

## UNSUPERVISED TERRAIN AND LAND COVER CLASSIFICATION OF THE MACKENZIE DELTA

Tobias Ullmann <sup>a,\*</sup>, Andreas Schmitt <sup>b</sup>, Achim Roth <sup>b</sup>, Jason Duffe <sup>c</sup>, Stefan Dech <sup>a,b</sup>, Hans-Wolfgang Hubberten <sup>d</sup> and Roland Baumhauer <sup>a</sup>

<sup>a</sup> University of Wuerzburg, Institute for Geography and Geology, 97074 Wuerzburg, Germany - [tobias.ullmann@uni-wuerzburg.de](mailto:tobias.ullmann@uni-wuerzburg.de); [baumhauer@uni-wuerzburg.de](mailto:baumhauer@uni-wuerzburg.de)

<sup>b</sup> German Aerospace Center (DLR), German Remote Sensing Data Center (DFD), 82234 Wessling, Germany - [andreas.schmitt@dlr.de](mailto:andreas.schmitt@dlr.de); [achim.roth@dlr.de](mailto:achim.roth@dlr.de); [stefan.dech@dlr.de](mailto:stefan.dech@dlr.de)

<sup>c</sup> National Wildlife Research Center (NWRC), Ottawa, Ontario, K1A 0H3 Canada - [Jason.Duffe@ec.gc.ca](mailto:Jason.Duffe@ec.gc.ca)

<sup>d</sup> Alfred Wegener Institute for Polar and Marine Research (AWI), Research Section Potsdam, Telegrafenberg A43, 14473 Potsdam, Germany - [hans-wolfgang.hubberten@awi.de](mailto:hans-wolfgang.hubberten@awi.de)

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### ABSTRACT:

The Mackenzie River has a length of more than 1.500 km and it has formed one of the largest deltas of the arctic at the northern shore of the Northwest Territories, Canada: The Mackenzie Delta (69° Northern Latitude, 133° Western Longitude). The eco- and geosystem of the Mackenzie Delta is a heritage for many mammals and bird species and is of high ecological value. In this work we investigated the potential of polarimetric HH/VV TerraSAR-X (TSX) and Landsat 8 (L8) data for unsupervised classification of general land cover types, such as water bodies, different tundra vegetation formations, wetlands or bare ground. The data of TSX have shown to be meaningful for the delineation of areas of sparse vegetated tundra, wetlands and bare ground on high level of confidence for the whole delta area and adjacent regions. The L8 data were identified to be sensitive for the characterization of mixed and shrub dominated tundra. The unsupervised classification derived from TSX and L8 data showed an overall accuracy of about 75%. The unsupervised classifier is based on Jenks-Natural-Breaks, Fuzzy-K-Means and iterative Maximum Likelihood classification. The in situ data used for the accuracy assessment were collected during fieldwork in 2012 and 2013. The intermediate digital elevation model data (IDEM) of the TanDEM-X Mission were used for unsupervised terrain classification of the delta area and adjacent regions. The topographic position indices, the slope and the convexity were used to delineate landform classes by means of modified nested means terrain classification. The information on the land cover and the landforms were used for semi-automated classification of general shoreline types.

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\* Corresponding author. This is useful to know for communication with the appropriate person in cases with more than one author.