Valentin Louf (Bureau of Meteorology)

Radar Hail and Wind nowcasting

Valentin Louf, Joshua Soderholm, and Alain Protat

Abstract:

The Radar Science team has developed a new tool that provides national coverage of winds and hail as seen by the weather radars. The recent expansion of the polarimetric radar network in Australia and new real-time monitoring of the absolute reflectivity calibration (S3CAR) is leveraged by the new HailCORE system to increase the robustness of hail retrievals and use modern polarimetric information. SWIRL (Synthetic Winds Information from Radar and Lidar) retrieves 3D wind components every 5 minutes and nowcasts winds up to about 1 and a half hours for all Doppler radars of the Australian Weather radar network. SWIRL uses the optical flow of the reflectivity and Doppler information in precipitations and clear-air to retrieve the wind magnitude and wind direction. SWIRL has been able to monitor and nowcast dangerous and destructive winds in the radar domain in many instances where the Numerical Weather Predictions (NWP) failed to provide helpful warnings. Comparisons with Automatic Weather Stations, that measure winds 2 meters above ground, and wind profilers show that SWIRL retrievals correlate well with wind profilers (p=0.7), with a mean error of less than 1 m/s for the wind speed and 20 degrees for the wind direction. Further on-going work is being done on SWIRL to use NWP outputs to parametrize retrievals of ground-level winds for the Energy sector and improve clear-air detection.