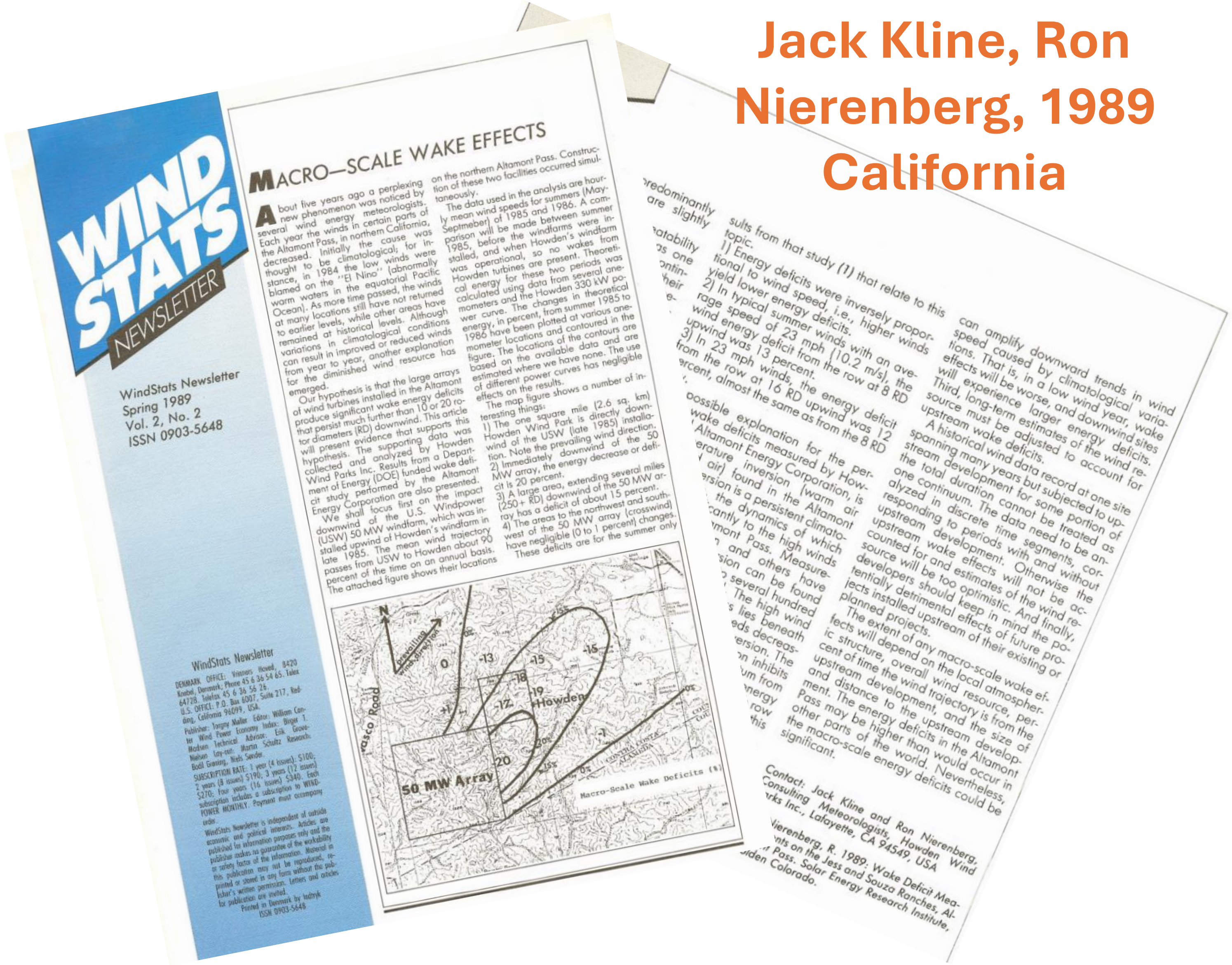
Jack Kline, Ron Nierenberg, 1989 California



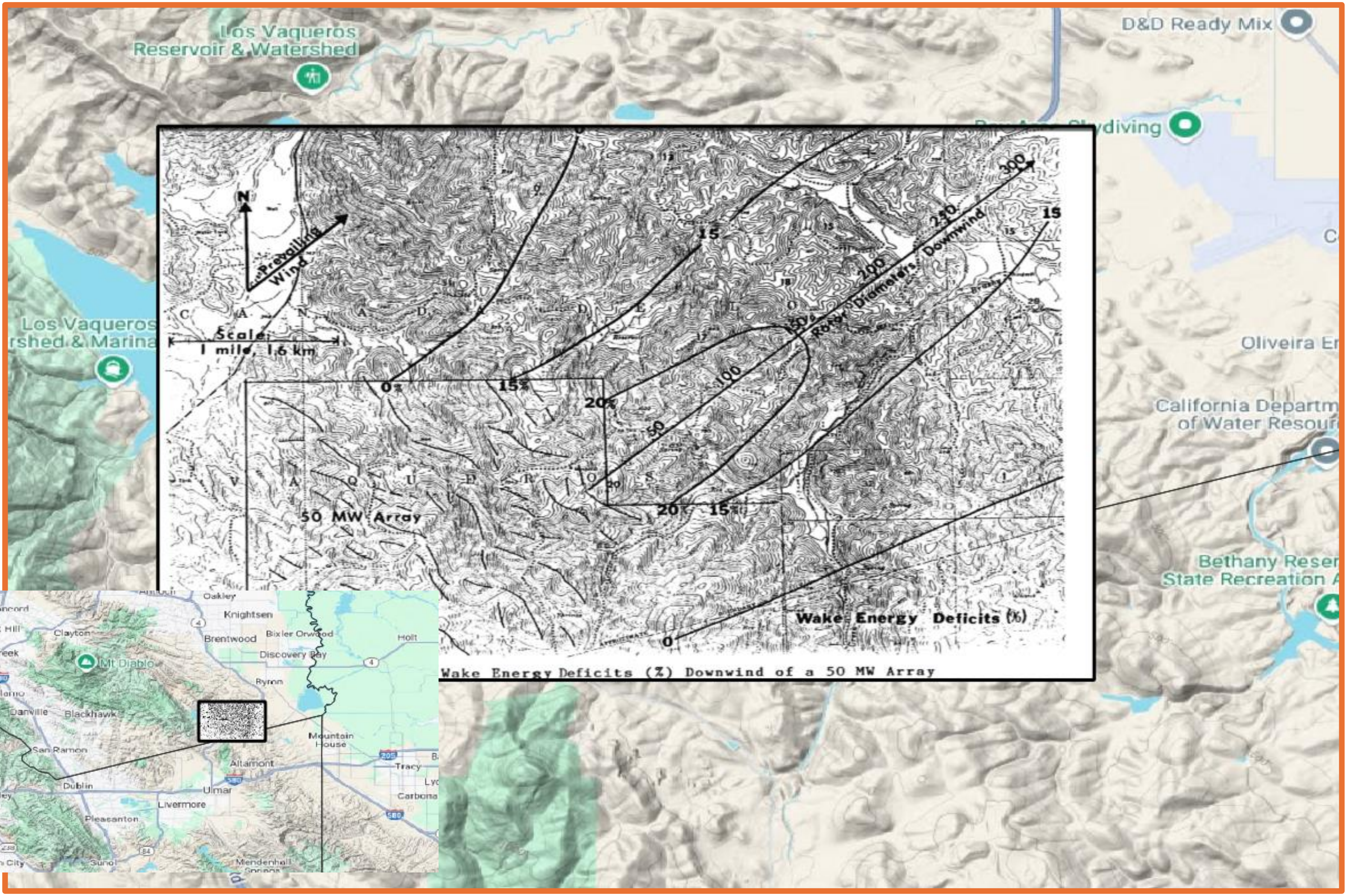
A possible explanation for the persistent wake deficits measured by Howden and Altamont Energy Corporation, is the temperature inversion (warm air above cold air) found in the Altamont Pass. This inversion is a persistent climatological feature, the dynamics of which contribute significantly to the high winds found in the Altamont Pass. Measurements by Howden and others have shown that the inversion can be found from near the surface to several hundred feet above ground level. The high wind layer in the Altamont Pass lies beneath the inversion, with wind speeds decreasing very rapidly above the inversion. The stabilizing nature of the inversion inhibits the downward mixing of momentum from above. Thus, the amount of wind energy flux in the Altamont is finite and each row of wind turbines removes a portion of this energy, permanently.

There are several important implications of these findings to wind energy developers. First, it helps to explain the de-

Wake effects far downstream... 10D, 20D

The study looked at 50MW array upstream of a 25MW array (Howden).

Since the 1989, a reservoir was created, and the old Vasco road decommissioned, plus an airport was built nearby ...



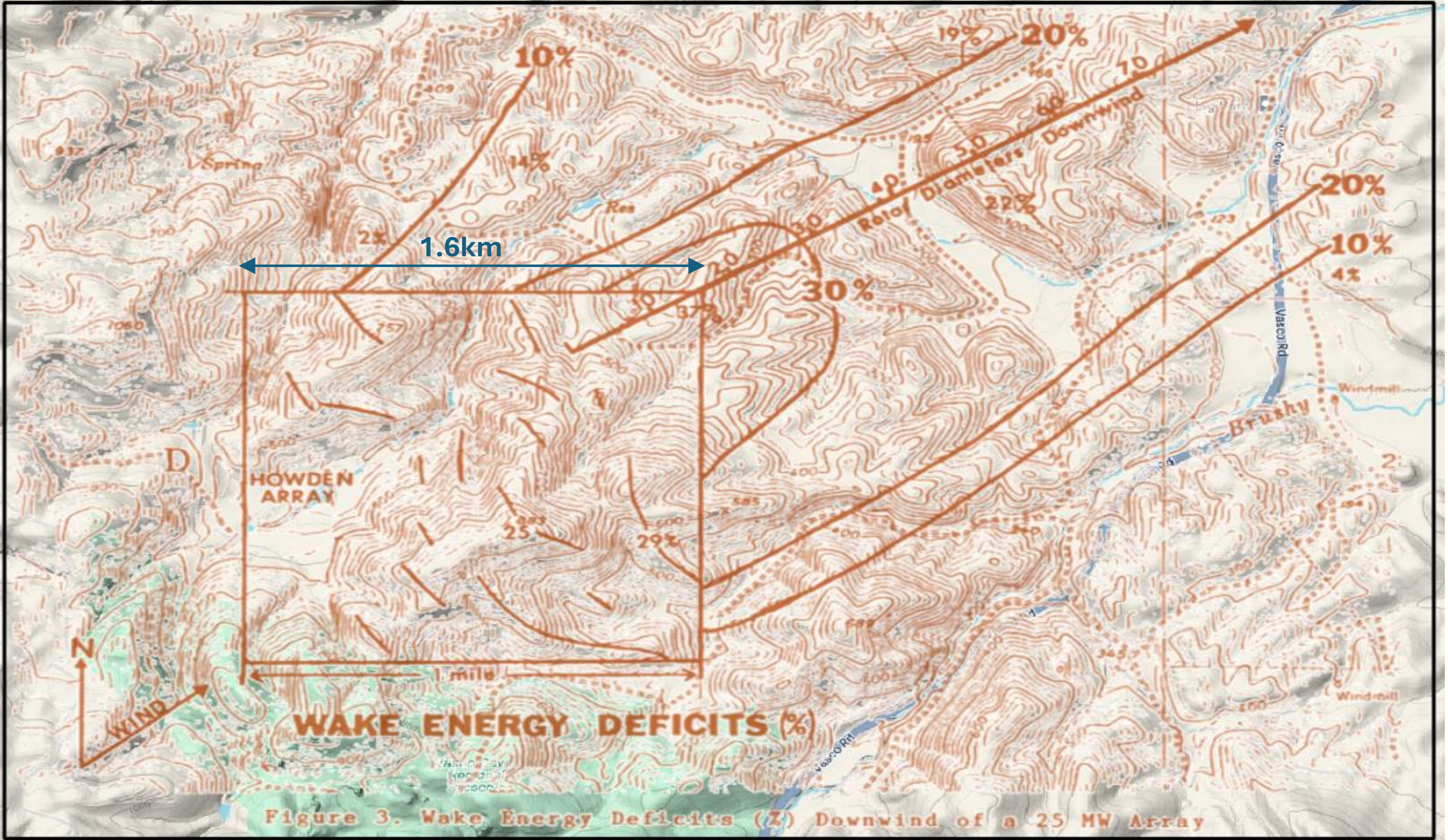


Figure 3. Wake Energy Deficits (%) Downwind of a 25 MW Array


1992 aerial image
50MW array
North
Howden
25MW
Image Landsat / Copernicus
Image © 2024 Maxar Technologies
Image U.S. Geological Survey
Google Earth

Ron Nierenberg, 1989

Just South of Howden.

Study on freestream wind speed variability.

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Free-Flow Variability on the Jess and Souza Ranches, Altamont Pass

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Altamont Energy Corporation
San Rafael, California

March 1989

SERI Technical Monitor: W. Bollmeier

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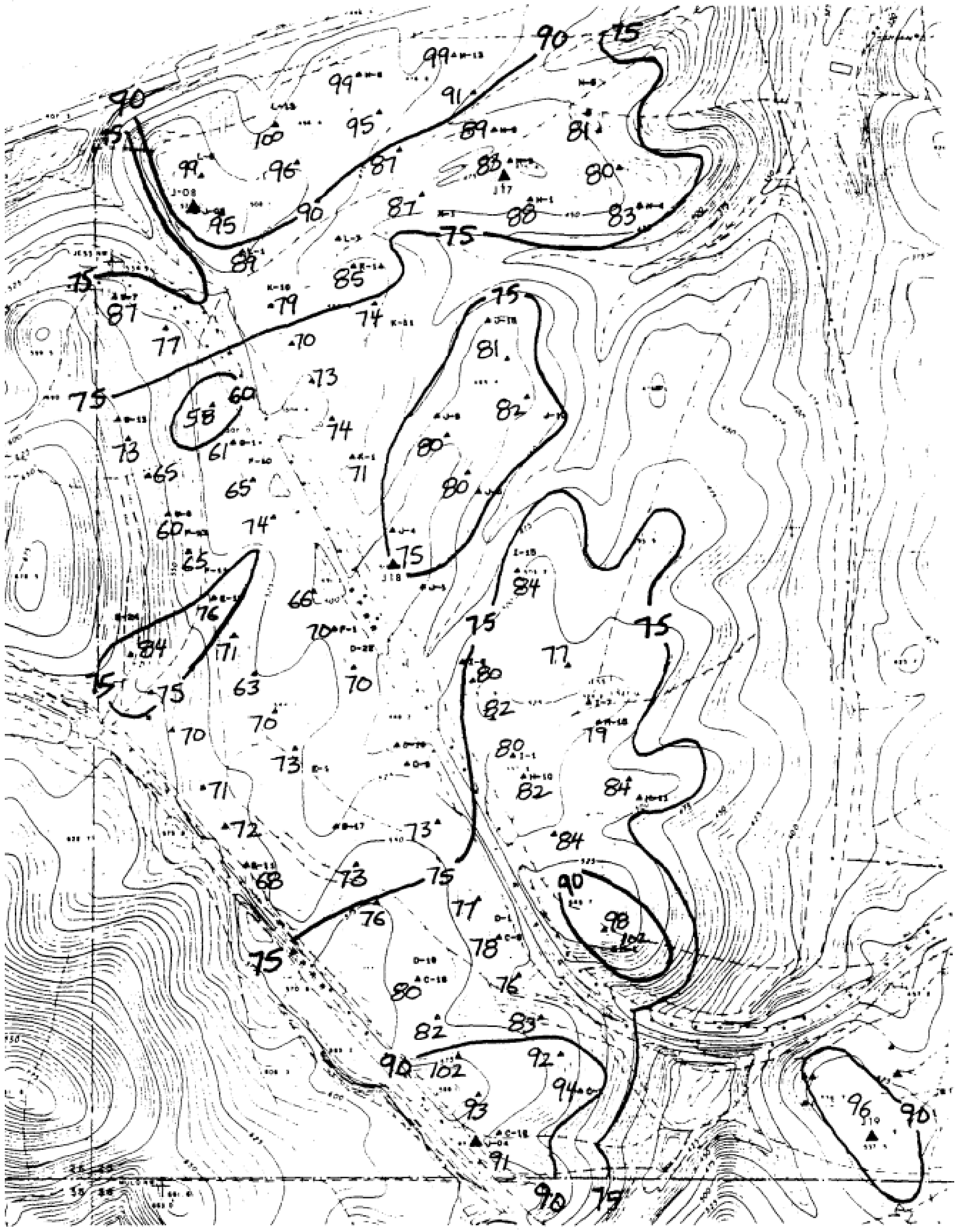

Figure 3-8. Normalized Speed Ratios (%) to J-08 for All Hours

Ron Nierenberg, 1989

Just South of Howden.

Study on freestream wind speed variability.

Of course without reanalysis to help figure out the synoptic conditions ☺