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## Mapping Surface Lineaments in the Umiujalik Lake Area, Nunavut Using Multi-Beam Radarsat-2 Polarimetric SAR Images

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### **ABSTRACT**

Our study tests the use of RADARSAT-2 polarimetric SAR data along with LANDSAT-7 Enhanced Thematic Mapper (ETM+) images for mapping lineaments in Umiujalik Lake area, Nunavut, Canada. The SAR images were acquired in three west-looking descending beam modes (FQ1, FQ12, and FQ20) with increasing respective incidence angles. Lineaments were visually interpreted on LANDSAT-7 ETM+ Principal Component images, and on RADARSAT-2 SAR single-polarized, RGB (HH, HV, and VV) composites, or total power images. It was possible to identify more lineaments on RADARSAT-2 SAR images than on LANDSAT-7 ETM+ images. Polarization analysis suggests that regardless of the incidence angle, a higher number of lineaments were identified on the HH image than on the HV image, but the most lineaments were identified on the multi-polarized RGB composite. With respect to incidence angle effects, more lineaments were identified on the FQ12 images than over the FQ1 or FQ20 images. The dominant lineaments trends are NW and NNW, which correspond to both the ice flow movement direction during the last glaciations of the area and a set of faults previously mapped in that direction. A smaller set of easterly lineaments is related to bedrock structures, such as faults and the trends of prominent lithologic units.

