**BOS1: Technology and Desirable Capabilities of mmWave PAR for Science Application.**

Stephen Frasier and Jorge Salazar

Place: Auditorium

This breakout session focuses on the technological advancements and desirable capabilities of millimeter-wave profiling and imaging phased array radars for scientific applications. mmWave PAR have emerged as a powerful tool for studying the atmosphere, offering a unique insight into cloud, precipitation, and aerosol dynamics. During this session, experts will discuss the latest developments in mmWave technology (IC’s, amplifiers, LNA’s, etc), including advancements in array and radar architectures, including MIMO and virtual arrays. This also include discussion on signal processing, and data analysis techniques. Participants will gain an understanding of the key features that make mmWave PARs ideal for scientific research, such as high spatial and temporal resolution, volumetric imaging, polarization diversity, and Doppler capabilities.

The session will also explore the desirable capabilities that researchers seek in mmWave radars for various scientific applications. These include improved sensitivity to small particles, enhanced range resolution, and the ability to operate in challenging environments. This session aims to provide recommendations and a roadmap to advance the Technology Readiness Level (TRL) of mmWave PAR for scientific applications.

**Discussion on suggested topics and questions (90 min)**

1. What are the frequency bands in the mmWave region that are best for atmospheric science applications?
2. Define the most important features and capabilities of mmWave technology that can be beneficial for mmWave PAR for Atmospheric science?
3. What are the biggest technology/cost barriers to implementing mmWave PAR?
4. Can Virtual array configurations used in automotive radars be useful in mmWave PAR for atmospheric science?
5. What are the key challenges in adapting commercial off-the-shelf mmWave technologies for scientific applications in atmospheric research?
6. Are there specific regulatory or licensing considerations that need to be addressed for deploying mmWave PAR systems in atmospheric science?
7. How can collaborative efforts between industry and academia accelerate the development and adoption of mmWave PAR technology for scientific applications?
8. What are the potential future advancements in mmWave technology that could further benefit atmospheric science research?

**Summarize discussion on Jamboard (30 min)**

To prepare for report out sessions and synthesize notes for a workshop report, we will use the final 30 min to conduct a high-level discussion of topics discussed. As time permits, attendees should discuss how new mmWave technology can be used for PARs and those can be integrated into field campaigns and used synergistically with other instrumentation.