The Nonacho Basin, NWT: Structural and Surficial Analysis from Remote Sensing and High-Resolution DEM data

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The Nonacho Basin is a geologically significant area situated in the southeastern Northwest Territories. It is composed of sedimentary rocks along with less common volcanics on a granitic basement, all of which are debated in age. Research by Henderson (1939) and Aspler (1985) suggest that the region may be related to the Snowbird Tectonic Zone (1.92-1.88Ga), the Trans-Hudson Orogeny (1.86-1.80 Ga), the Hearn-Rae collision (1.85-1.84Ga), or the Rae-Slave collision (1.97Ga). However, new research suggests the deposits may have occurred prior to the Trans Hudson. Data compilation and analysis by the Northwest Territories Geological Survey (NTGS) eludes to high mineral potentials (U, Au, Ag, Mo) within the basin. The NTGS is planning to update the bedrock map of the basin starting in June 2018 as per the efforts of Beth Fischer and Edith Martel. The objective of this contribution is to show compilation work completed with remote sensing (Sentinel, Landsat 8) and high resolution DEM (5m resolution Arctic DEM, derived from World View 1, 2, 3 and GeoEye-1 sensors) data. A number of filtered products were computed from the DEM data (Aspect, Slope, Curvature, Openness), from which landform and edge detection maps were produced. From the satellite images, different RGB and pseudocolour transformations and ratios using SWIR2, NIR, red, green, and blue bands were computed to aid on the discrimination of the different exposed lithologies. The structural analysis of the lineament maps produced from the DEM is being compiled with structural analysis on an aeromagnetic survey flown by Goldak Airborne Surveys for the NTGS in 2007. The aeromagnetic data provides a deeper view of the main structures observed from the DEM. All the data compiled throughout this project was utilized to generate predictive maps that will be utilized by the NTGS as control maps for the field mapping, as well as aiding towards the tectonic evolution of the basin.