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Development, Deployment, and Characterization of a Ku-band Interferometer

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Abstract
Space-borne radar interferometry provides a global vantage point to understand climate change, global weather phenomenon, and other Earth dynamics. For climate change observations, space-borne interferometers can be utilized to relate ocean topography to temperature, thus providing a global map of ocean temperatures. Since the oceans are in constant motion, a single-pass interferometer is needed to successfully make these measurements of ocean height. The feasibility of a single-pass measurement is dependent on the physical size of the instrument, hence it is cheaper and more practical to launch a small, light weight instrument into space. Since instrument size scales inversely with operating frequency, high frequency microwave technology (Ku-band and Ka-band) is preferred for these types of applications. However, space-borne deployments become more difficult to implement at these frequencies since the physical structure of the instrument changes in the harsh

environment of space. For that reason, a ground-based Ku-band (13.245GHz) radar interferometer has been developed at the University of Massachusetts, Amherst Microwave Remote Sensing Laboratory (MIRSL). In this thesis, a description of the radar hardware as well as interferometric results from Mount Sugarloaf provide a measure of the performance of the radar and demonstrate the capabilities of using a ground-based interferometer as a test-bed for space-borne applications.

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