

Construction of a Radarsat mosaic of Nova Scotia and integration of elevation data

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The province of Nova Scotia acquired 17 Radarsat 1 Synthetic Aperture Radar (SAR) images in the fall of 1996 covering the province. These data have been processed at the Centre of Geographic Sciences (COGS) and used to construct a provincial radar mosaic. The processing involved orthorectification of the imagery, which translates the orientation of the image from the path of the satellite orbit to a map projection, also the various geometric distortions and relief displacements that are inherent in radar imagery as a result of the side looking geometry have been corrected utilizing a Digital Elevation Model (DEM) constructed from 1:50,000 topographic maps. Once the imagery was in a proper map projection the seventeen scenes were scaled from 16 bit to an 8 bit (256 grey scale) representation. The 8 bit images were radiometrically adjusted to ensure a seamless image mosaic. The SAR data were processed to a 30 m pixel. For provincial scale processing the data were averaged up to a 120 m pixel. A 1:50,000 based DEM was used to construct a shaded relief image with illumination from an azimuth of 188° and a zenith of 45° to compliment the natural illumination of the SAR data which is 98°. The DEM was also used to construct a colour elevation map of 256 colours, coded to

optimize chroma-stereoscopy. The SAR mosaic, shaded relief and colourized elevation data were merged to produce a hybrid value-added provincial mosaic. The weighting factors for the three input layers were: 40% SAR, 30% shaded relief, 30% colour elevation. The DEM used in this study did not have the lakes coded. The SAR image was used to code the lakes and incorporate them into the final mosaic. The SAR image of standard mode 7 provides information related to the landcover, for example the forest is grey, while cleared areas such as agriculture lands are darker in tone and water is very dark. Major roads, airports and landcover can be identified in the final image. The final mosaic was then merged with a generalized regional land and bathymetric dataset. The image can be readily used within a GIS since it is georeferenced. Geologists can use the image and interpret it in terms of the topographic expression and drainage and landcover patterns, as well observe the data in 3-D through the use of Chromadepth™ glasses. Other layers, for example geophysics, can be used to colour code the SAR/DEM combination to correlate surface topography with subsurface characteristics.