Alaska Division of Geological & Geophysical Surveys

MISCELLANEOUS PUBLICATION 141

QUATERNARY FAULTS AND FOLDS IN ALASKA: A DIGITAL DATABASE

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July 2012

Released by

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
Division of Geological & Geophysical Surveys
3354 College Rd.
Fairbanks, Alaska 99709-3707

QUATERNARY FAULTS AND FOLDS IN ALASKA: A DIGITAL DATABASE

by
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Abstract

The Alaska Division of Geological & Geophysical Surveys (DGGS) has designed a Quaternary fault and fold database for Alaska in conformance with standards defined by the U.S. Geological Survey for the National Quaternary Fault and Fold Database. Alaska is the most seismically active region of the United States; however, little information exists on the location, style of deformation, and slip rates of Quaternary faults. Thus, to provide an accurate, user-friendly, reference-based fault inventory to the public, DGGS created a GIS shapefile of Quaternary fault traces and compiled attributes that describe age, relative activity, and general parameters for each fault or fold. This report describes relevant information pertaining to the shapefile and online access and availability. The database is the first comprehensive digital compilation of Quaternary faults in Alaska and future updates will include the results of new research, as well as summary sheets describing each fault.

Introduction

Over the last two decades, the U.S. Geological Survey (USGS), state geological agencies, and private consultants have compiled maps showing the locations, ages, and activity rates of Quaternary faults and folds for the conterminous United States and Hawai'i for use in seismic hazard evaluation. This large effort was funded by the U.S. Geological Survey's Earthquake Hazards Program (EHP) as part of the International Lithosphere Program's (ILP) Project II-2 "World Map of Major Active Faults" and contributes to the new Global Seismic Hazards Assessment Program (ILP Project II-0) for the International Decade for Natural Disaster Reduction. Recently, the fault and fold data from the U.S. and other seismically active regions around the world have been incorporated into the Global Earthquake Model (GEM), a program aimed at establishing an independent, uniform standard for calculating and communicating earthquake hazard and risk.

Despite being the most seismically active state in the country, Alaska has not been previously included in the U.S. Geological Survey's National Fault and Fold database. Earlier efforts to document the distribution of Quaternary faults in Alaska had been compiled on the Neotectonic Map of Alaska (Plafker and others, 1994). Although this paper map represents a seminal contribution to the Alaska geological literature, it was compiled at a small scale (1:2,500,000) and is out of print, making its utility in the modern technological (digital) environment limited. Thus, to modernize the Plafker and others (1994) map and incorporate new data, DGGS designed the digital Quaternary fault and fold database for Alaska presented here (fig. 1).

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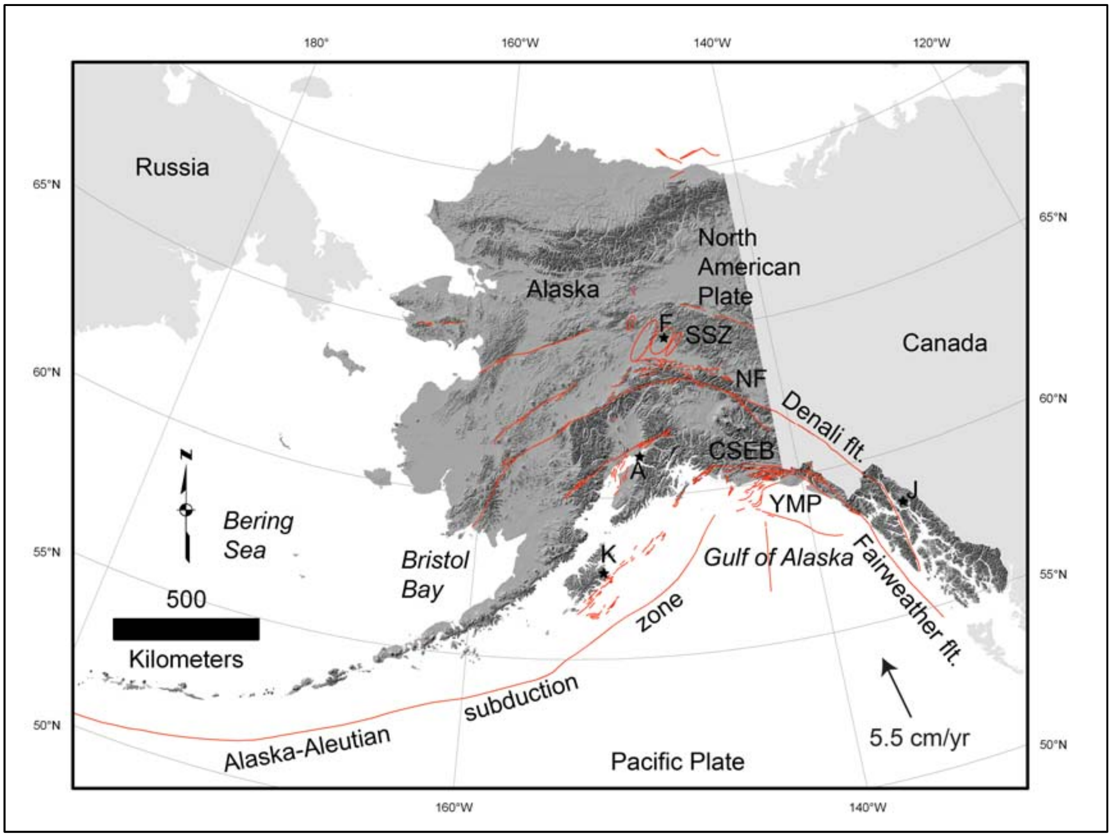

Figure 1. Quaternary fault and fold database shapefile displayed on a shaded relief map of the State of Alaska. Major cities shown by black stars. A, Anchorage; F, Fairbanks; J, Juneau; K, Kodiak; YMP, Yakutat microplate; CSEB, Chugach-Saint Elias fold and thrust belt; NF, Northern Foothills fold and thrust belt; SSZ, Salcha seismic zone.

The Alaska database was compiled and constructed based on guidelines outlined in Haller and others (1993) for the National Quaternary Fault and Fold Database (U.S. Geological Survey, 2006) and is similar to efforts by other state agencies and private consultants to compile maps in the lower 48 states including maps in California (Bryant, 2005), Hawaii (Cannon and others, 2007), Nevada (dePolo and others, 2009; Sawyer and others, 1999), Oregon (Personius, 2002), Washington (Lidke and others, 2003), Arizona (Pearthree, 1998), Texas (Collins and others, 1996), Colorado (Widmann and others, 1998), Montana (Stickney and others, 2000), Idaho (Haller and others, 2005), New Mexico (Machette and others, 1998), and Utah (Black and others, 2001).

This report summarizes the information contained in the new database and describes how it is being disseminated to the public. The database serves as a single source comprising important information on paleoseismic parameters for faults in Alaska. The database includes the first comprehensive collection of Quaternary fault traces digitized from original sources, as well as individual fault trace attributes that catalogue fault parameters such as slip rate, age of most recent rupture, and others. This information will be published by DGGS as a database and will be incorporated in the U.S. Geological Survey's National Fault and Fold Database.

Overview of Quaternary faults in Alaska

Alaska is the most seismically active state in the country. Since 1900, Alaska has had an average of one M8+ (magnitude 8 or greater) earthquake every 13 years, one M7–8 earthquake every two years, and six M6–7 earthquakes per year (Alaska Seismic Hazard Safety Commission, 2012). Quaternary deformation in Alaska is the result of oblique subduction of the Pacific plate and Yakutat microplate beneath the North American plate at a rate of ~5.5 cm/yr. This deformation is distributed over 700 km into interior Alaska. The Alaska–Aleutian subduction zone along the state's southern margin is the most active seismic feature in the state and has generated multiple great historic earthquakes including the 1938 M8.3 Alaska Peninsula earthquake, 1946 M7.8 Unimak earthquake, 1957 M8.6 Fox Islands earthquake, 1964 M9.2 Good Friday earthquake, and 1965 M8.7 Rat Islands earthquake (Johnson and Satake, 1994; Johnson and others, 1994; Plafker, 1969; Christensen and Beck, 1994; Beck and Christensen, 1991). The Chugach–Saint Elias fold and thrust belt extends east–west along the Chugach Mountains and northern Gulf of Alaska. The 1899 Yakutat Bay earthquakes occurred along the eastern part of this system and included three shocks: M8.1, M8.2, and M7.4 (Tarr and Martin, 1912; Plafker and Thatcher, 2008). In the southeastern part of the state, the Fairweather fault extends over 1,000 km along the continental margin and has generated three large strike-slip earthquakes during the last century including the 1949 M8.1 Queen Charlotte, the 1972 M7.3 Sitka, and 1958 M7.9 Lituya Bay earthquakes (Sykes, 1971; Page, 1973; Tocher, 1960). To the north, the Denali fault extends along the southern margin of the Alaska Range in south-central Alaska and was the source of the 2002 M7.9 earthquake, one of the seven largest continental strike-slip earthquakes worldwide over the last century (Eberhart-Phillips and others, 2003; Haeussler and others, 2004; Schwartz, 2006).

The interior of Alaska north of the Alaska Range is an area of diffuse seismicity and few mapped surface faults. A north-directed component of compression related to the curvature of the Denali fault is accommodated along the Northern Foothills fold and thrust belt (Bemis and others, 2012), which extends over 500 km along the northern side of the Alaska Range. This system has generated multiple moderate magnitude earthquakes, although the location of these events are poorly constrained (Ruppert and others, 2008). Paleoseismic data suggest this system is capable of generating earthquakes with large displacements (Carver and others, 2008; 2010). In the Fairbanks area, seismic zones defined by clusters of seismicity have been the source of multiple moderate to large magnitude earthquakes, the largest of which was the 1937 M7.3 earthquake centered in the Salcha seismic zone (Ruppert and others, 2008; Wickens and Hodgson, 1967).

Despite the high rate of large earthquakes, the majority of Quaternary faults and folds in Alaska remain poorly characterized. Particularly relevant to seismic hazards assessment, information on the location, style of deformation, and slip rates for most faults is generally lacking, and few site-specific paleoseismic studies have been conducted. This is due, in part, to rugged, relatively inaccessible terrain, limited investigation, and past major glaciations that completely re-sculpted vast areas of landscape in the latest Pleistocene, resulting in a short geologic record of Quaternary deposits in which to preserve evidence of active deformation. In addition to the earthquake sources described above, distributed seismicity throughout the state indicates that additional Quaternary faults and folds exist and remain yet undiscovered or unstudied. Ongoing and future geologic mapping will undoubtedly discover previously unknown active Quaternary faults, and paleoseismic studies will contribute to a better understanding of their relative activity and associated hazards to the state of Alaska.

Map and digital database

The initial list of Quaternary active structures for the Alaska fault and fold database were derived from The Neotectonic Map of Alaska (Plafker and others, 1994) and supplemented with more recent data where available. Maps and literature compiled in Craw and others (2001) and more than 1,000 references related to the project and archived at DGGS were used to determine the best fault traces to digitize, and to verify that sufficient evidence was available to classify a fault or fold as a Quaternary active structure. An alphabetical list of references that were used to digitize the final map traces is included as Appendix A. The new Quaternary fault and fold database for Alaska contains 163 structures and more than 1,500 individual digitized tectonic features (fig. 1, sheet 1).

The majority of the Quaternary faults depicted by Plafker and others (1994) are included in the new database, with the exception of a few faults that were based on unpublished information and were difficult to verify. These faults may be added to the database at a later date when more information becomes available. Due to the limited level of knowledge on Quaternary faults in Alaska, pre-Quaternary fault traces from the Plafker and others (1994) map are shown as an inset on Sheet 1 and will be provided as a layer in our future online interactive web-map portal so users may view a more accurate distribution of mapped faults and to suggest the possibility that some older traces may be active, yet unstudied.

Digitizing the faults at their original published scales ensures the greatest utility for users in the current technological environment. Quaternary faults and folds were georeferenced from paper maps contained in 1970s vintage and earlier bedrock maps, and newer publications when available. The most common map scale used was 1:250,000, however, the scales range from 1:20,000 to 1:500,000. Paper maps were scanned using a large-format scanner and the resulting tiff files were georeferenced in ArcMap 9.3. In some cases, the only available map traces were figures contained in published papers, making accurate registration difficult. This problem was alleviated by adding as many control points as possible to obtain a best fit to topographic base maps. Detailed inspection of several maps published at 1:250,000 scale revealed that the scale was not correct. For these maps, digitizing was based on terrain matching between source maps and the fault database. Source map data was in a wide variety of projections common in Alaska. Thus, source data was imported or digitized in its native projection and reprojected to the database projection (for instance, NAD 27 UTM to GCS WGS 1984). With the exception of the Denali fault, tectonic features were not digitized in Canada. General boundaries of seismic zones in interior Alaska were defined based on seismicity in Ruppert and others (2008).

The Quaternary fault and fold shapefile, metadata, a pdf of this report including Sheet 1, and an alphabetical list of references used to define each structure, is publicly available for download from the DGGS website. Pending future funding, the data will also be displayed on an interactive web-map portal embedded on the DGGS website. This web-map application will present the database, including digitized faults from Plafker and others (1994) through a visible scale range with each fault displayed at the resolution of the original map. Basic map options will include identification tools, a search interface, and multiple base maps including topographic, satellite imagery, and elevation maps.

Fault parameters

Fault parameters in the shapefile attribute table comply with national guidelines and are linked to individual fault and fold traces. The guidelines provided by the U.S. Geological Survey are described in Appendix B. The attributes include object ID, fault name, unique identification number, age, slip rate, slip sense, dip direction, fault line type (well constrained, moderately constrained, or inferred), mapped scale, and secondary slip sense. Each structure is assigned a three-integer CODE, based upon how well the fault is located (FCODE), age of most recent deformation (ACODE), and slip rate (SLIPCODE). These codes are combined to create the three-integer CODE, which allows the user to define line-type properties for display in GIS projects. For example, users can color code fault lines by age of most recent earthquake and/or display faults with solid, dashed, or dotted symbols to represent certainty of original mapping. Given the lack of information on many structures, specific modifications were made for the Alaska database. For instance, in the case of slip rate, if obvious scarps occur on post-glacial deposits the minimum SLIPCODE is 4, indicating a slip rate of <0.2 mm/yr. Additionally, a SLIPCODE 5 was added to indicate that a slip rate cannot be determined using geologic reasoning. Suspicious features in which the age of the most recent earthquake is unknown but other evidence suggests the possibility that the structure may be active in Quaternary time were given the designation of "Class B."

Conclusion and future direction

The Alaska Quaternary fault and fold database is an accurate, user-friendly, reference-based inventory of Quaternary active structures and is the first comprehensive digital collection of Quaternary fault and fold traces and associated attributes available to the public. The database will serve as a platform that can be expanded and updated as the existing structures become better characterized and new faults are discovered. Periodic updates will be necessary to keep pace with the rapidly expanding knowledge base related to Quaternary deformation in Alaska. Information emerging from multi-faceted research programs including the STEEP (Saint Elias Tectonics and Erosion Project) in southeastern Alaska, the proposed deployment of the USArray by EarthScope, expanding geodetic and seismic monitoring networks, new paleoseismic studies, and geohazard studies related to in-state infrastructure, among others, have the potential to discover new, previously unrecognized Quaternary active structures and to refine fault parameters.

A future component of the Alaska Quaternary fault and fold database is to produce text-based descriptions of individual structures. These text-based descriptions are an integral part of the U.S. Geological Survey's National Fault and Fold Database. Pertinent data summarized in these descriptions include geographical information, geomorphic expression, length, average strike, sense of movement, age of faulted surficial deposits, existing paleoseimological studies, and a list of references. Overwhelming demand for the map trace and fault attribute data for Alaska suggested it was in the best interest of the user community to release the database without detailed summary descriptions. Once the summary descriptions are complete they will be linked with their associated map trace in the database and be released by DGGS as an updated revision of the database.

Acknowledgments

The authors extend gratitude to many staff members of the Division of Geological & Geophysical Surveys who assisted in one way or another in the compilation of the database. Countless hours of map and literature data gathering and scanning were performed by Cheryl Cameron, Carol Gallo, and Jessica Mayer. Jim Weakland designed the ArcGIS server to host the data online and Ken Woods assisted in building the computer infrastructure to make the online interface possible. Simone Montayne assisted with metadata. Partial funding was provided by the U.S. Geological Survey National Earthquake Hazards Reduction Program (Grant #03WRAG0027) and the State of Alaska, Division of Homeland Security and Emergency Management, Earthquake Hazards Reduction State Assistance Program (Grant #39320/39507).

Several members of the U.S. Geological survey were instrumental in bringing this project to fruition, including Kathy Haller, Tony Crone, George Plafker, and Mike Machette. Constructive reviews of the database by Peter Haeussler and Rob Witter (U.S. Geological Survey, Anchorage) improved the content.

References

Alaska Seismic Hazards Safety Commission, 2012, [Annual] Report to the Governor and State Legislature, http://seismic.alaska.gov/download/ashsc_meetings_minutes/ASHSC_2012_annual_report.pdf

Beck, S.L., and Christensen, D.H., 1991, Rupture process of the February 4, 1965, Rat Islands earthquake: Journal of Geophysical Research, v. 96, no. B2, p. 2,205–2,221.

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Bryant, W.A. (compiler), 2005, Digital database of Quaternary and younger faults from the Fault Activity Map of California, version 2.0: California Geological Survey website, http://www.consrv.ca.gov/CGS/information/publications/QuaternaryFaults_ver2.htm

Cannon, E.C., Buergmann, Roland, Crone, A.J., Machette, M.N., and Dart, R.L., 2007, Map and data for Quaternary faults and fault systems on the Island of Hawai'i, U.S. Geological Survey Open-File Report 2007-1284, 81 p., 1 sheet, http://pubs.usgs.gov/of/2007/1284/

Carver, G.A., Bemis, S.P., Solie, D.N., and Obermiller, K.E., 2008, Active and potentially active faults in or near the Alaska Highway corridor, Delta Junction to Dot Lake, Alaska: Alaska Division of Geological & Geophysical Surveys Preliminary Interpretive Report 2008-3d, 32 p.

Carver, G.A., Bemis, S.P., Solie, D.N., Castonguay, S.R., and Obermiller, K.E., 2010, Active and potentially active faults in or near the Alaska Highway corridor, Dot Lake to Tetlin Junction, Alaska: Alaska Division of Geological & Geophysical Surveys Preliminary Interpretive Report 2010-1, 42 p.

Christensen, D.H., and Beck, S.L., 1994, The rupture process and tectonic implications of the Great 1964 Prince William Sound earthquake: Pure and Applied Geophysics, v. 142, no. 1, p. 29–53.

Collins, E., Raney, J.A., Machette, M.N., Haller, K.M., and Dart, R.L., 1996, Map and data for Quaternary faults in West Texas and adjacent parts of Mexico: U.S. Geological Survey Open-File Report 96-002, 74 p., 1 plate, scale 1:500,000.

Craw, P.A., Mayer, J.L., and Combellick, R.A., 2001, Preliminary bibliographic database of Quaternary faults and folds in Alaska: Division of Geological & Geophysical Surveys, Miscellaneous Publication 44, 1 DVD.

dePolo, C.M., Johnson, G.L., Price, J.G., and Mauldin, J.M., 2009, Quaternary faults in Nevada—Online interactive map: Nevada Bureau of Mines and Geology Open-file Report 09-9, http://www.nbmg.unr.edu/Pubs/of/of09-9/index.html

Eberhart-Phillips, Donna, Haeussler, P.J., Freymueller, J.T., Frankel, A.D., Rubin, C.M., Craw, P.A., Ratchkovski, N.A., Anderson, Greg, Carver, G.A., Crone, A.J., Dawson, T.E., Fletcher, Hilary, Hansen, Roger, Harp, E.L., Harris, R.A., Hill, D.P., Hreinsdottir, Sigrun, Jibson, R.W., Jones, L.M., Kayen, R.E., Keefer, D.K., Larsen, C.F., Moran, S.C., Personius, S.F., Plafker, George, Sherrod, B.L., Sieh, Kerry, Sitar, Nicholas, and Wallace, W.K., 2003, The 2002 Denali fault earthquake, Alaska—A large magnitude, slip-partitioned event: Science, v. 300, no. 5622, p. 1,113–1,118.

Haeussler, P.J., Schwartz, D.P., Dawson, T.E., Stenner, H.D., Lienkaemper, J.J., Sherrod, Brian, Cinti, F.R., Montone, Paola, Craw, P.A., Crone, A.J., and Personius, S.F., 2004, Surface rupture and slip distribution of the Denali and Totschunda faults in the 3 November 2002 M7.9 earthquake, Alaska: Bulletin of the Seismological Society of America, v. 94, no. 6B, p. 23–52.

Haller, K.M., Personius, S.F., Crone, A.J., Lidke, D.J., Machette, M.N., and Dart, R.L., 2005, Fault descriptions for the State of Idaho as part of the Quaternary fault and fold database of the United States: U.S. Geological Survey Open-File Report 2005-1047.

Haller, K.M., Machette, M.N., and Dart, R.L., 1993, Maps of major active faults, Western Hemisphere, International Lithosphere Program (ILP) Project II-2—Guidelines for U.S. database and map: U.S. Geological Survey Open-file Report 93-338, 45 p.

Johnson, J.M., and Satake, Kenji, 1994, Rupture extent of the 1938 Alaskan earthquake as inferred from tsunami waveforms: Geophysical Research Letters, v. 21, no. 8, p. 733–736.

Johnson, J.M., Tanioka, Y., Ruff, L.J., Satake, K., Kanamori, H., and Sykes, L.R., 1994, The 1957 Great Aleutian earthquake: Pure and Applied Geophysics, v. 142, no. 1, p. 3–28.

Lidke, D.J., Johnson, S.Y., McCrory, P.A., Personius, S.F., Nelson, A.R., Dart, R.L., Bradley, Lee-Ann, Haller, K.M., and Machette, M.N., 2003, Map and data for Quaternary faults and folds in Washington State: U.S. Geological Survey Open-File Report 03-428, 15 p., 1 pl., scale 1:750,000, http://pubs.usgs.gov/of/2003/428/.

Machette, M.N., Personius, S.F., Kelson, K.I., Haller, K.M., and Dart, R.L., 1998, Map and data for Quaternary faults and folds in New Mexico: U.S. Geological Survey Open-File Report 98-521, 367 p., 1 plate, scale 1:750,000, http://greenwood.cr.usgs.gov/pub/open-file-reports/ofr-98-0521/.

Page, R.A., 1973, The Sitka, Alaska, earthquake of 1972: U.S. Geological Survey Earthquake Information Bulletin, v. 5, no. 5, p. 4–9.

Pearthree, P.A., 1998, Quaternary fault data and map for Arizona: Arizona Geological Survey Open-File Report 98-24, 122 p., 1 sheet, scale 1:750,000.

Personius, S.F., compiler, 2002, Quaternary faults in Oregon, *in* Quaternary fault and fold database of the United States: U.S. Geological Survey website, http://earthquakes.usgs.gov/regional/qfaults, accessed 04/20/2012.

Plafker, G., 1969, Tectonics of the March 17, 1964, Alaska earthquake, U.S. Geological Survey Professional Paper 543-I, p. I1–I74, 2 sheets, scale 1:500,000.

Plafker, G., Gilpin, L.M., and Lahr, J.C., 1994, Neotectonic map of Alaska, *in* Plafker, George, and Berg, H.C., eds., Geology of Alaska, Geology of North America,: Boulder, Geological Society of America, v. G-1, 2 sheets, 1:2,500,000 scale.

Plafker, George, and Thatcher, Wayne, 2008, Geological and geophysical evaluation of the mechanisms of the Great 1899 Yakutat Bay Earthquakes, *in* Freymueller, J.T., Haeussler, P.J., Wesson, R.L., and Ekström, Göran, eds., Active Tectonics and Seismic Potential of Alaska: Washington, D.C., American Geophysical Union, Geophysical Monograph 179, p. 215–236.

Ruppert, N.A., Ridgway, K.D., Freymueller, J.T., Cross, R.S., and Hansen, R.A., 2008, Active tectonics of Interior Alaska—Seismicity, GPS geodesy, and local geomorphology, *in* Freymueller, J.T., Haeussler, P.J., Wesson, R.L., and Ekström, Göran, eds., Active Tectonics and Seismic Potential of Alaska: Washington, D.C., American Geophysical Union, Geophysical Monograph 179, p. 109–133.

Sawyer, T.L., Adams, K.D., Oswald, J., and Haller, K.M., compilers, 1999, Quaternary fault database for Nevada, *in* Quaternary Fault and Fold Database of the United States: U.S. Geological Survey website, http://earthquakes.usgs.gov/regional/qfaults, accessed 04/20/2012.

Schwartz, D.P., 2006, A look back at 1906—Perspectives on great earthquakes and post earthquake investigations: Seismological Research Letters, v. 77, no. 2, p. 123–127.

Stickney, M.C., Haller, K.M., and Machette, M.N., 2000, Quaternary faults and seismicity in western Montana: Montana Bureau of Mines and Geology Special Publication 114, 1 sheet, scale 1:750,000.

Sykes, L.R., 1971, Aftershock zones of great earthquakes, seismicity gaps, and earthquake prediction for Alaska and the Aleutians: Journal of Geophysical Research, v. 76, no. 32, p. 8,021–8,041.

Tarr, R.S., Martin, Lawrence, and Gilbert, G.K., 1912, The earthquakes at Yakutat Bay, Alaska, in September, 1899; with a preface by G. K. Gilbert: U.S. Geological Survey Professional Paper 69, 135 p., 3 sheets, scale 1:5,000,000.

Tocher, Don, 1960, The Alaska earthquake of July 10, 1958—Movement on the Fairweather fault and field investigation of southern epicentral region: Bulletin of the Seismological Society of America, v. 50, no. 2, p. 267–292.

U.S. Geological Survey, 2006, Quaternary fault and fold database for the United States, last accessed April 20, 2012, from USGS website: http://earthquakes.usgs.gov/regional/qfaults/.

U.S. Geological Survey and Utah Geological Survey, 2001, Quaternary faults in Utah, *in* Quaternary fault and fold database of the United States: U.S. Geological Survey website, accessed 04/20/2012.

Wickens, A.J., and Hodgson, J.H., 1967, Computer re-evaluation of earthquake mechanism solutions, 1922–1962: Ottawa, Canada, Department of Energy, Mines, and Resources, Observatories Branch, Publications of the Dominion Observatory, v. 33, no. 1, 560 p.

Widmann, B.L., Kirkham, R.M., Rogers, W.P., Crone, A.J., Kelson, K.I., and Personius, S.F., 1998, Preliminary Quaternary fault and fold map and database of Colorado: Colorado Geological Survey Open-File Report 98-8, 331 p., 1 sheet, scale 1:500,000, 1 CD-ROM.

APPENDIX A

Alaska Quaternary fault and fold database
Alphabetical reference list for digitized fault and fold traces

Comments:

In the compilation of the Alaska Quaternary fault and fold database it was necessary to review multiple maps of the same fault trace to determine the most accurate fault traces to digitize. The metadata associated with the shapefile contains the references from which the final fault traces were derived. However, for some faults, additional references were used to evaluate the quality of mapping and were not used in the final shapefile and are consequently not included in the metadata. Additionally, some maps contained multiple faults, and these faults are listed in the 'source contribution' section of the metadata for each source. Thus, to assist the user in obtaining pertinent information the following alphabetical list of faults and associated references was compiled.

Alaska–Aleutian megathrust, Aleutian megathrust, and Aleutian fault

Bird, P., 2003, An updated digital model of plate boundaries: Geochemistry Geophysics Geosystems, v. 4, no. 3, p. 1,027, doi:10.1029/2001GC000252.

ESRI, 2011, Ocean_Basemap, ESRI, scale range 1:591,657,528 down to 1:1,155,581.

Albatross Bank fault zone anticline

von Huene, R., Hampton, M.A., Fisher, M.A., Varchol, D.J., and Cochrane, G.R., 1980, Map showing near-surface geologic structures of Kodiak shelf, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-1200, 1 sheet, 1:500,000 scale.

Albatross Bank fault zone

von Huene, R., Hampton, M.A., Fisher, M.A., Varchol, D.J., and Cochrane, G.R., 1980, Map showing near-surface geologic structures of Kodiak shelf, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-1200, 1 sheet, 1:500,000 scale.

Art Lewis Glacier fault (Fairweather fault system)

Plafker, George, 1967, Geologic map of the Gulf of Alaska Tertiary province, Alaska: U.S.Geological Survey Miscellaneous Geologic Investigations Map I-484, 1 sheet, scale 1:500,000.

Atsaksovluk fault

Cady, W.M., Wallace, R.E., Hoare, J.M., and Webber, E.J., 1955, The central Kuskokwim region, Alaska: U.S. Geological Survey Professional Paper 268, 132 p., 5 sheets.

Bagley fault

Plafker, George, 1967, Geologic map of the Gulf of Alaska Tertiary province, Alaska: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-484, 1 sheet, scale 1:500,000.

Bancas Point fault

Plafker, George, and Thatcher, Wayne, 2008, Geological and geophysical evaluation of the mechanisms of the Great 1899 Yakutat Bay Earthquakes, *in* Freymueller, J.T., Haeussler, P.J., Wesson, R.L., and Ekström, Göran, eds., Active Tectonics and Seismic Potential of Alaska: Washington, D.C., American Geophysical Union, Geophysical Monograph 179, p. 215–236.

Bear Creek fault (Northern Foothills fold and thrust belt)

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Bear Paw fault (Narrow Cape fault zone)

Carver, G.A., Sauber, J.M., Lettis, W., Witter, R., and Whitney, B., 2008, Active faults on northeastern Kodiak Island, Alaska, *in* Freymueller, J.T., Haeussler, P.J., Wesson, R.L., and Ekström, Göran, eds., Active tectonics and seismic potential of Alaska: Washington, D.C., American Geophysical Union, Geophysical Monograph, v. 179, p. 167–184.

Beaver Creek anticline (Cook Inlet folds)

Haeussler, P.J., and Saltus, R.W., 2009, Location and extent of Tertiary structures in Cook Inlet Basin, Alaska, and mantle dynamics that focus deformation and subsidence, Studies by the U.S. Geological Survey in Alaska, 2008–2009, U.S. Geological Survey, Professional Paper 1776-D, 26 p.

Beluga River anticline (Cook Inlet folds)

Haeussler, P.J., and Saltus, R.W., 2009, Location and extent of Tertiary structures in Cook Inlet Basin, Alaska, and mantle dynamics that focus deformation and subsidence, Studies by the U.S. Geological Survey in Alaska, 2008–2009, U.S. Geological Survey, Professional Paper 1776-D, 26 p.

Bendeleben fault

Till, A.B., Dumoulin, J.A., Gamble, B.M., Kaufman, D.S., and Carroll, P.I., 1986, Preliminary geologic map and fossil data, Solomon, Bendeleben, and southern Kotzebue quadrangles, Seward Peninsula, Alaska: U.S. Geological Survey Open File Report 86-276, 1 sheet, 1:250,000 scale.

Sainsbury, C.L., Kachadoorian, Reuben, Hudson, T., Smith, T.E., Richards, T.R., and Todd, W.E., 1969, Reconnaissance geologic maps and sample data, Teller A-1, A-2, A-3, B-1, B-2, B-3, C-1, and Bendeleben A-6, B-6, C-6, D-5, D-6 Quadrangles, Seward Peninsula, Alaska: U.S. Geological Survey Open File Report 69-236, 49 p., 12 sheets, 1:63,360 scale, 1 sheet, text.

Big Lake North anticline (Cook Inlet folds)

Haeussler, P.J., and Saltus, R.W., 2009, Location and extent of Tertiary structures in Cook Inlet Basin, Alaska, and mantle dynamics that focus deformation and subsidence, Studies by the U.S. Geological Survey in Alaska, 2008–2009, U.S. Geological Survey, Professional Paper 1776-D, 26 p.

Billy Creek fault (Northern Foothills fold and thrust belt)

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Carver, G.A., Bemis, S.P., Solie, D.N., and Obermiller, K.E., 2008, Active and potentially active faults in or near the Alaska Highway corridor, Delta Junction to Dot Lake, Alaska: Alaska Division of Geological & Geophysical Surveys Preliminary Interpretive Report 2008-3d, 32 p.

Bison fault (Narrow Cape fault zone)

Carver, G.A., Sauber, J.M., Lettis, W., Witter, R., and Whitney, B., 2008, Active faults on northeastern Kodiak Island, Alaska, *in* Freymueller, J.T., Haeussler, P.J., Wesson, R.L., and Ekström, Göran, eds., Active tectonics and seismic potential of Alaska: Washington, D.C., American Geophysical Union, Geophysical Monograph, v. 179, p. 167–184.

Boundary fault

Miller, D.J., 1971, Geologic map of the Yakataga district, Gulf of Alaska Tertiary province, Alaska: U.S. Geological Survey Miscellaneous Investigations 610, 6 p., 1 sheet, scale 1:125,000.

Plafker, George, 1967, Geologic map of the Gulf of Alaska Tertiary province, Alaska: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-484, 1 sheet, scale 1:500,000.

Beikman, H.M., comp., 1974, Preliminary geologic map of the southeast quadrant of Alaska: U.S. Geological Survey Miscellaneous Field Studies Map 612, 2 sheets, scale 1:1,000,000.

Camden Bay anticline

Bader, J.W., and Bird, K.J., comps., 1986, Geologic map of the Demarcation Point, Mt. Michelson, Flaxman Island, and Barter Island quadrangles, northeastern Alaska: U.S. Geological Survey Miscellaneous Investigations Series Map 1791, 1 sheet, scale 1:250,000.

Camden Bay faults

Bader, J.W., and Bird, K.J., comps., 1986, Geologic map of the Demarcation Point, Mt. Michelson, Flaxman Island, and Barter Island quadrangles, northeastern Alaska: U.S. Geological Survey Miscellaneous Investigations 1791, 1 sheet, scale 1:250,000.

Canteen fault

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Reger, R.D., Stevens, D.S.P., and Solie, D.N., 2008, Surficial-geologic map, Delta Junction to Dot Lake, Alaska Highway Corridor: Alaska Division of Geological & Geophysical Surveys Preliminary Interpretive Report 2008-3A, 48 p., 2 sheets, scale 1:63,360.

Carver, G.A., Bemis, S.P., Solie, D.N., and Obermiller, K.E., 2008, Active and potentially active faults in or near the Alaska Highway corridor, Delta Junction to Dot Lake, Alaska: Alaska Division of Geological & Geophysical Surveys Preliminary Interpretive Report 2008-3d, 32 p.

Caribou fault (Castle Mountain fault system)

Wilson, F.H., Dover, J.H., Bradley, D.C., Weber, F.R., Bundtzen, T.K., and Haeussler, P.J., 1998, Geologic map of central (Interior) Alaska: U.S. Geological Survey Open File Report 98-133, 76 p., 2 sheets, 1:500,000, 1 sheet, figures.

Castle Mountain fault including Susitna section anticline, Susitna section, East section, and Talkeetna West section

Labay, K. and Haeussler, P.J., 2001, GIS coverages of the Castle Mountain fault, south-central Alaska: U.S. Geological Survey Open-File Report 01-504, 1 sheet, scale 1:63,360.

Haeussler, P.J., 1998, Surficial geologic map along the Castle Mountain fault between Houston and Hatcher Pass road, Alaska: U.S. Geological Survey Open-File Report 98-480, 1 sheet, 1:25,000 scale.

Wilson, F.H., Dover, J.H., Bradley, D.C., Weber, F.R., Bundtzen, T.K., and Haeussler, P.J., 1998, Geologic map of central (Interior) Alaska: U.S. Geological Survey Open File Report 98-133, 76 p., 2 sheets, 1:500,000, 1 sheet, figures.

Cathedral Rapids fault and Cathedral Rapids fault B (Northern Foothills fold and thrust belt)

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Reger, R.D., Hubbard, T.D., and Carver, G.A., 2011, Surficial geology of Alaska Highway Corridor, Robertson River to Tetlin Junction, Alaska: Alaska Division of Geological & Geophysical Surveys Preliminary Interpretive Report 2009-6A, 53 p., 4 sheets, scale 1:63,360.

Nokleberg, W.J., Aleinikoff, J.N., Lange, I.M., Silva, S.R., Miyaoka, R.T., Schwab, C.E., and Zehner, R.E., 1992, Preliminary geologic map of the Mount Hayes Quadrangle, eastern Alaska Range, Alaska: U.S. Geological Survey Open-File Report 92-594, 39 p., 1 sheet, scale 1:250,000.

Carver, G.A., Bemis, S.P., Solie, D.N., Castonguay, S.R., and Obermiller, K.E., 2010, Active and potentially active faults in or near the Alaska Highway corridor, Dot Lake to Tetlin Junction, Alaska: Alaska Division of Geological & Geophysical Surveys Preliminary Interpretive Report 2010-1, 42 p.

Chaix Hills fault (Chugach-St. Elias fold and thrust belt)

Miller, D.J., 1971, Geologic map of the Yakataga district, Gulf of Alaska Tertiary province, Alaska: U.S. Geological Survey Miscellaneous Investigations 610, 6 p., 1 sheet, scale 1:125,000.

Plafker, George, 1967, Geologic map of the Gulf of Alaska Tertiary province, Alaska: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-484, 1 sheet, scale 1:500,000.

Beikman, H.M., comp., 1974, Preliminary geologic map of the southeast quadrant of Alaska: U.S. Geological Survey Miscellaneous Field Studies Map 612, 2 sheets, scale 1:1,000,000.

Chugach-St. Elias fault (Chugach-St. Elias fold and thrust belt)

Miller, D.J., 1971, Geologic map of the Yakataga district, Gulf of Alaska Tertiary province, Alaska: U.S. Geological Survey Miscellaneous Investigations 610, 6 p., 1 sheet, scale 1:125,000.

Plafker, George, 1967, Geologic map of the Gulf of Alaska Tertiary province, Alaska: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-484, 1 sheet, scale 1:500,000.

Beikman, H.M., comp., 1974, Preliminary geologic map of the southeast quadrant of Alaska: U.S. Geological Survey Miscellaneous Field Studies Map 612, 2 sheets, scale 1:1,000,000.

Claudia fault (Narrow Cape fault zone)

Carver, G.A., Sauber, J.M., Lettis, W., Witter, R., and Whitney, B., 2008, Active faults on northeastern Kodiak Island, Alaska, *in* Freymueller, J.T., Haeussler, P.J., Wesson, R.L., and Ekström, Göran, eds., Active tectonics and seismic potential of Alaska: Washington, D.C., American Geophysical Union, Geophysical Monograph, v. 179, p. 167–184.

Coal Glacier fault (Chugach-St. Elias fold and thrust belt)

Miller, D.J., 1971, Geologic map of the Yakataga district, Gulf of Alaska Tertiary province, Alaska: U.S. Geological Survey Miscellaneous Investigations 610, 6 p., 1 sheet, scale 1:125,000.

Plafker, George, 1967, Geologic map of the Gulf of Alaska Tertiary province, Alaska: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-484, 1 sheet, scale 1:500,000.

Beikman, H.M., comp., 1974, Preliminary geologic map of the southeast quadrant of Alaska: U.S. Geological Survey Miscellaneous Field Studies Map 612, 2 sheets, scale 1:1,000,000.

Cook Inlet folds

Haeussler, P.J., and Saltus, R.W., 2009, Location and extent of Tertiary structures in Cook Inlet Basin, Alaska, and mantle dynamics that focus deformation and subsidence, Studies by the U.S. Geological Survey in Alaska, 2008–2009, U.S. Geological Survey, Professional Paper 1776-D, 26 p.

Cordova fault

Winkler, G.R., and Plafker, George, 1993, Geologic map of the Cordova and Middleton Island quadrangles, Southern Alaska: U.S. Geological Survey Miscellaneous Investigations Series Map 1984, 1 sheet, scale 1:250,000.

Dall Mountain fault

Woodward-Lundgren & Associates, 1974, Summary report basis for pipeline design for active-fault crossings for the Trans-Alaska Pipeline System: Prepared for Alyeska Pipeline Service Company, Appendix A-3.1111, Figure 157.

Brosgé, W.P., Reiser, H.N., and Yeend, Warren, 1973, Reconnaissance geologic map of the Beaver Quadrangle, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map 525, 1 sheet, scale 1:250,000.

Denali fault (Boss Creek section)

Cady, W.M., Wallace, R.E., Hoare, J.M., and Webber, E.J., 1955, The central Kuskokwim region, Alaska: U.S. Geological Survey Professional Paper 268, 132 p., 5 sheets.

Denali fault (Central Muldrow-Alsek section)

Haeussler, P.J., 2009, Surface rupture map of the 2002 M7.9 Denali fault earthquake, Alaska—Digital Data: U.S. Geological Survey Data Series 422, 9 p., 1 sheet, scale 1:63,360. http://pubs.usgs.gov/ds/422/.

Haeussler, P.J., personal communication, Rupture traces of the 2002 Denali fault earthquake generalized to a scale of 1:63,000.

Richter, D.H., 1976, Geologic map of the Nabesna Quadrangle, Alaska: U.S. Geological Survey Miscellaneous Investigations Series Map 932, 1 sheet, scale 1:250,000.

Denali fault (Chatham Strait section)

Loney, R.A., Brew, D.A., Muffler, L.J.P., and Pomeroy, J.S., 1975, Reconnaissance geology of Chichagof, Baranof, and Kruzof islands, southeastern Alaska: U.S. Geological Survey Professional Paper 792, 105 p., 4 sheets, scale 1:250,000.

Denali fault (Chilkat River section)

MacKevett, E.M., Jr., Robertson, E.C., and Winkler, G.R., 1974, Geology of the Skagway B-3 and B-4 quadrangles, southeastern Alaska: U.S. Geological Survey Professional Paper 832, 33 p., 1 sheet, scale 1:63,360.

Denali fault (Dalton section)

Campbell, R.B., and Dodds, C.J., 1975, Operation Saint Elias, Yukon Territory, in Report of Activities Part A, April to October 1974: Geological Survey of Canada Paper 75-1, Part A, p. 51–53.

Denali fault (East Muldrow–Alsek section)

Bostock, H.S., 1952, Geology of northwest Shakwak Valley, Yukon Territory: Geological Survey of Canada Memoir 267, 54 p, 2 oversized plates, 1:253,440 scale.

Muller, J.E., 1967, Kluane Lake map area, Yukon Territory: Geological Survey of Canada Memoir 340, 134 p, 2 oversized plates, 1:253,440 scale.

Denali fault (Farewell section)

Wilson, F.H., Dover, J.H., Bradley, D.C., Weber, F.R., Bundtzen, T.K., and Haeussler, P.J., 1998, Geologic map of central (Interior) Alaska: U.S. Geological Survey Open File Report 98-133, 76 p., 2 sheets, 1:500,000, 1 sheet, figures.

Denali fault (Holitna section)

Cady, W.M., Wallace, R.E., Hoare, J.M., and Webber, E.J., 1955, The central Kuskokwim region, Alaska: U.S. Geological Survey Professional Paper 268, 132 p., 5 sheets.

Denali fault (Togiak–Tikchik section)

Hoare, J.M., and Coonrad, W.L., 1961, Geologic map of the Goodnews Quadrangle, Alaska: U.S. Geological Survey Miscellaneous Geologic Investigations Map 339, 1 sheet, scale 1:250,000.

Denali fault (Tonzona–Muldrow section)

Reed, B.L., and Nelson, S.W., 1980, Geologic map of the Talkeetna Quadrangle, Alaska: U.S. Geological Survey Miscellaneous Investigations Series Map 1174, 15 p., 1 sheet, scale 1:250,000.

Denali fault (West Muldrow–Alsek section)

Nokleberg, W.J., Aleinikoff, J.N., Lange, I.M., Silva, S.R., Miyaoka, R.T., Schwab, C.E., and Zehner, R.E., 1992, Preliminary geologic map of the Mount Hayes Quadrangle, eastern Alaska Range, Alaska: U.S. Geological Survey Open-File Report 92-594, 39 p., 1 sheet, scale 1:250,000.

Csejtey, Bela, Jr., Mullen, M.W., Cox, D.P., and Stricker, G.D., 1992, Geology and geochronology of the Healy Quadrangle, south-central Alaska: U.S. Geological Survey Miscellaneous Investigations Series Map 1961, 63 p., 2 sheets, scale 1:250,000.

Ditch Creek fault (Northern Foothills fold and thrust belt)

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Donnelly Dome fault (Northern Foothills fold and thrust belt)

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Dot “T” Johnson fault (Northern foothills fold and thrust belt)

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Reger, R.D., Stevens, D.S.P., and Solie, D.N., 2008, Surficial-geologic map, Delta Junction to Dot Lake, Alaska Highway Corridor: Alaska Division of Geological & Geophysical Surveys Preliminary Interpretive Report 2008-3A, 48 p., 2 sheets, scale 1:63,360.

Reger, R.D., Hubbard, T.D., and Carver, G.A., 2011, Surficial geology of Alaska Highway Corridor, Robertson River to Tetlin Junction, Alaska: Alaska Division of Geological & Geophysical Surveys Preliminary Interpretive Report 2009-6A, 53 p., 4 sheets, scale 1:63,360.

Carver, G.A., Bemis, S.P., Solie, D.N., Castonguay, S.R., and Obermiller, K.E., 2010, Active and potentially active faults in or near the Alaska Highway corridor, Dot Lake to Tetlin Junction, Alaska: Alaska Division of Geological & Geophysical Surveys Preliminary Interpretive Report 2010-1, 42 p.

Carver, G.A., Bemis, S.P., Solie, D.N., and Obermiller, K.E., 2008, Active and potentially active faults in or near the Alaska Highway corridor, Delta Junction to Dot Lake, Alaska: Alaska Division of Geological & Geophysical Surveys Preliminary Interpretive Report 2008-3d, 32 p.

East Boulder Creek fault (Castle Mountain fault system)

Wilson, F.H., Dover, J.H., Bradley, D.C., Weber, F.R., Bundtzen, T.K., and Haeussler, P.J., 1998, Geologic map of central (Interior) Alaska: U.S. Geological Survey Open File Report 98-133, 76 p., 2 sheets, 1:500,000, 1 sheet, figures.

East Fork fault (Northern Foothills fold and thrust belt)

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Emmons Lake fault

Kennedy, G.C., and Waldron, H.H., 1955, Geology of Pavlof Volcano and vicinity, Alaska: U.S. Geological Survey Bulletin 1028-A, p. 1-19, 1 sheet, scale 1:100,000.

Etches fault

Winkler, G.R., and Plafker, George, 1993, Geologic map of the Cordova and Middleton Island quadrangles, Southern Alaska: U.S. Geological Survey Miscellaneous Investigations Series Map 1984, 1 sheet, scale 1:250,000.

Eva Creek fault (Northern Foothills fold and thrust belt)

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Eyak fault

Winkler, G.R., and Plafker, George, 1993, Geologic map of the Cordova and Middleton Island quadrangles, Southern Alaska: U.S. Geological Survey Miscellaneous Investigations Series Map 1984, 1 sheet, scale 1:250,000.

Fairbanks seismic zone

Ruppert, N.A., Ridgway, K.D., Freymueller, J.T., Cross, R.S., and Hansen, R.A., 2008, Active tectonics of Interior Alaska—Seismicity, GPS geodesy, and local geomorphology, *in* Freymueller, J.T., Haeussler, P.J., Wesson, R.L., and Ekström, Göran, eds., Active Tectonics and Seismic Potential of Alaska: Washington, D.C., American Geophysical Union, Geophysical Monograph 179, p. 109–133.

Fairweather fault

Plafker, George, 1967, Geologic map of the Gulf of Alaska Tertiary province, Alaska: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-484, 1 sheet, scale 1:500,000.

Falls Creek–Ninilchik anticline (Cook Inlet folds)

Haeussler, P.J., and Saltus, R.W., 2009, Location and extent of Tertiary structures in Cook Inlet Basin, Alaska, and mantle dynamics that focus deformation and subsidence, Studies by the U.S. Geological Survey in Alaska, 2008–2009, U.S. Geological Survey, Professional Paper 1776-D, 26 p.

Glacier Creek fault (Northern Foothills fold and thrust belt)

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Gold King A and B faults (Northern Foothills fold and thrust belt)

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Granite Mountain fault (Northern Foothills fold and thrust belt)

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Granite Point anticline (Cook Inlet folds)

Haeussler, P.J., and Saltus, R.W., 2009, Location and extent of Tertiary structures in Cook Inlet Basin, Alaska, and mantle dynamics that focus deformation and subsidence, Studies by the U.S. Geological Survey in Alaska, 2008–2009, U.S. Geological Survey, Professional Paper 1776-D, 26 p.

Gulf of Alaska shear zone

Gulick, S.P.S., Lowe, L.A., Pavlis, T.L., Gardner, J.V., and Mayer, L.A., 2007, Geophysical insights into the Transition fault debate—Propagating strike-slip in response to stalling Yakutat block subduction in the Gulf of Alaska: Geology, v. 35, no. 8, p. 763–766; doi: 10.1130/G23585A.

Reece, R., Gulick, S.P.S., Christeson, G., von Avendonk, H.J.A., Horton, B., and Barth, G., (in prep.), Effects of the Yakutat terrane collision with North America on the neighboring Pacific Plate, for submission to Journal of Geophysical Research.

Hanning Bay fault

Tysdal, R.G., and Case, J.E., 1979, Geologic map of the Seward and Blying Sound quadrangles, Alaska: U.S. Geological Survey Miscellaneous Investigations 1150, 1 sheet, scale 1:250,000.

Healy Creek fault (Northern Foothills fold and thrust belt)

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Healy fault (Northern Foothills fold and thrust belt)

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Heney fault

Winkler, G.R., and Plafker, George, 1993, Geologic map of the Cordova and Middleton Island quadrangles, Southern Alaska: U.S. Geological Survey Miscellaneous Investigations Series Map 1984, 1 sheet, scale 1:250,000.

Hope Creek fault (Chugach-St. Elias fold and thrust belt)

Miller, D.J., 1971, Geologic map of the Yakataga district, Gulf of Alaska Tertiary province, Alaska: U.S. Geological Survey Miscellaneous Investigations 610, 6 p., 1 sheet, scale 1:125,000.

Plafker, George, 1967, Geologic map of the Gulf of Alaska Tertiary province, Alaska: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-484, 1 sheet, scale 1:500,000.

Beikman, H.M., comp., 1974, Preliminary geologic map of the southeast quadrant of Alaska: U.S. Geological Survey Miscellaneous Field Studies Map 612, 2 sheets, scale 1:1,000,000.

Hunter fault (Northern Foothills fold and thrust belt)

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Iditarod–Nixon Fork fault (including Fourth of July Creek section)

Patton, W.W., Jr., Moll, E.J., Dutro, J.T., Jr., Silberman, M.L., and Chapman, R.M., 1980, Preliminary geologic map of Medfra quadrangle, Alaska: U.S. Geological Survey Open-File Report 80-811-A, 1 sheet, scale 1:250,000.

Wilson, F.H., Dover, J.H., Bradley, D.C., Weber, F.R., Bundtzen, T.K., and Haeussler, P.J., 1998, Geologic map of central (Interior) Alaska: U.S. Geological Survey Open File Report 98-133, 76 p., 2 sheets, 1:500,000, 1 sheet, figures.

Bundtzen, T.K., Miller, M.L., Laird, G.M., and Bull, K.F., 1992, Geology and mineral resources of Iditarod mining district, Iditarod B-4 and eastern B-5 quadrangles, southwestern Alaska: Alaska Division of Geological & Geophysical Surveys Professional Report 97, 88 p., 2 sheets, scale 1:63,360.

Bundtzen, T.K., Laird, G.M., and Lockwood, M.S., 1988, Geologic map of the Iditarod C-3 Quadrangle, Alaska: Alaska Division of Geological & Geophysical Surveys Professional Report 96, 13 p., 1 sheet, scale 1:63,360.

Bundtzen, T.K., and Laird, G.M., 1982, Geologic map of the Iditarod D-2 and eastern D-3 quadrangles, Alaska: Alaska Division of Geological & Geophysical Surveys Geologic Report 72, 1 sheet, scale 1:63,360.

Bundtzen, T.K., and Laird, G.M., 1983, Geologic map of the Iditarod D-1 Quadrangle, Alaska: Alaska Division of Geological & Geophysical Surveys Professional Report 78, 1 sheet, scale 1:63,360.

Bundtzen, T.K., and Laird, G.M., 1980, Preliminary geology of the McGrath–upper Innoko River area, western interior Alaska: Alaska Division of Geological & Geophysical Surveys Alaska Open-File Report 134, 39 p., 2 sheets, scale 1:125,000.

Reger, R.D., Campbell, K.M., Stevens, D.S.P., and Smith, R.L., 2003, Survey of geology, geologic materials, and geologic hazards in proposed access corridors in the Sleetmute Quadrangle, Alaska: Alaska Division of Geological & Geophysical Surveys Miscellaneous Publication 109, 4 sheets, scale 1:250,000.

Bundtzen, T.K., Harris, E.E., Miller, M.L., Layer, P.W., and Laird, G.M., 1999, Geology of the Sleetmute C-7, C-8, D-7, and D-8 quadrangles, Horn Mountains, southwestern Alaska: Alaska Division of Geological & Geophysical Surveys Report of Investigation 98-12, 38 p., 3 sheets, scale 1:63,360.

Bundtzen, T.K., Laird, G.M., Harris, E.E., Kline, J.T., and Miller, M.L., 1993, Geologic map of the Sleetmute C-7, D-7, C-8, and D-8 Quadrangles, Horn Mountains area, southwest Alaska: Alaska Division of Geological & Geophysical Surveys Public Data File 93-47, 15 p., 2 sheets, scale 1:63,360.

Wilson, F.H., Dover, J.H., Bradley, D.C., Weber, F.R., Bundtzen, T.K., and Haeussler, P.J., 1998, Geologic map of central (Interior) Alaska: U.S. Geological Survey Open File Report 98-133, 76 p., 2 sheets, scale 1:500,000, 1 sheet, figures.

Hoare, J.M., and Coonrad, W.L., 1959, Geology of the Russian Mission Quadrangle, Alaska: U.S. Geological Survey Miscellaneous Geologic Investigations Map 292, 1 sheet, scale 1:250,000.

Cady, W.M., Wallace, R.E., Hoare, J.M., and Webber, E.J., 1955, The central Kuskokwim region, Alaska: U.S. Geological Survey Professional Paper 268, 132 p., 5 sheets.

Ivan River anticline (Cook Inlet folds)

Haeussler, P.J., and Saltus, R.W., 2009, Location and extent of Tertiary structures in Cook Inlet Basin, Alaska, and mantle dynamics that focus deformation and subsidence, Studies by the U.S. Geological Survey in Alaska, 2008–2009, U.S. Geological Survey, Professional Paper 1776-D, 26 p.

Kaltag fault

Patton, W.W., Jr., Miller, T.P., Chapman, R.M., and Yeend, Warren, 1978, Geologic map of the Melozitna Quadrangle, Alaska: U.S. Geological Survey Miscellaneous Investigations 1071, 1 sheet, scale 1:250,000.

Cass, J.T., 1959, Reconnaissance geologic map of the Norton Bay Quadrangle, Alaska: U.S. Geological Survey Miscellaneous Investigations 286, 1 sheet, scale 1:250,000.

Patton, W.W., Jr., and Moll-Stalcup, E.J., 2000, Geologic map of the Nulato Quadrangle, west-central Alaska: U.S. Geological Survey Geologic Investigations Series Map 2677, 41 p.

Patton, W.W., Jr., and Moll-Stalcup, E.J., 1996, Geologic map of the Unalakleet Quadrangle, west-central Alaska: U.S. Geological Survey Miscellaneous Geologic Investigations Map 2559, 39 p., 1 sheet.

Kansas Creek fault (Northern Foothills fold and thrust belt)

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Kantishna Hills anticline (Northern Foothills fold and thrust belt)

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Kasilof anticline (Cook Inlet folds)

Haeussler, P.J., and Saltus, R.W., 2009, Location and extent of Tertiary structures in Cook Inlet Basin, Alaska, and mantle dynamics that focus deformation and subsidence, Studies by the U.S. Geological Survey in Alaska, 2008–2009, U.S. Geological Survey, Professional Paper 1776-D, 26 p.

Kayak fault

Winkler, G.R., and Plafker, George, 1993, Geologic map of the Cordova and Middleton Island quadrangles, Southern Alaska: U.S. Geological Survey Miscellaneous Investigations Series Map 1984, 1 sheet, scale 1:250,000.

Kenai–Cannery Loop anticline (Cook Inlet folds)

Haeussler, P.J., and Saltus, R.W., 2009, Location and extent of Tertiary structures in Cook Inlet Basin, Alaska, and mantle dynamics that focus deformation and subsidence, Studies by the U.S. Geological Survey in Alaska, 2008–2009, U.S. Geological Survey, Professional Paper 1776-D, 26 p.

Kigluaik fault

Till, A.B., Dumoulin, J.A., Gamble, B.M., Kaufman, D.S., and Carroll, P.I., 1986, Preliminary geologic map and fossil data, Solomon, Bendeleben, and southern Kotzebue quadrangles, Seward Peninsula, Alaska: U.S. Geological Survey Open File Report 86-276, 1 sheet, 1:250,000 scale.

Sainsbury, C.L., Kachadoorian, Reuben, Hudson, T., Smith, T.E., Richards, T.R., and Todd, W.E., 1969, Reconnaissance geologic maps and sample data, Teller A-1, A-2, A-3, B-1, B-2, B-3, C-1, and Bendeleben A-6, B-6, C-6, D-5, D-6 Quadrangles, Seward Peninsula, Alaska: U.S. Geological Survey Open File Report 69-236, 49 p., 12 sheets, 1:63,360 scale, 1 sheet, text.

Kodiak shelf fault zone and anticline

von Huene, R., Hampton, M.A., Fisher, M.A., Varchol, D.J., and Cochrane, G.R., 1980, Map showing near-surface geologic structures of Kodiak shelf, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-1200, 1 sheet, 1:500,000 scale.

Kosakuts fault (Chugach-St. Elias fold and thrust belt)

Miller, D.J., 1971, Geologic map of the Yakataga district, Gulf of Alaska Tertiary province, Alaska: U.S. Geological Survey Miscellaneous Investigations 610, 6 p., 1 sheet, scale 1:125,000.

Plafker, George, 1967, Geologic map of the Gulf of Alaska Tertiary province, Alaska: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-484, 1 sheet, scale 1:500,000.

Beikman, H.M., comp., 1974, Preliminary geologic map of the southeast quadrant of Alaska: U.S. Geological Survey Miscellaneous Field Studies Map 612, 2 sheets, scale 1:1,000,000.

Lake Clark fault

Wilson, F.H., Dover, J.H., Bradley, D.C., Weber, F.R., Bundtzen, T.K., and Haeussler, P.J., 1998, Geologic map of central (Interior) Alaska: U.S. Geological Survey Open File Report 98-133, 76 p., 2 sheets, 1:500,000, 1 sheet, figures.

Detterman, R.L., Hudson, Travis, Plafker, George, Tysdal, R.G., and Hoare, J.M., 1976, Reconnaissance geologic map along Bruin Bay and Lake Clark faults in Kenai and Tyonek quadrangles, Alaska: U.S. Geological Survey Open-File Report 76-477, 4 p., 1 sheet, scale 1:250,000.

Nelson, W.H., Carlson, Christine, and Case, J.E., 1983, Geologic map of the Lake Clark Quadrangle, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map 1114-A, 1 sheet, scale 1:250,000.

Leeper syncline (Chugach-St. Elias fold and thrust belt)

Miller, D.J., 1971, Geologic map of the Yakataga district, Gulf of Alaska Tertiary province, Alaska: U.S. Geological Survey Miscellaneous Investigations 610, 6 p., 1 sheet, scale 1:125,000.

Plafker, George, 1967, Geologic map of the Gulf of Alaska Tertiary province, Alaska: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-484, 1 sheet, scale 1:500,000.

Beikman, H.M., comp., 1974, Preliminary geologic map of the southeast quadrant of Alaska: U.S. Geological Survey Miscellaneous Field Studies Map 612, 2 sheets, scale 1:1,000,000.

Lewis River anticline (Cook Inlet folds)

Haeussler, P.J., and Saltus, R.W., 2009, Location and extent of Tertiary structures in Cook Inlet Basin, Alaska, and mantle dynamics that focus deformation and subsidence, Studies by the U.S. Geological Survey in Alaska, 2008–2009, U.S. Geological Survey, Professional Paper 1776-D, 26 p.

Macomb Plateau fault (Northern Foothills fold and thrust belt)

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Malaspina fault (Chugach–St. Elias fold and thrust belt)

Miller, D.J., 1971, Geologic map of the Yakataga district, Gulf of Alaska Tertiary province, Alaska: U.S. Geological Survey Miscellaneous Investigations 610, 6 p., 1 sheet, scale 1:125,000.

Plafker, George, 1967, Geologic map of the Gulf of Alaska Tertiary province, Alaska: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-484, 1 sheet, scale 1:500,000.

Beikman, H.M., comp., 1974, Preliminary geologic map of the southeast quadrant of Alaska: U.S. Geological Survey Miscellaneous Field Studies Map 612, 2 sheets, scale 1:1,000,000.

Marsh Creek anticline

Bader, J.W., and Bird, K.J., comps., 1986, Geologic map of the Demarcation Point, Mt. Michelson, Flaxman Island, and Barter Island quadrangles, northeastern Alaska: U.S. Geological Survey Miscellaneous Investigations Series Map 1791, 1 sheet, scale 1:250,000.

McArthur River–Redoubt Shoal anticline (Cook Inlet folds)

Haeussler, P.J., and Saltus, R.W., 2009, Location and extent of Tertiary structures in Cook Inlet Basin, Alaska, and mantle dynamics that focus deformation and subsidence, Studies by the U.S. Geological Survey in Alaska, 2008–2009, U.S. Geological Survey, Professional Paper 1776-D, 26 p.

McCallum Creek fault

Nokleberg, W.J., Albert, N.R.D., Bond, G.C., Herzon, P.L., Miyaoka, R.T., Nelson, W.H., Richter, D.H., Smith, T.E., Stout, J.H., Yeend, Warren, and Zehner, R.E., 1982, Geologic map of the southern part of Mount Hayes Quadrangle, Alaska: U.S. Geological Survey Open-File Report 82-52, 26 p., 1 sheet, scale 1:250,000.

McGinnis Glacier fault (Northern Foothills fold and thrust belt)

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Medicine Lake lineament (Tintina fault zone)

Foster, H.L., Laird, Jo, Keith, T.E.C., Cushing, G.W., and Menzie, W.D., 1983, Preliminary geologic map of the Circle Quadrangle, Alaska: U.S. Geological Survey Open-File Report 83-170-A, 30 p., 1 sheet, scale 1:250,000.

Middle Ground Shoal anticline (Cook Inlet folds)

Haeussler, P.J., and Saltus, R.W., 2009, Location and extent of Tertiary structures in Cook Inlet Basin, Alaska, and mantle dynamics that focus deformation and subsidence, Studies by the U.S. Geological Survey in Alaska, 2008–2009, U.S. Geological Survey, Professional Paper 1776-D, 26 p.

Miller Creek fault (Chugach-St. Elias fold and thrust belt)

Miller, D.J., 1971, Geologic map of the Yakataga district, Gulf of Alaska Tertiary province, Alaska: U.S. Geological Survey Miscellaneous Investigations 610, 6 p., 1 sheet, scale 1:125,000.

Plafker, George, 1967, Geologic map of the Gulf of Alaska Tertiary province, Alaska: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-484, 1 sheet, scale 1:500,000.

Beikman, H.M., comp., 1974, Preliminary geologic map of the southeast quadrant of Alaska: U.S. Geological Survey Miscellaneous Field Studies Map 612, 2 sheets, scale 1:1,000,000.

Minto Flats seismic zone

Ruppert, N.A., Ridgway, K.D., Freymueller, J.T., Cross, R.S., and Hansen, R.A., 2008, Active tectonics of Interior Alaska—Seismicity, GPS geodesy, and local geomorphology, *in* Freymueller, J.T., Haeussler, P.J., Wesson, R.L., and Ekström, Göran, eds., Active Tectonics and Seismic Potential of Alaska: Washington, D.C., American Geophysical Union, Geophysical Monograph 179, p. 109–133.

Molybdenum Ridge fault (Northern Foothills fold and thrust belt)

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Moquawkie anticline (Cook Inlet folds)

Haeussler, P.J., and Saltus, R.W., 2009, Location and extent of Tertiary structures in Cook Inlet Basin, Alaska, and mantle dynamics that focus deformation and subsidence, Studies by the U.S. Geological Survey in Alaska, 2008–2009, U.S. Geological Survey, Professional Paper 1776-D, 26 p.

Mystic Mountain fault (Northern Foothills fold and thrust belt)

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Narrow Cape fault (Narrow Cape fault zone)

Carver, G.A., Sauber, J.M., Lettis, W., Witter, R., and Whitney, B., 2008, Active faults on northeastern Kodiak Island, Alaska, *in* Freymueller, J.T., Haeussler, P.J., Wesson, R.L., and Ekström, Göran, eds., Active tectonics and seismic potential of Alaska: Washington, D.C., American Geophysical Union, Geophysical Monograph, v. 179, p. 167–184.

Narrow Cape fault zone

Carver, G.A., Sauber, J.M., Lettis, W., Witter, R., and Whitney, B., 2008, Active faults on northeastern Kodiak Island, Alaska, *in* Freymueller, J.T., Haeussler, P.J., Wesson, R.L., and Ekström, Göran, eds., Active tectonics and seismic potential of Alaska: Washington, D.C., American Geophysical Union, Geophysical Monograph, v. 179, p. 167–184.

Nicolai Creek anticline (Cook Inlet folds)

Haeussler, P.J., and Saltus, R.W., 2009, Location and extent of Tertiary structures in Cook Inlet Basin, Alaska, and mantle dynamics that focus deformation and subsidence, Studies by the U.S. Geological Survey in Alaska, 2008–2009, U.S. Geological Survey, Professional Paper 1776-D, 26 p.

North Cook Inlet—SRS anticline (Cook Inlet folds)

Haeussler, P.J., and Saltus, R.W., 2009, Location and extent of Tertiary structures in Cook Inlet Basin, Alaska, and mantle dynamics that focus deformation and subsidence, Studies by the U.S. Geological Survey in Alaska, 2008–2009, U.S. Geological Survey, Professional Paper 1776-D, 26 p.

North Trading Bay anticline (Cook Inlet folds)

Haeussler, P.J., and Saltus, R.W., 2009, Location and extent of Tertiary structures in Cook Inlet Basin, Alaska, and mantle dynamics that focus deformation and subsidence, Studies by the U.S. Geological Survey in Alaska, 2008–2009, U.S. Geological Survey, Professional Paper 1776-D, 26 p.

Northern Foothills fold and thrust belt (including unnamed faults)

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Bemis, S.P., 2004, Neotectonic framework of the north-central Alaska Range foothills: Fairbanks, Alaska, University of Alaska Fairbanks M.Sc. thesis, 142 p.

Northern Foothills thrust fault (Northern Foothills fold and thrust belt)

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Otmeloi fault

Plafker, George, and Thatcher, Wayne, 2008, Geological and geophysical evaluation of the mechanisms of the Great 1899 Yakutat Bay Earthquakes, *in* Freymueller, J.T., Haeussler, P.J., Wesson, R.L., and Ekström, Göran, eds., Active Tectonics and Seismic Potential of Alaska: Washington, D.C., American Geophysical Union, Geophysical Monograph 179, p. 215–236.

Pamplona fault zone

Worthington, L.L., Gulick, S.P.S., and Pavlis, T.L., 2010, Coupled stratigraphic and structural evolution of a glaciated orogenic wedge, offshore St. Elias Orogen, Alaska: Tectonics,
v. 29, no. 6, TC6013, doi: 10.1029/2010TC002723.

Panoramic fault (Northern Foothills fold and thrust belt)

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Park Road fault (Northern Foothills fold and thrust belt)

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Pass Creek fault

Reed, B.L., and Nelson, S.W., 1980, Geologic map of the Talkeetna Quadrangle, Alaska: U.S. Geological Survey Miscellaneous Investigations Series Map 1174, 15 p., 1 sheet, scale 1:250,000.

Patton Bay fault

Tysdal, R.G., and Case, J.E., 1979, Geologic map of the Seward and Blying Sound quadrangles, Alaska: U.S. Geological Survey Miscellaneous Investigations 1150, 1 sheet, scale 1:250,000.

Peters Dome fault (Northern Foothills fold and thrust belt)

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Pittman anticline (Cook Inlet folds)

Haeussler, P.J., and Saltus, R.W., 2009, Location and extent of Tertiary structures in Cook Inlet Basin, Alaska, and mantle dynamics that focus deformation and subsidence, Studies by the U.S. Geological Survey in Alaska, 2008–2009, U.S. Geological Survey, Professional Paper 1776-D, 26 p.

Potts fault (Northern Foothills fold and thrust belt)

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Preacher fault (Tintina fault zone)

Foster, H.L., Laird, Jo, Keith, T.E.C., Cushing, G.W., and Menzie, W.D., 1983, Preliminary geologic map of the Circle Quadrangle, Alaska: U.S. Geological Survey Open-File Report 83-170-A, 30 p., 1 sheet, scale 1:250,000.

Ragged Mountain fault

Winkler, G.R., and Plafker, George, 1993, Geologic map of the Cordova and Middleton Island quadrangles, Southern Alaska: U.S. Geological Survey Miscellaneous Investigations Series Map 1984, 1 sheet, scale 1:250,000.

Rampart seismic zone

Ruppert, N.A., Ridgway, K.D., Freymueller, J.T., Cross, R.S., and Hansen, R.A., 2008, Active tectonics of Interior Alaska—Seismicity, GPS geodesy, and local geomorphology, *in* Freymueller, J.T., Haeussler, P.J., Wesson, R.L., and Ekström, Göran, eds., Active Tectonics and Seismic Potential of Alaska: Washington, D.C., American Geophysical Union, Geophysical Monograph 179, p. 109–133.

Red Mountain fault (Northern Foothills fold and thrust belt)

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table,
doi: 10.1130/GES00695.1.

Rex fault (Northern Foothills fold and thrust belt)

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Rude River fault and Rude River/Bagley fault

Winkler, G.R., and Plafker, George, 1993, Geologic map of the Cordova and Middleton Island quadrangles, Southern Alaska: U.S. Geological Survey Miscellaneous Investigations Series Map 1984, 1 sheet, scale 1:250,000.

Salcha seismic zone

Ruppert, N.A., Ridgway, K.D., Freymueller, J.T., Cross, R.S., and Hansen, R.A., 2008, Active tectonics of Interior Alaska—Seismicity, GPS geodesy, and local geomorphology, *in* Freymueller, J.T., Haeussler, P.J., Wesson, R.L., and Ekström, Göran, eds., Active Tectonics and Seismic Potential of Alaska: Washington, D.C., American Geophysical Union, Geophysical Monograph 179, p. 109–133.

Stampede fault (Northern Foothills fold and thrust belt)

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Sterling anticline (Cook Inlet folds)

Haeussler, P.J., and Saltus, R.W., 2009, Location and extent of Tertiary structures in Cook Inlet Basin, Alaska, and mantle dynamics that focus deformation and subsidence, Studies by the U.S. Geological Survey in Alaska, 2008–2009, U.S. Geological Survey, Professional Paper 1776-D, 26 p.

Stump Lake anticline (Cook Inlet folds)

Haeussler, P.J., and Saltus, R.W., 2009, Location and extent of Tertiary structures in Cook Inlet Basin, Alaska, and mantle dynamics that focus deformation and subsidence, Studies by the U.S. Geological Survey in Alaska, 2008–2009, U.S. Geological Survey, Professional Paper 1776-D, 26 p.

Sullivan fault (Chugach-St. Elias fold and thrust belt)

Miller, D.J., 1971, Geologic map of the Yakataga district, Gulf of Alaska Tertiary province, Alaska: U.S. Geological Survey Miscellaneous Investigations 610, 6 p., 1 sheet, scale 1:125,000.

Plafker, George, 1967, Geologic map of the Gulf of Alaska Tertiary province, Alaska: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-484, 1 sheet, scale 1:500,000.

Beikman, H.M., comp., 1974, Preliminary geologic map of the southeast quadrant of Alaska: U.S. Geological Survey Miscellaneous Field Studies Map 612, 2 sheets, scale 1:1,000,000.

Susitna Glacier fault

Haeussler, P.J., 2009, Surface rupture map of the 2002 M7.9 Denali fault earthquake, Alaska—Digital Data: U.S. Geological Survey Data Series 422, 9 p., 1 sheet, scale 1:63,360. http://pubs.usgs.gov/ds/422/.

Haeussler, P.J., personal communication, Rupture traces of the 2002 Denali fault earthquake generalized to a scale of 1:63,000.

Swanson River anticline (Cook Inlet folds)

Haeussler, P.J., and Saltus, R.W., 2009, Location and extent of Tertiary structures in Cook Inlet Basin, Alaska, and mantle dynamics that focus deformation and subsidence, Studies by the U.S. Geological Survey in Alaska, 2008–2009, U.S. Geological Survey, Professional Paper 1776-D, 26 p.

Tenfathom fault

Winkler, G.R., and Plafker, George, 1993, Geologic map of the Cordova and Middleton Island quadrangles, Southern Alaska: U.S. Geological Survey Miscellaneous Investigations Series Map 1984, 1 sheet, scale 1:250,000.

Tintina fault zone

Foster, H.L., Laird, Jo, Keith, T.E.C., Cushing, G.W., and Menzie, W.D., 1983, Preliminary geologic map of the Circle Quadrangle, Alaska: U.S. Geological Survey Open-File Report 83-170-A, 30 p., 1 sheet, scale 1:250,000.

Foster, H.L., comp., 1976, Geologic map of the Eagle Quadrangle, Alaska: U.S. Geological Survey Miscellaneous Investigations Series Map 922, 1 sheet, scale 1:250,000.

Dover, J.H., and Miyaoka, R.T., 1988, Reinterpreted geologic map and fossil data, Charley River Quadrangle, east-central Alaska: U.S. Geological Survey Miscellaneous Field Studies Map 2004, 2 sheets, scale 1:250,000.

Totschunda fault

Richter, D.H., 1976, Geologic map of the Nabesna Quadrangle, Alaska: U.S. Geological Survey Miscellaneous Investigations Series Map 932, 1 sheet, scale 1:250,000.

MacKevett, E.M., Jr., 1978, Geologic map of the McCarthy Quadrangle, Alaska: U.S. Geological Survey Miscellaneous Investigations Series Map 1032, 1 sheet, scale 1:250,000.

Haeussler, P.J., 2009, Surface rupture map of the 2002 M7.9 Denali fault earthquake, Alaska—Digital Data: U.S. Geological Survey Data Series 422, 9 p., 1 sheet, scale 1:63,360. http://pubs.usgs.gov/ds/422/.

Haeussler, P.J., personal communication, Rupture traces of the 2002 Denali fault earthquake generalized to a scale of 1:63,000.

Trading Bay anticline (Cook Inlet folds)

Haeussler, P.J., and Saltus, R.W., 2009, Location and extent of Tertiary structures in Cook Inlet Basin, Alaska, and mantle dynamics that focus deformation and subsidence, Studies by the U.S. Geological Survey in Alaska, 2008–2009, U.S. Geological Survey, Professional Paper 1776-D, 26 p.

Transition fault

Gulick, S.P.S., Lowe, L.A., Pavlis, T.L., Gardner, J.V., and Mayer, L.A., 2007, Geophysical insights into the Transition fault debate—Propagating strike-slip in response to stalling Yakutat block subduction in the Gulf of Alaska: Geology, v. 35, no. 8, p. 763–766; doi: 10.1130/G23585A.

Christeson, G.L., Gulick, S.P.S., van Avendonk, H.J.A., Worthington, L.L., Reece, R.S., and Pavlis, T.L., 2010, The Yakutat terrane–Dramatic change in crustal thickness across the Transition fault, Alaska: Geology, v. 38, no. 10, p. 895–898, doi: 10.1130/G31170.1.

Reece, R., Gulick, S.P.S., Christeson, G., von Avendonk, H.J.A., Horton, B., and Barth, G., (in prep.), Effects of the Yakutat terrane collision with North America on the neighboring Pacific Plate, for submission to Journal of Geophysical Research.

Trident fault (Northern Foothills fold and thrust belt)

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Trident Glacier fault (Northern Foothills fold and thrust belt)

Bemis, S.P., Carver, G.A., and Koehler, R.D., 2012, The Quaternary thrust system of the northern Alaska Range: Geosphere, v. 8, no. 1, p. 196–205, 6 figures, 1 table, doi: 10.1130/GES00695.1.

Wasilla St. No. 1—Needham anticline (Cook Inlet folds)

Haeussler, P.J., and Saltus, R.W., 2009, Location and extent of Tertiary structures in Cook Inlet Basin, Alaska, and mantle dynamics that focus deformation and subsidence, Studies by the U.S. Geological Survey in Alaska, 2008–2009, U.S. Geological Survey, Professional Paper 1776-D, 26 p.

West Fork anticline (Cook Inlet folds)

Haeussler, P.J., and Saltus, R.W., 2009, Location and extent of Tertiary structures in Cook Inlet Basin, Alaska, and mantle dynamics that focus deformation and subsidence, Studies by the U.S. Geological Survey in Alaska, 2008–2009, U.S. Geological Survey, Professional Paper 1776-D, 26 p.

West McArthur River anticline (Cook Inlet folds)

Haeussler, P.J., and Saltus, R.W., 2009, Location and extent of Tertiary structures in Cook Inlet Basin, Alaska, and mantle dynamics that focus deformation and subsidence, Studies by the U.S. Geological Survey in Alaska, 2008–2009, U.S. Geological Survey, Professional Paper 1776-D, 26 p.

White River syncline (Chugach-St. Elias fold and thrust belt)

Miller, D.J., 1971, Geologic map of the Yakataga district, Gulf of Alaska Tertiary province, Alaska: U.S. Geological Survey Miscellaneous Investigations 610, 6 p., 1 sheet, scale 1:125,000.

Plafker, George, 1967, Geologic map of the Gulf of Alaska Tertiary province, Alaska: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-484, 1 sheet, scale 1:500,000.

Beikman, H.M., comp., 1974, Preliminary geologic map of the southeast quadrant of Alaska: U.S. Geological Survey Miscellaneous Field Studies Map 612, 2 sheets, scale 1:1,000,000.

Wingham fault

Winkler, G.R., and Plafker, George, 1993, Geologic map of the Cordova and Middleton Island quadrangles, Southern Alaska: U.S. Geological Survey Miscellaneous Investigations Series Map 1984, 1 sheet, scale 1:250,000.

Yaga syncline (Chugach-St. Elias fold and thrust belt)

Miller, D.J., 1971, Geologic map of the Yakataga district, Gulf of Alaska Tertiary province, Alaska: U.S. Geological Survey Miscellaneous Investigations 610, 6 p., 1 sheet, scale 1:125,000.

Plafker, George, 1967, Geologic map of the Gulf of Alaska Tertiary province, Alaska: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-484, 1 sheet, scale 1:500,000.

Beikman, H.M., comp., 1974, Preliminary geologic map of the southeast quadrant of Alaska: U.S. Geological Survey Miscellaneous Field Studies Map 612, 2 sheets, scale 1:1,000,000.

Yakataga anticline (Chugach-St. Elias fold and thrust belt)

Miller, D.J., 1971, Geologic map of the Yakataga district, Gulf of Alaska Tertiary province, Alaska: U.S. Geological Survey Miscellaneous Investigations 610, 6 p., 1 sheet, scale 1:125,000.

Plafker, George, 1967, Geologic map of the Gulf of Alaska Tertiary province, Alaska: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-484, 1 sheet, scale 1:500,000.

Beikman, H.M., comp., 1974, Preliminary geologic map of the southeast quadrant of Alaska: U.S. Geological Survey Miscellaneous Field Studies Map 612, 2 sheets, scale 1:1,000,000.

Yakutat fault (also known as Foothills fault)

Plafker, George, 1967, Geologic map of the Gulf of Alaska Tertiary province, Alaska: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-484, 1 sheet, scale 1:500,000.

APPENDIX B

General Description of GIS Fault Attributes

(see the metadata for more detail)

FID: Assigned in ArcMap

NAME is an 80-character field for the name of the fault or fold (including section name, i.e., Denali fault, Holitna section).

CODE is a three-integer field that defines certainty or reliability of field mapping (FCODE, integer one), time of most recent movement (ACODE, integer two), and amount or rate of slip (SLIPCODE, integer three). CODE determines the line type (fault trace) to be plotted.

NUM is a unique number for each fault or fold. A letter is added to the end of the number for structures that have clearly defined sections. At this time the Alaska numbers do not correlate with the six-character unique USGS identifier system previously developed for the national fault database.

AGE is the upper bounding time of the most recent surface-deforming earthquake. The allowable choices are described under the ACODE heading below.

ACODE is the second integer in CODE and defines the upper bounding time of the most recent surface-deforming earthquake. Permissible values are between 1 and 6:

1 = historic (<150 years);
2 = post glacial (<15,000 years);
3 = late Quaternary (<130,000 years);
4 = middle and late Quaternary (<750,000 years);
5 = Quaternary (<1,600,000 years);
6 = Class B (questionable or suspected structures)

SLIPRATE is the assigned slip rate category. The allowable choices are described under the SLIPCODE heading below.

SLIPCODE is the third integer in CODE and defines the assigned slip rate category. Permissible values are between 1 and 5:
1 = >5 mm/year;
2 = 1–5 mm/year;
3 = 0.2–1 mm/year;
4 = <0.2 mm/year;
5 = unknown; cannot be determined using geologic reasoning

If there are obvious scarps on post-glacial deposits the bare minimum would be a 4 for SLIPCODE.

SLIPSENSE indicates type of relative fault or fold movement, N (normal), R (reverse), SS (strike slip), T (thrust), and unk (unknown)

SECONDARYS is the secondary slip sense. Possible values are: SS (strike-slip), T (thrust), R (reverse), N (normal), and blank (unknown)

DIPDIRECTI is the quadrant dip direction. Unless the structure is known to have backthrusts and forethrusts, a single dip direction value was assigned to the entire structure or structure section.

FCODE is the first integer in CODE and defines how well the fault is located and expressed in the landscape. Permissible values are between 1 and 3:

1 = fault landforms are more continuous than discontinuous and mapping is accurate at given MAPPED SCALE (solid);
2 = fault landforms are more discontinuous than continuous and mapping is accurate at given MAPPED SCALE (dashed);
3 = location of fault is inferred (dotted)

FTYPE is one of three allowable choices including

- Well constrained (FCODE 1),
- Moderately constrained (FCODE 2), and
- Inferred (FCODE 3)

MAPPEDSCAL Mapped scale will control visualization of the fault at various scales. Most faults fall under the basic categories below, however there are several at smaller and larger scales.

- 1:24,000, fault should be more continuous than discontinuous and mapping is accurate at >10,000 scale.
- 1:63,360, fault should be more continuous than discontinuous and mapping is accurate at >24,000 scale.
- 1:100,000, fault could be more discontinuous than continuous and mapping is accurate at >50,000 scale.
- 1:250,000, fault location may be inferred or is poorly constrained and mapping is accurate at >125,000 scale.
- 1:316,000, fault location may be inferred or is poorly constrained and mapping is accurate at >158,000 scale.
- 1:500,000, fault location may be inferred or is poorly constrained and mapping is accurate at >250,000 scale.