

# Dual-Polarized Ultrawide Band MIMO Radar for Polar Ice Sounding

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***Abstract***—This paper presents a dual-polarized ultrawide band (UWB) ice sounding radar deployed to Greenland in 2019. Ice sounding and mapping internal layers with radars over large areas is an effective way to obtain data to understand and model ice dynamics. To deliver fine-resolution ice layer mapping and crystal preferred orientation (CPO) measurement, the radar is designed to operate at 180 - 340 MHz with dual-polarization support. It is configured as a 12-channel multiple-in-multiple-out (MIMO) system for 3D ice layer topography mapping with digital beam forming. To achieve high power-aperture product as well as polarization switching capability, we also designed and built a dual-polarized antenna array and a T/R, polarization switch. The radar system-level architecture, hardware development and the sample data collected in the field are discussed in the paper.

