Annual Research, Development, and Innovation Report

BGC’s strategic plan and big goal help us focus our efforts to advance the science and tools used we use to solve our client’s problems. We’ve been investing in internal projects, partnering with our clients and universities, and providing opportunities for our staff to publish and present the amazing work they do. Here’s what we worked on in 2016.

Internal Projects

Our 2016 internal projects built on previous efforts to push our tools and systems to new heights. We also challenged ourselves to adopt cutting edge technology. The passion and drive of individual BGC’ers continue to be the deciding factors in the success of these initiatives. Here are some highlights from 2016:

<table>
<thead>
<tr>
<th>Project</th>
<th>Summary</th>
<th>BGC Lead(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAMBIO / River Network Tools</td>
<td>BGC’s flag-ship R&amp;D project. CAMBIO™ and the River Network Tools™ are the back-bone of our pipeline services. We continue to lead the industry in no small part due to the development of these tools. In 2016, we started an exciting new phase of development under project code name “JUNO”.</td>
<td>Sarah Newton; Eldon Wong</td>
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<tr>
<td>Hololens</td>
<td>We completed a “proof of concept” (POC) of a mine closure immersive visualization that has captured the imaginations of the mining world.</td>
<td>Matt Lato; Gerald Magnusson</td>
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<tr>
<td>Landform Design Tools</td>
<td>Work continued working on in-house tools to assist with the design, planning, and development of construction drawings for mine closure landforms.</td>
<td>Julian McGreevy; Gord McKenna</td>
</tr>
<tr>
<td>Snow Pack Change and Avalanche Runout</td>
<td>We started testing the ability to develop 3D models of snow pack from photogrammetry and the ability to model snow avalanche runout using currently available 2D and 3D runout models.</td>
<td>Mike Conlan</td>
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<tr>
<td>Open Pit Failure Database</td>
<td>We developed an online database for open pit failure case studies. This database has been shared with, and received contributions from, the members of the international “Large Open Pit” project consortium.</td>
<td>John Whittall; Warren Newcomen</td>
</tr>
<tr>
<td>Numerical Data Processing System</td>
<td>We worked toward assembling an internal tool chain and set of workflows based on open source software to streamline the acquisition, processing, and analysis of climate and topographic data.</td>
<td>Patrick Grover; Matthew Buchanan; Leonardo Guzman</td>
</tr>
</tbody>
</table>
**University Collaboration**

In 2016, we collaborated with several university research groups. We contributed interesting project ideas and data. We provided funding for professors and our own staff returning to graduate school to undertake projects. Several BGC’ers sat on student committees or advisory boards. Highlights from 2016 are below:

<table>
<thead>
<tr>
<th>Project</th>
<th>University</th>
<th>University Researcher(s)</th>
<th>BGC Lead(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rock Mass Disturbance</td>
<td>Dalhousie University</td>
<td>Dr. Andy Corkum</td>
<td>Andrea Regli; Derek Kinakin</td>
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<tr>
<td>Automated Aerial Image and Lidar Analysis</td>
<td>Queens University</td>
<td>Dr. Jean Hutchinson</td>
<td>Matt Lato</td>
</tr>
<tr>
<td>Landslide-Generated Waves</td>
<td>Queens University</td>
<td>Dr. Andy Take</td>
<td>Garrett Miller; Shielan Liu; Mike Porter</td>
</tr>
<tr>
<td>Debris Flow Mitigation</td>
<td>Simon Fraser University</td>
<td>Dr. Doug Stead</td>
<td>Emily Moase; Matthias Jakob; Alex Strouth</td>
</tr>
<tr>
<td>Radar Data Analysis for Open Pit Slopes</td>
<td>Simon Fraser University</td>
<td>Dr. Doug Stead</td>
<td>John Danielson; Derek Kinakin</td>
</tr>
<tr>
<td>Channel Scour on Alluvial Fans</td>
<td>Simon Fraser University</td>
<td>Dr. Brent Ward</td>
<td>Carie-Ann Lau; Matthias Jakob</td>
</tr>
<tr>
<td>Landslides following the 2015 Earthquake in Nepal</td>
<td>Simon Fraser University, University of Durham, University of British Columbia</td>
<td>Dr. Doug Stead, Dr. Nick Rosser, Dr. Scott McDougall</td>
<td>Lauren Hockin; Marc-Andre Brideau</td>
</tr>
<tr>
<td>Bio-Cementation</td>
<td>University of Alberta</td>
<td>Dr. Ania Ulrich, Dr. Yang Liu, Dr. Nick Beier</td>
<td>Vanessa Mann; Brent Mooder; Gord McKenna; Bill Burton</td>
</tr>
<tr>
<td>Trenchless Technology Chair</td>
<td>University of Alberta</td>
<td>Dr. Aliraza Bayat</td>
<td>Pete Barlow</td>
</tr>
<tr>
<td>Bank Erosion</td>
<td>University of British Columbia</td>
<td>Dr. Brett Eaton</td>
<td>Sarah Davidson; Matthias Jakob</td>
</tr>
<tr>
<td>Vortex Induced Vibrations in Pipelines</td>
<td>University of British Columbia – Okanagan</td>
<td>Dr. Joshua Brinkerhoff</td>
<td>Gerry Ferris</td>
</tr>
<tr>
<td>Landslide Impacts on Pipelines</td>
<td>University of Cambridge</td>
<td>Geoff Eichhorn</td>
<td>Alex Baumgard</td>
</tr>
</tbody>
</table>
2017 Outlook

With 2016 just behind us, 2017 is shaping up to be another exciting year for research, development, and innovation. BGC’s R&D review committee is already receiving interesting proposals related to machine learning, stream avulsion, and InSAR. Many projects from 2015 and 2016 will continue.

Have a research, development, or innovation idea that you’d like to propose for funding/support? Get in touch with a Business Sector or Technical Discipline Lead, your office manager, or any CMT member to learn more about the proposal process.

2016 Publication List

Journals


Conferences


Ansah-Sam, M., Hackey, L., McKenna, G., and Mooder, B. 2016. The DBM approach for setting engineering design criteria for an oil sands mine closure plan. In Fifth International Oil Sands Tailings Conference, Lake Louise, Alberta, 4-7 December 2016. University of Alberta Geotechnical Group, Edmonton. 11 pp.


Lato, M., Kromer, R., Hutchinson, D.J., and Gauthier, D. 2016. Understanding slope stability through remote sensing. LARAM School, Salerno, Italy.


McKenna, G., Mooder, B., Burton, B., and Jamieson, A. 2016. Shear strength and density of oil sands fine tailings for reclamation to a boreal forest landscape. In Fifth International Oil Sands Tailings Conference, Lake Louise, Alberta, 4-7 December 2016. University of Alberta Geotechnical Group, Edmonton.


Strouth, A. 2016. An example of mapping geotechnical assets for Alberta Transportation. 95th Annual Meeting of the Transportation Research Board, Engineering Geology Committee Meeting (AFP10), Washington, DC, 10-14 January 2016. Invited presentation.


