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APAR: The Next Generation of Airborne Polarimetric Doppler Weather Radar

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A novel, airborne phased array radar (APAR) is currently under design at the NCAR Earth Observing Laboratory. This novel airborne radar is to be carried by the NSF/NCAR C-130 aircraft. The APAR system will consist of four removable C-band active electronically scanned arrays (AESA), strategically placed on the fuselage of the aircraft. Conceptually, the radar system is divided into the front-end, the backend, and the aircraft-specific section. The front-end primarily consists of AESAs, the backend of the signal processor, and the aircraft specific section includes a power system and a GPS antenna.

APAR, with dual-Doppler and dual polarization capabilities at a lesser attenuating C-band wavelength, is designed to enable further advancement in understanding of in-cloud microphysical and dynamical processes within a variety of precipitation systems. Such unprecedented observations, in conjunction with the advanced radar data assimilation systems, is anticipated to significantly improve understanding and predictability of hazardous weather events.

At present, and with funding from both the National Science Foundation and the National Oceanic and Atmospheric Administration, NCAR is engaged in the risk reduction and APAR preliminary design activities. In this talk, we will provide an update on the status of these activities for various system components as well as the system-level design. For the final design and development of APAR, NCAR plans to apply for the NSF Mid-scale Research Infrastructure funds in 2021. It is anticipated that the APAR final design and development will be a five-year effort.