

WINTER STREAM MORPHOLOGY ON THE NORTH SLOPE OF ALASKA

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ABSTRACT

On the North Slope of Alaska, with the exception of the Colville and possibly the Canning Rivers, surface water flow in the rivers is discontinuous and may cease by the end of the winter. As the winter progresses, the shallower reaches freeze to the streambed and the deeper pools in the river channels become isolated. ERS-1 SAR images obtained during the 1991-1992 winter clearly show the portions of the channels which contain water beneath the ice cover. Chronological comparison of the SAR images, generally obtained on a three day interval, indicates when discontinuous surface flow occurs and shows the reduction in surface area of the isolated pools as the ice cover thickens. Ground truth of the ERS-1 SAR data is provided by short-pulse radar surveys conducted in January and April, 1992, to map surface and subsurface water near and within the Sagavanirktok River floodplain. The ground radar surveys on the Sagavanirktok River show that river taliks are associated with the unfrozen river reaches and deep pools. Comparison of the January and April ground radar surveys indicate that the volume of water contained within the channels beneath the ice cover and within the river taliks decreases over the winter with frost penetration and ice thickening. In contrast, river icing mounds begin growth early in the winter and continue to accumulate water volume as long as the connection to a

water source, which appears to be a river talik in most cases, remains open. The timing of the transfer of water to storage in the icing mounds is documented by a record of water pressure changes within the mounds and surveys of mound growth.