

Geophysical and Geological Investigations of the Tanacross Region 2015 Update

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Modern Speaker's Note: When using Adobe Geophy Reader or Adobe Acrobat you can see DGGS H and Mag slide notes by moving your mouse Feder over or clicking on the dialog box in the upper left corner of each slide. DGGS Fixe This option is not currently supported Federa in most web browsers; therefore State download the file and save to your computer. -Abraham

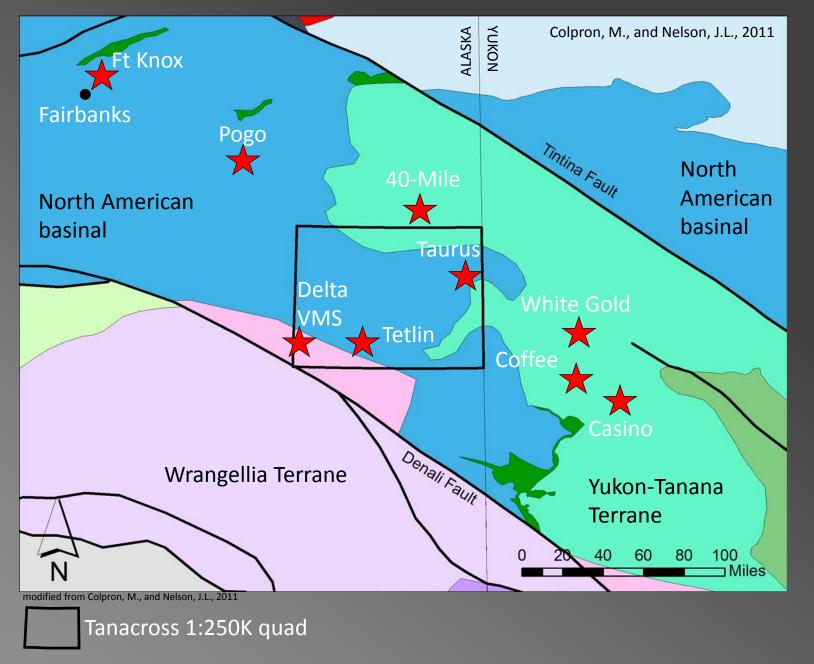
Area of Discussion

Federally Funded 800 m line spacing

> Federally Funded 1600 m line spacing



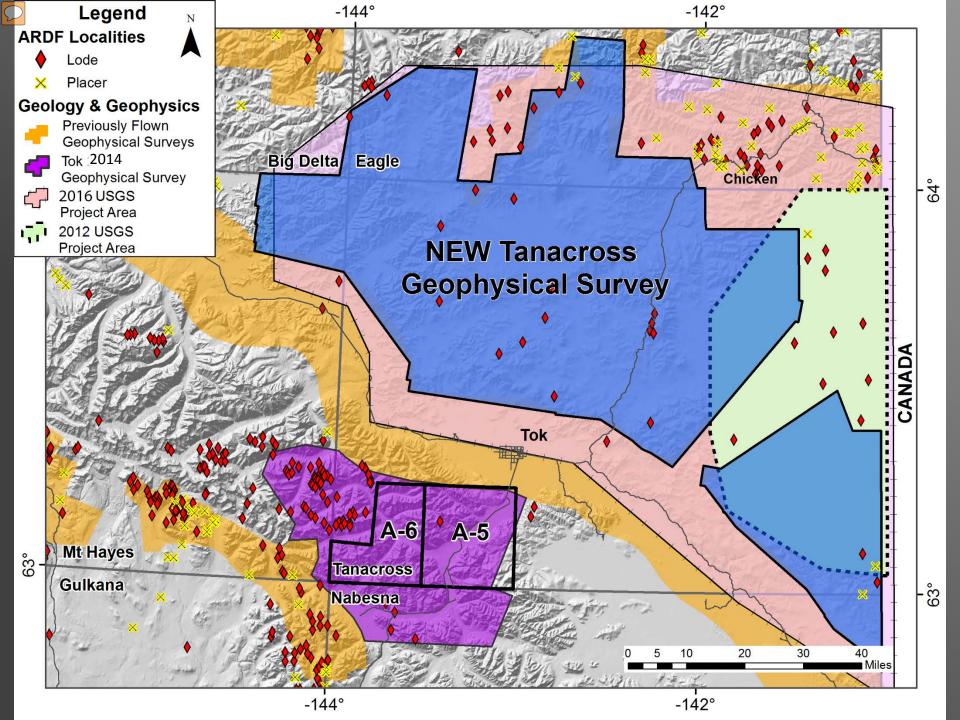
Regional Terrane Map With Deposits

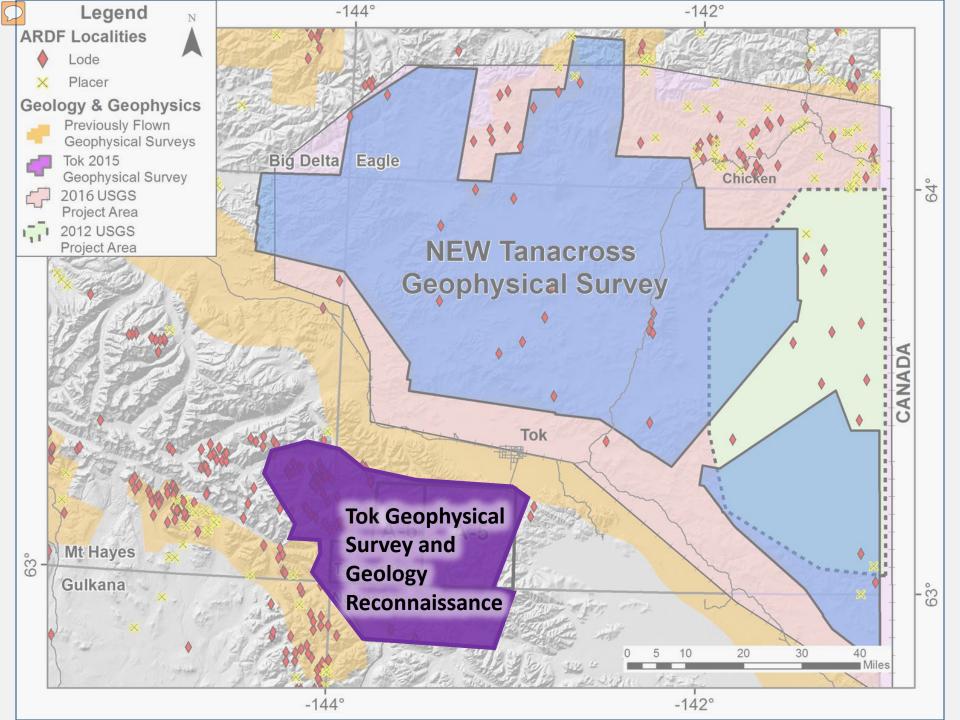


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Why Tanacross and what we are doing about it

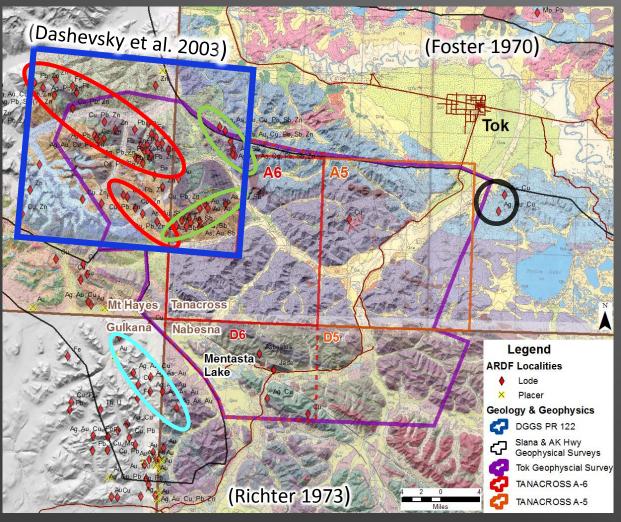
- Surrounded by deposits and active exploration
- Only reconnaissance mapping (Foster, 1970; Nockleberg et al., 2015 [1980s])
- New geophysical data
 - 2014 DGGS Tok EM and Magnetic Survey
 - 2015 DGGS-USGS Tanacross Magnetic Survey
 - Builds on prior surveys
- New geologic work
 - 2015 DGGS Tok Recon
 - 2016 DGGS Tok STATEMAP proposal
 - FY12-15 USGS Yukon Tanana project
 - FY16-19 USGS Yukon Tanana project







Background Geology and Mineral Deposits





Geologic Mapping:

- Reconnaissance Tanacross map
- Richter Mt Hayes, Gulkana, Nabesna
- DGGS Highway corridor and Slana maps, *in progress*
- Delta Mineral belt (DGGS)

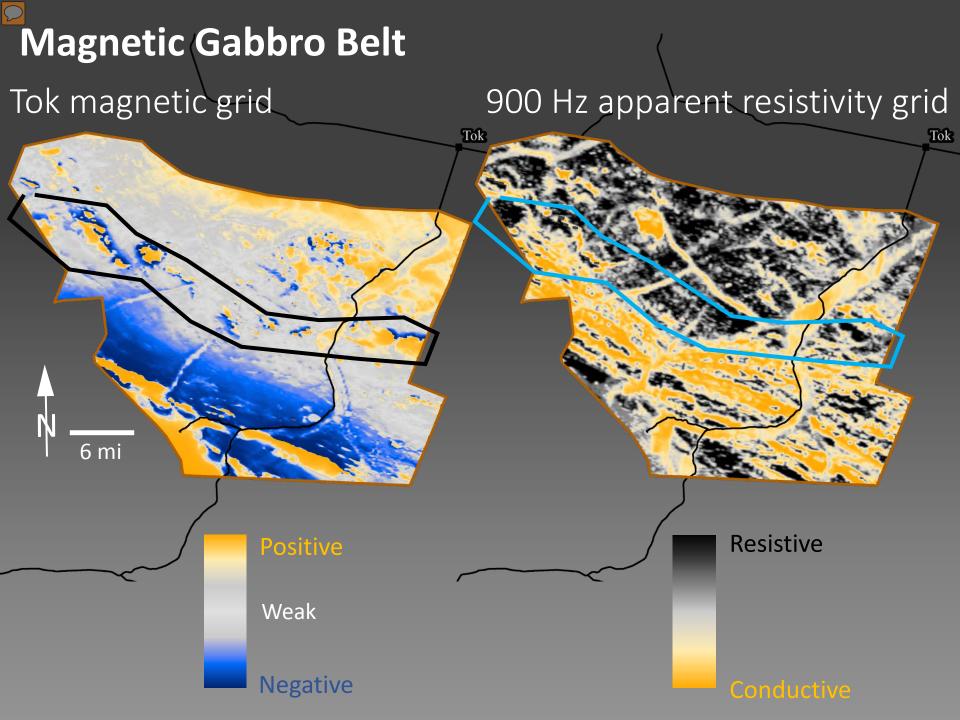
Mineral deposits

- Delta Mineral Belt VMS
- Tetlin project porphyry related Au-skarn
- Stibnite Creek & "White Gold" Sb-Au-Ag – Orogenic Au(/IRG?)
- Jolly-Green Penn(?) porphyry Cu-Au
- Unpublished Ahtna/Doyon exploration data



Tok Geophysical Survey DGGS

- Electromagnetic and Magnetic Data
- 400 meter line spacing
- Published April
 2015 (flown in 2014)
- 1000 square miles
- Last AGGMI survey
- Conducted by CGG





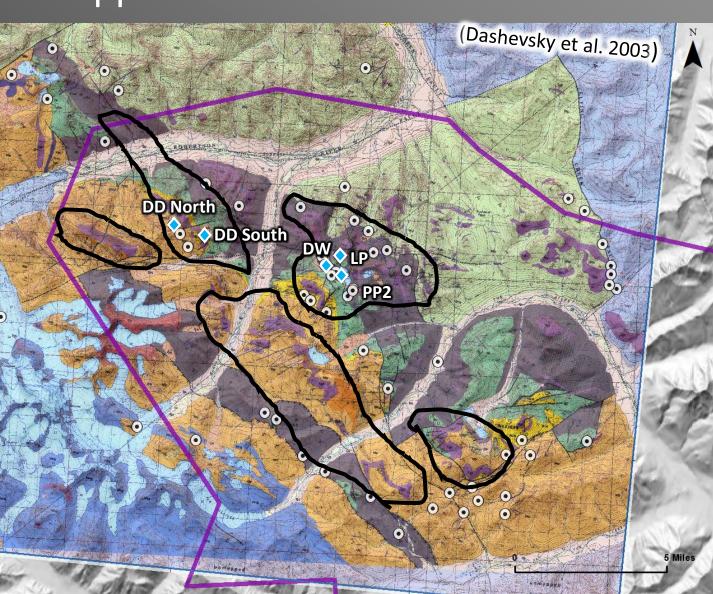
Mapped Gabbro Belts

- mineral occurrence
- ♦ VMS deposit

Tigb

Gabbro (Triassic)

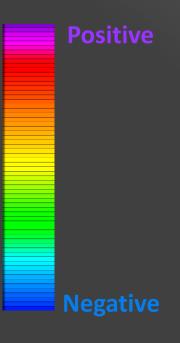


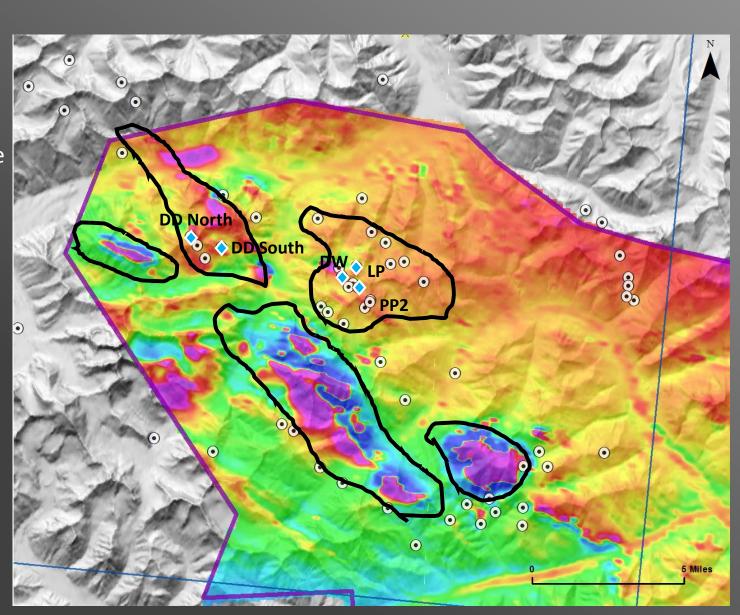




Gabbro Belts and Magnetic Data

- mineral occurrence
- ♦ VMS deposit

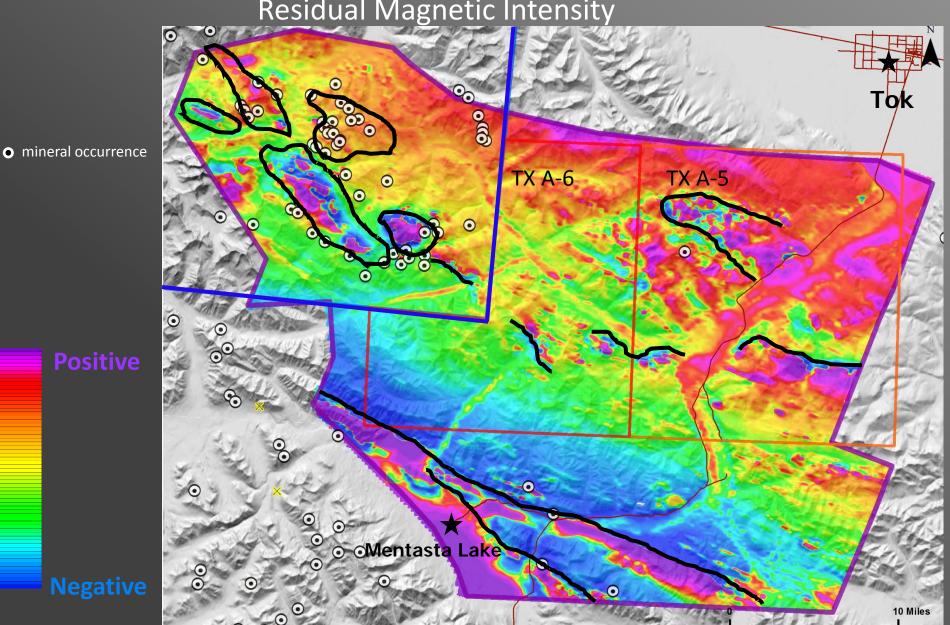




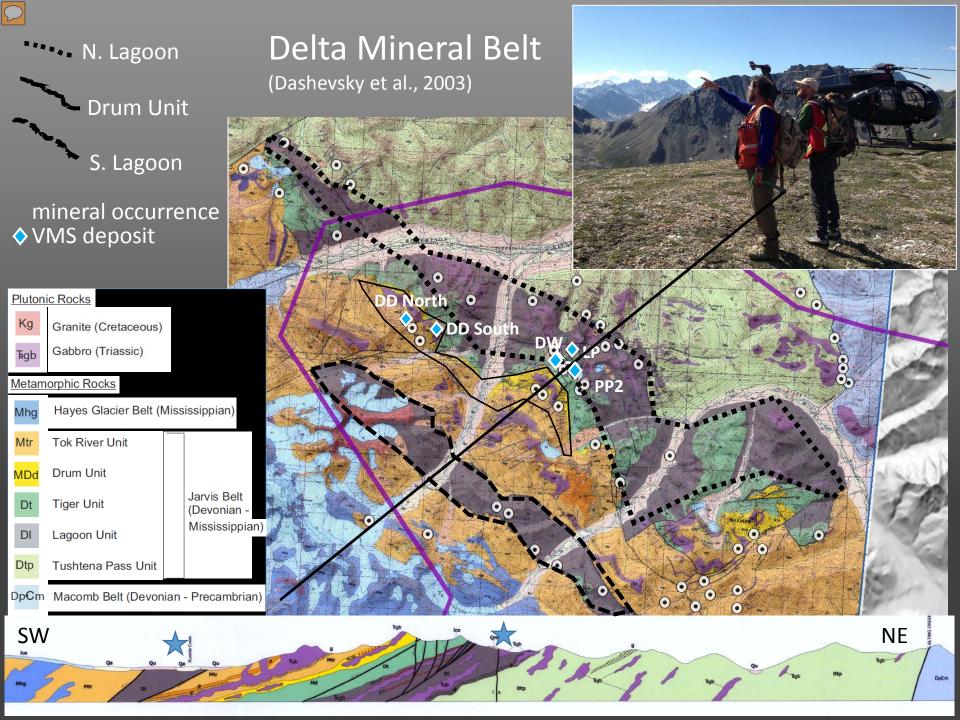


Gabbro Belts

Residual Magnetic Intensity



Excellent Stratigraphy - Hayes Glacier Belt Tok magnetic grid 900 Hz apparent resistivity grid Tok 6 mi Resistive Positive Weak Negative



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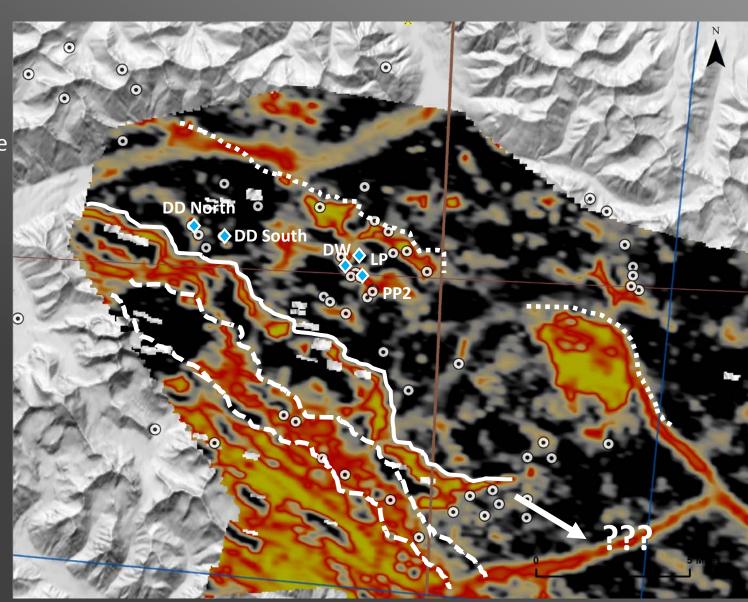
Conductive units

900 Hz Apparent Resistivity Data



- N. Lagoon
 - Quad Marker
 - S. Lagoon

Conductive

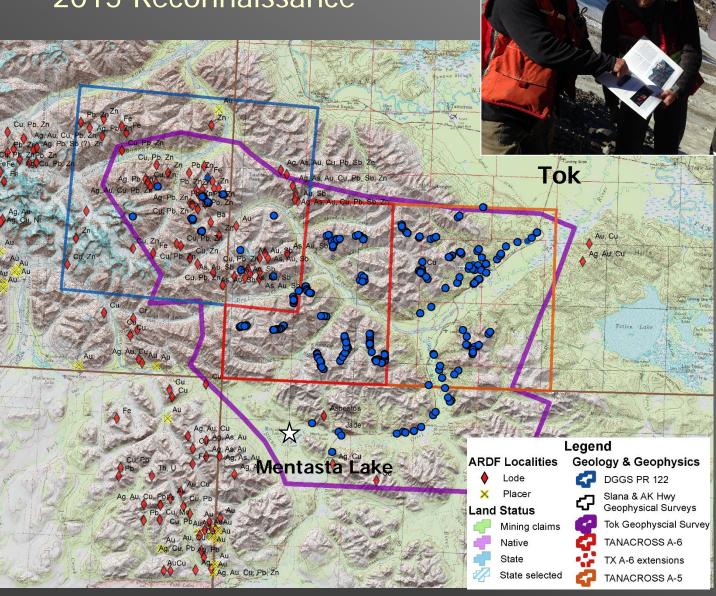


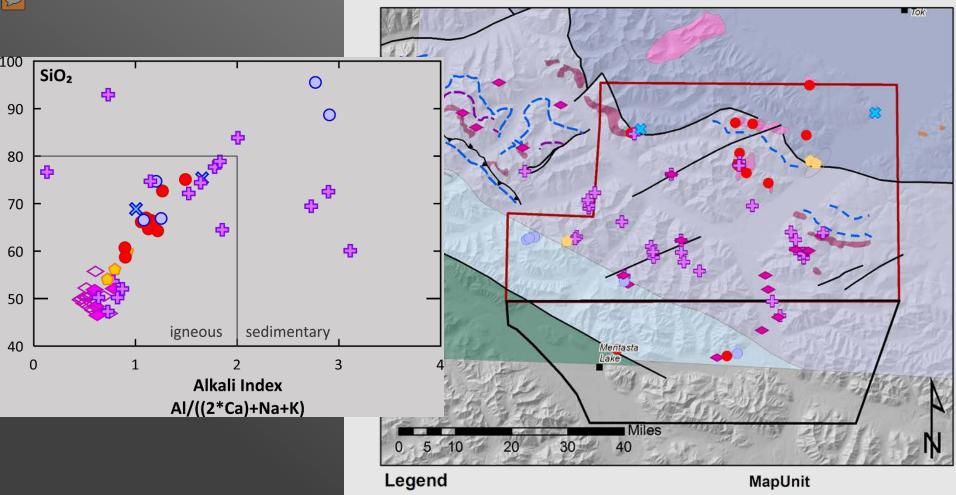
Conductive units N. Amer. basinal strata 900 Hz Apparent Resistivity Data Windy Wrangellia mineral occurrence ♦ VMS deposit N. Lagoon Quad Marker S. Lagoon Conductive o o Mentasta 10 Miles Resistive

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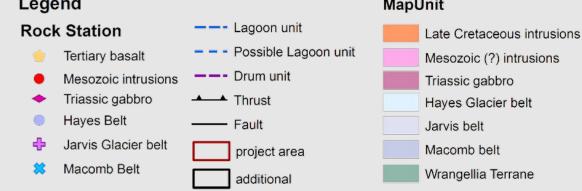
Tok River Project2015 Reconnaissance





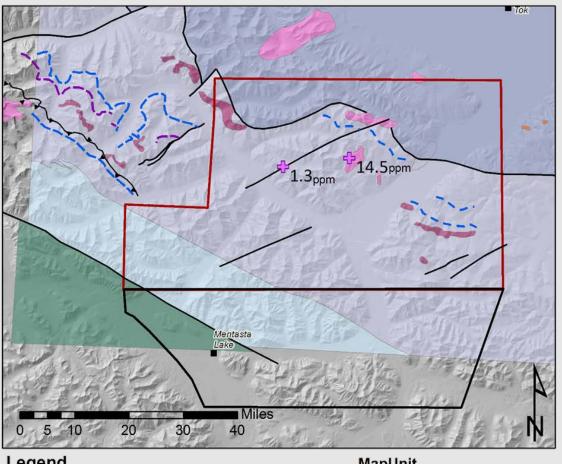
Major oxide geochemistry

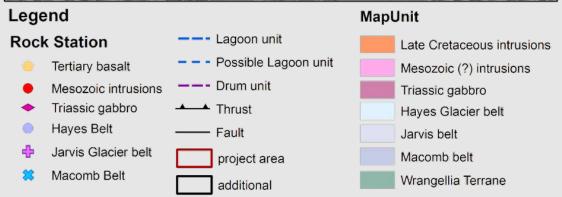
A. Wypych et. al. 2015





Gold Anomalies

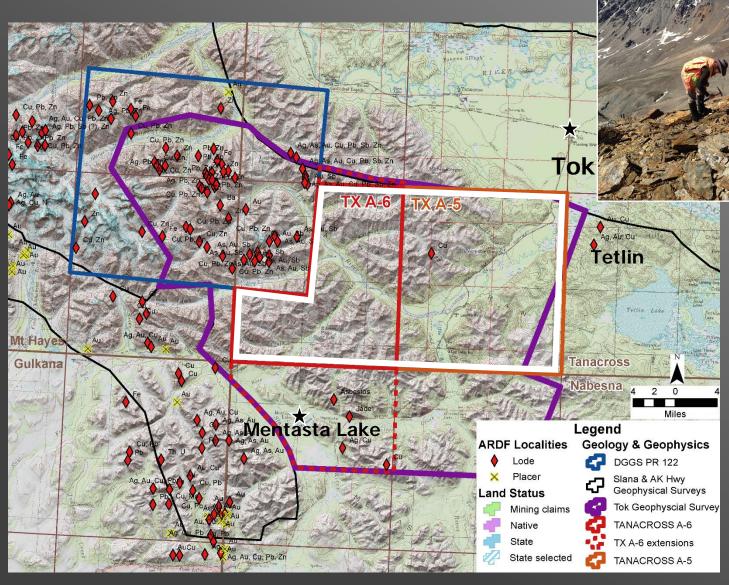






Tok River Project DGGS

STATEMAP Proposal: Tanacross A-5 and A-6, 1:50,000

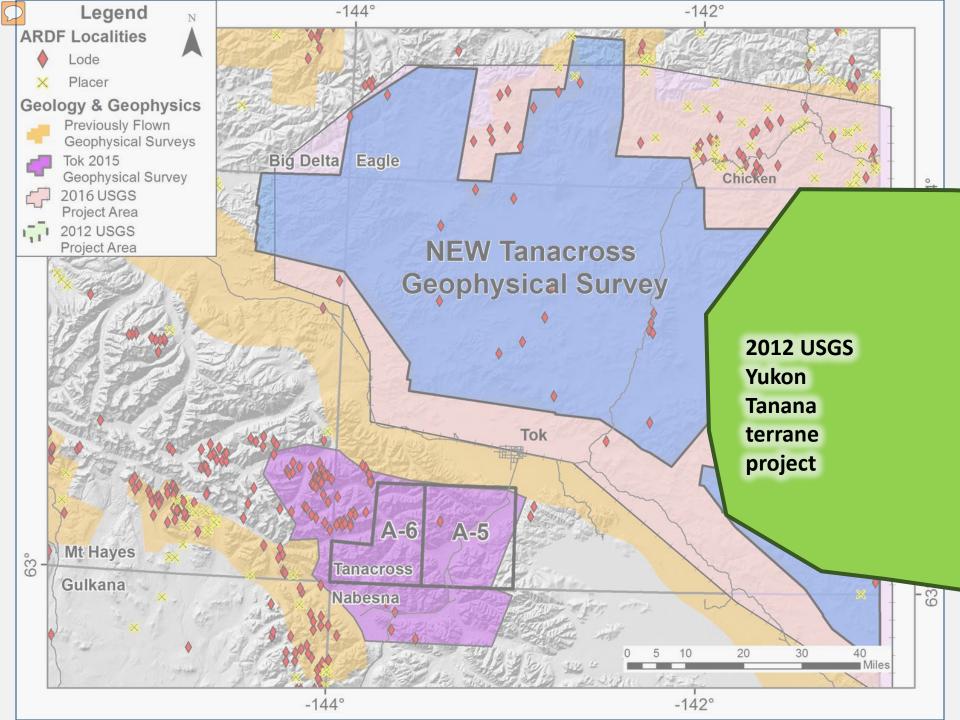




Tok River Project Motivations

- Relevant to State Plan
 - Mapping State Lands
- Societal Need
 - Economic development
 - Raw materials
- Science
 - Poorly understood/understudied
- Timely
 - 2014 Tok Geophysical Survey
 - 2015 Geology Reconnaissance
 - USGS projects and Active Exploration







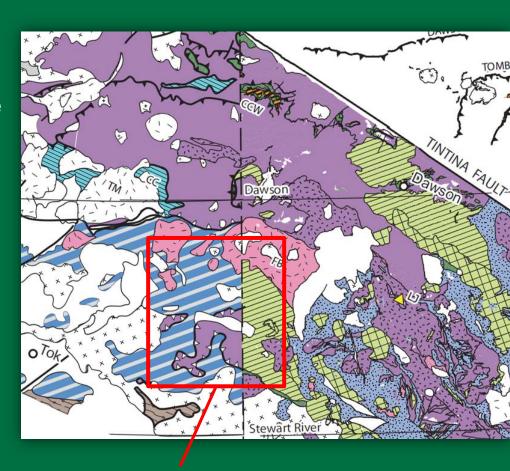
Recent findings and progress

Key questions for FY12-15 project:

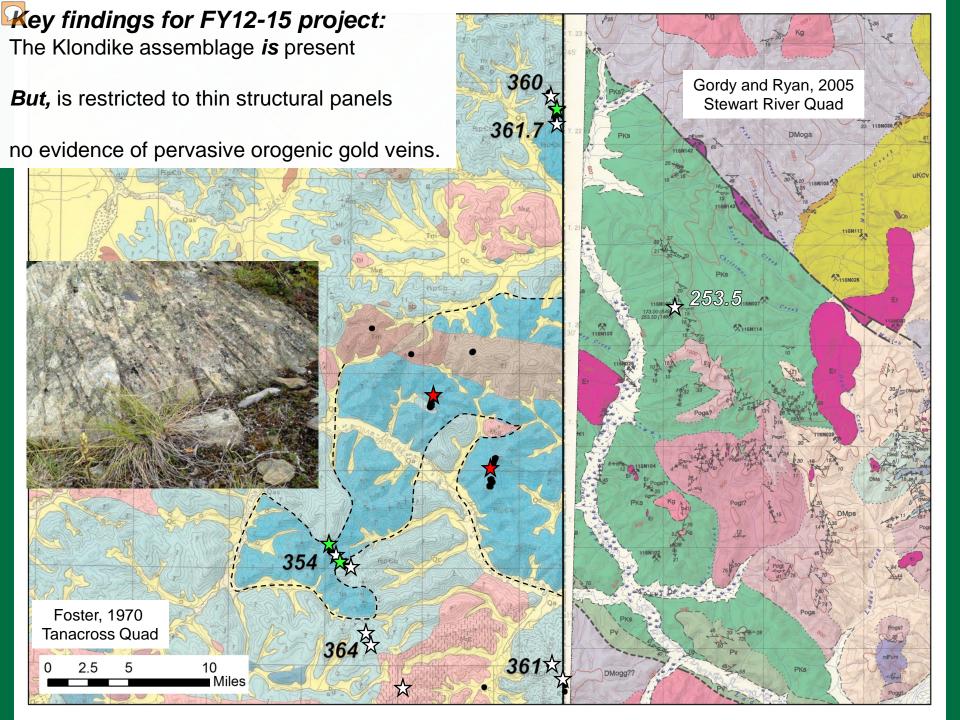
Does the Permian Klondike assemblage extend into eastern AK?

"border fault"

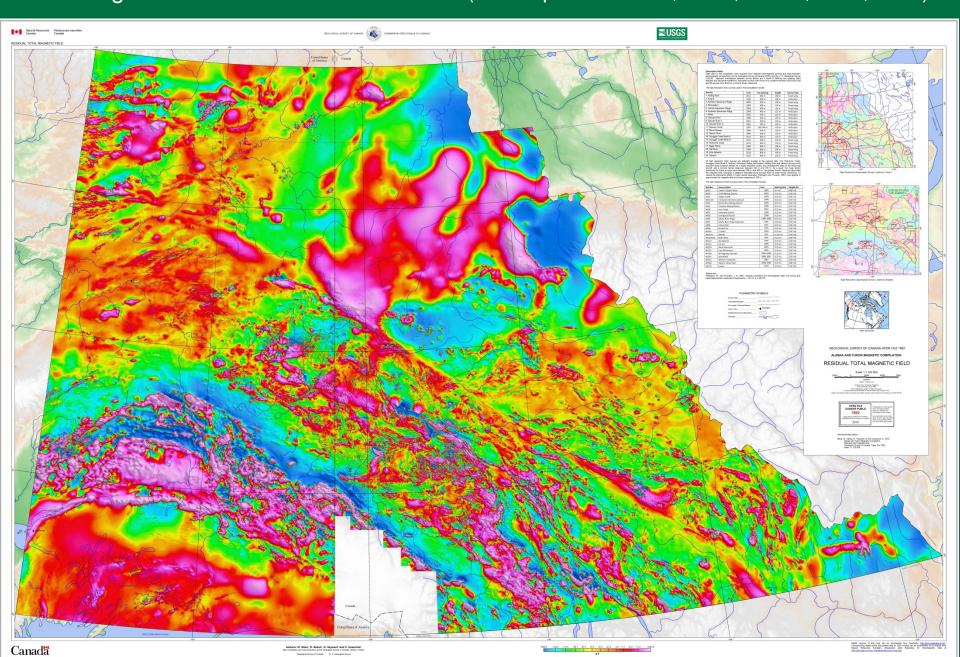
Klondike is the primary lode source of placer gold in the Yukon



Primary focus area for FY12-15 project



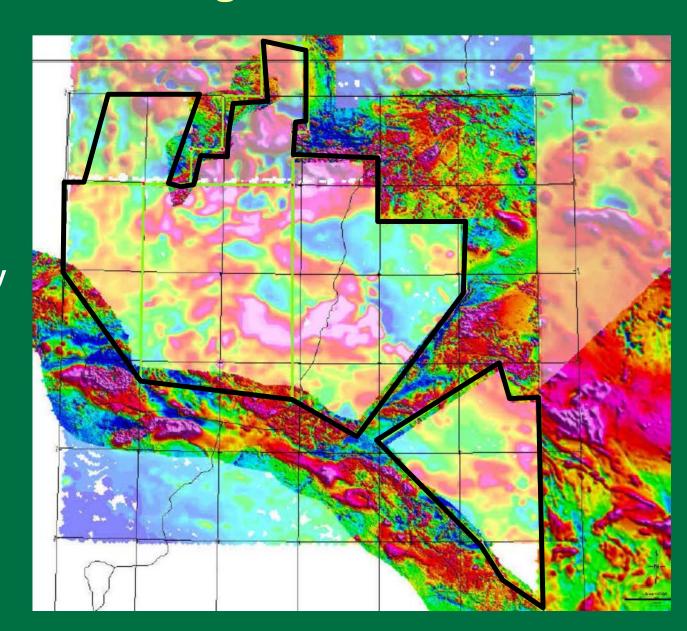
FY12-15 project also produced a new GSC+USGS compilation of all available aeromagnetic data for Alaska and Yukon (GSC Open File 7862, Miles, Saltus, et al., 2015)



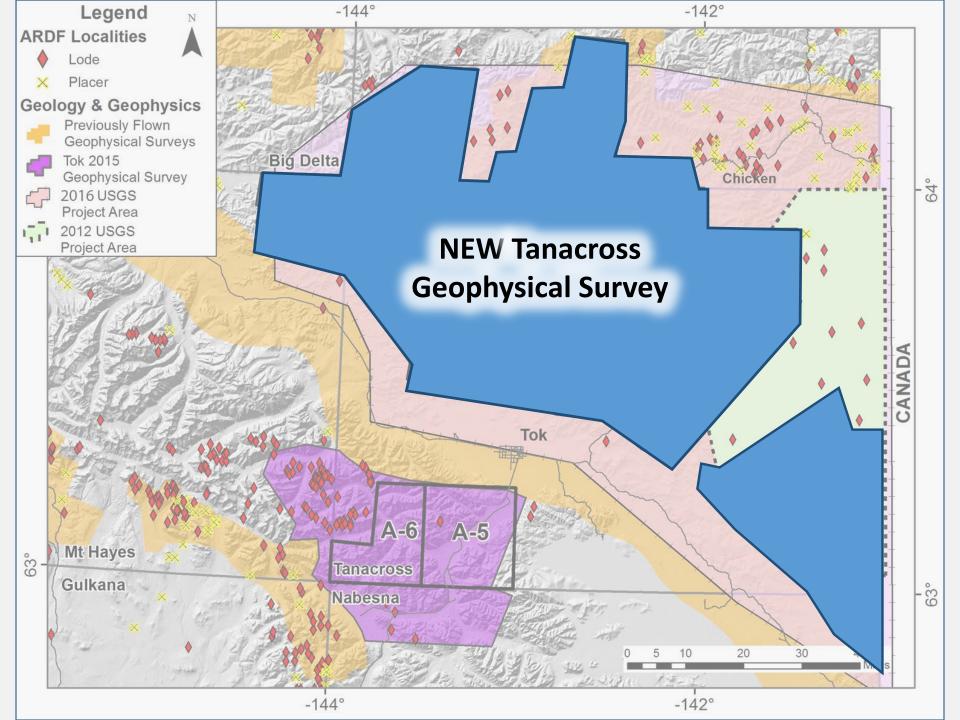


New Magnetic Data Needed

- Low resolution areas identified
- CooperativeUSGS/DGGSfixed-wingmagnetic survey
- Funded by the USGS Minerals Program





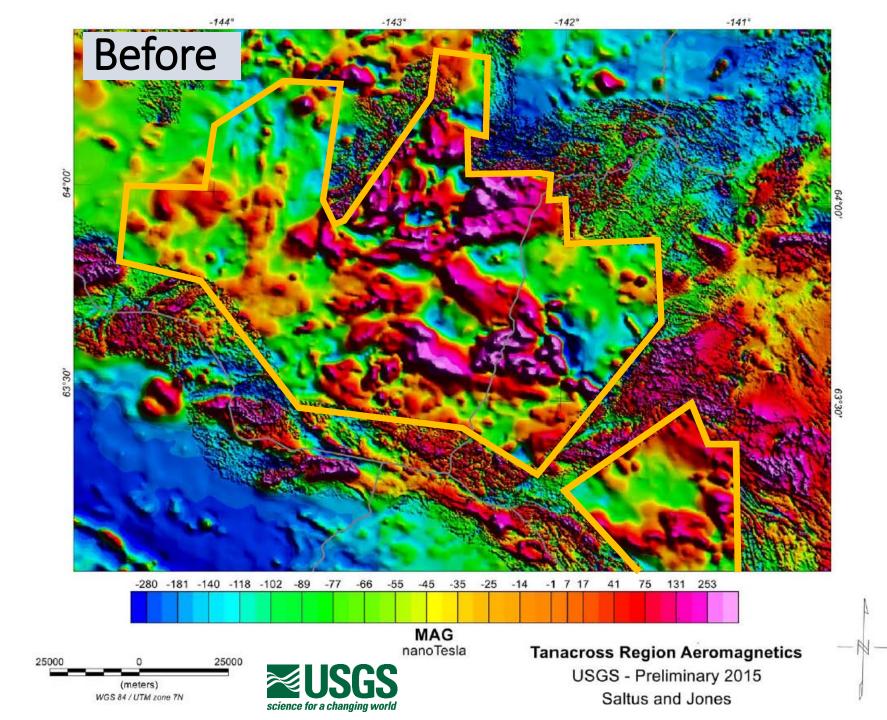


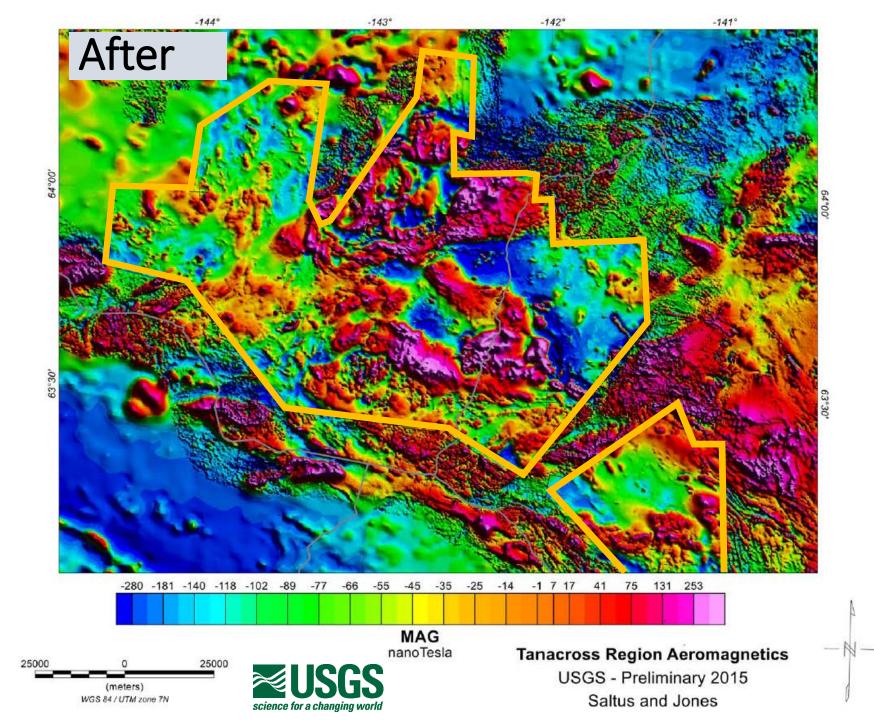


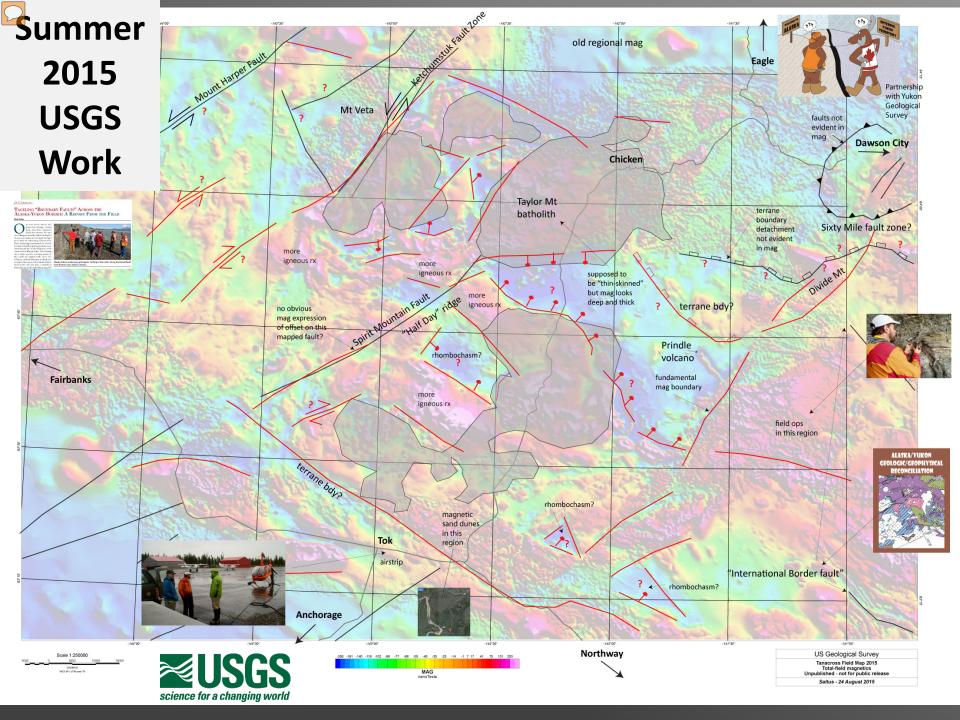
USGS – DGGS Tanacross Airborne Geophysical Survey

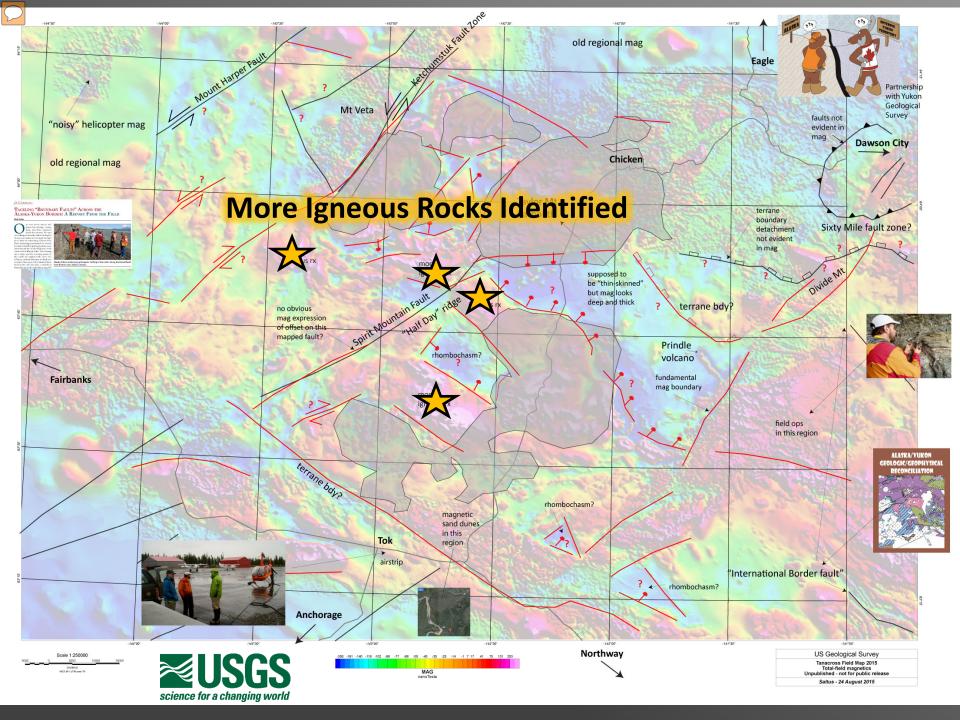
- Total field magnetic data, measured horizontal gradients, high resolution video
- 500 meter line spacing
- 4500 square miles
- Entirely federally funded
- Procured and managed by DGGS
- Conducted by Goldak Airborne Surveys
- Published in 2015 by DGGS

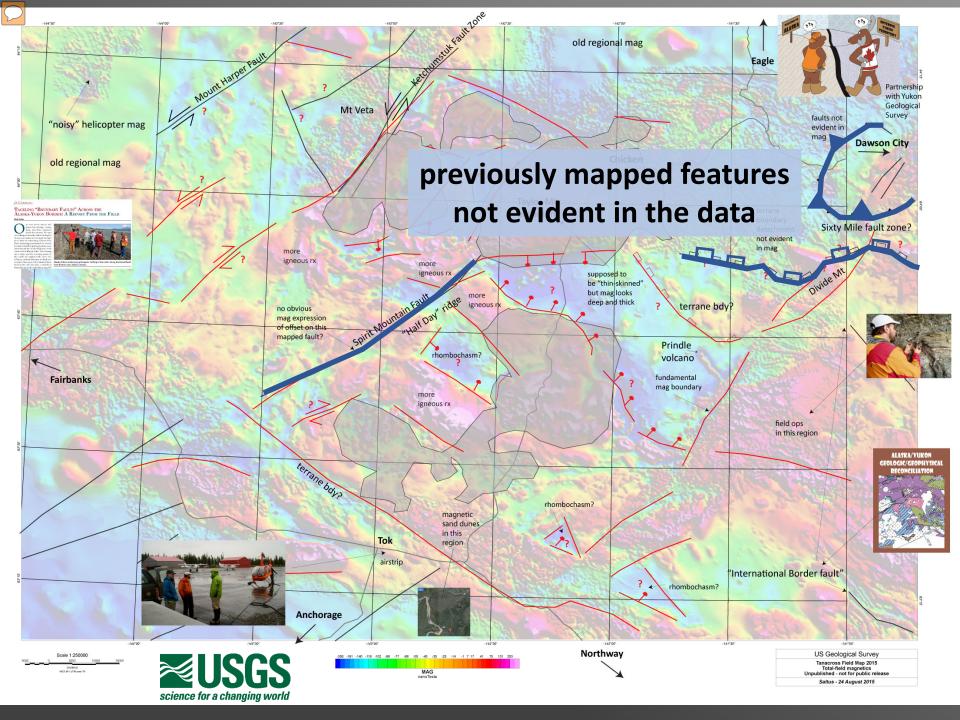


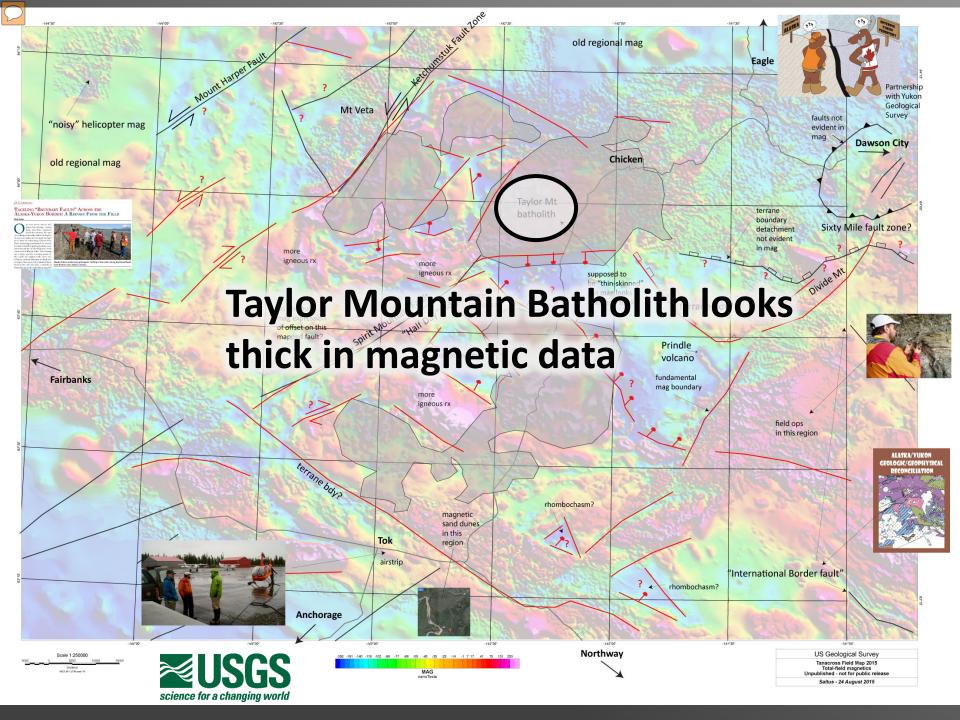




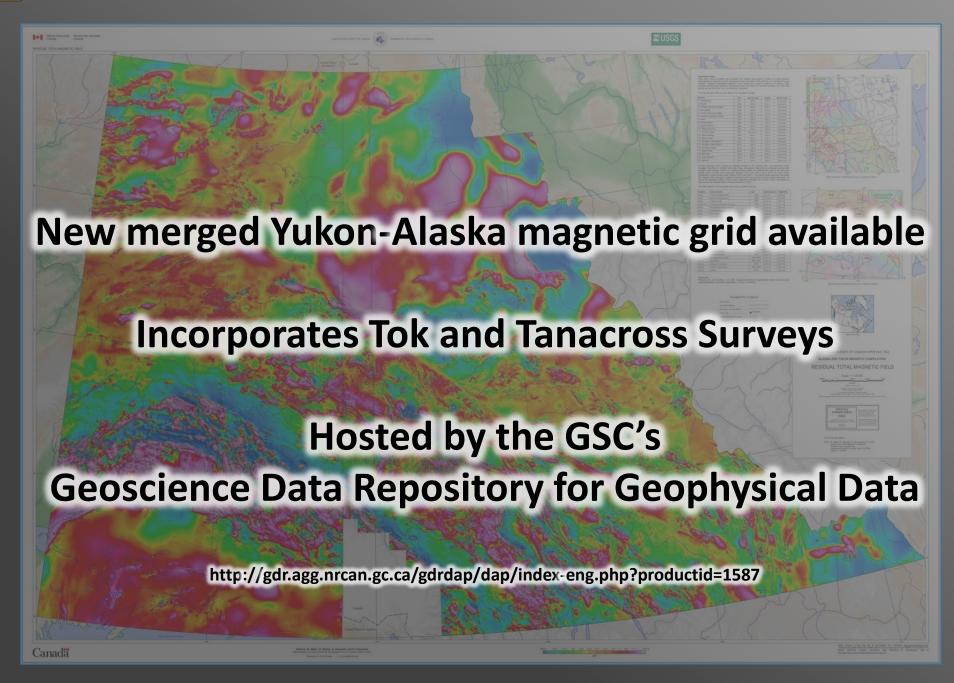


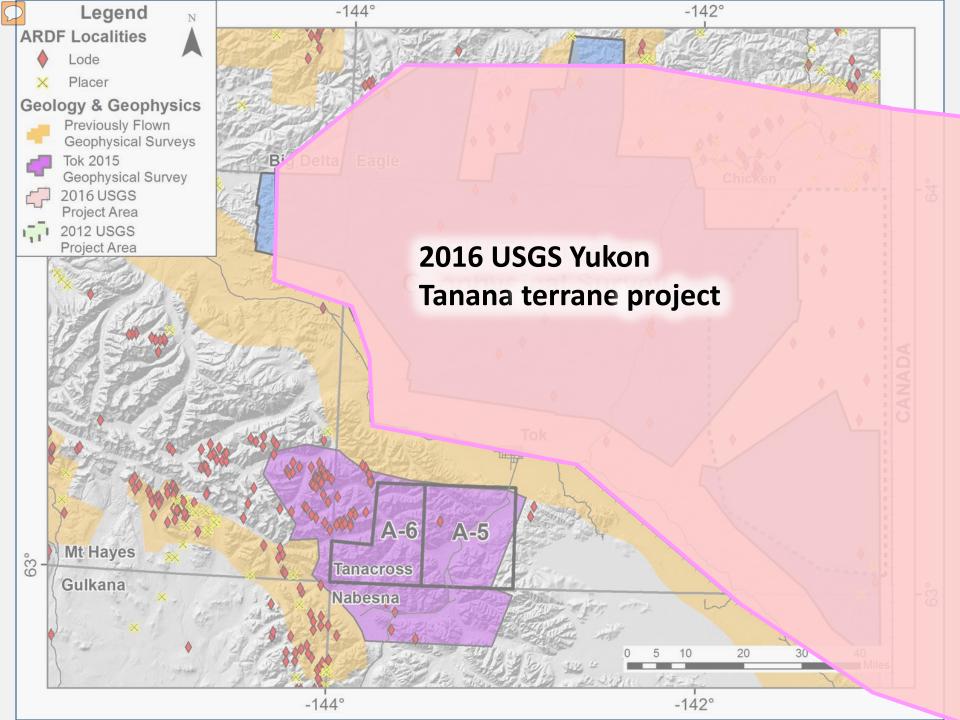




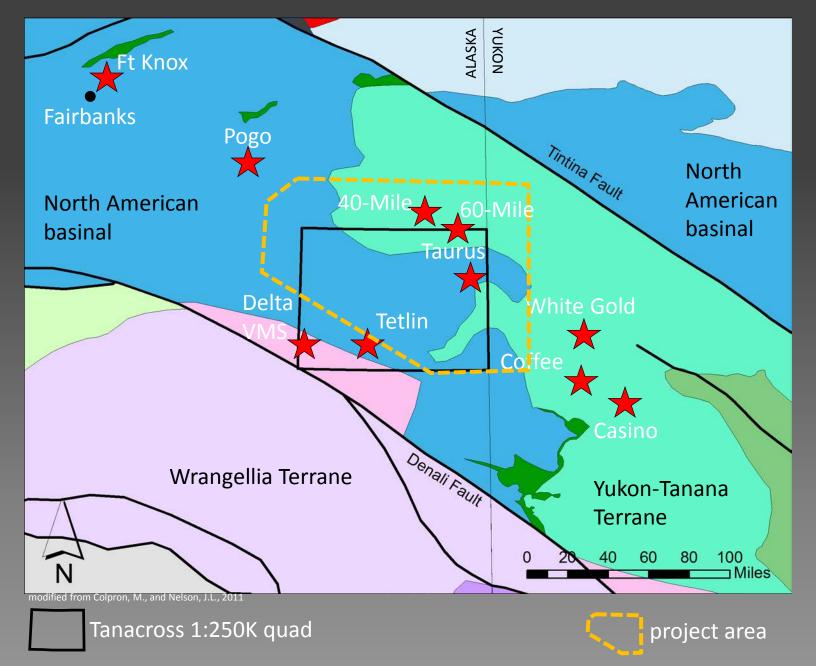








USGS FY 2016-2019 project area





Tectonic and metallogenic evolution of the eastern Yukon-Tanana upland, Alaska

- Major new field-based project funded by USGS Mineral Resources Program through August 2019
- Project leads
 - Jamey Jones (Anchorage–Geology)
 - Garth Graham (Denver–Metallogeny)
 - Rick Saltus (Denver–Geophysics)
- 12 project scientists, \$120k annual field support, \$130k annual analytical support
- collaborative Yukon Geological Survey, Geological Survey of Canada, DGGS







Key project objectives

Identify geology and structures for resource discovery

- Improve regional mapping and interpretation
- Study age, tectonic setting, and petrogenesis
- Structural controls on mineralization
- Focused studies on mineral occurrences and deposits
- Geophysical structural interpretation
- Geophysical signatures of known mineral occurrences



New Releases

Emond, A.M., Saltus, R.W., Graham, Gina, and Goldak Airborne Surveys, 2015, Airborne magnetic geophysical survey of the Tanacross region, Alaska: Alaska Division of Geological & Geophysical Surveys Geophysical Report 2015-6. doi:10.14509/29514

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Yukon-Alaska Magnetic Grid, http://gdr.agg.nrcan.gc.ca/gdrdap/dap/index-eng.php?productid=1587

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Hudson, T.L., 2003, Alaska Resource Data File; Nebesna Quadrangle, Alaska: U.S. Geological Survey Open-File Report 2003-446, 229 p.

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Related USGS and others work

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- Minsley, B.J, Kass, M.A., Bloss, B., Pastick, N., Santosh, K,P., Smith, B.D., Abraham, J.D., and Burns, L.E., 2012, A multi-scale permafrost investigation along the Alaska Highway Corridor based on airborne electromagnetic and auxiliary geophysical data; Fall AGU meeting, San Francisco. (also Symposium on Application of Geophysics to Engineering and Environmental Problems, Denver, 2013.
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² United States Geological Survey (USGS)

The Alaska Division of Geological & Geophysical Surveys (DGGS) and the U.S. Geological Survey (USGS) have been actively collecting new data in the Tanacross region. These publicly available data improve the geologic understanding of the area and aid mineral exploration. Recent, ongoing, and new projects include the DGGS Tok electromagnetic and magnetic airborne geophysical survey, DGGS Tok geologic mapping and reconnaissance, two USGS Yukon–Tanana terrane projects, and the USGS–DGGS Tanacross airborne magnetic geophysical survey. These projects are shown with Alaska Resource Data File (ARDF) localities, major towns, quadrangle boundaries, and hill-shaded elevation data in the figure below.

DGGS's AGGMI program funded Tok geophysical survey covered 989 mi² roughly 35 mi west—southwest of Tok in the Mt. Hayes, Tanacross, Gulkana, and Nabesna quadrangles. Most of the area is in the Tok mining district; a minor portion is in the Chistochina district. The survey area is bordered by two previous airborne-geophysical surveys: the 2006 Alaska Highway Corridor and 2008 Slate Creek–Slana River surveys. The area is a mixture of State- and Native-owned and Federally managed land. Data were released in spring 2015 as line, grid, and vector data and as maps, available for download (http://dggs.alaska.gov) or from the DGGS office. The data were collected to improve the geologic understanding of the area.

DGGS geologists conducted reconnaissance mapping covering the Tok geophysical survey area in 2015. Fieldwork included visiting volcanogenic massive-sulfide (VMS) deposits and prospects in the Delta Mineral Belt and investigating the potential for discovery of other prospects in the Tanacross A-5 and A-6 quadrangles. Past work indicates significant errors and omissions in published geologic mapping, particularly regarding the extension of the VMS-prospective horizons into the proposed area, as conductors in the geophysical survey would suggest. This area is an exciting place to work with a porphyry Cu–Au system at the Noah prospect, mobilization of gold along northeast-trending faults, close proximity to the actively drilled Tetlin project with porphyry-related Au–Cu–Ag skarn, and Stibnite Creek and White Gold Sb–Au–Ag orogenic Au. The proposed STATEMAP project in the area for 2016 will be guided by geochemical analyses, measured structures, and geochronology conducted this winter.

The FY2012–15 USGS Yukon–Tanana terrane project investigated whether the Permian Klondike assemblage extends into eastern Alaska and looked for evidence of Jurassic orogenic gold deposits similar to those in Yukon Territory. As currently mapped, a prominent border fault separates the Klondike assemblage in the Yukon from the Ladue River complex in Alaska. This project also funded a compilation of best available magnetic data for the region, published as Geological Survey of Canada Open File Report 7862. The project discovered a strong potential for the Klondike assemblage in eastern Alaska within dashed line in figure below similar to the type localities described near Dawson City. The Klondike in eastern Alaska is restricted to thin (~330 ft) structural panels that are volumetrically minor, represent deeper structural and metamorphic levels, and where exposed show no evidence of pervasive orogenic gold veins.

The 2015 Tanacross Airborne Magnetic Survey, funded by the USGS Mineral Resources Program and managed by DGGS, provides important new geophysical data for the exploration community and ongoing projects in the area. Total-field and gradient magnetic data covering 4,500 mi² were collected near Tok, Alaska, in the area north of the Alaska Highway from the Canada border to 30 mi east of Delta Junction. Data were released in fall 2015 as digital data and in map-based formats, available for download

(http://dggs.alaska.gov) or from the DGGS office. The Tanacross data improve the high-resolution magnetic data coverage in the Yukon–Tanana terrain and will become part of a new merged Alaska-Canada magnetic data grid.

The USGS will capitalize on the Tanacross geophysical survey with a four-year project (beginning October 2015) that is focused on the tectonic and metallogenic evolution of eastern Alaska and westernmost Yukon. The project will involve new geologic mapping and sampling across much of the northern Tanacross quadrangle and parts of the southern Eagle quadrangle. USGS and DGGS studies in eastern Alaska will lead to a better understanding of the geologic framework and metallogenic evolution of the region.

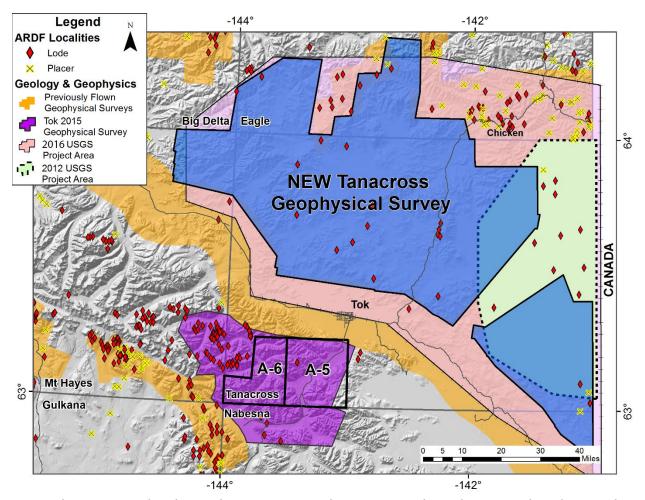


Figure description: Tok airborne electromagnetic and magnetic geophysical survey, Tok geologic study areas, Tanacross airborne magnetic survey, USGS Yukon—Tanana terrane project areas, prior DGGS airborne electromagnetic and magnetic survey, ARDF lode and placer localities, relevant 1:250,000-scale quadrangle boundaries, and hill-shaded elevation data.