Radar Training Modules

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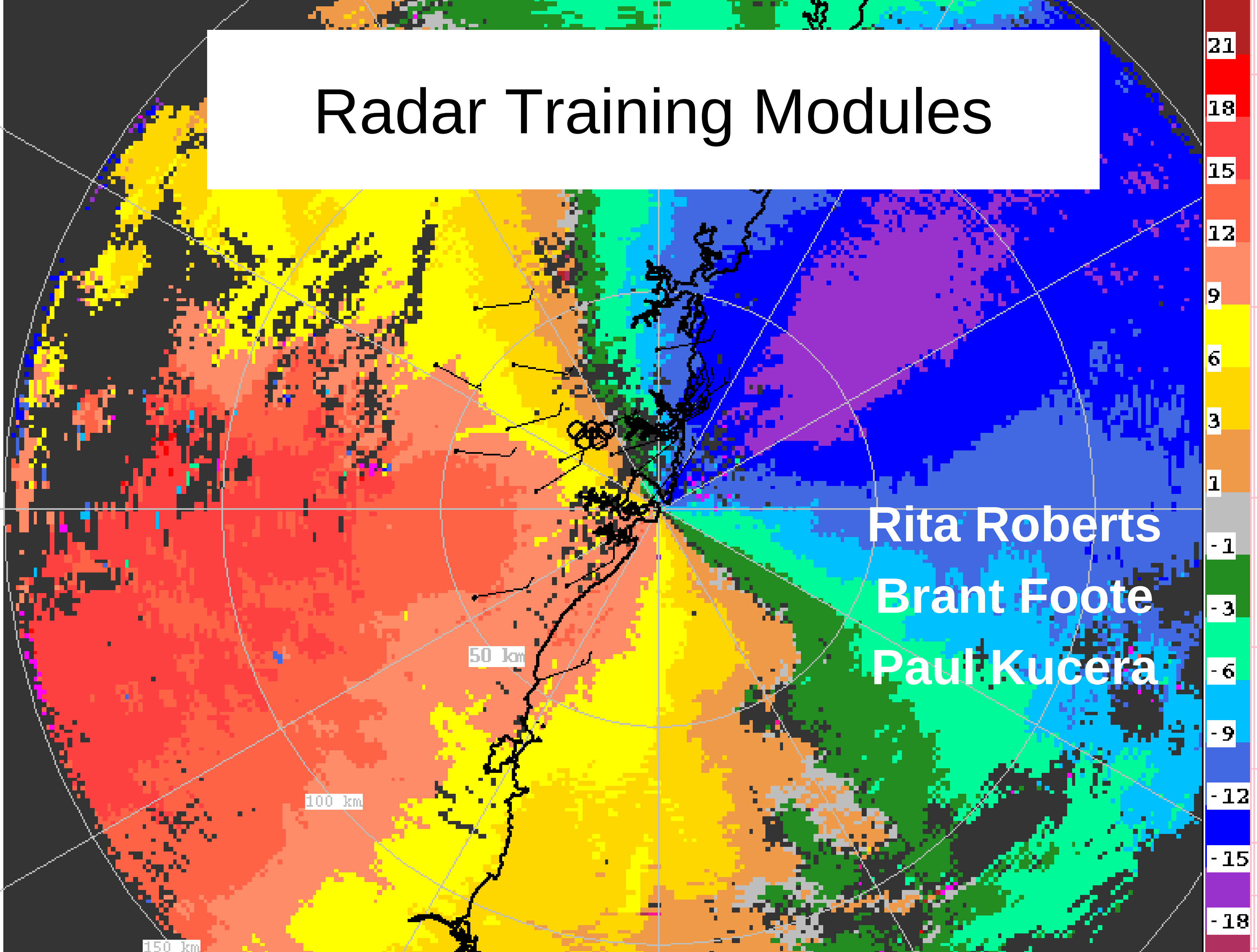


History of Modules

- 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:

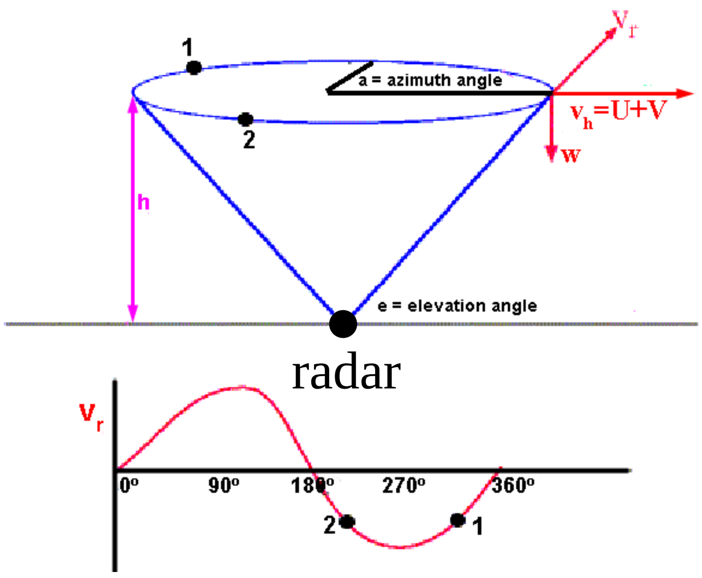
- Interpretation Doppler radial velocities and radar reflectivity
- Identification of radar signatures associated with convergence boundaries, wind shear, severe weather
- Retrieval of Doppler wind fields
- Estimation of Quantitative Precipitation Estimation (QPE)
- Comparison of radar observations with 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

Concept For Training

A brief overview or lecture (powerpoint presentation) is given before the forecaster uses a selected module.

Velocity Azimuth Display (VAD)



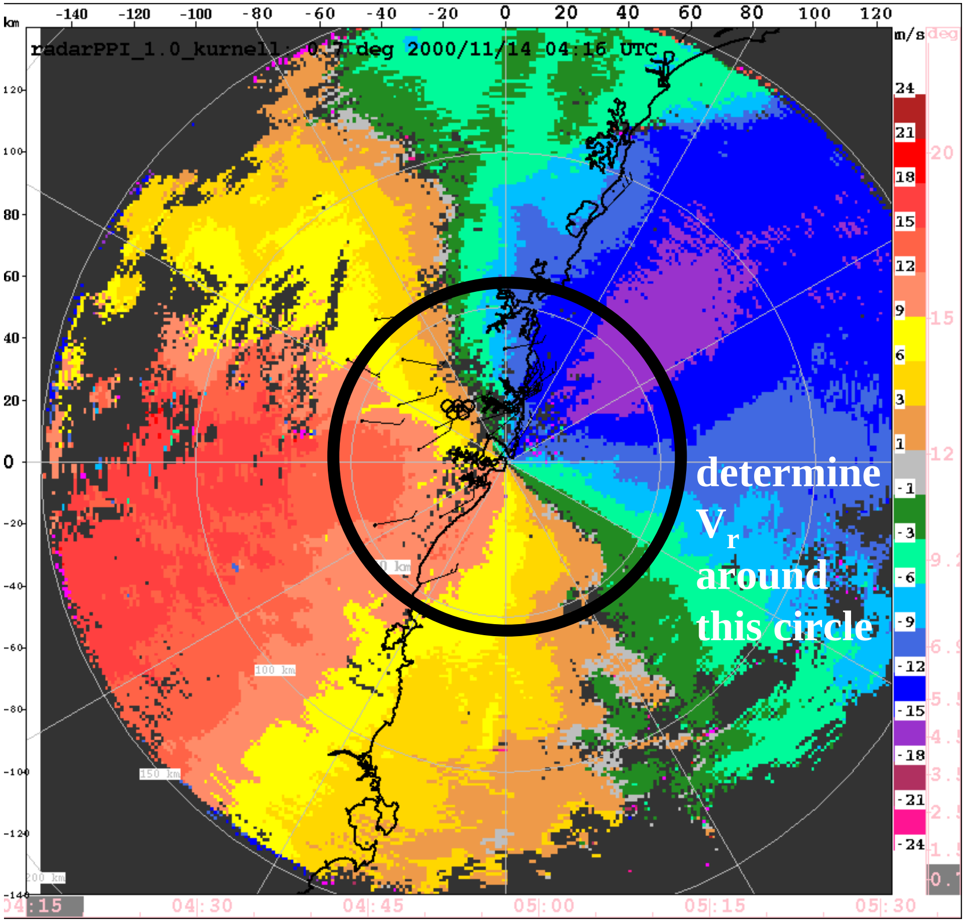
$$v_{rvad} = a_o + a_1 \cos(\text{azimuth\_angle}) + b_1 \sin(\text{azimuth\_angle})$$

$$\text{where } a_o = \frac{1}{N} \sum_{i=1,N} v_{ri}$$

$$a_1 = \frac{2}{N} \sum_{i=1,N} v_{ri} \cos(\text{azimuth\_angle})$$

$$b_1 = \frac{2}{N} \sum_{i=1,N} v_{ri} \sin(\text{azimuth\_angle})$$

$$\text{convergence} = -2a_o / (\text{range} \times \cos^2(\text{elevation}))$$



Concept For Training

Forecasters then work in groups or individually to analyze radar data and respond to specific questions posed in the module.

Modules	Scientific Objectives
Sea Breeze and Westerly Wind Change	Analysis of a convergence boundary and comparison of propagation speeds with other datasets.
Wind Retrieval	Velocity azimuth display calculation and dual-Doppler wind retrieval
Rainbands Traversing the Sydney Area	Forecast areal rainfall at different time periods and for specific locations
Quantitative Precipitation Estimation	Estimate rainfall at two locations using rainfall intensity and accumulation maps, and rain gauge data for both a thunderstorm and a narrow rainband
Heavy Rainfall	Forecast thunderstorm development and region of most intense convection over South Africa using radar mosaics, satellite (EUMETSAT) and TITAN data
Case Study: Nov. 3, 2000 Sydney Thunderstorms	Forecast thunderstorm development and severe weather using radar, Auto-nowcaster, CARDS, TITAN, WDSS data
Toronto Aviation Case Study	Using radar fields and radar-derived products, analyze factors contributing to aircraft accident
USA Midwest Thunderstorms, 4 July 2003	Identify boundaries and provide 1 hr nowcasts of rain areas using radar, satellite, NWP and Auto-nowcaster data

Examples