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THE GEOSCIENCE ATLAS AND GEOSCIENCE DATA UPDATES: 2024

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ABSTRACT

The geoscience-data specialists at the Geological Survey of Newfoundland and Labrador conducted two updates to the provincial Geoscience Atlas Online application ("Atlas") in 2024. Updates to the Atlas included the addition of two new thematic data layers: Wind Energy Land Reserves *and* Canadian Protected and Conserved Areas Database. *Additionally two new geophysical image datasets were added:* Makkovik River West *in Labrador, and* Terrenceville *in south-central Newfoundland. New data were added and corrections to attribute tables made for many other layers, including* Map Labels*, various* Index *layers,* Detailed Surficial Geology, Striations *and* Geochronology. *New and recently compiled geophysical survey images were added for a portion of the central Newfoundland gold belt and west-central Labrador, respectively. An update to the standalone Geoscience Index Application was made to improve client data search and custom data visualization. Geoscience Atlas usage remains consistent with historical trends, but spikes in metrics compiled from Google Analytics present challenges to understanding our user base. Efforts to enhance the client experience, internal data management and public data delivery continue in 2025.*

INTRODUCTION

The geoscience-data specialists at the Geological Survey of Newfoundland and Labrador (GSNL) are tasked with maintaining and updating the online geoscience data portal – Geoscience Atlas – with new and newly digitized or compiled archival data, as well as enhancing the organization's geoscience data strategy and implementation. This report describes updates to the datasets provided through the Geoscience Atlas completed in 2024, as well as updates to improve the overall client data delivery experience.

THE GEOSCIENCE ATLAS

The Geoscience Atlas (Atlas; Figure 1) is a web-accessible interface to a geographic information system (GIS) that provides Newfoundland and Labrador geoscience datasets (*e.g.*, geology maps, mineral occurrences, map staked claims information, geochemistry data, geophysical images, and links to reports) that may be of use to prospectors, mineral-exploration companies, and the public. The Atlas hosts more than 180 geoscience data layers and more than 200 unique data visualizations (*e.g.*, geochemistry dot plots for individual elements). The Atlas also displays ancillary data layers generated by other provincial and federal government agencies to support decision making in areas such as the locations of transmission lines, municipal and planning area boundaries, quarry locations, staked claims and mineral tenure, and federal and provincial parks and protected areas.

The Atlas is updated regularly, with the update frequency varing by data type. Foundational geoscience information (*e.g.*, *Geochemistry, Surficial Geology, Geophysics*) is updated annually or bi-annually. Other layers that pertain to mineral rights and mineral exploration (*e.g.*, *Mineral Occurrences, Map Staked Claims* and *Quarry* layers) are automatically updated daily or in real-time. Linked help files and metadata pages are updated on an "as needed" basis.

The Atlas can be accessed *via* direct link (https://geoatlas.gov.nl.ca/Default.htm) or through the Geoscience Online page (https://gis.geosurv.gov.nl.ca), where notices of planned maintenance or changes that may impact users are also posted. The Atlas functionality (*e.g.*, query, download, print, help files) is described in previous Current Research reports (Honarvar *et al.*, 2015, 2022). For discussion on Geoscience Atlas data access *via* its REST service endpoints refer to Jenkins *et al.* (2023). For updates to the Atlas applications and notices of planned maintenance, visit the Geoscience Online webpage at https://gis.geosurv.gov.nl.ca/.

GEOSCIENCE ATLAS USAGE

Geoscience Atlas traffic during the reporting period (September 2023 to September 2024) remained consistent with historical trends. The Atlas web server logged approximately 49 800 client sessions, while Google Analytics 4 (GA4) estimated 63 500 sessions (of which, 34 000 were

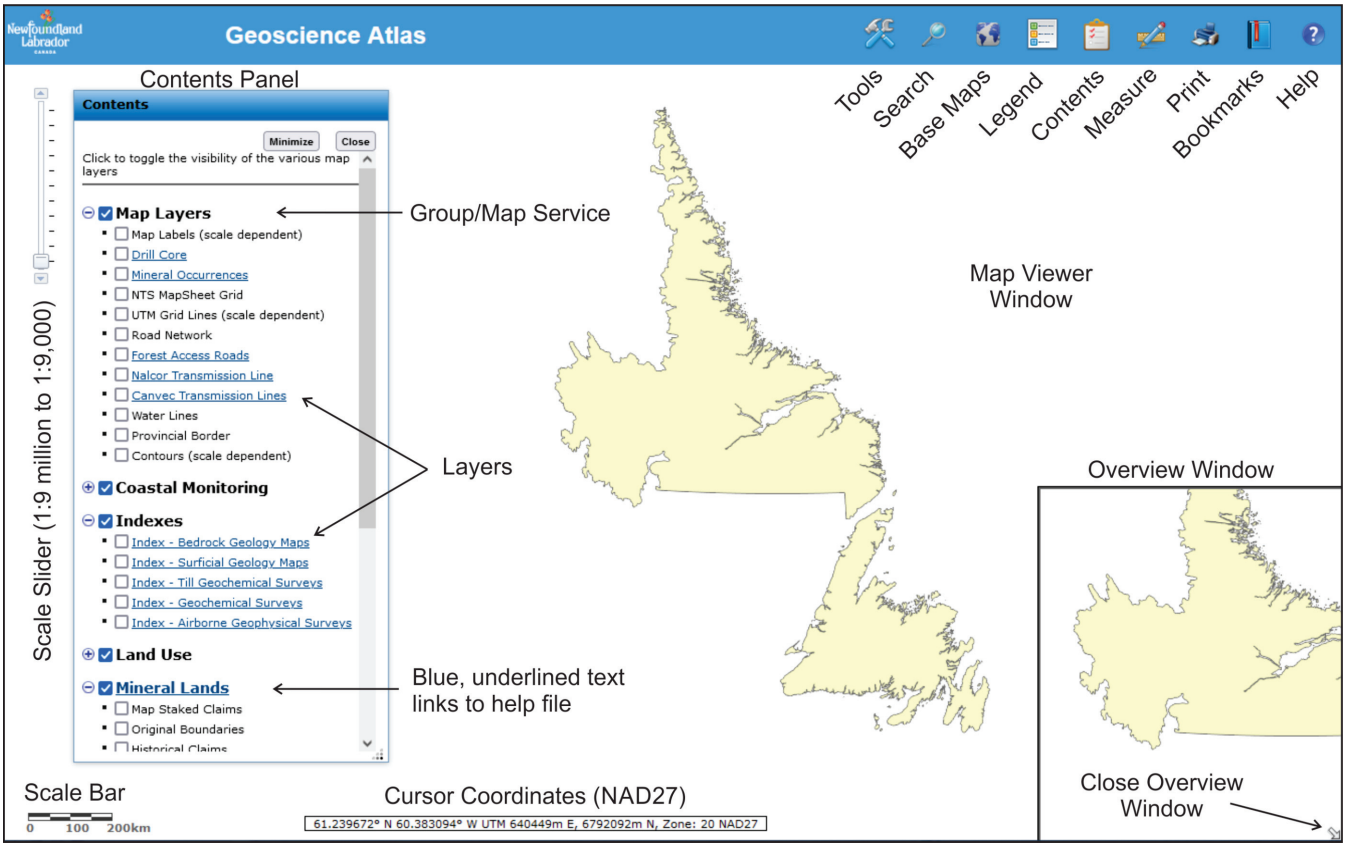

Figure 1. *The Geoscience Atlas webpage layout. The scale slider and contents panel are located on the left side. The scale bar, cursor coordinates (based on the North American Datum of 1927- NAD27) and overview window are located along the bottom. Tools, Base Map options, Legend generator, Print, Help file links and additional function buttons are located in the menu bar across the top right.*

"engaged sessions") from 19 000 users. Differences in calculation method may explain some of the discrepancy in the counts of Atlas sessions. We suspect that a marked increase in GA4-reported traffic after July 1, 2024 (Figure 2) is primarily from "bots" and other automated web tools (the GA4 spike is mainly "first time users" (Figure 2A) from Vancouver and Quito, Ecuador that do not contribute to an increase in "engaged" sessions during this period (Figure 2B)) and because the spike is not recorded in web server logs (Figure 2C). Compared to the 2022–2023 reporting period, Atlas use declined by approximately 16% for the 2023–2024 reporting period (considering web server log reports only).

User demographics in this paragraph only consider data reported between September 2023 and June 2024, prior to the poorly understood spike in user traffic reported by GA4. User demographics are consistent with previous reporting periods: 90% of our clients are from Canada, of which most are based in Newfoundland and Labrador (57%, up from 47% for the 2022–2023 reporting period), followed by eastern and Atlantic Canada: Ontario (14%), Nova Scotia (8%), Quebec (7%), New Brunswick (3%) and British Columbia (4%). The top international client jurisdictions were United States (4%) and Australia (2%).

GEOSCIENCE ATLAS UPDATES

Updates to the Geoscience Atlas data portal were made in March and November 2024, and again in January, 2025. These updates, listed below, included newly compiled data, updated or appended data, and links to reports by GSNL personnel and exploration companies. The list below does not include layers updated in real time (*i.e.*, *Map Staked Claims*) or daily (*e.g.*, *Mineral Occurrences, Historical Claims* and *Quarry* layers).

- **Map Layers Group** The *Forest Access Roads* layer was renamed *Resource Access Roads* and updated. Users of resource roads are encouraged to access these data through the Department of Fisheries, Forestry and Agriculture GeoHub (https://geohub-gnl.hub.arcgis.com/), where the resource roads layer is updated frequently. The *Map Labels* layer was replaced with the newest

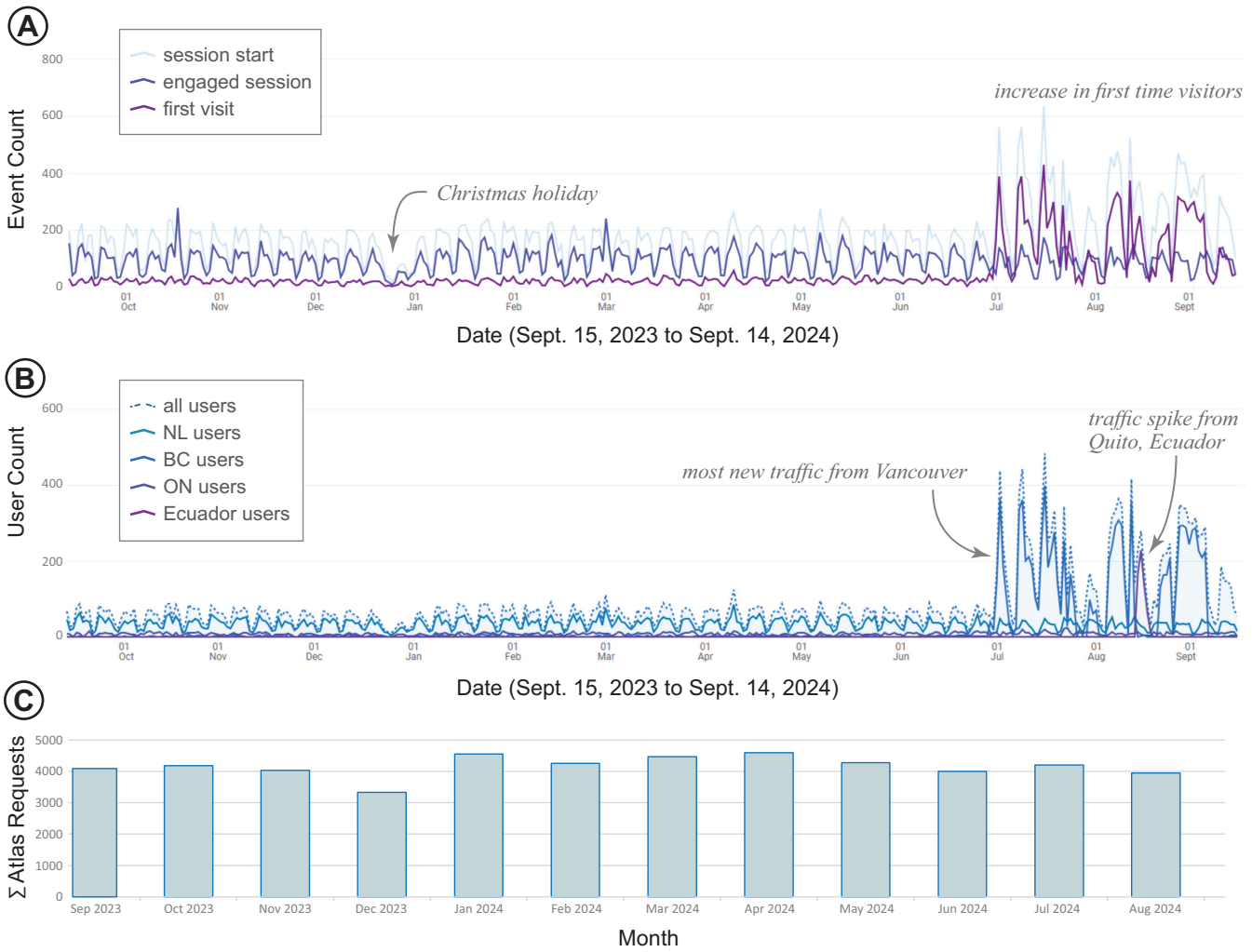

Figure 2. *A) Count of daily events logged by Google Analytics 4 (GA4) for the Geoscience Atlas between September 15, 2023, and September 12, 2024. The "engaged sessions" represent the number of clients sending requests to/from the Geoscience Atlas interface; the "first visit" is the count of new users accessing the Atlas. For most of the year, a weekly pattern is visible, with more Atlas usage during the work week than weekends, and a significant drop during Holiday periods. The spike in new users, without a corresponding increase in Atlas engagement overall after July 1, 2024, may be due to bots or other web indexing/scraping agents; B) The location of users accessing the Geoscience Atlas over the same period shows that most of the "first visit" traffic has IP addresses registered to Vancouver, BC, or – for the single spike in mid-August, 2024 – from Quito, Ecuador. Again, the preliminary interpretation of this traffic is bots, because there is no corresponding increase in overall web server traffic (C) for the months of July and August 2024. September 2024 is not plotted in (C) because the reporting period ends in the middle of the month.*

Canadian Geographical Names Database subset for Newfoundland and Labrador. The Geoscience Atlas now displays nearly 800 Inuktitut, Innu-aimun, and Mi'kmaq place names throughout Labrador.

- **Indexes Group** All Index Group layers were renamed with the addition of the "*Index* -" prefix. New thematic geochemical index layers were created by splitting the former *Geochemical Surveys* index layer into *Rock Geochemical Surveys, Lake Geochemical Surveys* and *Other Geochemical Surveys*; the latter contains links to newly published humus geochemistry and indicator-mineral reports and data, as well as data from placer and other uncommon survey types. Recently published maps and reports were also added to the Index layers *Bedrock Geology Maps, Surficial Geology Maps, Till Geochemical Surveys* and *Airborne Geophysical Surveys*.

- **Land Use Group** New layer added to depict *Wind Energy Land Reserves*. This layer is for illustrative purposes only and cannot be queried or downloaded.

Users who wish to obtain official boundaries of the Wind Energy Land Reserves should visit https://www.gov.nl.ca/iet/wind-hydrogen-projects/. In March 2024, the NL portion of the *Canadian Protected and Conserved Areas Database* was added as a new layer. This dataset contains the most up-to-date information on protected areas across Canada, published by Environment and Climate Change Canada (ECCC). The layer will be updated on the Atlas periodically when new data are published by ECCC; the most recent ECCC update was in December 2023.

- **Bedrock Geology Group** Several new U–Pb dates were added for the Burin and Bonavista Peninsulas from GSNL publications, along with corrections to other records in the *Geochronology* layer.

- **Surficial Geology Group** New data for Puddle Pond (NTS 12A/05) and newly digitized historical data in NTS 12A/01, 08, 14, 12B/01, 2C/12, 2D/04, 09, 12, 2E/08, 12I/02, 03, 09, 10, 1M/13, 11O/15 and 11P/14 were added to the *Landforms and the Detailed Surficial Geology* layers. Corrections were made in parts of central Newfoundland to address polygon edge mismatches and gaps between adjacent map sheets, and polygons were trimmed under large bodies of water and where they extended out to sea to improve data visualization and reduce over-interpretation. New *Striations* measured during the 2024 fieldwork season were added to the Atlas in 1:250 000 NTS map areas 2D, 12H and 12I in Newfoundland and, in Labrador, 13M and 13N. Minor corrections made to the *14C Dates* layer.

- **Geophysics – Newfoundland Group** The results from two recent airborne geophysical surveys have been added. The *Great Gull Lake* survey, flown in 2021 over a portion of the southern central Newfoundland gold belt, comprises 19 image themes that depict the gradient magnetic data: residual total field, first and second vertical derivatives, horizontal gradients (4 directions), analytic signal, tilt derivative, and horizontal derivative of tilt; radiometric data: 3 radio-element concentrations, 3 element ratios, a ternary plot, and dose rate (calibrated total radiation exposure); as well as a digital elevation model (DEM) theme. The *Terrenceville* survey, flown in 2023 as an extension of the Burin survey (2022) in the south coast region of Newfoundland comprises the aforementioned 19 image themes plus VLF-EM results: 5 map themes of amplitude, in-phase field and quadrature. The download pages for these surveys (reports, maps, data files, and GIS layers) are linked to the survey names in the Table of Contents.

- **Geophysics – Labrador Group** For logistical reasons, the Makkovik River airborne survey, in eastern central Labrador was divided into 2 phases: the *Makkovik River West* block was flown in 2022, and the *Makkovik River East* block was flown in 2023. For each survey block, the data on the Atlas comprise 14 images that depict the magnetic results: residual total field, first and second vertical derivatives, analytic signal, tilt derivative, and horizontal derivative of tilt; and radiometric data: 3 radioelement signals, 3 element ratios, a ternary plot and a dose rate (total radiation). The download pages for these survey blocks (reports, maps, data files and GIS layers) are linked to the survey names in the Table of Contents.

GEOSCIENCE INDEX APPLICATION

The Geoscience Index Application is a web GIS application published by the GSNL for searching geoscience indices outside of the Geoscience Atlas. This application is a lightweight search portal that connects users to GSNL geoscience resources (maps, reports, data) in the provincial Geofiles collection *via* the seven thematic index layers from the Geoscience Atlas. Users can search the portal by navigating to a geographic area of interest, or by filtering the attribute tables for each index layer. Launched in 2019, the application was updated in 2024 with new layer symbology and functionality. Users can now add other datasets from ArcGIS Online, can upload their own geospatial files (shapefile, KML, GeoJSON, *etc.*), or add data from other published web services (*e.g.*, add Map Staked Claims *via* its service endpoint). This functionality permits each user to customize the application for a wide variety of use cases. Users can also print custom maps from the application. Clients can access the Geoscience Index Application at https://www.gov.nl.ca/iet/mines/geoscience/reports-maps/indexes/.

PLANNED ENHANCEMENTS

The GSNL is committed to improving the efficiency of data access and delivery for the exploration industry, and other clients. Priorities for 2025 include the development of comprehensive geochemistry database(s), planning and development for additional thematic web applications, and continued improvement of all geoscience datasets to facilitate interoperability with other provincial and federal data products.

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