R. Keith Raney, IEEE Life Fellow
Johns Hopkins University Applied Physics Laboratory

BIOGRAPHY

Dr. Raney received a BS (with honors) in physics from Harvard University (1960), a MSEE from Purdue University (1962), and a PhD in Computer Information and Control from the University of Michigan (1968). He contributed to the design of NASA's Venus radars Pioneer and Magellan, the ERS-1 SAR of the European Space Agency (ESA), and the Shuttle Imaging Radar SIR-C. While with the Canada Centre for Remote Sensing (1976-1994) Dr. Raney was scientific authority for the world's first digital processor for satellite SAR data, and responsible for the conceptual design of the RADARSAT synthetic aperture radar (SAR). These and other contributions in radar remote sensing systems, theory, and applications are documented in more than 350 professional publications.

Dr. Raney was on NASA's Instrument Definition Teams for the Europa Orbiter and several Mars missions, the IDTs and Science Teams for Magellan and Pioneer Venus, and advisory teams for ESA's ERS radars. He wss on the Science Advisory Groupfor ESA's CryoSat radar altimeter, whose design is based on his original concept. He holds several United States and international patents, and two patents on polarimetric radar architectures, including the conceptual design of the Mini-RF radars for which he was the radar architect. He served for more than 20 years as an Associate Editor (radar) for the IEEE Transactions on Geoscience and Remote Sensing, and was the Society's President for two terms (1988-9). He has served on numerous advisory committees for the Office of Naval Research, the U.S. National Academy of Sciences, Germany's Helmholtz Society, and the Danish Technical Research Council, among others. He is a Life Fellow of the IEEE, a Fellow of the Electromagnetics Academy, and an Associate Fellow of the Canadian Aeronautics and Space Institute. Dr. Raney is a recipient of numerous awards, including the 1999 Gold Medal of the Canadian Remote Sensing Society, the IEEE Geoscience and Remote Sensing Society Transactions Prize Paper for 1998, the IEEE Millennium Medal 2000, and the IEEE Dennis J. Picard Medal for radar technologies and applications for 2007.

TITLE

Two Hybrid-Polarimetric Imaging Radars at the Moon: Their Design, Build, and Results

ABSTRACT

The two Mini-RF radars flown in near-polar lunar orbits (on Chandrayaan-1 and the Lunar Reconnaissance Orbiter) were the first of their kind, hybrid-

polarimetric. This new paradigm transmits circular polarization, and receives coherently on orthogonal linear polarizations. The resulting data support calculation of the 2x2 covariance matrix of the backscattered field, from which follow the four Stokes parameters. These are the basis of science products from the observations, which include images that are traditional in radar astronomy, as well as polarimetric decompositions. The instruments each have mass less than 15 kg, antenna areas of about 1 m^2, and modest power and spacecraft accommodation requirements. Data quality and instrument characteristics suggest that hybrid polarity is highly desirable for future exploratory radar missions in the Solar system

CONTACT INFORMATION

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