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Nechako NATMAP Project overview, central British Columbia, year five

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Nechako NATMAP Project overview, central British Columbia, year five[1]

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Struik, L.C. and MacIntyre, D.G., 2000: Nechako NATMAP Project overview, central British Columbia, year five; Geological Survey of Canada, Current Research 2000-A10, 10 p. (online; http://www.nrcan.gc.ca/gsc/bookstore)

Abstract: In this last year of the project, activities have been primarily laboratory and office research, compilation, and documentation of results, and presentations at various venues. Some fieldwork was done to constrain optional interpretations, and to initiate post-project follow-up studies. A suite of bedrock maps has been produced covering the Fort Fraser, parts of Nechako River, the east half of the Manson River NTS sheets, and the Babine Porphyry Belt. In addition, surficial geology maps were produced for these same areas including Manson River, and part of western Prince George. Computer GIS products and some maps will contain the geology base integrated with till, lake, lodgepole pine, and lithological chemical data sets. In addition magnetic, gravity, DEM, and RADARSAT maps are being integrated with lithological and structural maps. Research into, and integration of, Quaternary geology, structure and tectonics, paleontology, tectonostratigraphic terrane characterization, metallogenesis, and isotopic chemical signatures continues.

Résumé : Au cours de cette dernière année du projet, les activités ont consisté surtout en travaux de laboratoire et de bureau (recherches, compilations et documentation des résultats), ainsi qu'en présentations lors de diverses réunions. Certains travaux ont été effectués sur le terrain afin de fixer des limites à diverses interprétations possibles et d'amorcer des études de suivi découlant du projet. Une série de cartes de la géologie du substratum rocheux ont été produites et couvrent les régions cartographiques de Fort Fraser, de Nechako River (en partie) et de Manson River (moitié est) du SNRC, ainsi que la bande d'intrusions porphyriques de Babine. De plus, des cartes géologiques des dépôts superficiels ont été réalisées pour ces mêmes régions, qui englobent celle de Manson River et des sections de la partie ouest de la région de Prince George. Des produits numériques élaborés sur SIG et quelques cartes présenteront un fond géologique intégré à des jeux de données géochimiques (till, lacs, pin de Murray et lithologie). De plus, diverses autres cartes (anomalies magnétiques et gravimétriques, MAN et RADARSAT) sont en voie d'être intégrées à des cartes lithologiques et structurales. La recherche et l'intégration des données se poursuivent dans les domaines suivants : géologie du Quaternaire, géologie structurale et tectonique, paléontologie, caractérisation des terranes tectonostratigraphiques, métallogénie et géochimie (signatures isotopiques).

[1] Contribution to the Nechako NATMAP Project

INTRODUCTION

This final year of the Nechako NATMAP project, to study the geology of central British Columbia (Fig. 1), was used to research information collected in the field and laboratory, and compile and document the study results through various publications. These ideas on the geology were presented at various conferences. In addition we have enhanced our website to include more output from the project.

As this is the last year of the project and essentially no fieldwork was done, few reports will appear as Current Research (Geological Survey of Canada) and Geological Fieldwork (British Columbia Geologial Survey) articles. Instead, efforts have gone to producing open file and final maps, articles for refereed journals, government bulletins, and conference presentations.

This article will include a review of the upcoming products and form a directory of new and future sources of information on project results. Selected publications in preparation are cited and listed in Table 1. In past project overviews the information was organized by project research component. In this case, it is organized by type of product, as well as by ongoing research.

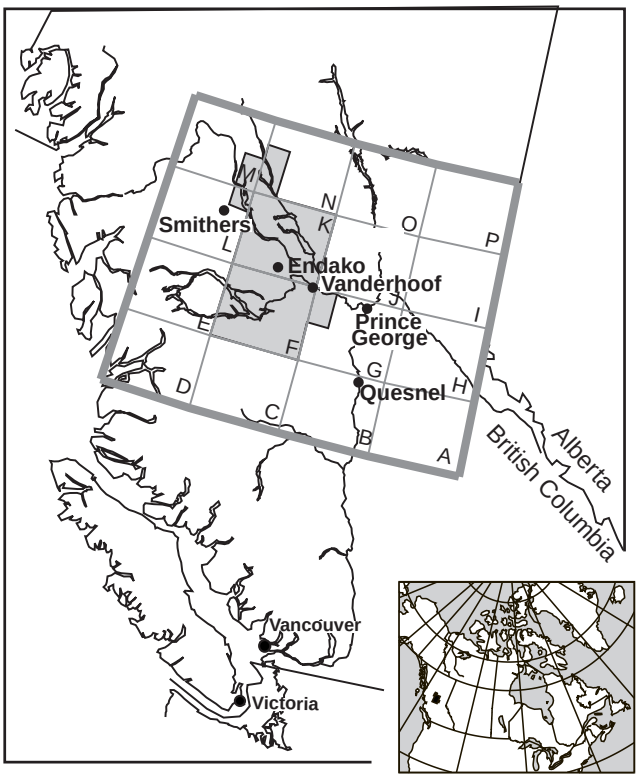

Figure 1. *Location of the Nechako NATMAP Project in central British Columbia, as displayed on the Parsnip River NTS map area (93).*

PROJECT OUTPUT (1999–2000)

Maps

Bedrock, surficial, combined bedrock and surficial, biogeochemistry, and geophysical maps are being prepared and released in the last year of the project (Fig. 2). Drafting of these maps is being done mainly by Steve Williams and Nicky Hastings at the Vancouver office of the Geological Survey of Canada (GSC), Don MacIntyre and Paul Schiarizza at the British Columbia Geological Survey (BCGS), Carmel Lowe at the Pat Bay office of the GSC, and staff of the Geoscience Information Division of Earth Science Sector, Ottawa. The maps are being released as colour open files to make them available quickly.

An annotated lithology map that addresses the relationship between geology and the natural environment has been released for the Fort Fraser map area (NTS 93 K; Hastings et al., 1999). The map, *Geoscape Fort Fraser*, is 1:250 000 scale, has a pictorial legend and addresses issues such as material properties, molybdenum and mercury in the environment, impact of geology on fish habitat, and the dispersion of glacial material.

Several bedrock geology maps have been, or will be, open filed this year. These include 1:100 000 scale maps for Cunningham Lake (NTS 93 K/NW; MacIntyre and Schiarizza, 1999), Burns Lake (NTS 93 K/SW; item 21, Table 1), Tsayta Lake (NTS 93 N/SW; item 18, Table 1), Old Hogem (item 17, Table 1), Babine Porphyry Belt (NTS 93 L/9, 16; 93 M/1, 8; item 9, Table 1), Euchiniko River (NTS 93 F/SE; item 19, Table 1, Cheslaslie River (NTS 93 F/SW; item 20, Table 1), Takysie Lake and Marilla (NTS 93 F/12, 13; Anderson et al., 2000a, b; Pint et al., 2000), and northeastern Nechako River (Anderson et al., 1999; item 3, Table 1). In addition 1:250 000 scale geology maps for Fort Fraser (NTS 93 K; item 22, Table 1) and Manson River (NTS 93 N; item 16, Table 1) should be available. These maps are being supplemented with data tables that elaborate on located and determined fossil sites, isotopic age dates, and mineral occurrence information (MINFILE database of the British Columbia Ministry of Energy and Mines). In some cases, data tables of lithochemistry will also be included.

Surficial geology maps include that of the 1:50 000 scale Marilla map area (NTS 93 F/12; Mate and Levson, 1999a), the 1:100 000 scale Nechako River southeast and southwest map areas (item 11, 12, Table 1), and the 1:250 000 scale Fort Fraser (Plouffe, in press a) and Manson River (Plouffe, in press b) map areas.

Maps of biogeochemical survey data have been made available for two more areas. The maps include a bedrock geology base of 1:250 000 scale derived from the most current complete compilation, and panels that contain from six to nine maps, each showing the chemical concentrations of a particular element. Areas covered include Nechako River northeast map area (NTS 93 F/9, 10, 15, 16; item 6, Table 1), and Fort Fraser south-central (NTS 93 K/2, 3; Dunn and Hastings, 1999).

Table 1. List of some publications from the Nechako NATMAP project that are in preparation and cited in this manuscript.

Item	Description	Item	Description
1	Anderson, R.G., Snyder, L.D., Haskin, M., Grainger, N.C., Villeneuve, M.E. Barnes, E.M., and Struik, L.C., in prep.: Petrology of the Eocene Endako Group mafic volcanic rocks, central British Columbia; Canadian Journal of Earth Sciences.	14	Plouffe, A. and Williams, S.P., in prep.: Quaternary geology, Fort Fraser and Manson River map areas, central British Columbia; Geological Survey of Canada, Open File, CD-ROM.
2	Anderson, R.G., Snyder, L.D., Hastings, N., Wetherup, S., L'Heureux, R., and Struik, L.C., in prep.: Geology of the Hallett Lake map area (NTS 93 F/15), central British Columbia; Geological Survey of Canada, Open File, scale 1:50 000.	15	Resnick, J., Anderson, R.G., Grainger, N.C., Suh, C., and Russell, J.K., in prep.: Neogene lithospheric probe; mafic centres and contained mantle and crustal xenoliths, central British Columbia, Canadian Journal of Earth Sciences.
3	Anderson, R.G. Wetherup, S., Snyder, L.D., Hastings, N., Resnick, J.R., and Barnes, E.M., in prep.: Bedrock geology of the northeastern Nechako River map area (NTS 93F/9, 10, 15, 16), central British Columbia; Geological Survey of Canada, Open File, scale 1:100 000.	16	Schiarizza, P., in prep.: Geology, Manson River map area (93N), central British Columbia; British Columbia Ministry of Energy and Mines, Open File, and Geological Survey of Canada; Open File, scale 1:250 000.
4	Cook, S.J. and Jackaman, W., in prep.: Geological controls on the distribution of mercury in lake sediments, Pinchi Lake area, central British Columbia; to be submitted to Canadian Journal of Earth Sciences.	17	Schiarizza, P. and Payie, G., in prep.: Bedrock geology, Old Hogem map area (93N/NW); British Columbia Ministry of Energy and Mines, Open File, scale 1:100 000.
5	Cook, S.J., Levson, V.M., Jackaman, W., and Law, D.T., in prep.: Regional geochemical compilation: Babine Porphyry Belt (NTS 93 L/9, 16; 93 M/1, 2, 7, 8); B.C. Ministry of Energy and Mines, Open File.	18	Schiarizza, P., Massey, N., and MacIntyre, D.G., in prep.: Bedrock geology, Tsayta Lake map area (93N/SW); British Columbia Ministry of Energy and Mines, Open File, scale 1:100 000.
6	Dunn, C. and Hastings, N., in prep.: Lodgepole pine chemistry, Nechako River northeast map area; Geological Survey of Canada, Open File, 1:250 000 scale maps of 16 elements.	19	Struik, L.C., Anderson, R.G., and Diakow, L., in prep.: Geology, Euchiniko River map area, central British Columbia; Geological Survey of Canada, Open File, scale 1:100 000.
7	Grainger, N.C., Heaman, L.H., Anderson, R.G., Villeneuve, M.E., and Creaser, R.A., in prep.: Timing and origin of the Eocene Ootsa Lake Group magmatism in central British Columbia, Canadian Journal of Earth Sciences.	20	Struik, L.C., Diakow, L., and Quat, M., in prep.: Geology; Cheslaslie River map area; Geological Survey of Canada, Open File, scale 1:100 000.
8	Lowe, C., Enkin, R., Struik, L.C., and Dubois, J., in prep.: Tertiary extension in the central British Columbia intermontane; magnetic and paleomagnetic constraints from the Endako region; to be submitted to Canadian Journal of Earth Sciences.	21	Struik, L.C, Whalen, J.B., Fallas, K., Hrudey, M., Huscroft, C., and Quat M., in prep.: Bedrock geology, Burns Lake map area, central British Columbia; Geological Survey of Canada, Open File, scale 1:100 000.
9	MacIntyre, D.G. and Webster, I., in prep.: Geology of the Babine Porphyry Belt, (93L/9,16; 93M/1,2,7,8), central British Columbia; British Columbia Ministry of Energy and Mines, Open File 2000-2, scale 1:100 000.	22	Struik, L.C., Whalen, J.B., MacIntyre, D.G., Schiarizza, P., Fallas, K., Hrudey, M., Huscroft, C., and Quat, M., in prep.: Bedrock geology, Fort Fraser map area; Geological Survey of Canada, Open File, scale 1:250 000.
10	MacIntyre, D., Villeneuve, M., and Tackaberry, D., in prep.: Recently discovered mid-Cretaceous Rocky Ridge felsic volcanic centers and associated VMS potential, Babine Lake area, central B.C.; Canadian Journal of Earth Sciences.	23	Stumpf, A., Levson, V.M., and Broster, B.: Quaternary stratigraphy, glacial lake history, and paleogeomorphology of the Babine Lake and Bulkley River areas, central British Columbia, Canada; paper submitted to Geographie Physique et Quaternaire.
11	Plouffe, A. and Levson, V.M., in prep.: Surficial geology, Euchiniko River, British Columbia (93 F/SE); Geological Survey of Canada, Open File, scale 1:100 000.	24	Villeneuve, M., Anderson, R.G., Snyder, L., and Struik, L.C., in prep.: Age constraints on Eocene mafic volcanism in north-central British Columbia; Canadian Journal of Earth Sciences.
12	Plouffe, A. and Levson, V.M. in prep.: Surficial geology, Entiako Lake, British Columbia (93 F/SW); Geological Survey of Canada, Open File, scale 1:100 000.	25	Whalen, J.B., Anderson, R., Villeneuve, M., and Struik, L.: Geochemistry of the François Lake Plutonic suite, host and possible progenitor to the Endako Molybdenum camp, Central British Columbia; to be submitted to Canadian Journal of Earth Sciences.
13	Plouffe, A. and Levson, V.M., in prep.: History of the north-western sector of glacial lake Fraser, central British Columbia, Canadian Journal of Earth Sciences.		

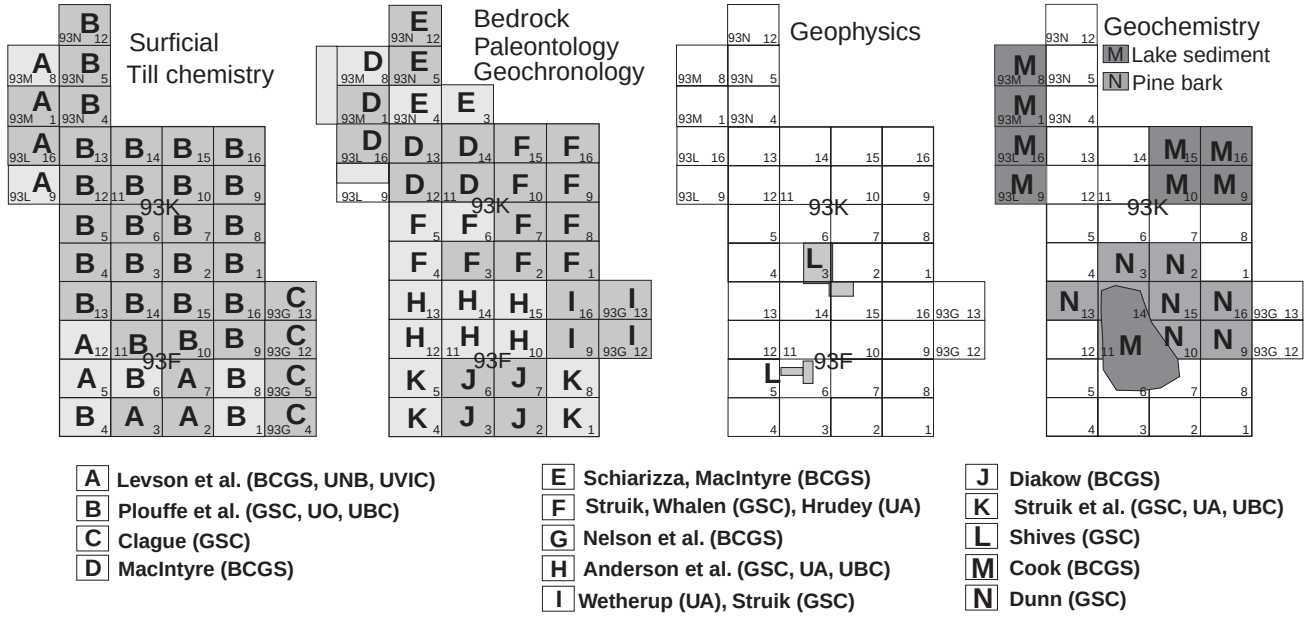

Figure 2. *Status of Nechako NATMAP project mapping, displayed on an NTS 1:50 000 scale grid. Maps published as open files or final maps are shown in dark shades and areas mapped and yet to be published are in lighter shades. Unmapped areas are in white.*

Steve Cook (BCGS) is preparing a series of 1:100 000 geochemical compilation maps for the Babine Porphyry Belt (item 5, Table 1), incorporating available stream sediment, lake sediment, lake water, and till geochemical data for the area. Release is tentatively scheduled to coincide with the Minerals North annual meeting in the spring of year 2000.

A number of integrated geological and geophysical images are in preparation and will be released as an open file. These include combined RADARSAT and Digital Elevation Model (DEM) images which provide useful information for analysis of ice-flow directions and surficial structures (E. Grunsky, O. Niemann, C. Lowe, and V.M. Levson). Also included are artificially illuminated aeromagnetic base maps with bedrock lithology overlays (C. Lowe, L.C. Struik, and R. Kung) that provide insight into the shallow crustal structure, and artificially illuminated aeromagnetic base maps with gravity overlays that emphasize deeper crustal structures (C. Lowe, L.C. Struik, and R. Kung).

Articles

Several manuscripts dealing with the economic aspects of the geological history are in press or in preparation. Several are about the Endako molybdenum camp (NTS 93 K/3). They describe the hydrothermal alteration and fluid chemistry (Selby et al., in press), the plutonic geochronology (item 24, Table 1) genesis of the Endako Batholith (item 25, Table 1), molybdenum distribution in local lake sediments (Cook, in press), and structure of the Endako mine area and batholith using paleomagnetic and aeromagnetic data (item 8, Table 1). Work continues on dating molybdenite from the Endako mine and surrounding François Lake Plutonic Suite using the Re-Os technique (D. Selby, pers. comm., 1999).

A final report on the Babine Porphyry copper belt (NTS 93 L/9, 16; 93 M/1, 8) will focus on new geochronological dating and tectonic evolution of the district in Late Cretaceous to Eocene time (item 9, Table 1). A separate article will discuss the economic potential for volcanogenic massive sulphide deposits associated with mid-Cretaceous felsic volcanic centres that were identified by geochronological dating done as part of the Babine project (item 10, Table 1).

Studies of the chemical patterns within the Pinchi mercury belt (NTS 93 K/8, 9, 14) have documented the distribution of mercury concentrations in lake sediments (item 4, Table 1) and till (Plouffe, 1999b). As well, manuscripts describing the evolution of the Eocene felsic volcanic rocks and associated plutons (item 7, Table 1), mafic volcanic rocks of the Endako Group (item 1, Table 1), and Neogene nodule-bearing alkaline basaltic intrusive and volcanic rocks (item 15, Table 1) are expected. Lowe and others (item 8, Table 1) assess the utility of airborne radiometric data for bedrock and surficial mapping and molybdenum exploration over the Capoose (NTS 93 F/6) and Endako (NTS 93 F/15; 93 K/2, 3, 4, 5, 6, 7) batholiths.

Preparation of a multi-authored fossil summary for the Canadian Journal of Earth Science is underway as a prelude to a thoroughly documented and fully illustrated GSC Bulletin planned for submission in late March, 2000 (authored by M.J. Orchard, F. Cordey, L. Rui, and W. Bamber).

A GSC Bulletin on the Quaternary geology of Fort Fraser and Manson River map sheets is currently in press (Plouffe, in press c). The same author is completing a paper on the Quaternary geology of the northern sector of the Nechako River map sheet (item 13, Table 1).

Presentations

Participants of the Nechako NATMAP project presented results of their mapping and research at several conferences and workshops throughout the year (Table 2). Project results will continue to be highlighted in the coming year. In particular, a symposium on the Nechako NATMAP project will be hosted at the Geological Society of America Cordilleran Section meeting to be held in Vancouver, April 27–29, 2000. The symposium is expected to consist of approximately 20 talks and a range of posters on the geological history and in part its metallogenic significance. Papers from the symposium are planned to be compiled and to appear as a special volume of the Canadian Journal Earth Sciences to be released early in the year 2001.

Computer products

CD-ROM

A CD-ROM has been designed and mostly populated to highlight the geochemical data collected through the Nechako NATMAP project area. All lake, till, biochemical, and MINFILE data have been compiled for the project area. Some of the lithochemical data has also been gathered. Geology base maps for the CD-ROM will be at 1:250 000 scale.

Surficial geological maps, reports, and till geochemistry for the Fort Fraser (NTS 93 K) and Manson River (NTS 93 N) areas are being compiled onto CD-ROM for interactive use with computers (item 14, Table 1). The GIS product will include a map and data viewer, and the reports are compiled in web browser format.

Internet

Nechako NATMAP project hosts a web site that contains project information and scientific results. The web site was revised this year, and new material and categories of material have been added. The site now hosts scientific reports, project area photographs, some internet viewable maps and updated lists of references to publications derived from the project (Nechako NATMAP Project web site; http://www.em.gov.bc.ca/natmap; hosted by the British Columbia Ministry of Energy and Mines). The material on the project web site will be transferred to the CORDLink website when all the work on the project is over.

ONGOING RESEARCH

Several avenues of research are being pursued in the final stages of the project. Each of these is intended to constrain interpretations of the field mapping and to understand the genesis and evolution of the various rock suites. The research includes isotopic chemistry and age dating, combined chemical and petrographic studies, fossil determinations, structural analysis, and ice-flow and aquifer characterization.

Isotopic, chemical, and petrographic characterization

Several isotopic studies in Nd, Sr, Pb, and O concentrations are being used to understand the genesis and sources of the Permian through Eocene magmatic suites (Lapierre et al., 1999; R.G. Anderson, pers. comm., 1999; N. Grainger, pers. comm., 1999). Age dating of these and other plutonic and volcanic suites continues to be used to constrain some of the more apparent critical events (N. Grainger and M. Villeneuve).

Table 2. List of presentations made at various conferences April to October 1999.

CONFERENCE OR WORKSHOP	PRESENTATION	REFERENCES
19th International Geochemical Exploration Symposium (Vancouver, 04/99)	Talks, posters	Cook (in press), Levson et al. (1999d, e), Plouffe (1999b), Plouffe and Hall (1999b)
Geological Association of Canada Annual Meeting (Sudbury, 05/99)	Talks, posters	Levson et al. (1999d), Mate and Levson (1999b)
22nd General Assembly of the International Union of Geodesy and Geophysics	poster	Anderson (1999)
Canadian Quaternary Association Biannual Meeting (Calgary, 08/99)	Talks, posters	Levson et al. (1999a), Mate and Levson (1999c, d), Plouffe (1999a), Plouffe and Hall (1999a)
15th Annual International Congress on the Carboniferous-Permian (Calgary, 08/99)	Talks, posters	Orchard et al. (1999b)
9th International Terrane Conference (Vernon, 09,10/99)	Talks, posters, field trip	Anderson et al. (1999b), Lapierre et al. (1999), Struik et al. (1999a, b)

Petrographic and detailed characterization of the Eocene Endako Group minerals (primary and amygdaloidal) has been completed (Barnes and Anderson, 1999).

A detailed study of Eocene volcanic rocks within the Fort Fraser and Nechako River map areas by Nancy Grainger (University of Alberta), has included four U-Pb and seven Ar/Ar ages of units within the Ootsa Lake Group, 25 geochemical analyses, 28 Sm/Nd and Rb/Sr analyses of the Newman volcanics, and Endako and Ootsa Lake groups. An accompanying study of the Oligocene and Miocene volcanic rocks includes four Ar/Ar age determinations and Sr and Nd isotopic analyses of basalt units and lherzolite xenoliths from three different volcanic centres. Those analyses complement extensive geochemical characterization of the suite and comparisons with apparently co-magmatic suites farther south (Resnick, 1999). The Ar/Ar and geochemical analytical work was completed at the Geological Survey of Canada (Ottawa) and all other isotopic work was completed at the Radiogenic Isotopic Facility at the University of Alberta. Preliminary data was presented at the Cordilleran Tectonics Workshop (Grainger and Anderson, 1999) and complete data is reported in an unpublished thesis (Grainger, 1999).

A suite of newly recognized Late Cretaceous plutons in southwestern Nechako River map area extends the known distribution of the commonly mineralized Bulkley plutonic suite farther east than previously known (Billesberger et al., 1999; Friedman et al., 2000).

Paleontology

Subsequent to data published by Orchard et al. (1999b), an additional 22 conodont microfaunas were recovered from samples collected by Hillary Taylor during the summer of 1998, six of them in conjunction with field crews of the British Columbia Geological Survey. In addition, British Columbia Geological Survey geologists collected samples that added five additional conodont faunas.

The collections included many new records of Late Carboniferous, Permian, and Triassic age. Amongst these were the good recovery of Middle to Late Permian conodonts from Mount Copley, and from recollections of the Leo Creek area. Further evidence of both Permian and Triassic conodonts were found in the Necoslie River breccia, and as well defined Tethyan fauna from west of Stuart Lake. Well preserved Late Triassic fauna were recovered from limestone along Pinchi Lake. British Columbia Geological Survey collections included new Middle Permian and Tethyan Triassic sites from the south shore of Trembleur Lake.

Preparation of these samples and SEM photography of key elements of the conodont fauna was undertaken during the spring and a summary of the data was presented at the International Congress on the Carboniferous–Permian, held in Calgary, August 17–21, 1999 (Orchard et al., 1999a).

Research, evaluation, and documentation continues on the radiolaria (Fabrice Cordey), fusulinid (Lin Rui), and coral and brachiopod (Wayne Bamber) collections from the Cache Creek Group of the project area. All the fossil studies will be integrated into a combined thorough evaluation of the Cache Creek Group paleontological character.

Terrane characterization

As part of research on the Sitlika assemblage of Cache Creek Terrane, Nick Massey and Paul Schiarizza (BCGS) have been interpreting the geochemistry of Sitlika volcanic and plutonic rocks and diabase dykes and gabbros from adjacent Cache Creek ophiolitic sections. Petrography of the sedimentary and volcanic successions is being used to assist in establishing the depositional environments and to differentiate and correlate these successions with those to the southeast. Constraints on the distribution of the units are being determined from 3-dimensional geometry developed in serial cross-sections.

Tectonics and structure

Analysis of the structural history and geometry, in combination with the genesis of the various rock suites is being done to further constrain the tectonic evolution of the central Canadian Cordillera. Particular attention has been focused on the transtensional and magmatic events of the early Eocene, and the Jurassic imbrication of the Quesnel, Cache Creek, and Stikine terranes (R.G. Anderson, D.G. MacIntyre, P. Schiarizza, L.C. Struik). Interpretation of paleomagnetic and aeromagnetic data (R.J. Enkin, C. Lowe) are being used to test and constrain the Eocene transtensional model. Cretaceous compression and possibly extension are less well understood due to poor exposure.

Quaternary geology

Studies of the glacial materials and incorporation of field and high-resolution DEM information constraining ice-flow directions are being used to assist in drift prospecting techniques in central British Columbia (V.M. Levson and A. Plouffe), and to constrain the source areas and distribution of anomalously rich concentrations of cinnabar (A. Plouffe and G.E.M. Hall).

Quaternary geology studies conducted by the British Columbia Geological Survey in 1999 included the analysis of till geochemical data for the Babine porphyry belt (NTS 93 M/1, 2, 7, 8, L/9, 16) and the west-central part of the Nechako map area (NTS 93 F/5, 12). Other work analyzes Quaternary stratigraphic data and ongoing landslide hazard studies (e.g. Levson, 1999; Levson et al., 1999c; Mate and Levson, 1999a; item 23, Table 1). Recent research has focused on landslide hazard studies including work towards a Ph.D. thesis (University of Western Ontario) by Don McClenagan and a M.Sc. thesis by Dave Mate (University of Victoria). Both these theses will also contribute to regional Quaternary stratigraphic studies in central British Columbia.

D. Mate is currently investigating translational and rotational landslides along the shores of the Nechako Reservoir and banks of the Cheslatta River. Cross-sections compiled for rotational slides along the Cheslatta River show slumps up to 230 m wide and about 25 m high with main scarps as much as

6 m high. The slumps are active and characterized by amphitheater-shaped main scarps, backward-tilted slump blocks, earthflows, small sag ponds, and slickensided basal slip surfaces in glaciolacustrine sediments (Mate and Levson, 1999d). These slides have been locally reactivated subsequent to logging and road construction (Levson et al., 1999c).

Surficial geological mapping of the Marilla map sheet (NTS 93 F/12) is nearly completed. Compilation of one of the most complete Quaternary sections in the region shows the presence of two exceptionally rare stratigraphic units interpreted as 1) a till deposited during the penultimate glaciation; and 2) nonglacial, organic-bearing, lacustrine sediments of probable Middle Wisconsinan age (Mate and Levson, 1999a, b, c). Large-scale troughs oriented transverse to the regional ice-flow direction are readily apparent on small scale DEMs and airphotos and are associated with ice-parallel, streamlined ridges (crag-and-tail forms) (Mate and Levson, 1999a, c).

Ten days of fieldwork were completed by A. Plouffe and J. Mayberry in the vicinity of Pinchi and Bralorne–Takla mercury mines, as part of the GSC Metals in the Environment (MITE) initiative. Soil weathering profiles were sampled in detail in the vicinity of both mine sites, but also at sites removed from the mines where mercury concentrations are known to be both naturally high and low in till.

A study of the Vanderhoof groundwater aquifer (Jennifer Mayberry, GSC Pacific, Vancouver) will determine the feasibility of making contributions to the understanding of aquifers from existing data sets derived from regional surficial and bedrock mapping and well drilling.

ACKNOWLEDGMENTS

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