Chandrasekar, V., H. Chen, and B. Philips, 2018: Principles of high-resolution radar network for hazard mitigation and disaster management in an urban environment. *J. Meteor. Soc. Japan*, **96A**, 119-139.
https://doi.org/10.2151/jmsj.2018-015

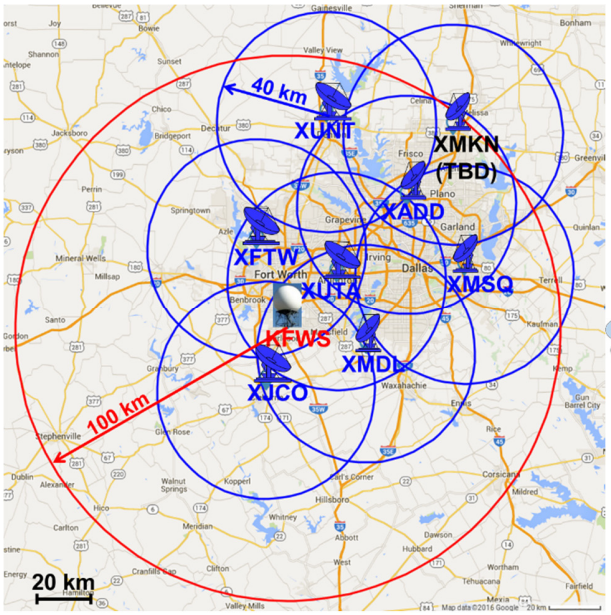

Figure (left): The layout of S-band KFWS WSR-88DP radar (100 km range ring in red) and DFW dual-polarization X-band radars (40 km range rings in blue). The letter symbols such as "XMDL" correspond to the naming of various radars.

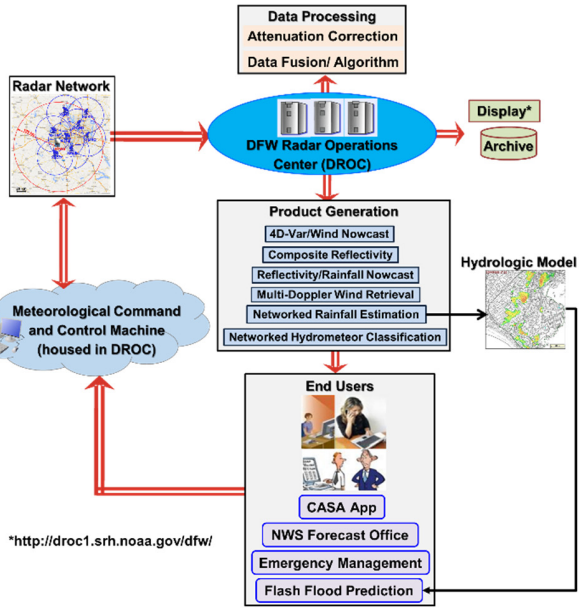

Figure (right): Close-loop real-time dataflow architecture of the DFW urban radar network. Through Internet the radar data are streamed to DROC, where majority of the real-time products are generated and archived. The real-time products are available to a variety of end users. Based on the users' feedback, the radar control commands are sent out from the DROC server.

- Due to the *Earth*'s curvature, complex terrain and urban deployment challenges, the physically large, high-power, long-range (i.e., S- or C-band) radars in the current operational network have severe limitations in observing the lower part of troposphere where many hazardous weather phenomena occur, such as tornadoes and flash floods.
- This paper presents the principles and applications of high-resolution X-band radar network for urban weather hazards detection and disaster mitigation. A technical summary of the Dallas-Fort Worth (DFW) dense urban radar network is presented from the perspective of tracking and warning of hails, tornadoes, and floods.
- The architecture and associated algorithms of various product systems for the DFW network are detailed, including the real-time hail detection system, the multiple Doppler wind retrieval system, and the high-resolution quantitative precipitation estimation system. The application products in the presence of high wind, tornado, hail, and flash flood are investigated, and the product performance is demonstrated through cross-validation with ground observations and weather reports.