

A Light-weight Planar Ultra-wideband UHF Monopole Mills Cross Array for Ice Sounding

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An electrically large ultra-wideband UHF monopole antenna array has been designed to sound up to 3 km of ice and meet the logistical requirements of transportation to arctic regions. The monopole array is comprised of sixteen planar sub-array modules, which in combination form a 16 m by 17 m Mills cross array configuration to maximize sensitivity and spatial selectivity in both cross-track and along-track directions. Each planar sub-array module is 1 m by 2 m in size with a 6.35 cm thick rigid insulation foam panel separating the individual monopole elements from metal foil ground plane on the top such that the maximum radiation is directed to nadir. Each sub-array panel consists of 4 by 8 circular monopole antenna elements with a spacing of 0.25 m. Each monopole element is printed on a 130 mm by 80 mm 62 mil FR4 board. The total weight of each sub-array panel is 9 kg, making for a very lightweight and low-profile antenna construction. The antenna array together with the radar system was deployed to the East Greenland Ice-coring Project (EGRIP) site in August 2018 for demonstrating surface-based ice sounding at UHF band.

This work was supported by the Villum Investigator Project IceFlow (NR. 16572) and the EGRIP which is supported by funding agencies and institutions in Denmark (A. P. Møller Foundation, Univ. of Copenhagen), USA (National Science Foundation, Office of Polar Programs), Germany (Alfred Wegener Institute), Japan (National Institute of Polar Research & Arctic Challenge for Sustainability), Norway (Univ. of Bergen & Bergen Research Foundation), Switzerland (Swiss National Science Foundation), France (French Polar Institute Paul-Emile Victor, the Institute for Geosciences & Environmental Research) and China (Chinese Academy of Sciences & Beijing Normal Univ.).