Geophysical Research Abstracts
Vol. 21, EGU2019-11437, 2019
EGU General Assembly 2019

Development of a semi-automated classification of hyperspatial imagery to detect landscape change following managed dyke realignment

Reyhan Akyol (1), Danika van Proosdij (1,2), Greg Baker (2), and Jennifer Graham (3)

(1) Department of Geography and Environmental Studies, Saint Mary's University, Halifax, Canada (reyhan.akyol@smu.ca; dvanproo@smu.ca), (2) Maritime Provinces Spatial Analysis Research Center, Halifax, Canada (greg.baker@smu.ca), (3) CBWES Inc., Halifax, NS, Canada (jen.m.graham@gmail.com)

An estimated 80% of former salt marsh habitat has been lost due to historical dyking in the Bay of Fundy Canada. This has resulted in the loss of critical natural buffer zones to protect against rising sea levels and storm surges. The re-establishment of tidal salt marshes in vulnerable coastal zones is an effective long-term adaptation and mitigation strategy for local communities to protect against the impacts of climate change. Monitoring the transition from former agricultural land back into salt marsh habitat, at a high spatial and temporal resolution, as tidal waters are re-introduced, provides important insights into the anticipated trajectory of the restoring ecosystem. In hypertidal, highly turbid estuaries such as the Bay of Fundy, the transitioning landscape is driven by the rapid deposition of fine grained sediments and frequency of inundation which creates a canvas for the formation of tidal creeks, pans and colonization by halophytic vegetation. The rate and spatial patterns of the evolution of the salt marsh landscape after managed realignment of dyke infrastructure in temperate, hypertidal estuaries has traditionally been poorly quantified and visualized. The availability of hyperspatial images acquired through UAS platforms stocked with a multispectral sensor provides an opportunity to establish a semi-automated classification framework using the methodology of Object-based Image Analysis (OBIA). For this analysis, images were acquired pre-dyke breach at Converse, Nova Scotia in Fall 2018 and will be acquired post breach after the winter in 2019. Classification rulesets were developed that incorporated not only spectral but also spatial characteristics as well as local expert knowledge through the application of machine learning algorithms, to provide high accuracies and uniform processing standards for change detection. The comparison of classification outcomes from two different observation times (t0 pre-breach and t1 post-breach) with geographical information system (GIS) software allows the quantification of the landscape change. This study will also help to inform about different drivers of changing features in a salt marsh system leading to a better understanding of restoration outcomes in time and space.