

# TERRAIN SCIENCES & GEOSCIENCE DATA

Geoscience data management, geochemistry, geophysics, Quaternary geoscience and climate-change geoscience all make up the diverse responsibilities of this section, which currently has a staff of 13.

Jennifer Organ continued the surficial mapping and till-sampling program of NTS map areas 12A/11 and 12A/14 in central Newfoundland. With the assistance of David Taylor, more than 200 sites were sampled in a helicopter-supported program. Thick deposits of glacial diamicton form blankets, plains and hummocky terrain, interspersed by bogs. Numerous meltwater channels have been eroded into the thick glacial diamicton. Road-based surficial mapping and sampling, at a density of one sample per linear kilometre, commenced on adjacent NTS map area 12A/05, on the Burgeo Highway. Glacial diamicton over much of this area is generally thinner, than that of the areas to the north. There are also isolated areas of both blanket and hummocky diamicton, with sandy to gravelly glaciofluvial deposits concentrated primarily within the large river valleys or associated with eskers.



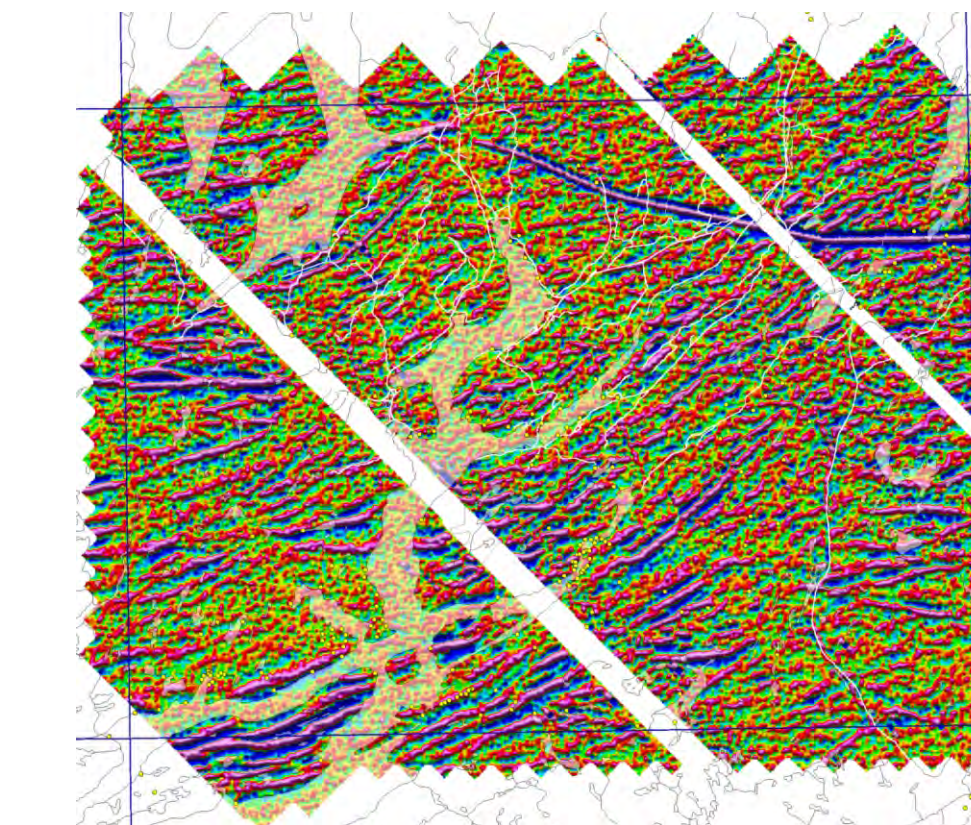
Heather Campbell participated in the GEM2 integrative bedrock and surficial mapping and sampling program in Labrador (NTS map areas 13 N and 13 M). Collaborators on the project included Hamish Sandeman and Alana Hinchey, and other participants from the Geological Survey of Canada and Memorial and Cape Breton Universities. Her contribution involved surficial mapping and targeted sampling west of Hopedale. The objectives of the survey were to: 1) sample till in areas of no coverage that are underlain by prospective bedrock units; 2) map glacial sediments and landforms and record erosional indicators in areas that have not been previously mapped.



Pre-field data mining and compilation of historical and new datasets (including the 2018 magnetic survey commissioned by the GSC) had revealed three areas of interest. The Hunt Lake Archean greenstone belt, and the area south and southwest of the Flowers River Igneous Suite were sampled, while preliminary mapping was conducted west of Triangle Lake. In total, 47 sites were sampled for geochemical analysis of the -63 micron fraction, and indicator-mineral analysis of bulk samples. Pebbles were also collected for examination and identification. Glacial landforms were mapped from the air, supplemented by ground observations, striation measurements and Unmanned Aerial Vehicle (UAV) imagery.

In August, Heather gave a presentation entitled "Understanding Glacial Dispersal in Central Newfoundland Using Glacial Till Geochemical Data, Imagery and Mapping" at the CANQUA conference in Ottawa.

Melanie Irvine carried out fieldwork across Newfoundland as part of the ongoing landscape hazard and coastal-monitoring program. Approximately 50 coastal cliff and beach sites were surveyed by drone and RTK, obtaining accurate topographic data and orthophotos. Analysis of the data will allow for the quantification of rates of cliff erosion and landscape modification in areas prone to slope movement, and generation of maps of flood risk arising from sea-level rise and storm-surge events. Along with Gillian Roberts, Melanie also travelled to Deer Lake in January to access the implications of flooding in the Humber River. She has made presentations at numerous events throughout the province, and continues to build relationships and offer support to numerous NGOs and other organizations.

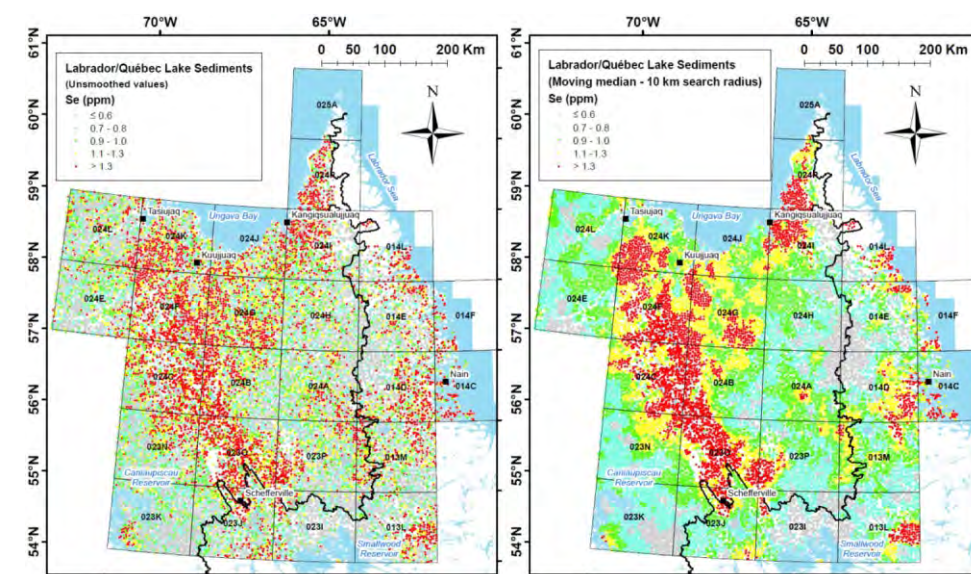


Gerry Kilfoil continues to generate standardized, high-quality imagery and map products amenable to desktop mapping software, from geophysical data from surveys flown by the private sector. An index of airborne surveys, available through the on-line Geoscience Atlas, is maintained and updated as data become

available. Geophysical guidance continues to be provided to prospectors and mineral exploration companies, as well as quality assurance for geophysical data submissions as part of mineral assessment.

It is expected that airborne VLF-EM data for NTS map area 01M/13 (St. Alban's), acquired in 2015, will be released around the time of Open House. These results highlight the predominant NE-SW linear fabric observed in the Baie d'Espoir Group (layered volcanic and metasedimentary rocks) which underlie the north-central part of the survey, an area actively being explored for gold.

The **Geochemical Laboratory** is mandated with the task of fulfilling all analytical requirements of the Geological Survey. The laboratory is located in the Howley Building, Higgins Line, St. John's, and has four staff: the Laboratory Director (Chris Finch) and Mineral Laboratory Chemists Jennifer Toope, Rosauero Roldan and Lisa Walsh. The lab carries out analyses of rocks, stream and lake sediments, till and soil, and well and lake waters for approximately 65 elements; over 200,000 determinations are done annually. Most of the analyses for trace and major elements are carried out using Inductively Coupled Plasma-Emission Spectrometry (ICPES) and Inductively Coupled Plasma-Mass Spectrometry (ICP-MS). Other selective methods are also applied. A detailed description of the currently applied sample-preparation and analytical methods was released as an open file (NFLD/3316 - Analytical Methods for Chemical Analysis of Geological Materials) in January of this year; this will provide a useful source reference in any Survey reports that incorporate analytical data.



The Geochemical Atlas of Northeastern Quebec and Adjacent Areas in Mainland Newfoundland and Labrador was published by the Geological Survey of Canada in March 2018. Authors are **Stephen Amor**; Martin McCurdy, Bob Garrett and

David Corrigan of the GSC; and Fabien Solgadi of the Quebec MRNF. The first three authors have also submitted a paper describing the Atlas' creation, which has been accepted for publication by Geochemistry: Exploration, Environment, Analysis (GEEA). Along with the staff of the Geochemical Laboratory, Steve also co-authored Open File NFLD/3316 (Analytical Methods for Chemical Analysis of Geological Materials).

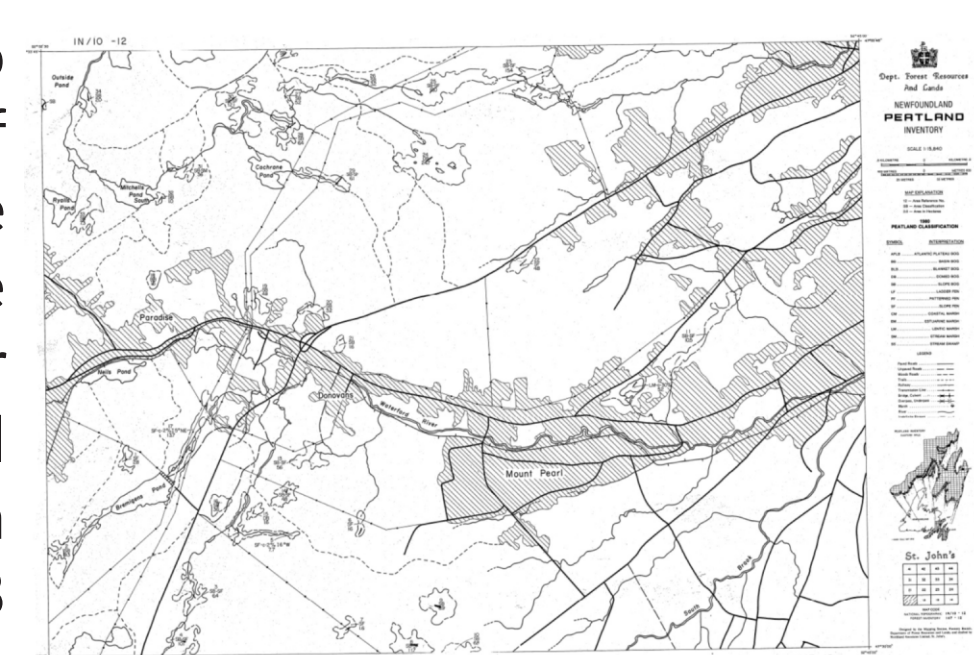
Sarah Hashmi initiated surficial mapping in the Northern Peninsula, focusing on the St. Anthony, Quirpon, and Raleigh map areas (NTS 02M/05, 02M/11 and 02M/12). The Northern Peninsula has a complex glacial history, as it has been affected by glacial flow from both the Newfoundland Ice Cap and the Laurentide Ice Sheet. This area also has potential for Pb-Zn mineralization and has seen increased exploration activity, with more than 2,000 claims staked since the beginning of 2017. Detailed till sampling and striae mapping were conducted in exposed trenches in the North and South zones of Altius Minerals' Sail Pond property, in the St. Julien's map area (02M/04).



During the 2018 field season, Gerry Kilfoil conducted ground geophysical surveys adjacent to recent coastal landslides near Daniel's Harbour and Sally's Cove, western Newfoundland, as a continuation of work initiated in 2017. The objective of this investigation is to characterize the subsurface arrangement of surficial sediments, and thereby help predict areas that are most susceptible to such erosion in future. Coincident profiles of direct current resistivity/induced polarization, ground-penetrating radar, and vertical-gradient magnetic data were recorded over selected sites, where existing infrastructure and ground disturbances could be avoided. For comparison, these surveys were also deployed at other coastal sites, known to be not prone to landslide erosion.



David Taylor continues to coordinate the integration of digital data with the on-line Geoscience Atlas. Currently there are 111 digital surficial maps for the island of Newfoundland and 38 for Labrador. New striation data collected during the 2018 field season are currently being edited and will be added to the striation dataset. Updates to the till geochemistry dataset include new datasets for the Sheffield Lake/Springdale and Topsails/Rainy Lake areas. Similar updates, to include the most recent data, have been made to the surficial landform dataset. A new initiative begun in 2015, to scan and rectify approximately 2000 1:15,840 scale Peatland inventory maps for the island of Newfoundland, is now complete. A new surficial Index layer has been compiled showing the most recent digital surficial mapping, and is ready for inclusion in the Atlas. The Carbon-14 dataset has been edited, and includes the addition of 272 new dates bringing the total number of entries to 1540.



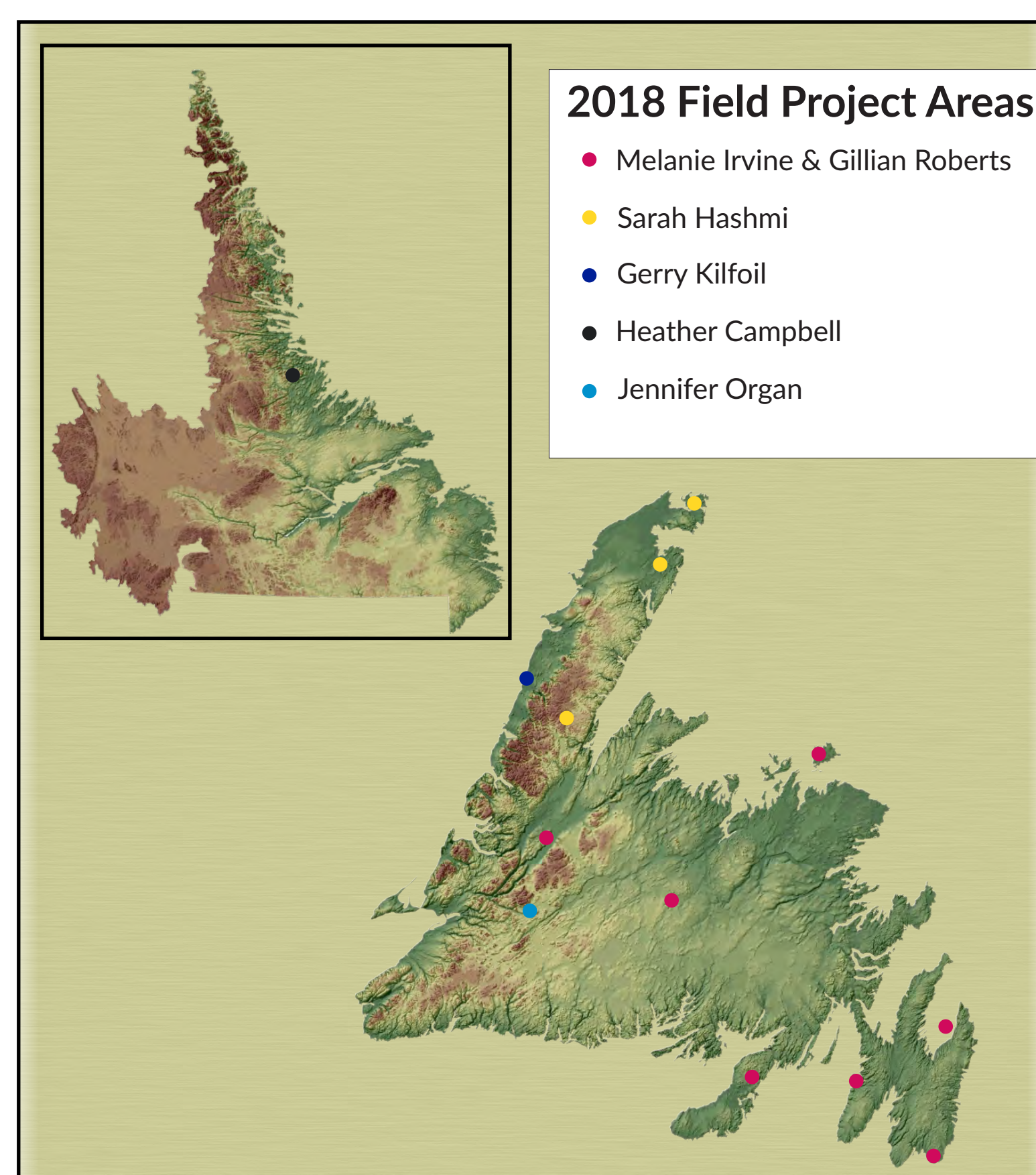
Pauline Honarvar has updated the Geoscience Atlas Index of Geochemical Surveys with an additional 12 surveys that link to recent open file reports. In the fall of 2018, Pauline and Gillian Roberts will complete the updating of 10 layers in the Geoscience Atlas, with five new layers being added. Pauline also reviewed 29 geochemistry datasets for four open-file geology reports. Work continues on preparing Dr. Charles Gower's memoir for publication; it has 35 datasets, of which 19 are GIS-based.

Loretta Crisby continues working on the development of a new framework for the bedrock geology database for the province. The database incorporates digital vector files with the legend attribute tables. Map preparation support is provided to Geological Survey field projects, industry and academia. The results of bedrock-mapping projects are incorporated into the bedrock-geology database. A GIS layer of geochronology age date results has been added to the Geoscience Atlas.



Gillian Roberts is investigating new ways of visualizing and presenting geospatial datasets; creating orthophotos and highly accurate digital elevation models from UAV surveys; and experimenting with different

programs to present data in motion and 3-D, while providing GIS support for various projects in the survey. She provides all project geologists with the data required for their field work, along with ensuring all equipment is tested and field ready. She has extended her expertise in UAV surveying and post-processing to the Royal Newfoundland Constabulary and continues her successful collaborations with Alana Hinchey (Geotourism) and Melanie Irvine (Coastal Hazards). Archival material from retired geologists continues to be compiled, including field notebooks, thin sections, and field traverse maps.



## MINERAL RESOURCES REVIEW

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