

# Improving the VWP

One of the most widely used products in the Weather Surveillance Radar – 1988, Doppler (WSR-88D) product suite is the Velocity Azimuth Display Wind Profile (VWP) product. The VWP product provides a time versus height wind profile for the volume above the radar location.

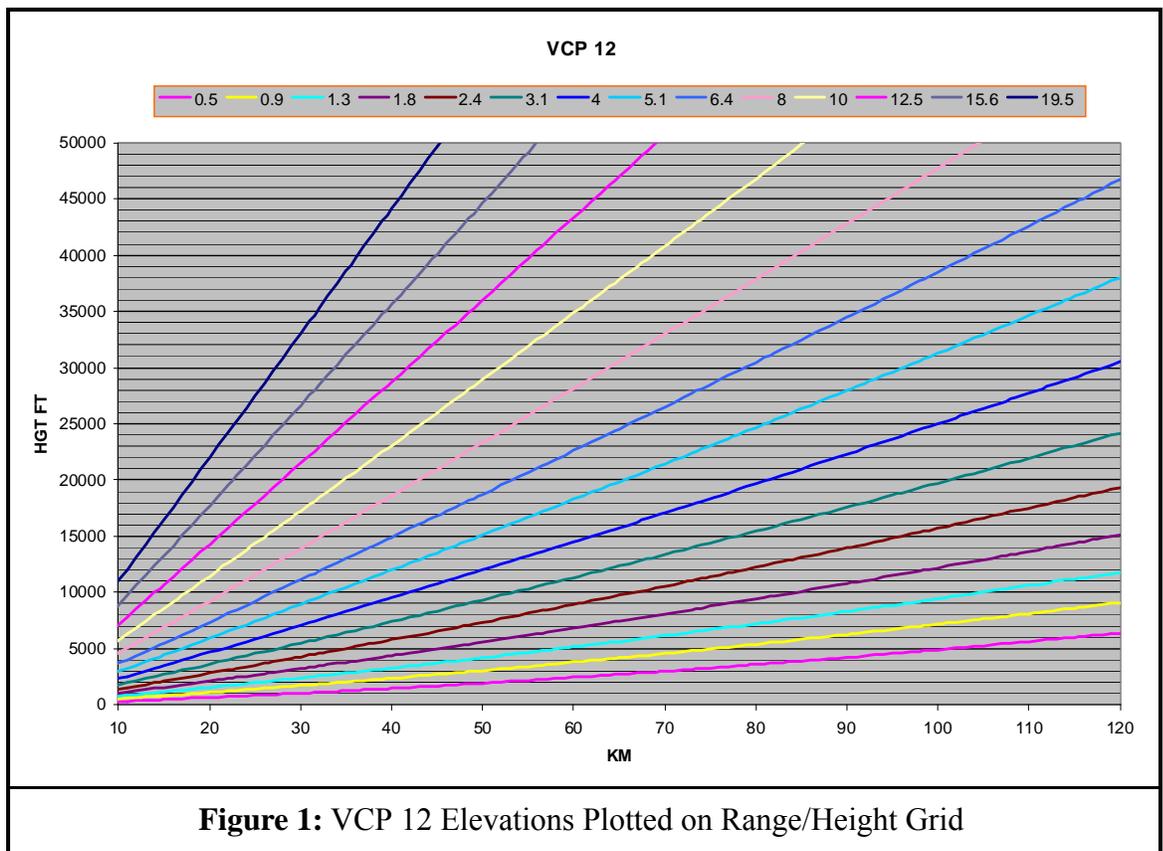
The VWP product uses the wind estimate derived by the Velocity Azimuth Display (VAD) algorithm for each desired VWP height. At the beginning of each volume scan, the VAD algorithm calculates the elevation/slant range pair for the active Volume Coverage Pattern (VCP) required to achieve the heights specified for the VWP product. The VAD algorithm uses a slant range parameter (default = 30 km) to guide the selection of the elevation angle for each required height. For any particular height, the elevation angle with slant range closest to the slant range parameter is used to compute the wind.

The VAD wind estimate for each height is based on the data from a single elevation/slant range pair. (For Clear Air Mode an average of three range bins is used.) This assumes that adequate return is available, using the single elevation/slant range pair to

calculate a representative wind estimate for the particular height. However, in many meteorological situations, this is not a valid assumption.

The Enhanced Velocity Azimuth Display Wind Profile (EVWP) function is designed to improve the availability and accuracy of VWP wind estimates. The concept behind the EVWP function is the fact that each VWP height is achieved at different slant ranges, depending on the elevation. At the beginning of each volume scan, the EVWP function calculates every possible elevation/slant range pair for the active VCP that achieves a height specified for the VWP product (see Figure 1). As each elevation is scanned, the EVWP function passes these additional slant ranges to the VAD algorithm to process. The VAD algorithm computes a wind

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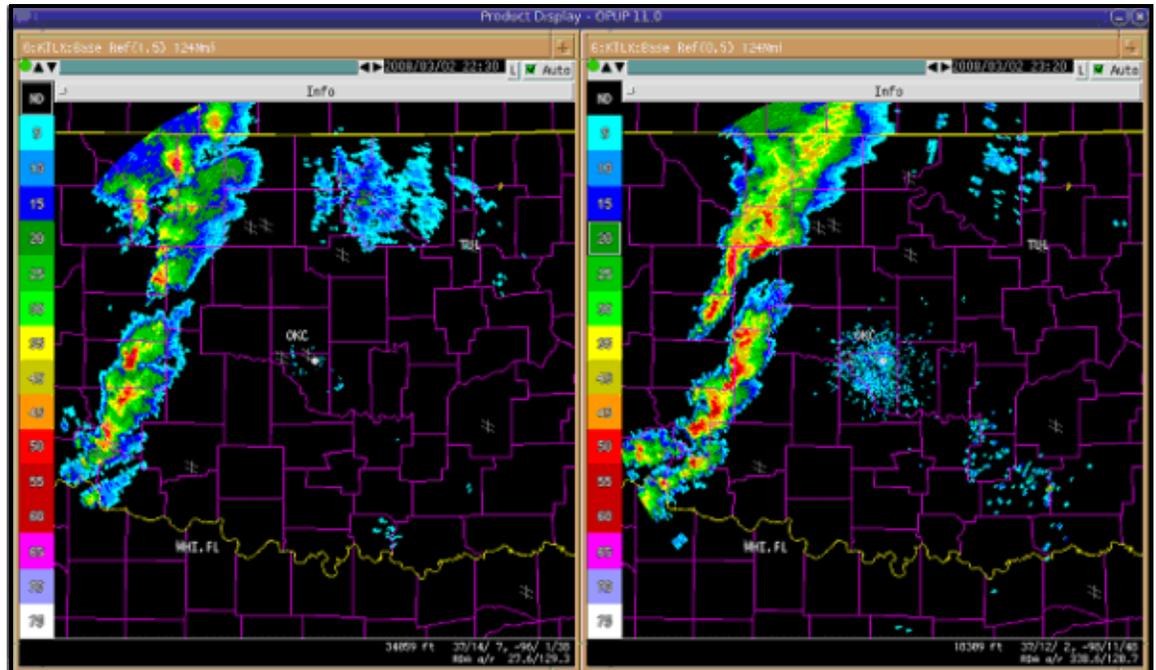


**Figure 1: VCP 12 Elevations Plotted on Range/Height Grid**

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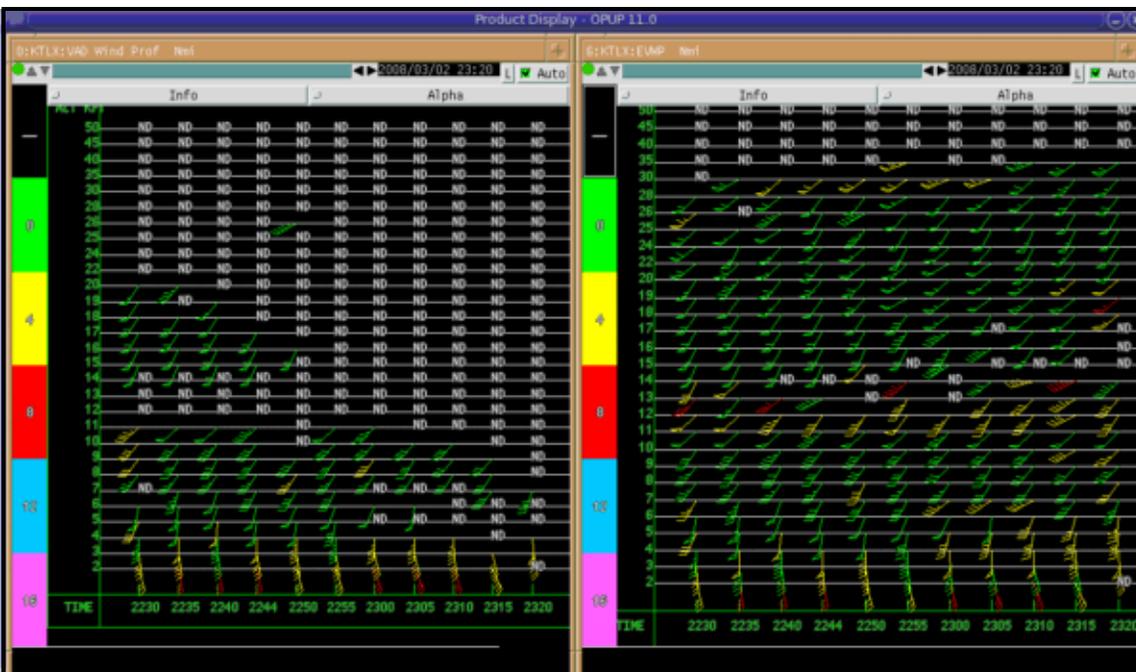
estimate for each height (identified slant range) intersected by the elevation scan. Each wind estimate is passed to the EVWP function for validation. Using multiple elevation/slant range pairs for a given height increases the likelihood of sampling valid returns from which to derive a representative wind estimate for that height. At the end of the volume scan, the EVWP function selects the “best” VAD estimate for each height. These



**Figure 2:** KTLX Reflectivity Products from 22:30Z and 23:20Z

“best” wind estimates are used to build the final VWP product.

To support meteorological testing, the EVWP



**Figure 3:** KTLX VWP and EVWP comparison

function was installed on a Radar Operations Center (ROC) test bed Radar Product Generator (RPG) and the associated display code was installed on an Open System Principal User Processor (OPUP). These test bed assets are used to process Level II data collected from multiple operational

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WSR-88Ds. To facilitate evaluation of any improvement provided by the EVWP function, the test code produces an “Original” VWP product and an “Enhanced” VWP (EVWP) product that incorporates the wind estimates selected by the EVWP function. The example (Figures 2, 3 and 4) is representative of the test results, to date.

line. The design of the EVWP function is to provide additional wind estimates to augment the wind data available for inclusion on the VWP product. This implementation will not change the basic format of the VWP product and, therefore, will not impact downstream processing and display systems.

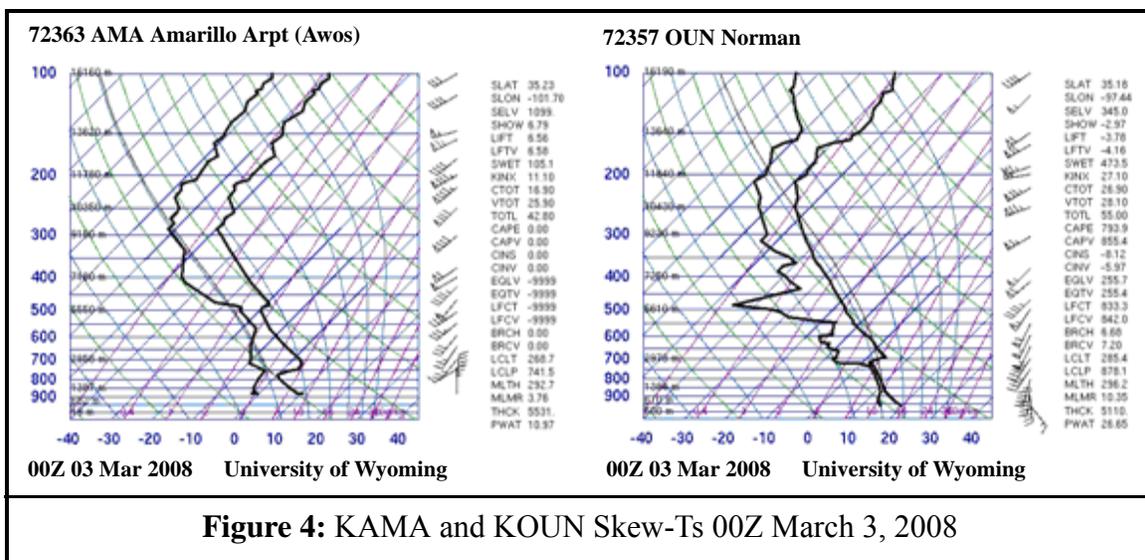


Figure 4: KAMA and KOUN Skew-Ts 00Z March 3, 2008

The EVWP function is still undergoing developmental testing. Results of testing, to date, indicate that the EVWP function consistently provides additional wind estimates not initially available from the legacy VAD/VWP algorithms. Additionally, the inclusion of these supplemental wind estimates in the VWP product can improve the overall operational usability of the VWP product. For more information, please refer to the Chrisman and Smith paper titled, Enhanced Velocity Azimuth Display Wind Profile (EVWP) Function for the WSR-88D, available at <http://www.roc.noaa.gov/WSR88D/PublicationsROC.aspx>.

The EVWP function is expected to be ready for inclusion into the WSR-88D RPG Build 13.0 base-

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