transport characteristics of the wind field may be calculated.
- An attempt may also be made to retrieve thermodynamic data from the time sequence of the high resolution wind fields.

6. Recommendations for New Research:

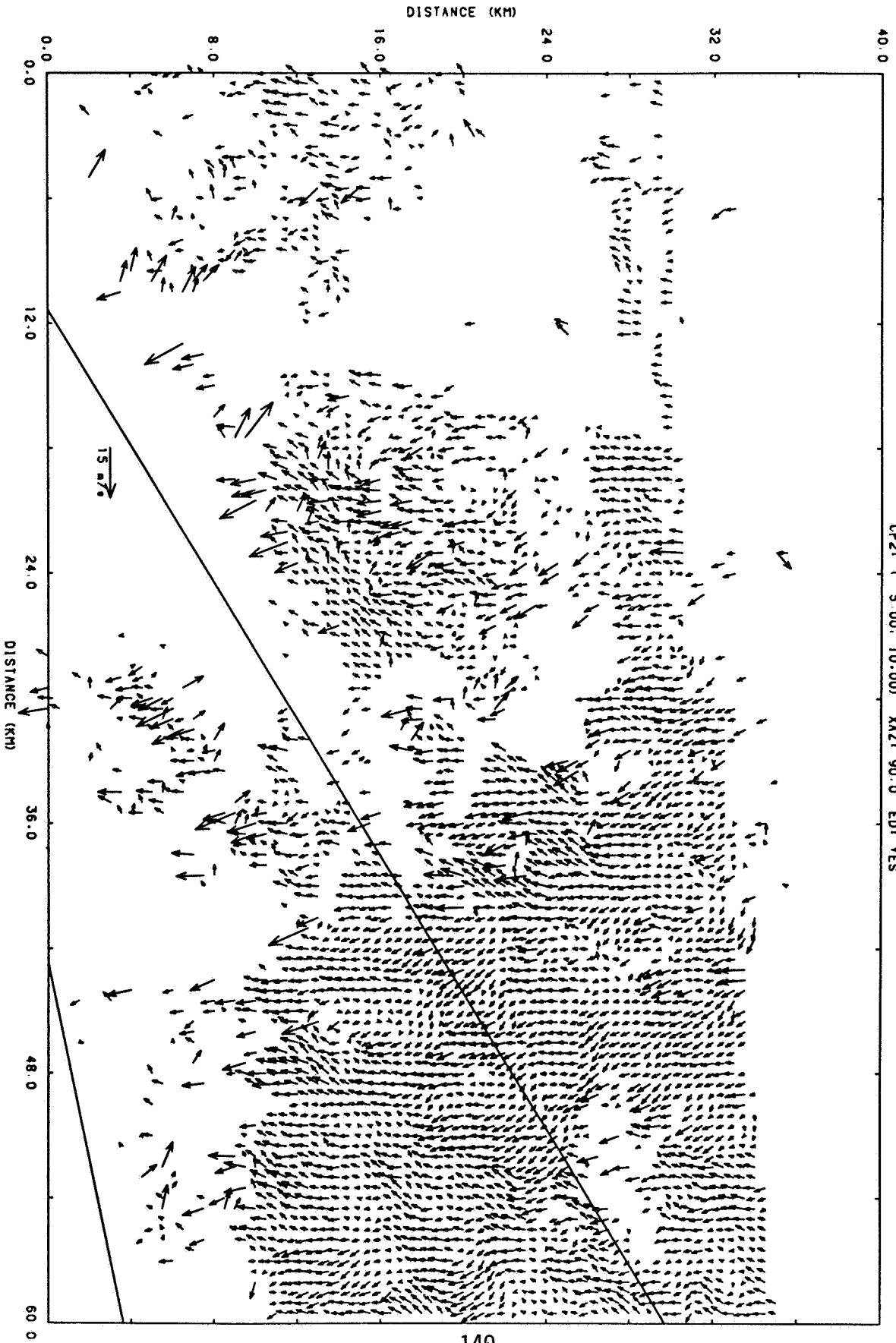
- a. Study of the detailed wind structure in the vicinity of an evolving inversion in the lower atmosphere. The lidar measurements should be supplemented by measurements by microwave radar and high resolution profiling of thermodynamic parameters, and perhaps other quantities.
- b. Mapping of the wind structure in 'generating' cells. Again, the measurements should be supplemented by microwave radar measurements.

7. List of Publications Prepared Since June 83:

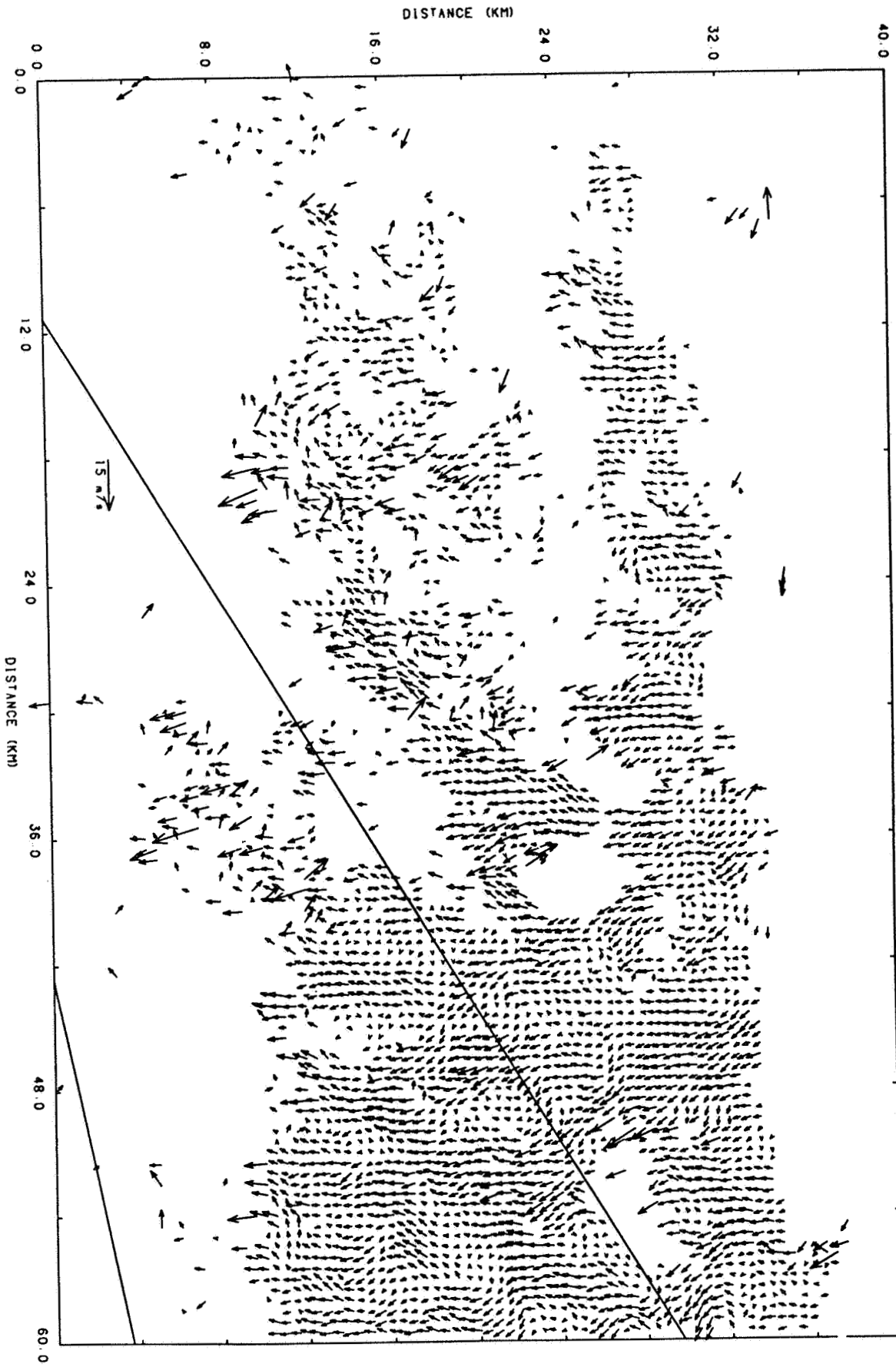
None. However, one is planned after 4 above is completed.



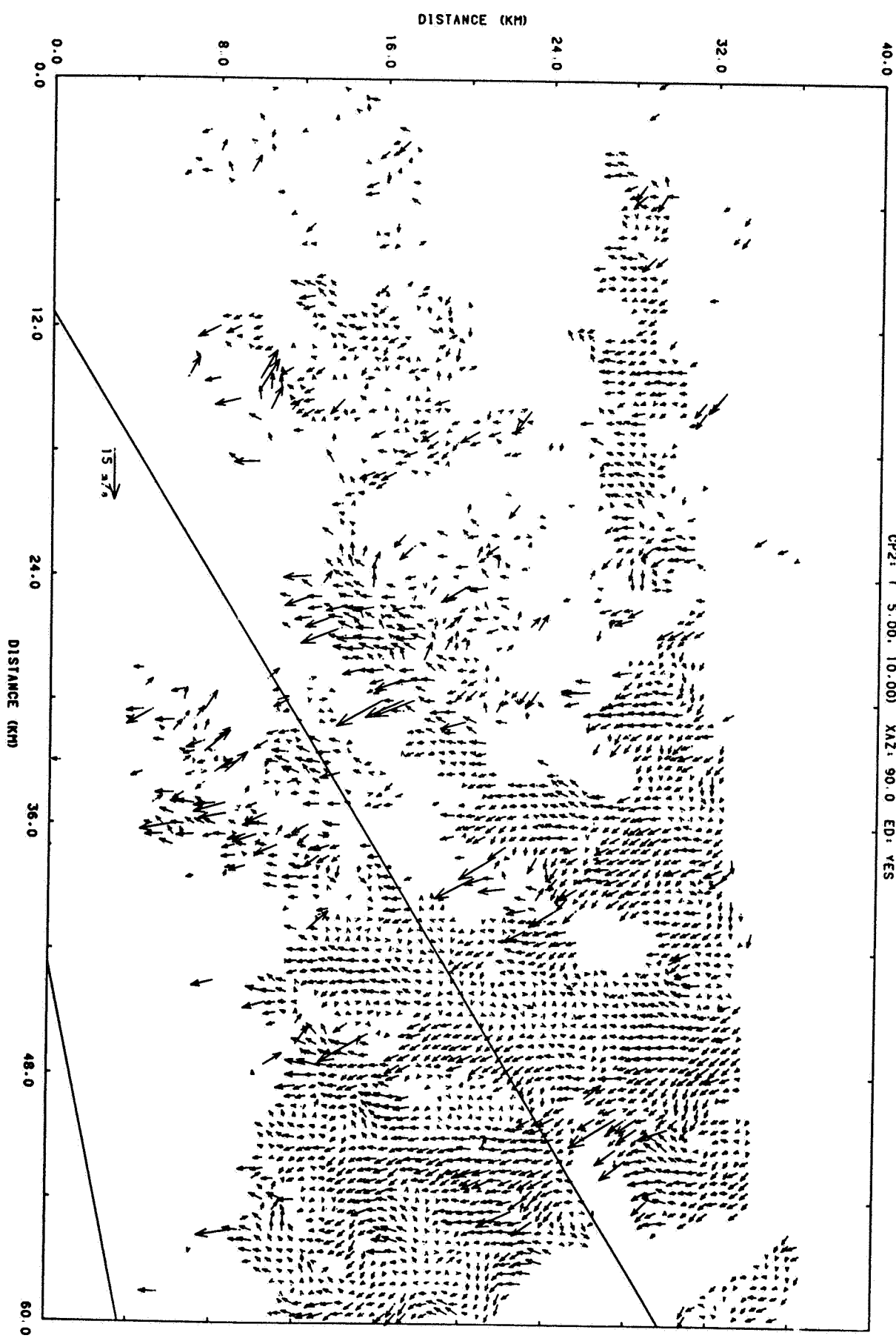
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