Radar Training Modules

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History of Modules

- Developed through sponsorship of the World Weather Research Program (WWRP) to train forecasters world-wide on the analysis and interpretation of radar data.

- Were first used during the Sydney Australia 2000 Forecast Demonstration Project to train 20 forecasters from around the world.

- Subsequently, they have been used to train forecasters in Brazil, Central America, and Turkey.

- Forecasters from 18 African countries were trained on radar, satellite, and lightning-related modules during the Nowcasting Training Workshop in Pretoria, South Africa in December 2005.

- Forecasters from Indonesia will be trained using these modules in August 2007.
Purpose of Training Modules

To train forecasters on:

- Interpretation Doppler radial velocities and radar reflectivity
- Identification of radar signatures associated with convergence boundaries, wind shear, severe weather
- Retrieval of Doppler wind fields
- Estimation of Quantitative Precipitation Estimation (QPE)
- Comparison of radar observations with other standard observational data sets (surface, satellite, NWP models)
- Interpretation of weather-related aviation hazards
- Producing 60 min nowcasts of new thunderstorm development

And to train those who teach other forecasters
A brief overview or lecture (powerpoint presentation) is given before the forecaster uses a selected module.

**Velocity Azimuth Display (VAD)**

\[
v_{rad} = a_o + a_i \cos(\text{azimuth\_angle}) + b_i \sin(\text{azimuth\_angle})
\]

where \( a_o = \frac{1}{N} \sum_{i=1}^{N} v_{ri} \)

\( a_i = \frac{2}{N} \sum_{i=1}^{N} v_{ri} \cos(\text{azimuth\_angle}) \)

\( b_i = \frac{2}{N} \sum_{i=1}^{N} v_{ri} \sin(\text{azimuth\_angle}) \)

convergence = \(-2a_o / (\text{range} \times \cos^2(\text{elevation}))\)
Forecasters then work in groups or individually to analyze radar data and respond to specific questions posed in the module.
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<td>Analysis of a convergence boundary and comparison of propagation speeds with other datasets.</td>
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<td>Wind Retrieval</td>
<td>Velocity azimuth display calculation and dual-Doppler wind retrieval</td>
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<td>Rainbands Traversing the Sydney Area</td>
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<td>Quantitative Precipitation Estimation</td>
<td>Estimate rainfall at two locations using rainfall intensity and accumulation maps, and rain gauge data for both a thunderstorm and a narrow rainband</td>
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<td>Heavy Rainfall</td>
<td>Forecast thunderstorm development and region of most intense convection over South Africa using radar mosaics, satellite (EUMETSAT) and TITAN data</td>
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<td>Case Study: Nov. 3, 2000 Sydney Thunderstorms</td>
<td>Forecast thunderstorm development and severe weather using radar, Auto-nowcaster, CARDS, TITAN, WDSS data</td>
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<td>Toronto Aviation Case Study</td>
<td>Using radar fields and radar-derived products, analyze factors contributing to aircraft accident</td>
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<td>USA Midwest Thunderstorms, 4 July 2003</td>
<td>Identify boundaries and provide 1 hr nowcasts of rain areas using radar, satellite, NWP and Auto-nowcaster data</td>
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Examples