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Multi-hop propagation mode in Antarctica: Simulating HF radio wave propagation between the McMurdo and South Pole stations BINJIE LIU, GARETH PERRY, Center for Solar-Terrestrial Research, New Jersey Institute of Technology, ALEX CHARTIER, The Johns Hopkins University Applied Physics Laboratory — High Frequency (HF) remote sensing techniques are sensitive to the plasma density variations in the ionosphere, which makes it an effective tool for understanding the behavior of the ionosphere. It is widely believed that multi-hop propagation modes (requiring ground scatter) cannot be supported in Antarctica because of the coverage of ice and snow, which are strong HF absorbers. We present HF ray-tracing simulation results in Antarctica and compare them with experimental data collected by a multi-frequency HF transmitter/receiver radio link between McMurdo (transmitter) and South Pole (receiver) stations. Simulation results include: the 5.1 MHz channel shows a clear E-region reflection mode and is highly absorbed under sunlit conditions (0-5 and 21-24 UT). A two-hop propagation mode exists in 4.1 MHz channel at around 9 UT. The highly absorbed signals in both the simulation and observations indicates that the receiver is sensitive enough to detect signals with significant ionospheric absorption. The presence of multi-hop propagation in the simulations and data suggests that this mode is attainable in Antarctica under certain conditions, although it appears to be sporadic in nature.

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