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CANADIAN GEOSCIENCE MAP 305

SURFICIAL GEOLOGY

LORETTA ISLAND, DOUGLAS CHANNEL AREA

British Columbia

parts of NTS 103-H/10 and 15



Map Information
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Preliminary



Geological Survey of Canada
Canadian Geoscience Maps

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RECOMMENDED CITATION

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ABSTRACT

Douglas Channel is a 100 km long fjord located south of the municipality of Kitimat, in northwest British Columbia. The Loretta Island map area covers Loretta Island and the northern tips of Maitland and Hawkesbury Islands within Douglas Channel where it meets Sue Channel, Loretta Channel, and Devastation Channel. The distance from Sue Channel through Loretta Channel to Douglas Channel is about 15 km. Mapping of surficial sediments, compilation of landslide deposits, and preliminary interpretation of bedrock types up to height of land were primarily carried out using British Columbia airphotos dated from 2001, 2003, and 2007 ranging in scales from 1:15 000 to 1:25 000. Older, field-based mapping by the authors in some isolated parts of the study area was incorporated into this mapping, complemented with additional, reconnaissance-level field observation in 2015 and 2016.

RÉSUMÉ

Le chenal Douglas est un fjord de 100 km de longueur, situé au sud de la municipalité de Kitimat, dans le nord-ouest de la Colombie-Britannique. La région cartographique de Loretta Island couvre l'île Loretta et l'extrémité nord des îles Maitland et Hawkesbury dans le chenal Douglas, là où celui-ci rencontre les chenaux Sue, Loretta et Devastation. La région couvre également une partie du continent formant la rive est du chenal Douglas. La distance couverte le long du chenal Douglas, puis du chenal Loretta jusqu'au chenal Sue est d'environ 15 km. La cartographie des sédiments superficiels, la compilation des dépôts de glissements de terrain et l'interprétation préliminaire des types de substratum rocheux jusqu'à la ligne de faite ont été effectuées à l'aide de photos aériennes à des échelles de 1/15 000 à 1/25 000 de la Colombie-Britannique datant de 2001, 2003 et 2007. Les résultats d'anciens travaux de cartographie réalisés par les auteurs dans des endroits isolés de la région d'étude ont été incorporés à la compilation cartographique, à laquelle s'ajoutent aussi des observations complémentaires provenant de travaux de reconnaissance sur le terrain effectués en 2015 et 2016.

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SHEET 1 OF 1, SURFICIAL GEOLOGY

GENERAL INFORMATION

Authors: I.C. Weiland, D.E. Maynard, A. Blais-Stevens, and M. Geertsema

This map was produced by Natural Resources Canada in co-operation with Transport Canada.

Geology by I.C. Weiland, D.E. Maynard, and A. Blais-Stevens, 2015

Geology conforms to Surficial Data Model v. 2.2

Geomatics and cartography by W. Chow, C.L. Wagner, and S. van Stavel

Joint initiative of the Geological Survey of Canada and the World Class Tanker Safety Project at Transport Canada, conducted under the auspices of North Coast activity as part of Natural Resources Public Safety Geoscience Program.

Map projection Universal Transverse Mercator, zone 9. North American Datum 1983

Base map at the scale of 1:50 000 from Natural Resources Canada, with modifications.

Elevations in metres above mean sea level

Shaded relief image derived from the Canadian Digital Elevation Model (CDEM) supplied by Natural Resources Canada. Illumination: azimuth 315°, altitude 45°, vertical factor 1x

Magnetic declination 2017, 18°13'E, decreasing 13.1' annually.

This map is not to be used for navigational purposes.

Title photograph: Looking north at the northern tip of Maitland Island, Douglas Channel, northwest British Columbia. Photograph by A. Blais-Stevens. 2016-075

The Geological Survey of Canada welcomes corrections or additional information from users.

Data may include additional observations not portrayed on this map. See map info document accompanying the downloaded data for more information about this publication.

This publication is available for free download through GEOSCAN (<http://geoscan.nrcan.gc.ca/>).

Preliminary publications in this series have not been scientifically edited.

MAP VIEWING FILES

The published map is distributed as a Portable Document File (PDF), and may contain a subset of the overall geological data for legibility reasons at the publication scale.

DESCRIPTIVE NOTES

This map area covers the surficial geology and landslide inventory up to height of land on the east side of Douglas Channel, at the entrance into Devastation Channel. The map area includes Loretta Island and the northern tips of Maitland and Hawkesbury islands. The distance along the channel is roughly 15 km. Within this map area, the topography is more subdued than immediately to the south, with the exception of the northern portion of Hawkesbury Island which has its highest elevation at about 950 m. Surficial geology compilation was carried out following the Geological Survey of Canada Surficial Data Model (Deblonde et al., 2012; Cocking et al., 2016) combined with the British Columbia Terrain Classification System (Howes and Kenk, 1997). The map area is one of six surficial geology maps that cover all of Douglas Channel.

The main objective of the surficial geology compilation is to provide baseline information on surface sediments and slope processes for stakeholders and decision-makers. In addition to the surficial geology, we have compiled information about landslides that were observed in the map area (Table 1). Most of the surficial geology consists of colluvium or a veneer of organic material cover (folisol; Agriculture Canada, 1998) partially mantling steep bedrock slopes. In lower lying areas, there are pockets of till that were deposited during the last glaciation dating back to the Pleistocene. Some of the valleys located close to the shoreline are mainly filled with glaciomarine sediments. The highest elevation in this map area where glaciomarine sediments are found is at roughly 100 m, located on the northwestern end of Hawkesbury Island and the north side of Hugh Creek (mainland), east shore of Douglas Channel. Superimposed on the glacial and deglacial deposits are modern Holocene stream sediments resulting from alluvial processes.

The bedrock polygons have been labeled R2 and R3 indicating dominantly igneous and metamorphic rocks, respectively, based on available bedrock geology maps (Aldrick, 2002; Nelson et al., 2014).

Interpretation of landslides was carried out using Cruden and Varnes' (1996) classification. Mappable landslide deposits and landslide tracks without mappable deposits are compiled in Table 1. The mappable landslide deposits are mainly labeled unit Cf (debris flow fans). An active talus deposit is mapped as unit Ca on a gully side

wall on Maitland Island. A large number of map units consists of colluvium that may not have been assigned to a specific landslide process (e.g. Cb = colluvial blanket; Cv = colluvial veneer). These units are included in Table 1 because they commonly contain small areas of landslide deposits. The most common type of landslide that occurs on these fiord slopes are small, shallow-seated translational slides. Their deposits are usually too small to be mapped or they run out into the ocean. These slides are labeled on the map as sediment transport arrows and are also included in Table 1. Sediment transport arrows depict debris slides and flows consisting of mineral and organic material (folic debris slides; Nagel 2000), small rock slides and rockfalls, and/or a combination of these.

Terrain stability mapping was also carried out for the map area following the method described by British Columbia Ministry of Forests (1999) for the Forest Practices Code. Although this method was developed for the forestry sector, it has been used in assessing terrain stability for environmental assessments for resource development projects, such as mining and wind farms in British Columbia and Yukon. Terrain stability mapping is intended to qualitatively highlight the potential landslide sources based on slope gradient, surficial materials, material texture, material thickness, slope morphology, moisture conditions, and ongoing geomorphic processes (British Columbia Ministry of Forests, 1999). Terrain polygons were rated as stable to unstable (Class I–V, respectively) and colour coded from green to red, respectively, for all types of landslides (Figure 1). In some cases on the surficial geology map, two adjacent polygons have the same map label, e.g. Cv. They were not joined as a single polygon because the two units were rated differently in terms of terrain stability. The reader has the option to generate a terrain stability map from the downloadable dataset associated with this map area.

ACKNOWLEDGMENTS

This activity was funded by the World Class Tanker Safety project at Transport Canada. It is part of the North Coast activity within the Geological Survey of Canada's Public Safety Geoscience Program. The authors would like to especially thank Gwyn Lintern and Trevor Allen (Activity leaders) for their support. Moreover, Louis Robertson is thanked for the scanning and ortho-rectification of the air-photos. William Chow and Carol Wagner are thanked for digitizing the interpreted polygons. Pouran Behnia is also thanked for compiling the database associated with the polygons.

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ADDITIONAL INFORMATION

The Additional Information folder of this product's digital download contains tables that appear in the map surround as well as additional geological information not depicted on the map, nor this document, nor the geodatabase.

- PDF of Figure 1.
- Excel tables relating to Table 1 and Figure 1 of this publication. Refer to the descriptive notes for further details.

AUTHOR CONTACT

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COORDINATE SYSTEM

Projection: Universal Transverse Mercator
Units: metres
Zone: 9
Horizontal Datum: NAD83
Vertical Datum: mean sea level

BOUNDING COORDINATES

Western longitude: 128°55'25"W
Eastern longitude: 128°39'30"W
Northern latitude: 53°48'00"N
Southern latitude: 53°39'50"N

SOFTWARE VERSION

Data has been originally compiled and formatted for use with ArcGIS™ desktop version 10.2.2 developed by ESRI®.

DATA MODEL INFORMATION

Surficial

The Geological Survey of Canada (GSC) through the Geo-mapping for Energy and Minerals Program (GEM) has undertaken the Geological Map Flow to develop protocols for the collection, management (compilation, interpretation), and dissemination of surficial and bedrock geology data and map information. To this end, a data model has been created.

The Surficial Data Model (SDM) was designed using ESRI geodatabase architecture. The XML workspace document provided can be imported into a geodatabase, and the geodatabase will then be populated with the feature datasets, feature classes, tables, relationship classes, subtypes, and domains.

Shapefile and table (.dbf) versions of the data are included within the data. Column names have been simplified and the text values have been maintained within the shapefile attributes. The direction columns are numerical, to display rotation for points, and the symbol fields will hold the correct values to be matched to the appropriate style file.

For a more in depth description of the data model please refer to the official publication:

Cocking, R.B., Deblonde, C., Kerr, D.E., Campbell, J.E., Eagles, S., Everett, D., Huntley, D.H., Inglis, E., Laviolette, A., Parent, M., Plouffe, A., Robertson, L., Smith, I.R., and Weatherston, A., 2016. Surficial Data Model, version 2.2.0: Revisions to the science language of the integrated Geological Survey of Canada data model for surficial geology maps; Geological Survey of Canada, Open File 8041, 45 p.
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