38th Conference on Environmental Information Processing Technologies

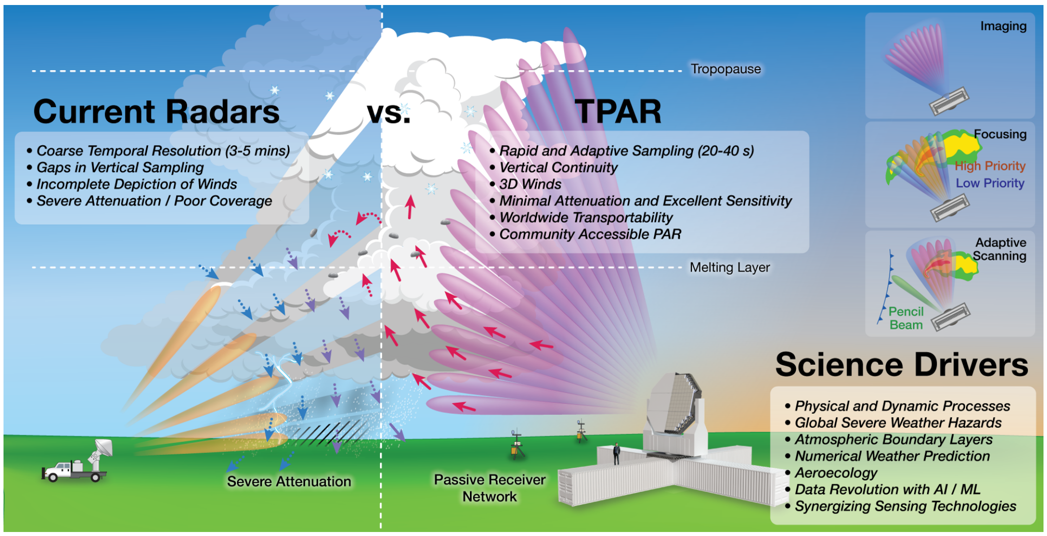
J4B.2 - Transportable Phased Array Radar: Meeting Weather Community Needs

Monday, January 24, 2022
4:00 PM - 4:15 PM
George R. Brown Convention Center - Remote

Abstract

Climate change is drastically increasing the severity and frequency of high-impact weather events, including landfalling hurricanes, floods, hailstorms, heavy snowfall, and drought, with disastrous effects on people's livelihood and ecosystems. Extreme events are often driven by atmospheric processes initiating and evolving over short time scales. Weather radars are essential tools for understanding and forecasting many of these events since they capture the inherently coupled physics, dynamics, and environments of atmospheric phenomena. Scientists have conveyed a clear need for improved temporal resolution and moving toward 4D observations, that can be achieved with rapid-scanning and transportable phased-array systems. The community-accessible high-resolution Transportable Phased Array Radar (TPAR) embodies that vision for the future. It will allow improved observations of clouds, convection, precipitation, atmospheric winds, and the boundary layer that have been repeatedly identified as priorities by the Earth Science community over recent decades. TPAR will enable rapid and adaptive volumes scans of S-Band, dual-polarization and 3D winds (based on a multi-static passive receiver) with excellent sensitivity and with fine spatial sampling specifically in the vertical. This transformative technological will provide 1-degree beamwidth and excellent sensitivity through a scalable all-digital phased array architecture. Through its convergent design with other sensing technologies (e.g., lidars, cameras, satellites) and leveraging AI/ML concepts, TPAR will transcend the current paradigm of asynchronous measurements of individual variables. It will fill a long-standing spatial and

temporal gap by enabling a 4D depiction of microphysical and dynamic weather processes, fostering new developments in atmospheric science theory and modeling. It will address critical science observing priorities in physical and dynamic processes, formation and evolution of severe weather, atmospheric boundary layer, numerical weather prediction, and data assimilation. By bridging across atmospheric science disciplines and broader environmental applications (e.g., aeroecology - airborne animals), TPAR will build a more comprehensive and integrated understanding of the atmosphere through deployments worldwide.



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