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2020

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Permanent link: https://doi.org/10.4095/323678

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

Recommended citation

Zagorevski, A., 2020. Whole-rock geochemical data compilation supporting Geo-mapping for Energy and Minerals Cordillera syntheses, British Columbia and Yukon; Geological Survey of Canada, Open File 8674, 1 .zip file. https://doi.org/10.4095/323678

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Whole-rock geochemical data compilation supporting Geo-mapping for Energy and Minerals Cordillera syntheses, British Columbia and Yukon

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The Geological Survey of Canada's Geo-mapping for Energy and Minerals (GEM) program, in collaboration with the British Columbia Geological Survey and Yukon Geological Survey, supported public geoscience research in the northern Cordillera between 2008 and 2020. Cordillera research was focused on improving the regional stratigraphy and tectonic models in northern British Columbia and Yukon and producing publicly available, regional-scale geoscience knowledge in Canada's North (Ryan and Zagorevski, 2020). The following report presents a compilation of the whole-rock geochemical data collected in the course of GEM regional mapping, re-analysis of archival samples, and unpublished archival analyses from within the GEM-Cordillera project footprint (Ryan and Zagorevski, 2020). This report also compiles select data from provincial, territorial, exploration and academic sources that include analyses of Late Devonian to Early Jurassic rocks. This report is intended to provide users with access to essential geochemical data to evaluate contents of GEM syntheses (Zagorevski and Staal, 2020; Zagorevski et al., 2020) and regional tectonic models of the northern Cordillera. It is, thus, not an exhaustive compilation of geochemical data; a vast amount of additional geochemical data reside in theses, publications and provincial/territorial data repositories (e.g. Han and Rukhlov, 2020; BC Assessment Report Indexing System (ARIS)). Whole-rock geochemical data utilized in this report are compiled from multiple sources of different vintage (and by extension suite of elements analyzed and elemental analytical parameters), including existing regional compilations (Piercey et al., 2006; Milidragovic et al., 2016; Ryan et al., 2018; Zagorevski, 2018), published reports and assessment reports (see Data Sources section).

Data compilation structure and content

Data are compiled in Microsoft Excel® (of_8674.xlsx) and tab-delimited TXT file (of_8674.txt) formats. These formats were chosen as they do not require database knowledge and allow easy exporting and importing of data. The tab-delimited TXT file contains all of the compiled analyses in a single file. The Excel® .xlsx file uses separate tabs for the individual data sources, in addition to a complete compiled dataset. Individual analyses are assigned a unique 'Record' number and 'Source' to ensure that it is easy to identify and cite the original sources of data (see Data Sources section). Samples are also assigned 'jcode', 'kcode', and 'lcode' numbers. These numbers control symbol shape and colour in Igpet software (Carr and Gazel, 2017) and can be used to evaluate or reproduce GEM synthesis diagrams (Zagorevski and Staal, 2020; Zagorevski et al., 2020).

For the purpose of this compilation, terrane and stratigraphic unit assigned in the original source materials have been retained where relevant. The main exceptions to this are the separation of the Cache Creek terrane into ophiolite (Atlin terrane) and carbonate platform-affiliated units (Cache Creek terrane: see Zagorevski et al., 2020), as well as the reassignment of Late Triassic units of Stikinia, Quesnellia and Cache Creek terrane to Triassic overlap. Many published sources do not list detailed sample descriptions. As such, much of the data are classified based on originally listed rock types (plutonic, volcanic, sedimentary), composition (mafic, intermediate, felsic) and, if possible, actual rock type. A rigorous check of individual samples for consistency with their compositional assignment was not performed, and only obvious errors were corrected (e.g., chert listed as volcanic, ultramafic listed as mafic or felsic).

Older geochemical data are generally less reliable because analytical methodologies have drastically improved in the last several decades. Many older analyses may be affected by incomplete dissolution of samples, high detection and quantification limits, and poor resolution of elements that are useful for discrimination of tectonic setting. Certain samples, such as ultramafic rocks, naturally have very low abundances of trace elements and some of these data should be treated as semi-quantitative or qualitative. Sample purpose and collection strategies should also be taken into account when working with these compiled geochemical data. For example, data collected for the purpose of alteration studies around mineral deposits are commonly not suited for regional studies because high degrees of fluid-rock interaction may mobilize elements, even those that are generally considered 'immobile'. Lastly, although compilation of data of questionable quality was avoided as much as possible, in regions with very sparse data it was not possible to maintain the same level of quality control. As such, users of this report should refer to original sources (see Data Sources section) to assess data vintage, sampling strategies and data quality.

The majority of samples herein are assigned an age and error range based on available age constraints or geochronological and fossil data obtained during the GEM program (published and unpublished). Where there is an obvious connection between samples and reliable radiometric or fossil ages, the most precise age was assigned. For lithostratigraphic units with multiple age constraints, the range of available ages was assigned. For all other samples, the mean age that is listed for the constituent stratigraphic unit in online geology databases was assigned (Cui et al., 2017; Yukon Geological Survey, 2019). As such, age errors for individual samples range from less than ± 1 Ma where reliable age data are available, to more than ± 54 Ma where stratigraphic units are only broadly defined (e.g. Mississippian to Middle Permian).

Data Sources

Whenever possible, original data sources should be evaluated and cited. Any compilation errors or revisions to the lithostratigraphic or age assignments should be reported to the author.

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Acknowledgments

This is a contribution to Geomapping for Energy and Minerals Program – Cordillera project. Paul Schiarizza is thanked for sharing unpublished data. This report was reviewed by N. Rogers.

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