RADAR SCIENCE

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X-band Phased Array Radar systems (SKYLER-I&II)

Fig. 1 (Left) SKYLER-I and (Right) SKYLER-II

The Radar Science group at Stony Brook University in collaboration with Raytheon Technologies has been experimenting with the use of SKYLER radars for weather research. In 2019, a SKYLER - I system was integrated onto a mobile platform for weather observations (Fig. 1a). The SKYLER-I radar has an antenna beamwidth of 1.98° in azimuth and 2.1° in elevation at boresight. The beam is electronically scanned in the horizontal plane by +/- 45° and in the vertical plane +/- 15° relative to the boresight. The radar transmits H- and V-polarization pulses (alternating) and provides estimates of dual-polarization measurements in addition to the standard power and Doppler measurements.

During the summer of 2021, Raytheon Technologies provided a second-generation system, Skyler-II, which uses a single channel transmit/receive module and a dual polarization antenna operating in alternating transmit, alternating receive mode (ATAR). The software defined transceiver uses long duty cycle pulses and pulse compression to increase sensitivity and can employ phase coding to suppress multi trip echoes. The weather data processor (WDP) utilizes spectrum-based methods for noise estimation and clutter filtering and provides the following polarimetric moments: reflectivity, differential reflectivity, radial velocity, spectrum width, specific differential phase and co-polar correlation coefficient, as well as several quality control parameters. More information about the SKYLER systems can be found here.

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