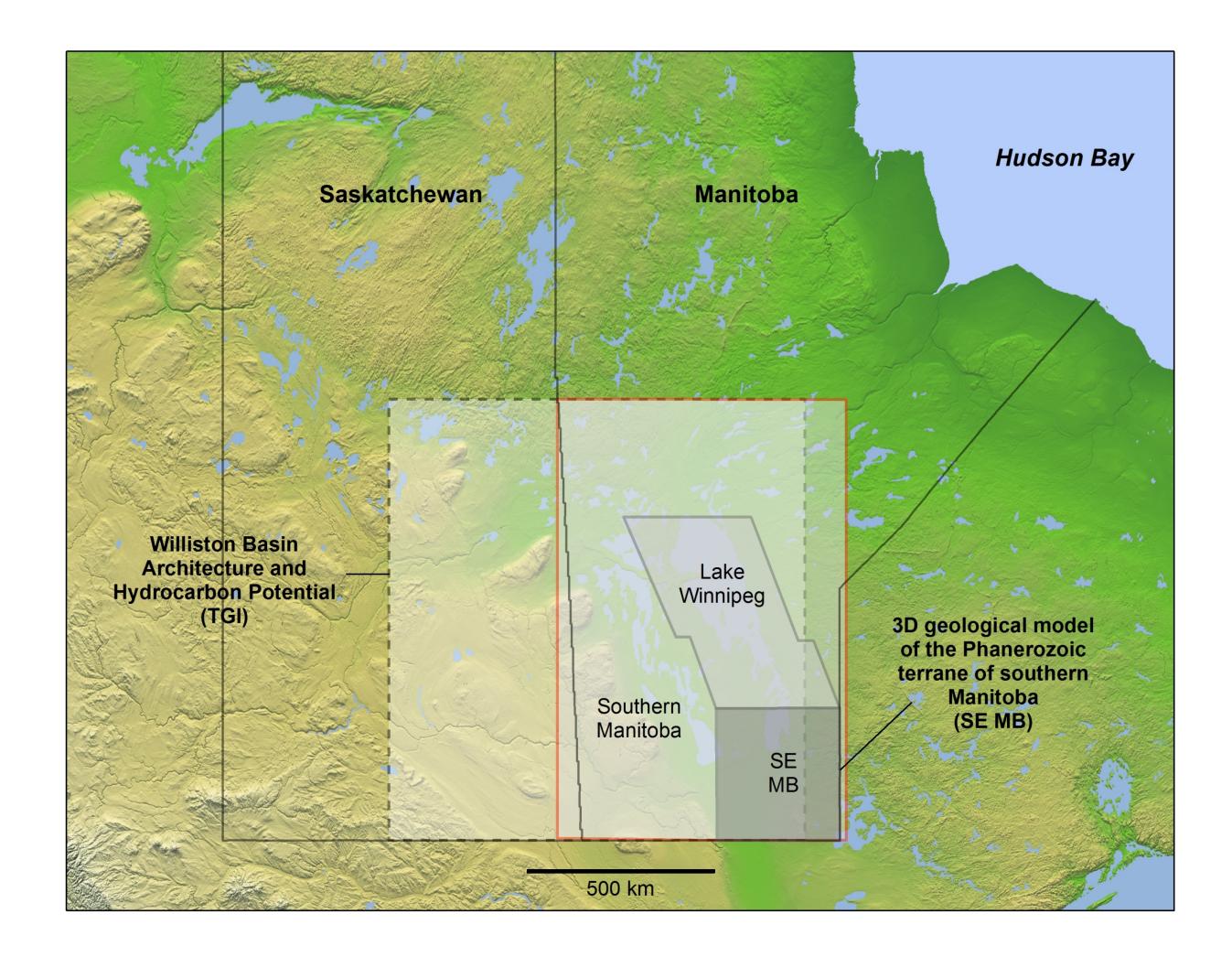
Abstract:

Increasing demand for groundwater and hydrocarbons have been the two main drivers for 3-D modeling in Manitoba. In order to satisfy these demands, and to broaden our knowledge of the subsurface geological and hydrogeological systems, the Manitoba Geological Survey has been moving toward the completion of a three-dimensional (3-D) geological model of the Phanerozoic succession in southern Manitoba, south of latitude 55°N.

Key model inputs are: digital elevation data, bathymetric charts for large lakes, offshore seismic surveys, surficial geological maps, drillhole and seismic data, existing models for the Phanerozoic rock units (the Stratigraphic Map series), and drillhole data. For the Quaternary, critical inputs to the 3-D model are cored holes logged by geologists and geophysical surveys. These high-quality drillholes are extrapolated laterally using data from provincial drillhole databases that include data over 100,000 sites.

After years of data compilation, two small scale and two regional bedrock models have been completed; 1) the pilot area in southeastern Manitoba (SE MB) which comprises the 200 km x 240 km Winnipeg region, 2) the Lake Winnipeg basin region (Lake Winnipeg), 3) the Targeted Geoscience Initiative Williston Basin Architecture and Hydrocarbon Potential Project's Williston Basin 3D Geological Model (TGI) and 4) the Canadian portion of the Williston Basin derived from the Western Canada Sedimentary Basin Atlas (WCSB). Currently, the MGS is working to complete our modelling in southern Manitoba's Phanerozoic terrane south of latitude 55°N (Southern Manitoba). This poster depicts our 3-D modelling progress and highlights our new bedrock surface; a derivative product of the 3D modelling process.

Location Map:



Model Outputs Lake Winnipeg model South-east Manitoba model Southeast Manitoba (SE MB) and Lake Winnipeg bedrock surface displaying the new Paleozoic edge within the Lake Winnipeg basin. Southeast Manitoba (SE MB) modelled bedrock units TGI - Williston Basin model WCSB model TGI Williston Basin model depicting bedrock units rom Devonian (brown) to Precambrian (pink) WCSB model depicting major geological time periods from the Tertiary (light green) to Precambrian (pink). Brown represents deformed Cordilleran rocks. * The bedrock portion of southern Manitoba is based upon this model

Model Construction: Southern Manitoba

1) Data from each previously

modelled area is concatenated

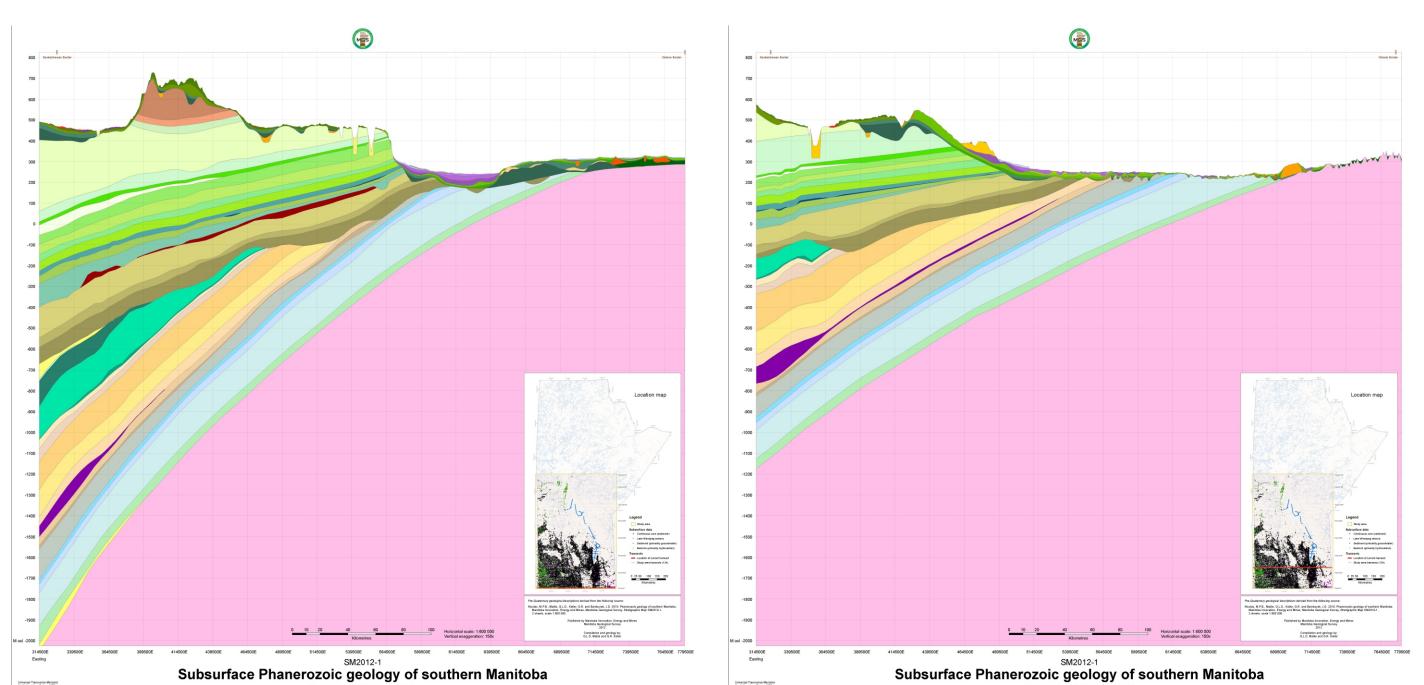
georeferenced and displayed along with the newly interpreted western portion of the model

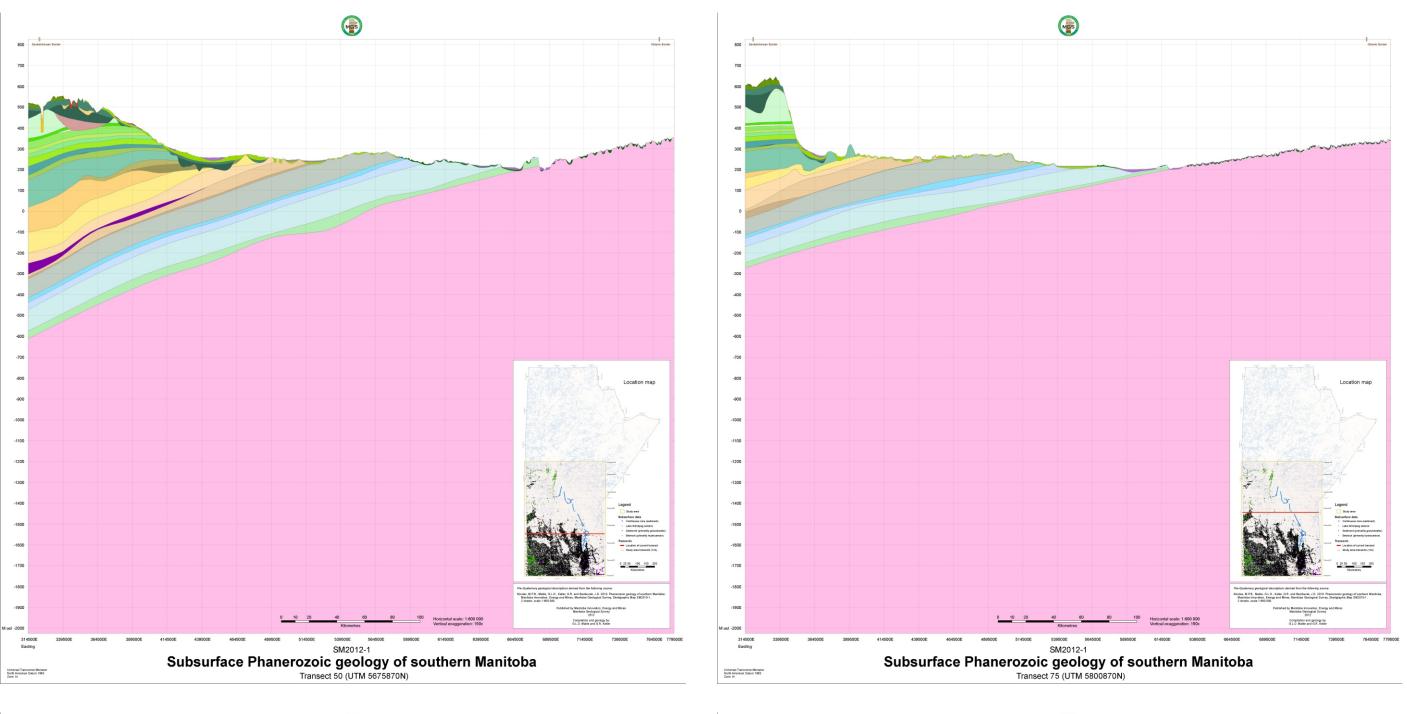


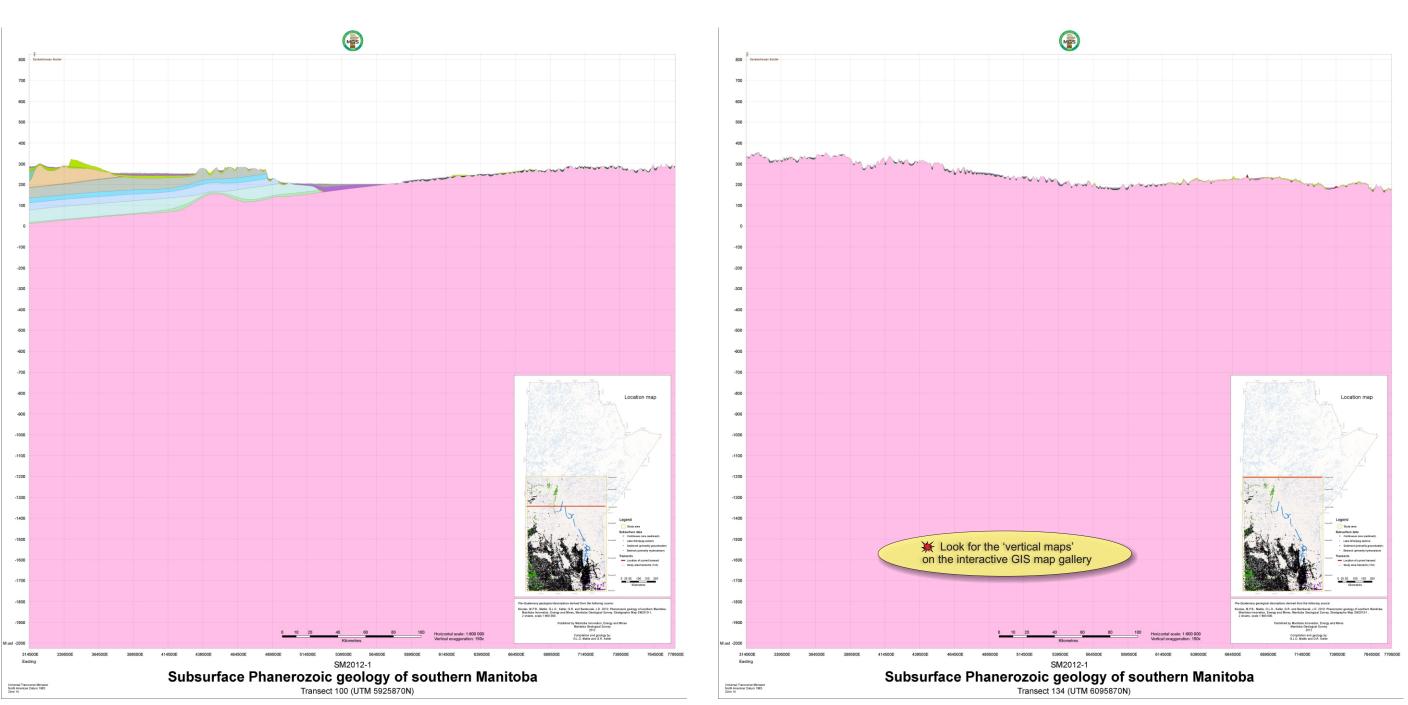
The data is reinterpreted collectively and 'heads up'

3-D Geological Mapping in Manitoba: Moving Forward

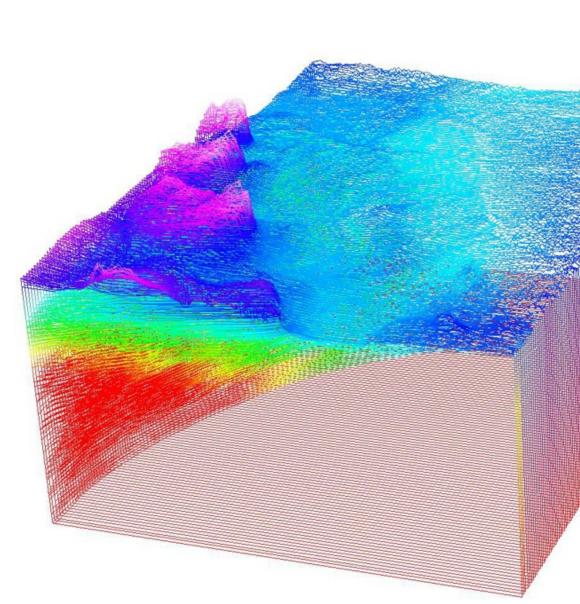
Model Construction: Vertical Maps

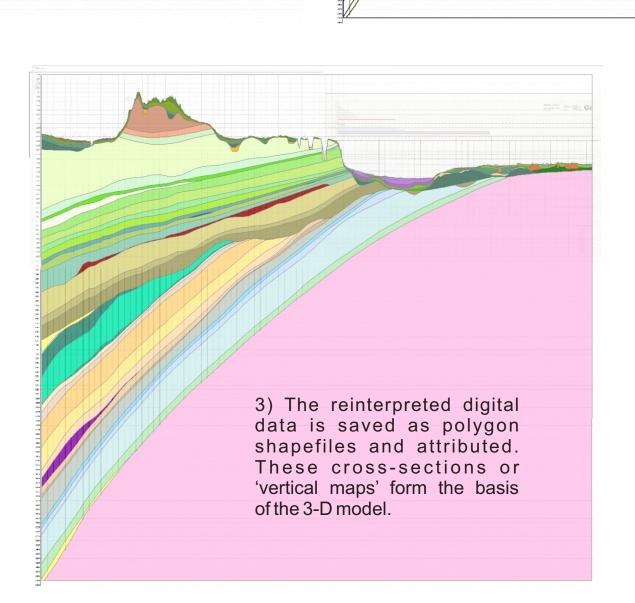






Model Construction: 3-D Modelling





Model Construction: Legend

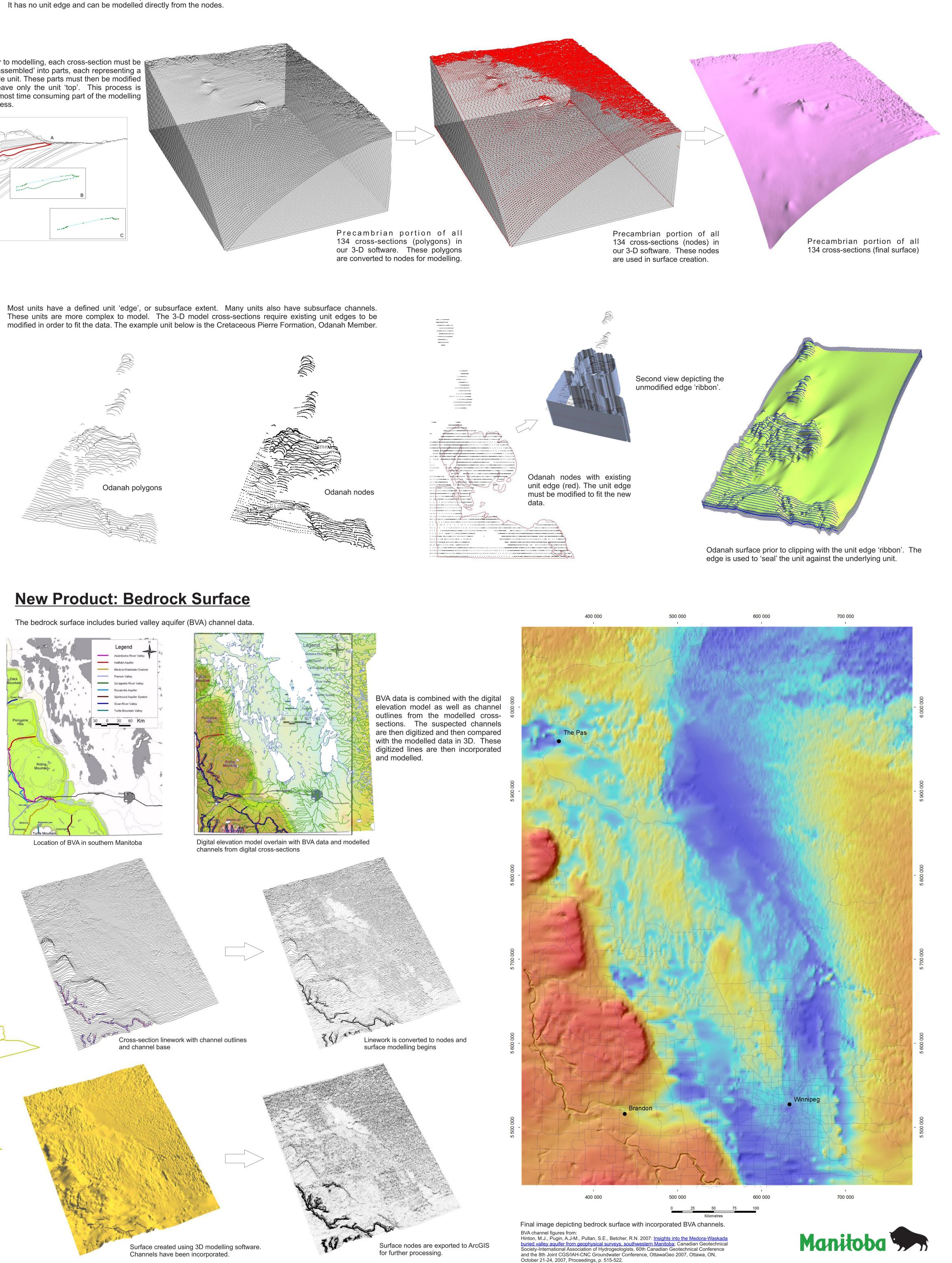


KELLER, Greg R. and MATILE, Gaywood L.D. (RET)

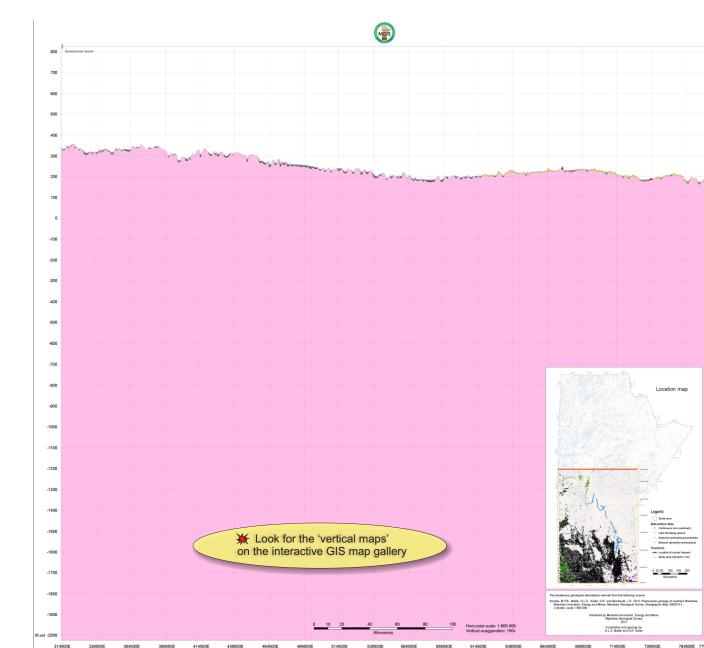


'disassembled' into parts, each representing a single unit. These parts must then be modified to leave only the unit 'top'. This process is the most time consuming part of the modelling process.

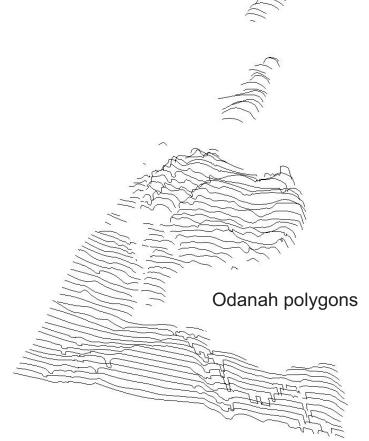
Prior to modelling, each cross-section must be



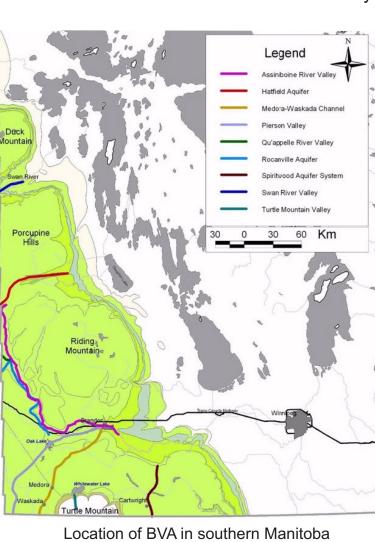
Most units have a defined unit 'edge', or subsurface extent. Many units also have subsurface channels. These units are more complex to model. The 3-D model cross-sections require existing unit edges to be modified in order to fit the data. The example unit below is the Cretaceous Pierre Formation, Odanah Member.

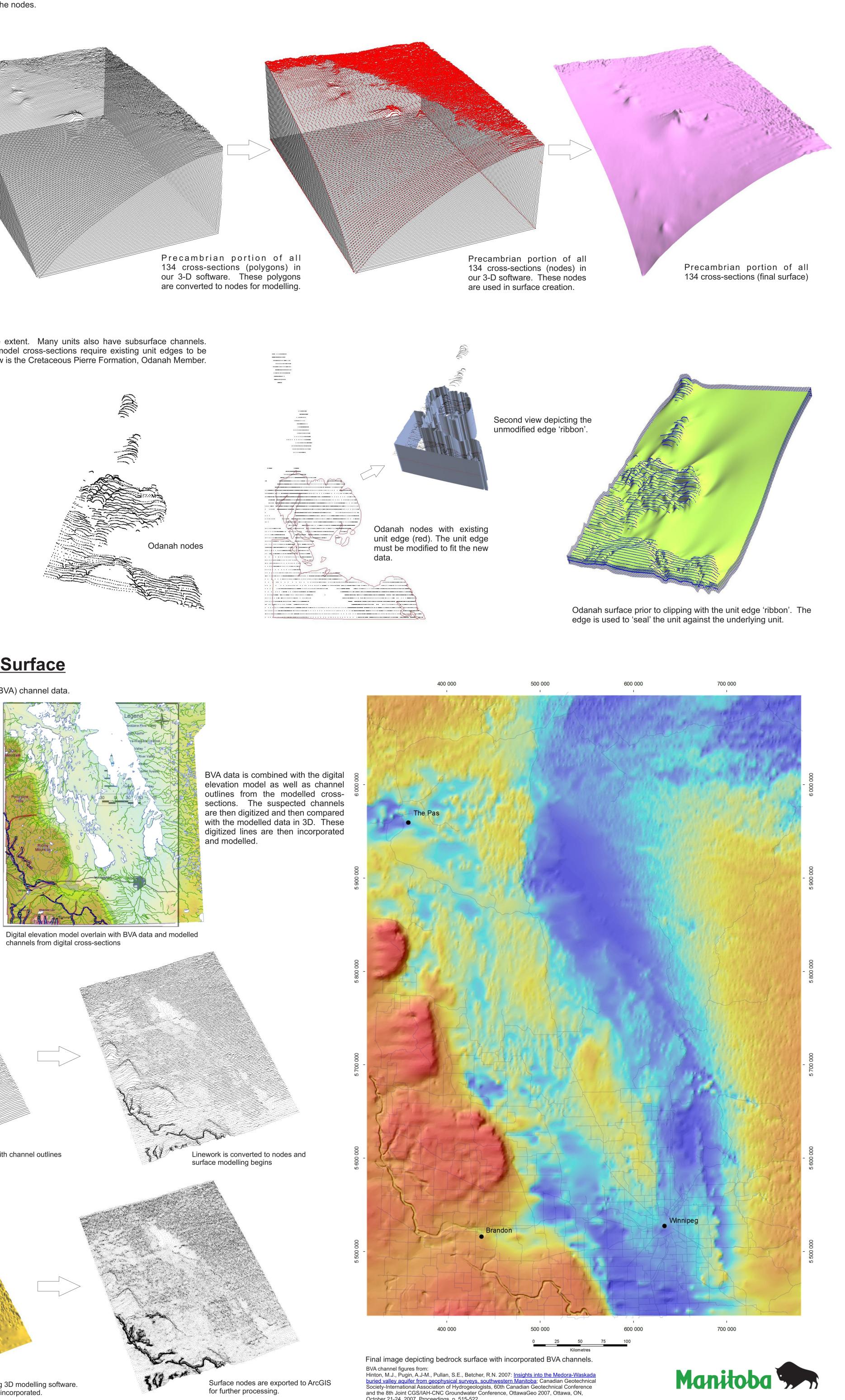


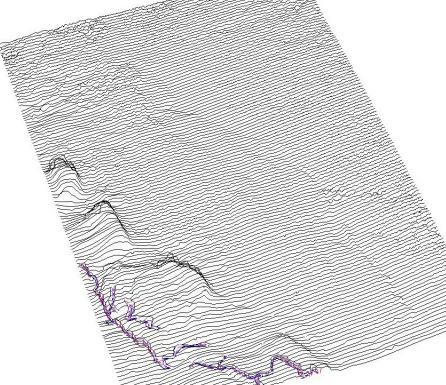
Subsurface Phanerozoic geology of southern Manitoba



New Product: Bedrock Surface







Cross-section locations

Digital cross-sections are georeferenced and brought in to our 3-D modelling software. This figure depicts all 134 cross-sections coloured for elevation.

Surface created using 3D modelling software