



Lake to Lake



**Mineralogical
Association of Canada**
Association minéralogique
du Canada



D'un lac à l'autre

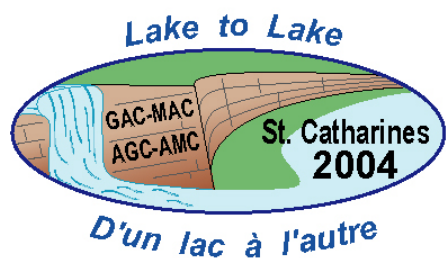
St. Catharines 2004

Abstracts Volume 29 Recueil des résumés 29

Joint Annual Meeting
Congrès annuel conjoint

Geological Association of Canada
Association géologique du Canada

Mineralogical Association of Canada
Association minéralogique du Canada



May 12-14 Mai

Brock University
St. Catharines, Ontario
www.stcatharines2004.ca/

INSTRUCTIONS

Welcome to St. Catharines 2004

St. Catharines is the site of the 49th Annual Meeting of the Geological Association as well as the Mineralogical Association of Canada. The meeting is being hosted by the Department of Earth Sciences of Brock University. On behalf of the Niagara Region, the City of St. Catharines and Brock University, the local organizing committee extends a warm welcome to our meeting.

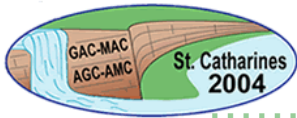
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Use of this abstract volume requires Adobe Acrobat Reader to be installed on your computer. Since you are reading this, Acrobat has already been installed on your machine. The abstract volume contains a large number of internal hyperlinks which are designed to aid navigation throughout the volume. If the hyperlinks do not work we recommend upgrading to a newer version of Adobe Acrobat which can be downloaded here:

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- Use the Adobe Acrobat Reader Bookmark feature to view to view the Table of contents. Clicking on the hyperlinked title of any session will jump you to the title page of that session.
- Abstracts within each session are arranged in the order of the talks, poster abstracts are located immediately following the abstracts of oral presentations.
- On each abstract you will note two hyperlinks:
 - Contents will return you to the table of contents, listing all sessions.
 - Index will jump you to the Author Index
- Within the Author Index, the hyperlinked alphabet will jump to the start of the appropriate section of author names.
- Authors with multiple contributions have individual entries for each abstract.
- Abstracts for oral presentations are designated with a session prefix (i.e. GS01) and the number of the talk; Posters are designated with the session prefix and a P for Poster.
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GROUNDWATER RESOURCES I: REGIONAL HYDROGEOLOGY IN SOUTHERN ONTARIO

RESSOURCES HYDRIQUES SOUTERRAINES I : L'HYDROGÉOLOGIE RÉGIONALE DANS LE SUD DE L'ONTARIO

SS06-12 REGIONAL GROUNDWATER MODELLING OF THE OAK RIDGES MORaine: AN INTEGRATED, DATA DRIVEN, GEOLOGY FOCUSED APPROACH TO GROUNDWATER MODELLING

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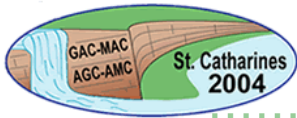
The Oak Ridges Moraine has been a focus of intense hydrogeological analyses for the past two years. The project has been undertaken under the direction of a partnership of local government agencies (municipalities and conservation authorities) and has led to the development of an effective water management tool that is being used to assess the affects of land use changes (including water allocations) on the overall groundwater flow system.

The success of the modeling effort can be synthesized into four key strategic initiatives: (1) a focus on data; (2) the incorporation of geological interpretation (as well as hard data) into the geological analyses; (3) a strong emphasis on understanding the linkage between the groundwater and surface water systems; and (4) an effective blending of regional scale thinking with sufficient resolution and detail for local scale analyses.

The data model constructed for the project was designed to effectively accommodate all data required to adequately undertake water management on a watershed basis. This includes groundwater, surface water and climate data. A unique approach in building the data model involved the scanning of nearly 2,000 key reports as well as the digital photographing of all maps and sections tied to the reports. Ready access all of the data through a pass-worded web site, as well through appropriate software tools also proved critical.

Another key aspect of the project was a strong focus on understanding the geological processes and the depositional setting of the Quaternary deposits that make up the moraine. In addition to simply kriging hard geological data from well records to construct geological surfaces, an emphasis was placed on incorporating "expert knowledge" in the form of digitized interpretation lines into the kriging process. This ensured continuity of valley systems, and allowed for layer pinch-outs to be effectively represented.

The model, although regional in its geographical area (8,000 km²), was developed on a 100 m mesh size. This ensured that a sufficient number of cells were present between headwater streams for a local groundwater flow systems to develop. Calibration of the model was partially tied to flux measurements taken in headwater streams in the form of low flow measurement surveys. This focus on stream systems allowed for these groundwater dependent, sensitive headwater streams to be evaluated against changes in land use or water allocation strategies.



GROUNDWATER RESOURCES I: REGIONAL HYDROGEOLOGY IN SOUTHERN ONTARIO

RESSOURCES HYDRIQUES SOUTERRAINES I : L'HYDROGÉOLOGIE RÉGIONALE DANS LE SUD DE L'ONTARIO

SS06-P08 BURIED VALLEY AQUIFERS: SIGNIFICANCE FOR MUNICIPAL WATER SUPPLY AND WATERSHED MANAGEMENT, CREDIT VALLEY, ONTARIO

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Buried valley aquifers are an important source of water supply to many communities in Ontario. They are likely to be of increasing significance to water resource managers as interest grows in source water protection, security of supply and in constraining estimates of watershed-scale water balances. To date, prospecting methods for this aquifer type have seldom used modern exploration techniques to discover, target and assess their reservoir potential and flow-system properties. This work outlines the exploration strategy employed near Caledon East in the upper Credit Valley watershed, southern Ontario.

Sparse archival borehole data were used to target a poorly-defined ~E-W trending bedrock valley, which appears to connect eastward with the larger Laurentian valley. High-resolution geophysical and geological data were collected to investigate the extent, depth and architecture of the suspected bedrock valley and its sedimentary fill. This work included ~10 line-kms of reflection seismic data in 3 profiles spaced at intervals of 4-6 km, downhole geophysics, and, detailed sediment logging data from an ~180 m-deep, continuously cored borehole. Several cored boreholes from a nearby landfill investigation provide additional detailed geological context.

Results of this work confirm the presence of and delineate the suspected bedrock valley that is ~100 m deep and ~2-4 km wide. The valley appears to trend and widen to the northeast. Seismic reflector patterns tied to borehole data show 3 main elements. A basal, semi-continuous, high-amplitude reflector, seismic facies (A), is interpreted as shale and limey bedrock of the Georgian Bay Formation. An overlying ~10-100 m thick package of high-amplitude, less continuous, truncated and inclined reflectors of seismic facies (B), interpreted as stacked sand and gravel sets with cut-and-fill and cross-bedding structures. This gravel facies is inferred to represent high-energy deposition from a subglacial fluvial system. An upper 80-170 m thick, low-amplitude, weakly-planar seismic facies (C) is interpreted as sand and silt. Borehole data indicate increasing mud content upward in the top 100 m of facies C. This succession is interpreted to correlate with the regional Oak Ridges Moraine and Halton Till stratigraphic units. Similar structures and coarse sediments have been interpreted from seismic facies and confirmed with continuous core in the region. Coarse sediment of unit B provides an ~100 m thick and ~2 km-wide target for hydraulic testing. Estimates of depositional flow directions will aid in the monitoring and assessment of this potentially significant aquifer.