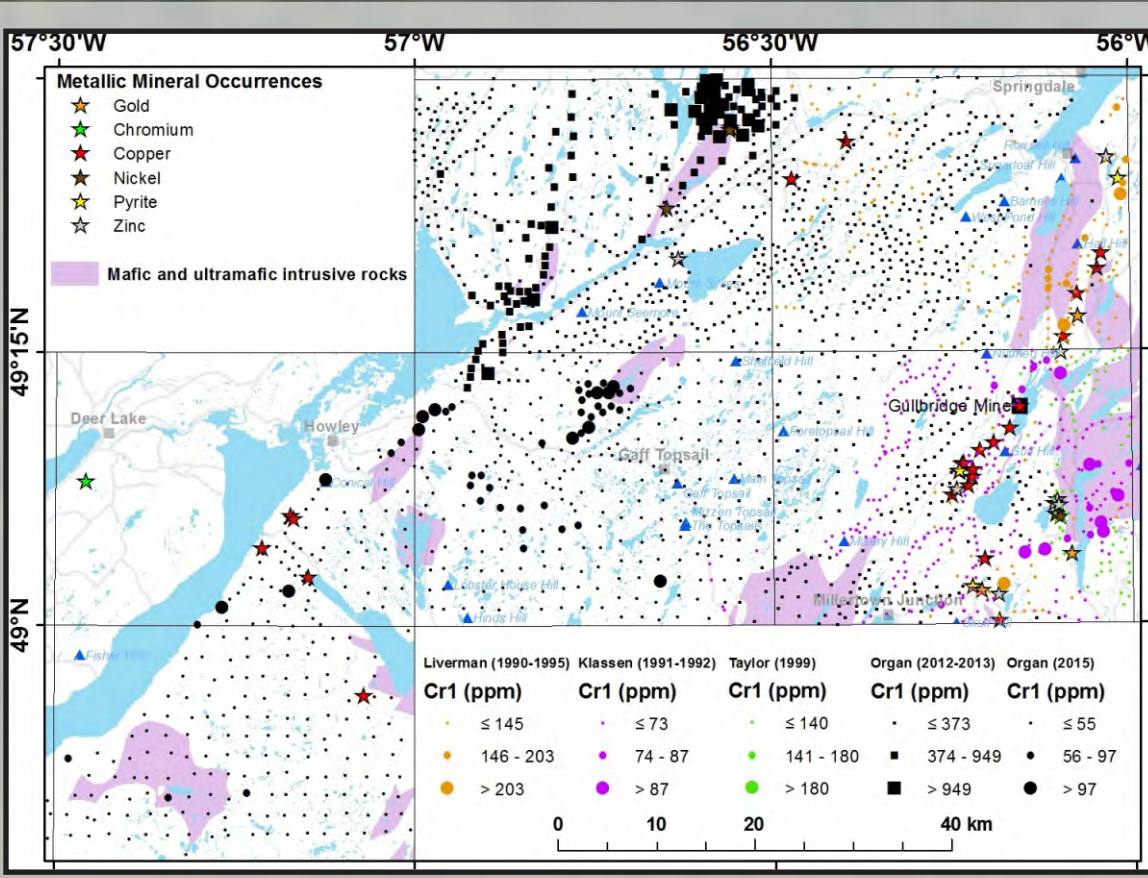


SECTION REVIEW 2017

Overview

The broad mandate of the Terrain Sciences and Geoscience Data Management Section includes the provision of a diverse range of services, including aggregate resource assessments, till and lake sediment geochemical surveys, surficial geological and ice-flow mapping; geophysical compilations and interpretation, environmental initiatives including geological hazard mapping and coastal erosion monitoring; laboratory services including geochemical and particle size analyses; the management of the Geoscience Atlas and the databases to which it provides access; compiling and presenting geospatial images; and computer and communications hardware and software support. The section currently has a staff of 14.



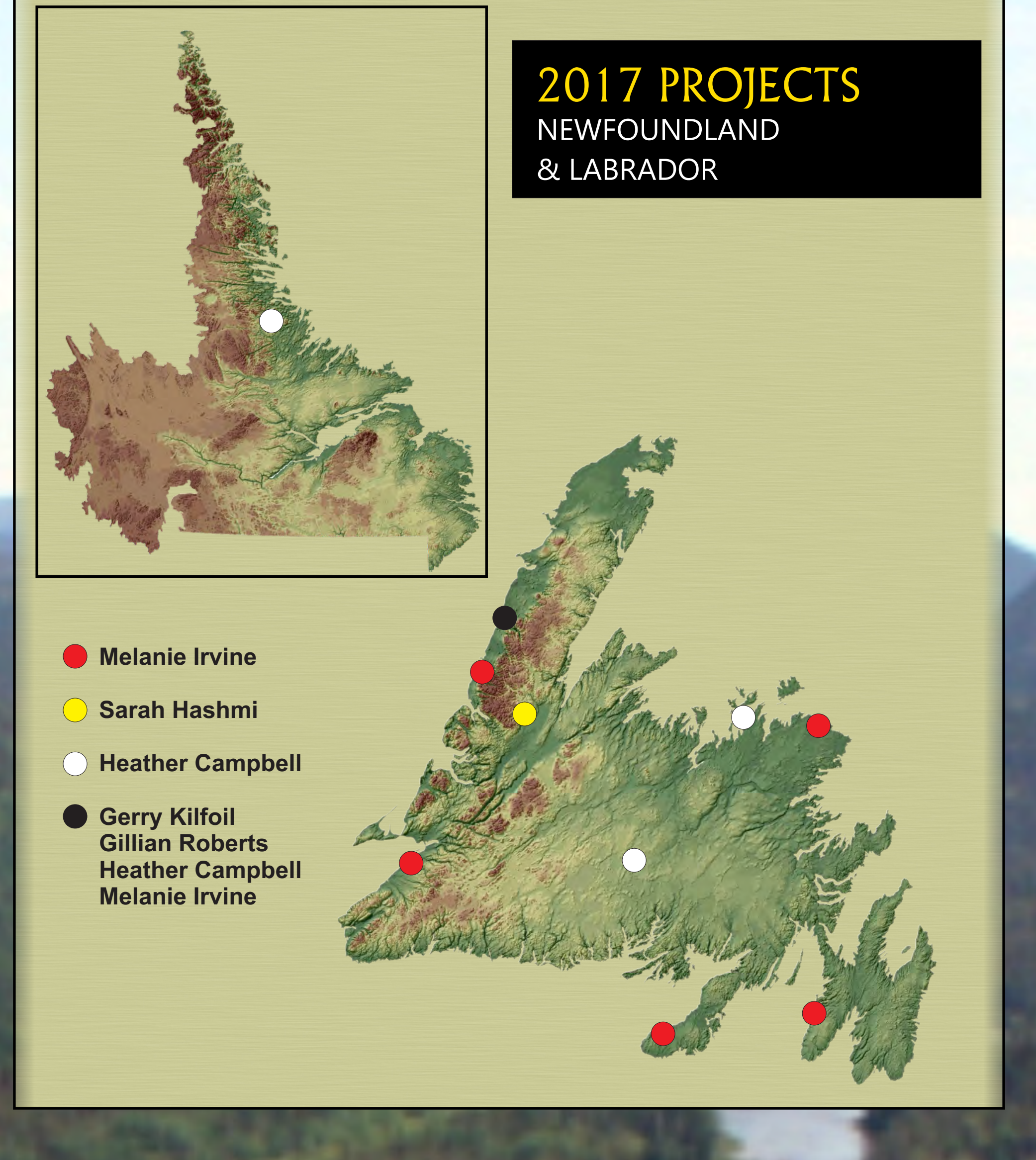
Jennifer Organ and Stephen Amor recently released two open-file reports of till-geochemical data from the Topsails and Sheffield Lake areas of west-central Newfoundland. A number of dispersion patterns have been identified that may be related to mineralization; till geochemistry also provides ambiguous evidence regarding ice-movement, as in this example of chromium dispersion from mafic and ultramafic intrusions.

Multidisciplinary studies of coastal stability have been undertaken on the west coast of Newfoundland, in collaboration with Memorial University and Natural Resources Canada. **Melanie Irvine, Gerry Kilfoil, Heather Campbell** and **Gillian Roberts** conducted ground geophysical surveys (Ground-Penetrating Radar, Direct Current Resistivity and Induced Polarization) and drone-assisted photo work, along with preliminary stratigraphic mapping, of the Daniel's Harbour and Parson's Pond areas. This study aims to characterize the stratigraphic discontinuities in surficial sediments that may contribute to the susceptibility of the coastline to erosion, and investigate the possibility that they can be detected and mapped remotely from the surface.



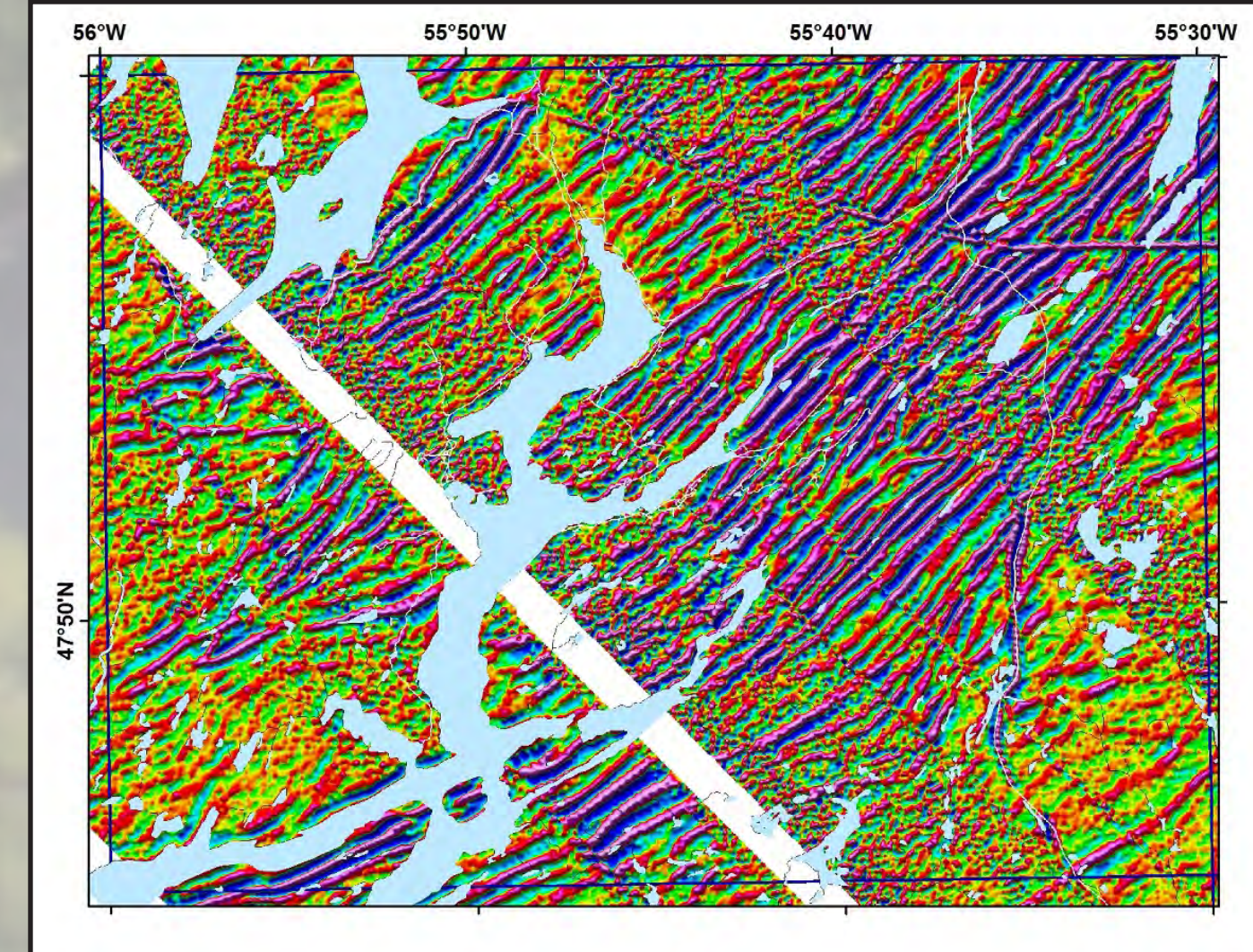
The program to map and sample the surficial geology of Newfoundland continued this year with work by **Heather Campbell** in the Middle Ridge area (assisted by **Dave Taylor** and **Robyn Constantine**) and in the Twillingate / Change Islands area, and by **Sarah Hashmi** in the Cormack and Silver Mountain NTS map areas. Preliminary work in the latter areas has identified east-northeastward and southeastward to southwestward ice-movement directions and four distinct till units, all deposited during the same depositional event.

In August, Heather participated in reconnaissance work for the GEM2 program near the Hopedale-Saglek boundary in Labrador, with **Alana Hinchey** (GSNL), **David Corrigan** (GSC) and **Dianne Van Rooyen** (Cape Breton University). This targeted research aims to upgrade geoscientific knowledge and stimulate mineral exploration along the Hopedale-Saglek tectono-stratigraphic corridor. The surficial component of the project will clarify ice-transport directions in drift-covered areas, and elucidation of the sources of geochemical anomalies by examining glacial dispersal patterns and landforms.



Quaternary Mapping

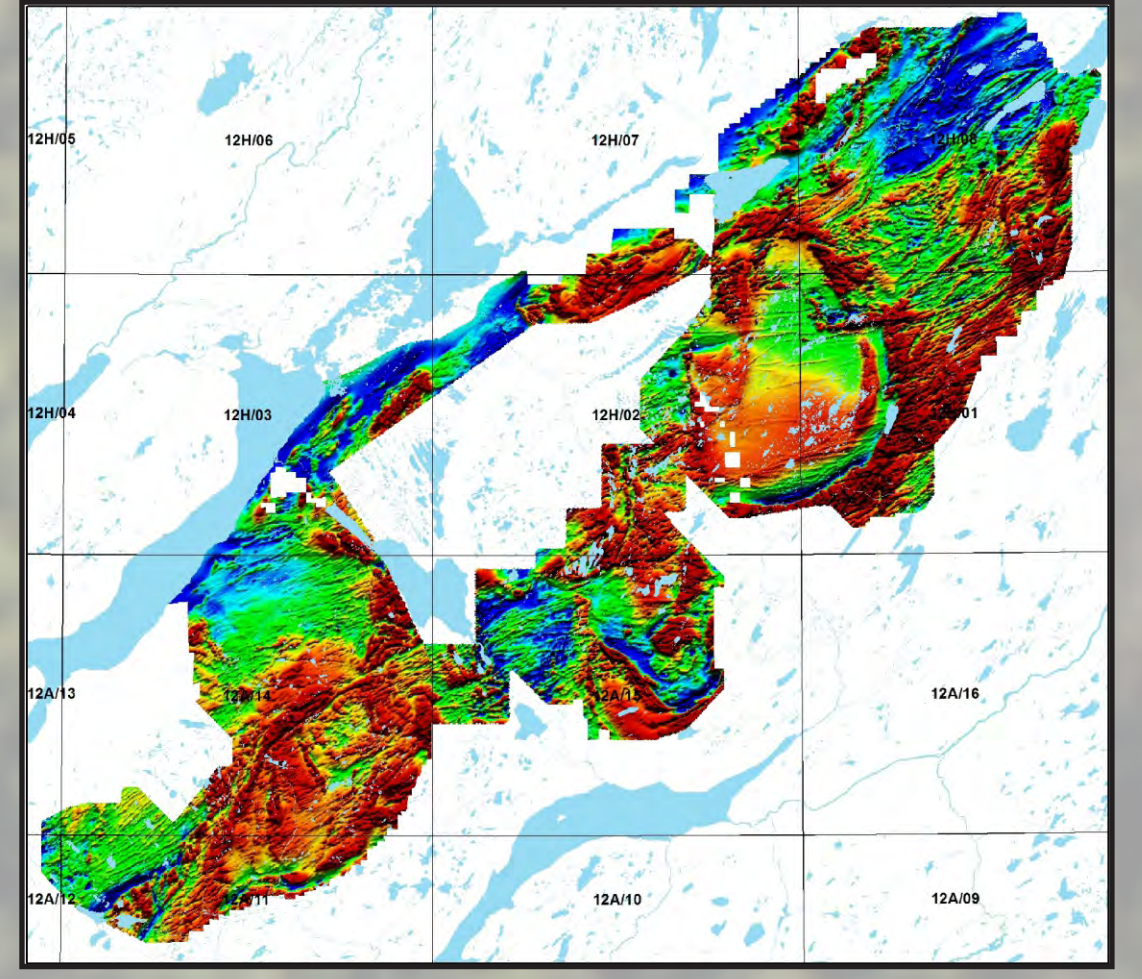
Geophysics



Gerry Kilfoil and Robyn Constantine (currently on secondment to the Mineral Development Division) have continued to reprocess geophysical data from surveys flown by the private sector, to yield standardized, high-quality imagery and map products amenable to desktop mapping software. An index of airborne surveys, available through the on-line Geoscience Atlas, is maintained and updated as data become available.

Airborne VLF-EM data, acquired during the 2015 St. Alban's survey, are being released to complement existing gradient magnetic and radiometric data from that survey. In particular, these results highlight the strong NE-SW linear fabric over the Baie d'Espoir Group (layered volcanic and metasedimentary rocks) which underlay the north-central part of the survey.

As in previous years, geophysical guidance has been provided to prospectors and exploration companies on request.



Environmental Geology

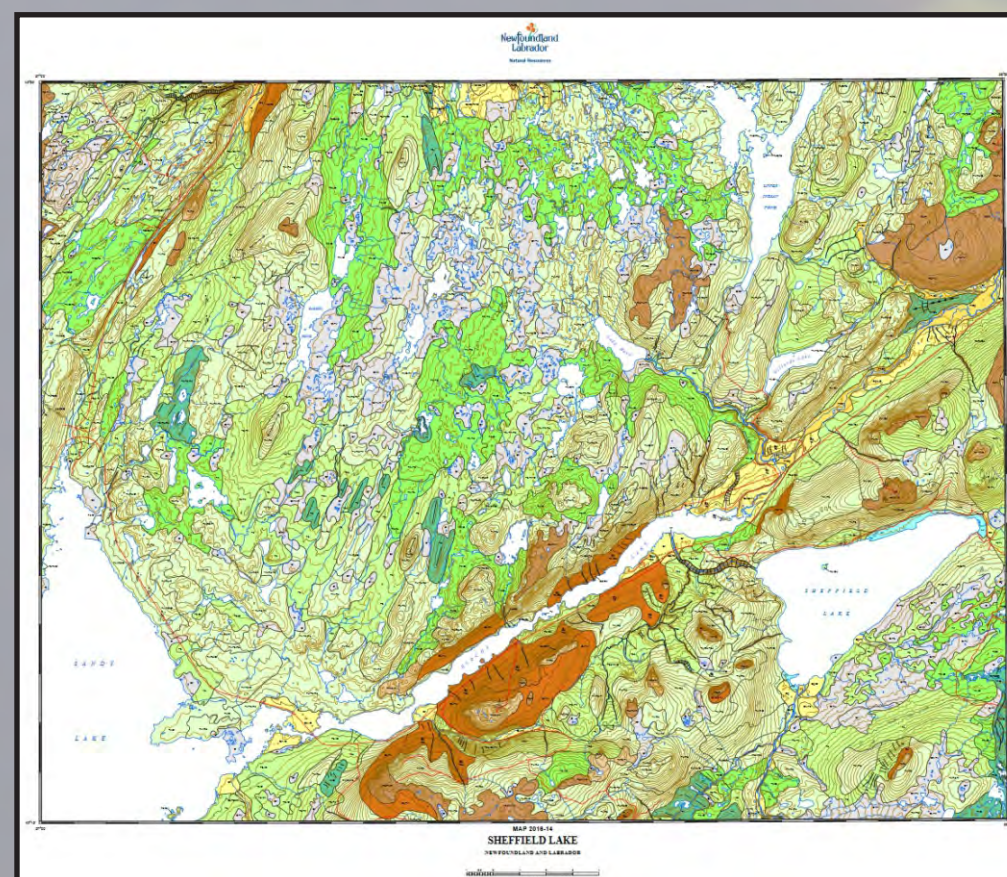
Melanie Irvine has carried out fieldwork across Newfoundland as part of the ongoing landscape hazard and coastal monitoring program. Almost 50 coastal cliff and beach sites were surveyed by drone, to obtain highly accurate topographic data and orthophotos. Analysis of the data will allow for the quantification of rates of cliff erosion and terrain displacement in areas prone to slope movement, and generation of flood-risk maps from sea-level rise and storm-surge events. Three-dimensional models are being created, which aid in stratigraphic mapping of unconsolidated cliff faces and in visualizing landscape processes.



Along with **Gillian Roberts**, Melanie presented a paper entitled "Exploring the use of UAVs in coastal environments, mining and geotourism" at the "High Resolution Mapping Along the Coastal Zone" Workshop held in Lawrencetown, N.S. in February. Melanie continues to provide information, and recommendations related to landscape hazards and the implications of climate change, to land-use planners, municipal leaders, NGOs and other stakeholders.



Digital Data



David Taylor continues to coordinate the integration of digital data with the on-line Geoscience Atlas. The surficial geology map of the Sheffield Lake area is complete and available for viewing.

To date, all old paper 1:50 000 scale surficial-geology maps have been digitized, including 36 000 landform structures and placed in the Geoscience Database to bring the total available maps to 111 for the Island and 38 for Labrador.

Laboratory Services

The Geochemical Laboratory of the Department of Natural Resources is mandated with the task of fulfilling all analytical requirements of the Geological Survey. The Geochemical 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 Kelly**, **Rosauro Roldan** and **Lisa Walsh**. The laboratory carries out analysis for more than 60 elements with an annual productivity of over 200 000 determinations. Most of the analyses for trace and major elements are carried out using Inductively Coupled Plasma-Emission Spectrometry (ICP-ES) and Inductively Coupled Plasma-Mass Spectrometry (ICP-MS). Other selective methods for loss-on-ignition (LOI), FeO, Fluoride, Conductivity and pH are also used.

Data Management

Loretta Crisby is responsible for the bedrock geology database for the province. The digital bedrock geology dataset for the island is complete and available for download from the Geoscience Atlas. She is collaborating with Alana Hinchey on creating a geochronology database for the province. This database is to be added as a layer to the Geoscience Atlas in 2018.

The web-based Geoscience Atlas, online delivery of geoscience information, online data standards and integration are coordinated by **Pauline Honarvar**. Layers in the Index, Geochemistry and Surficial groups, among others, will be updated in the coming year.

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. Gillian continues her successful collaborations with Alana Hinchey (geotourism) and Melanie Irvine (coastal hazards). She is participating in the multi-year, multi-disciplinary coastal stability study on the west coast; operating the UAV's, processing UAV data and assisting with the geophysical surveys.

