A)

View looking west-southwest toward linear alignment of lakes. Arrows point along lineament. Note kettle lake terrain in the foreground.

B)

Close up view looking west-southwest along linear alignment of lakes in Photograph A. Arrows point along lineament.

C)

View looking south across strong vegetation lineament associated with a ~2-meter-high linear ridge. Note that topographic expression of ridge abruptly dies out and does not continue to the west.

D)

View looking northeast along south side of vegetation lineament and ~2-meter-high linear ridge shown in Photograph C. Positive feedback of vegetation growth and organic matter accumulation on the linear ridge may accentuate the apparent relief of the ridge.

FUGRO Date 10/18/13	STATE OF ALASKA ALASKA ENERGY AUTHORITY ALASKA ENERGY AUTHORITY	SUSITNA-WATANA HYDROELECTRIC PROJECT LINEAMENT GROUP 27 PHOTOGRAPHS	FIGURE A27-3.2

6995000 350000 7000000 355000 7005000 360000 7010000 365000 7015000 370000 7020000 375000 7025000 380000 7030000 385000 7035000

7035000 390000 7030000 395000 7025000 400000 7020000 405000

70-km radius

West Fork Chulitna River

Middle Fork Chulitna River

East Fork Chulitna River

location of downhill ground traverse

BP1 BP2 BP3 BP4

Gold Creek

Honolulu Creek

3a 5 2

Explanation

Demali fault, moderately constrained (Koehler et al., 2012)

Faults from Clautice et al., 2001

Fault, solid line where certain, dashed where inferred

Thrust fault, certain, triangles on downthrown side

Lineaments Mapped by FCL (this study)

1 -8
10
77
88

See Figure A0.3 for explanation of numbered attributes for mapped lineaments

Lineament group mapped for this study coinciding with previously mapped fault or lineament

No previously mapped fault or lineament coincides with lineament group

Area with bedrock offset

Geologic Units

Unconsolidated Deposits

Alluvial Deposits

- Qa — Undifferentiated stream alluvium
- Qac — Abandoned-channel deposits
- Qaf — Alluvial fan deposits
- Qat — Terrace alluvium
- Qfp — Floodplain alluvium

Colluvial Deposits

- Qc — Undifferentiated colluvium
- Qcl — Landslide deposits
- Qct — Talus and rubble deposits
- Qrg — Rock-glacier deposits

Paludal Deposits

- Qs — Swamp deposits

Glacial Deposits

- Qao — Outwash alluvium
- Qt2 — Till of latest Holocene age
- Qt1 — Till of early to middle Holocene age
- Qd — Drift of late Wisconsin age
- Qg — Glacial ice

Sedimentary and Volcanic Rocks

Tertiary Deposits

- Ts — Gravel and sand

Cretaceous to Triassic Rocks

- Kms — Argillite and minor sandstone
- Kss — Sandstone and minor argillite
- Ksa — Sandstone and argillite

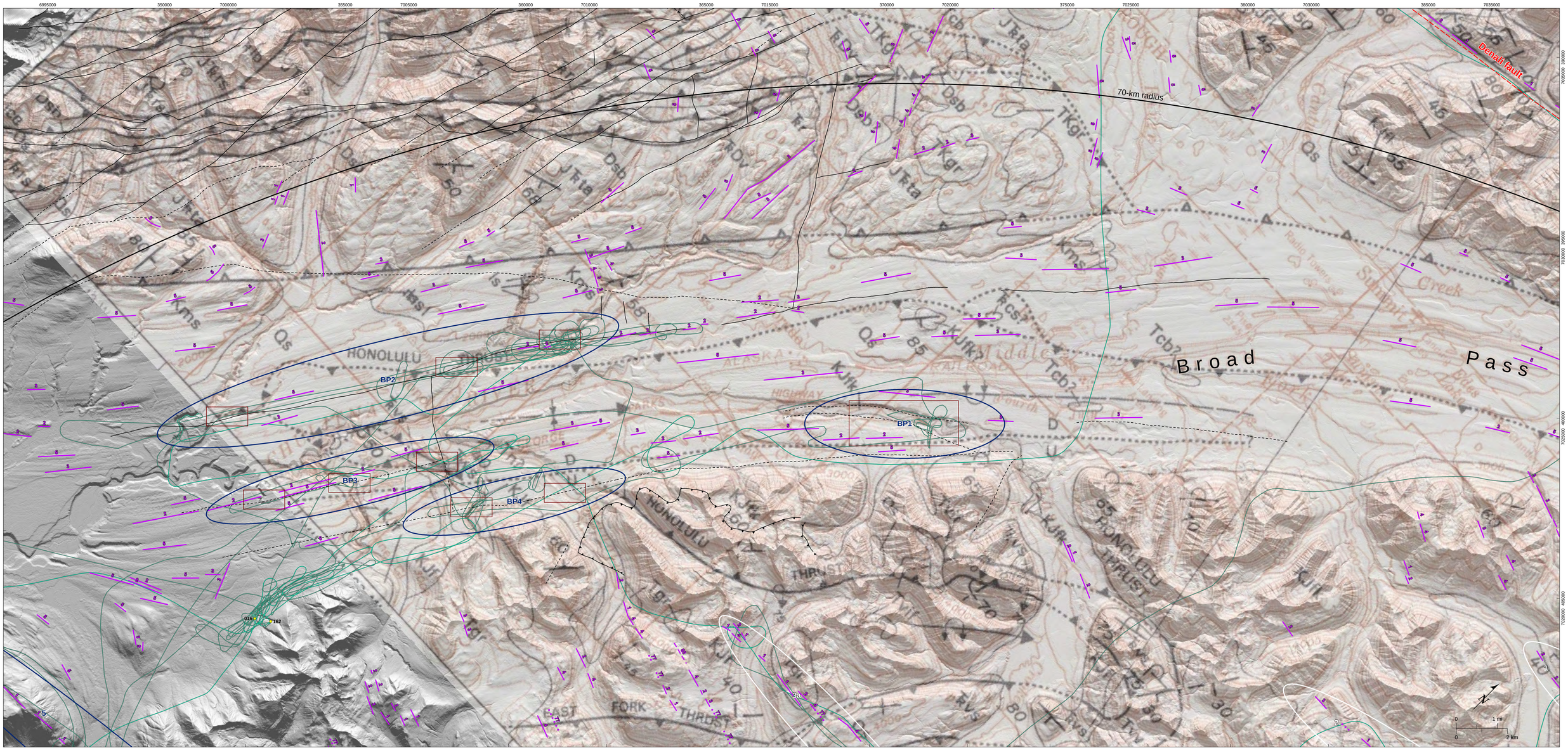
Upper Paleozic Rocks

- DSTs — Chert, cherty tuff, graywacke, and argillite

Note: Geologic units from DGGS RI 2001-1B, Clautice, 2001.

Only Quaternary units, and those offset by faults are listed; for a full explanation, see Clautice et al., 2001.

0 1 mi
0 2 km



0 1 mi
0 2 km

Notes: 1. See Figures A0.2, A0.3, A0.4, and A0.5 for explanation.
2. Data frames have been rotated 45° west of north.
3. Geologic map by Clautice et al., 2001 (top), geologic map by Csejtey et al., 1961 (bottom).
4. Coordinates on NAD83 UTM Zone 6 North meters.
5. Elevation from INSAR data.

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STATE OF ALASKA
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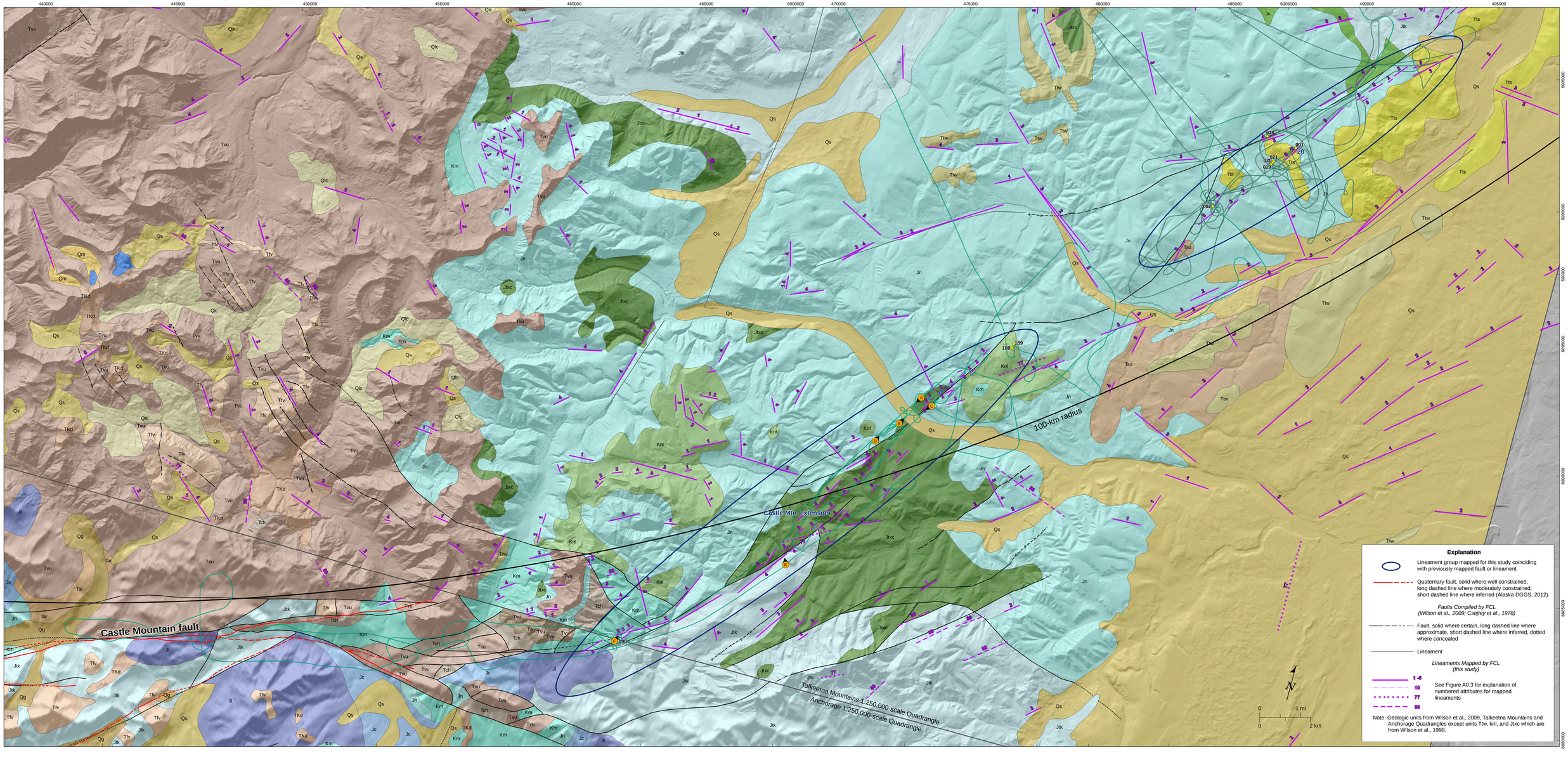
SUSITNA-WATANA HYDROELECTRIC PROJECT

Broad Pass Area

Plate A-BP

P:_219000_Alaska_Rail\tech\2109_Lineament Report October 2013_rvsd\fig\101.09.14



Notes: 1. See Figures A0.2, A0.3, A0.4, and A0.5 for explanation.
2. Data frames have been rotated 15° east of north.
3. Geology by Wilson et al., 2009
4. Coordinates on NAD83 UTM Zone 6 North meters.
5. Elevation from INSAR data and USGS SRTM data.

TUGRO
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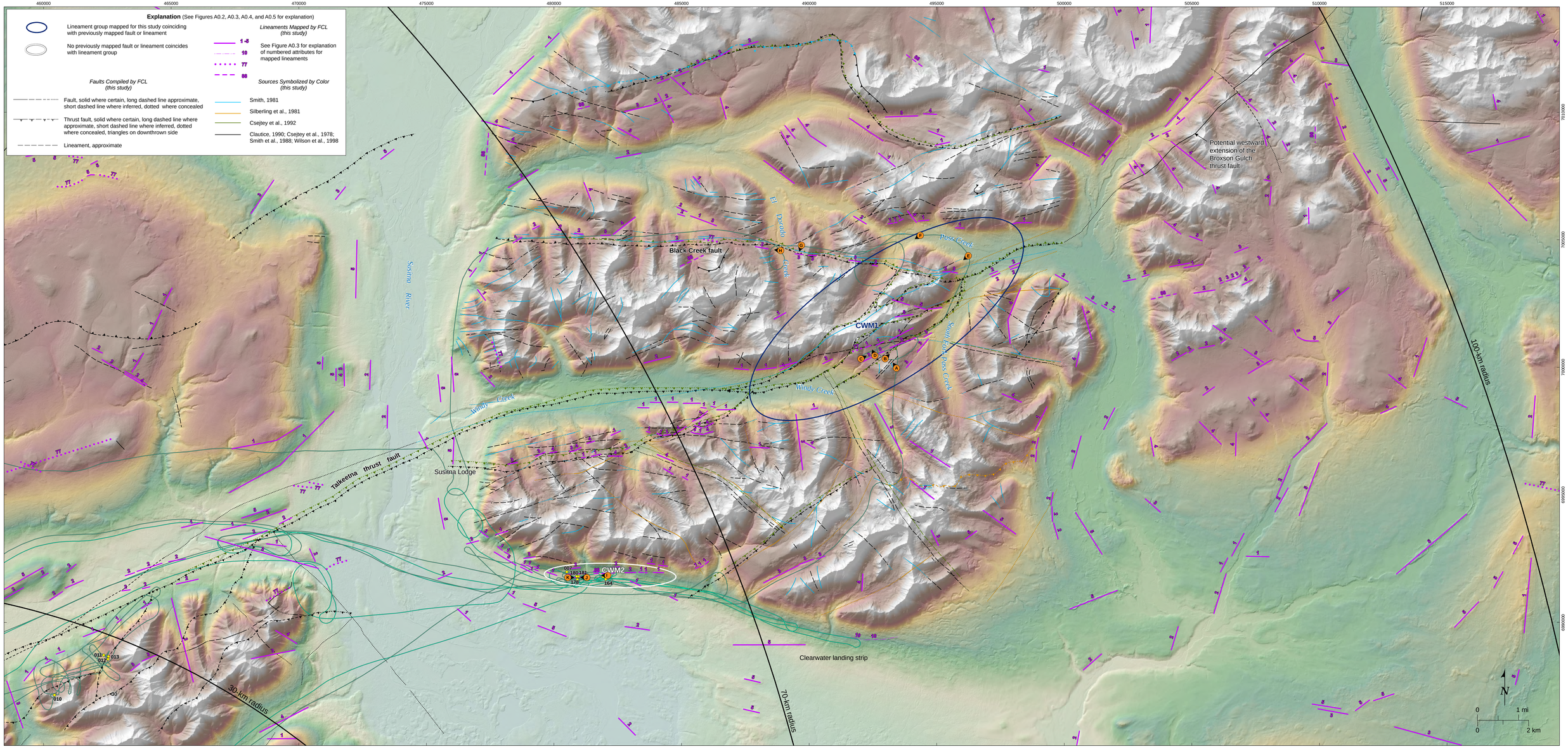
SUSITNA-WATANA HYDROELECTRIC PROJECT

Castle Mountain Extension Area

Plate A-CME

79_219000_Alaska_Railbelt\219R_Lineament Report\October 2013_rev\Rev1-01.04.14



Notes: 1. See Figures A0.2, A0.3, A0.4, and A0.5 for explanation.
2. Coordinates in NAD83 UTM Zone 6 North meters.
3. Elevation from INSAR data

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STATE OF ALASKA
ALASKA ENERGY AUTHORITY

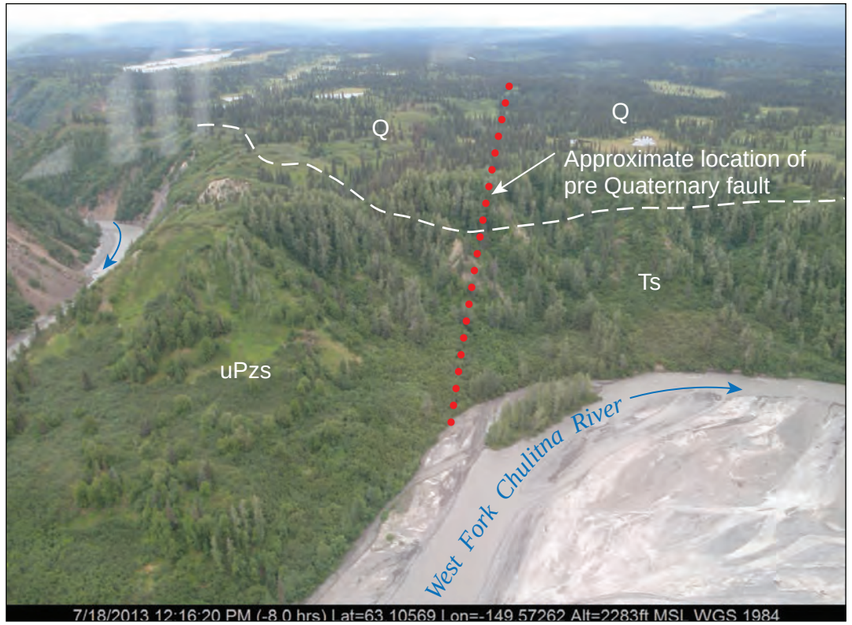
SUSITNA-WATANA HYDROELECTRIC PROJECT

Clearwater Mountains Area

Plate A-CWM

79_218000_Alaska_Plate#2189_Lineament Report October 2013, modified 01.06.14

A)

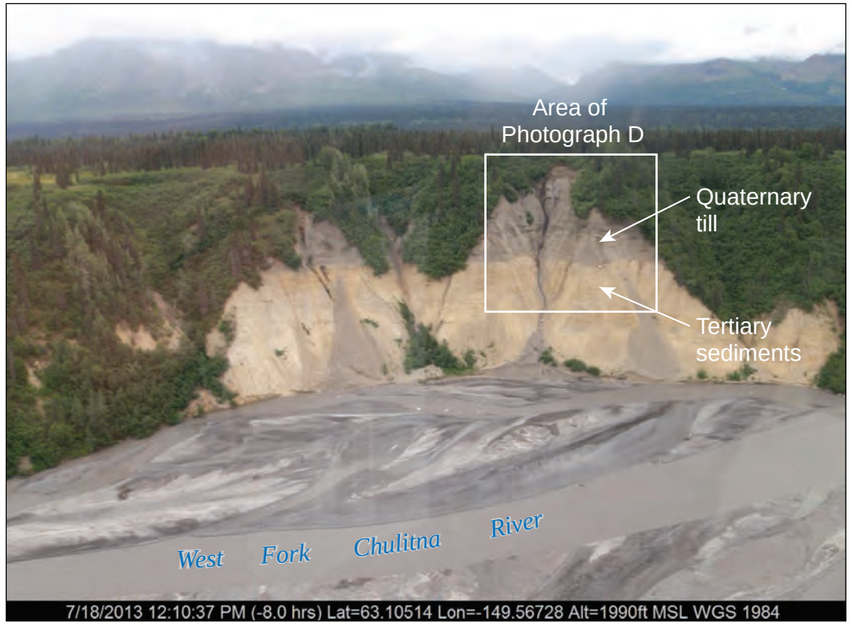


View looking north at location where mapped fault would traverse across Quaternary sediments.

B)

View looking north (upstream) along the West Fork Chulitna River valley at exposures described in text and photographs below.

C)



View looking west at exposure along east bank of the West Fork Chulitna River demonstrating Quaternary till overlying Tertiary fluvial sediments.

D)

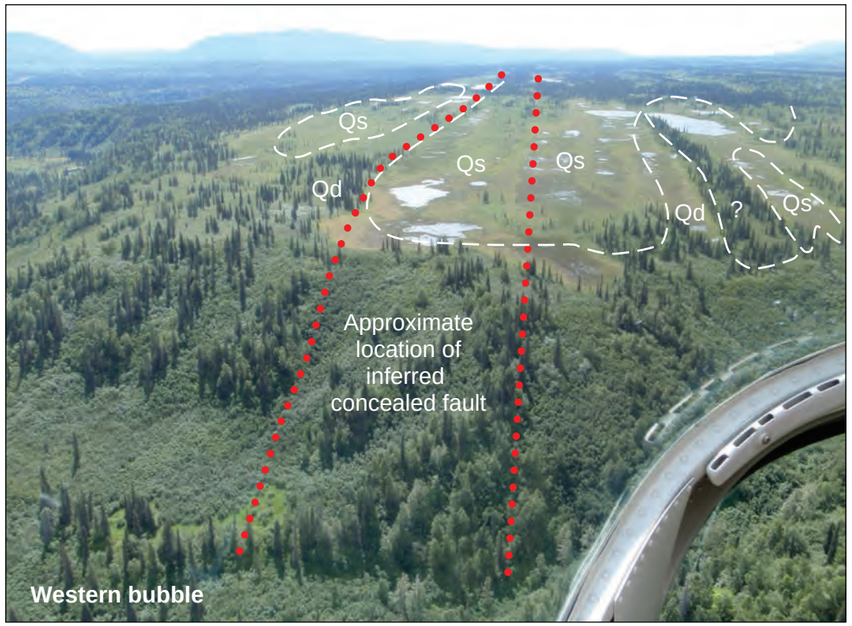
Close up view of exposure shown in Photograph C. Basal contact between overlying till and underlying fluvial deposits appears to be sub-horizontal.

FUGRO Date 10/18/13	STATE OF ALASKA ALASKA ENERGY AUTHORITY ALASKA ENERGY AUTHORITY	SUSITNA-WATANA HYDROELECTRIC PROJECT BROAD PASS AREA PHOTOGRAPHS	FIGURE A-BP.1

E)

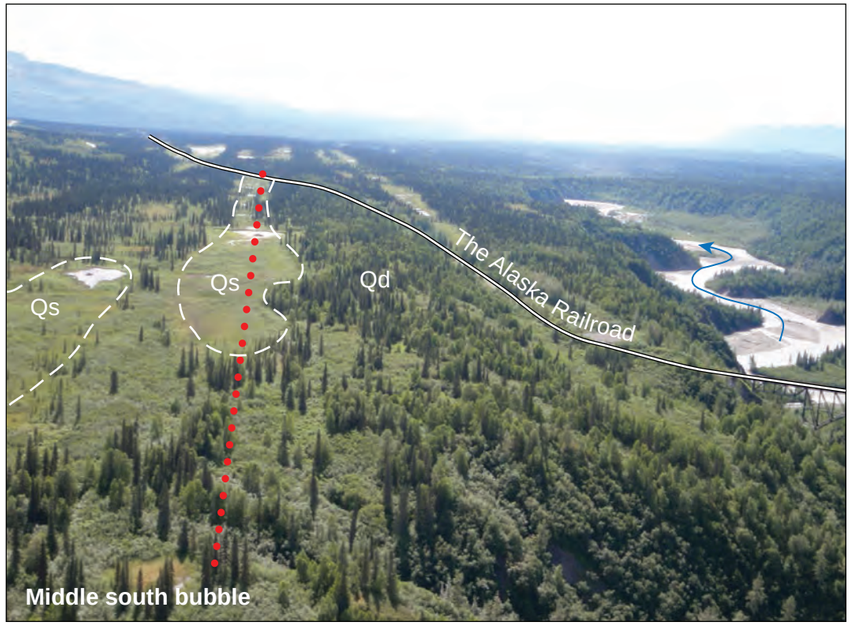
View looking northeast at subhorizontal contact between till and Tertiary sediments.

F)



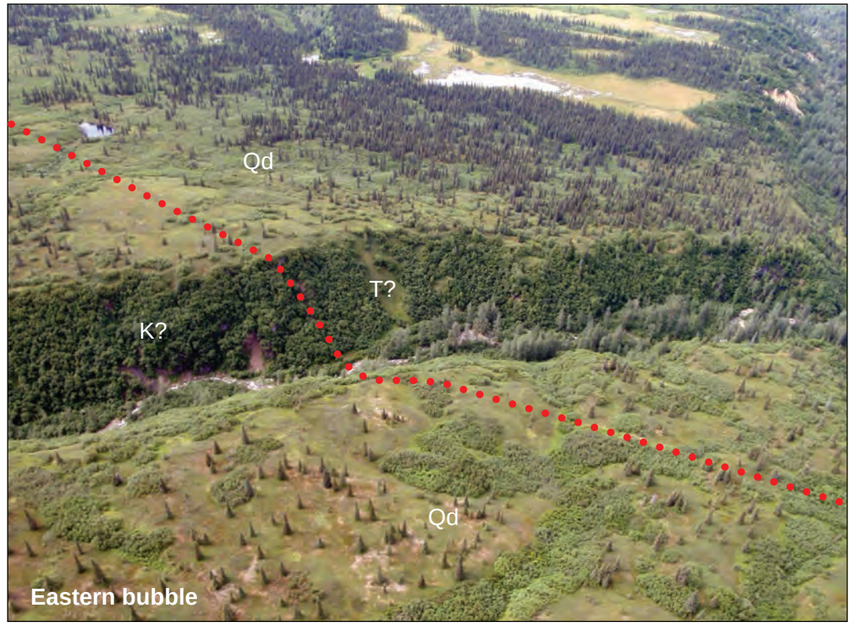
View looking south along Quaternary surface directly south of river valley. Marshy Quaternary sediments show no evidence of deformation or offset.

G)



View looking south at location where inferred fault would traverse east of railroad tracks. Fault is mapped as juxtaposing Triassic and Cretaceous rocks outcropping in creek behind photograph. No evidence of faulting in Quaternary deposits.

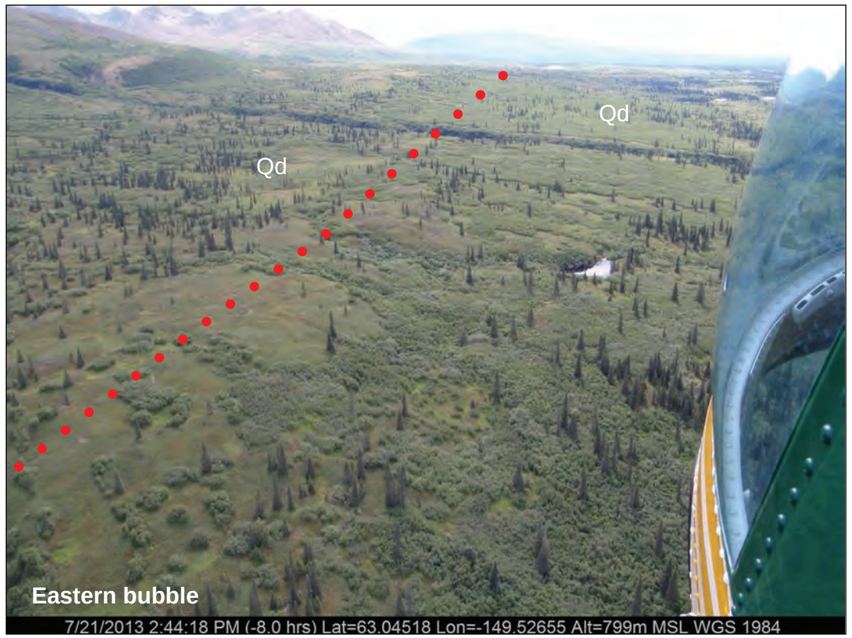
H)



View looking west at creek exposure along projection of mapped fault that depicts Cretaceous/Tertiary juxtapostion. Undisturbed surfaces support absence of Quaternary faulting.

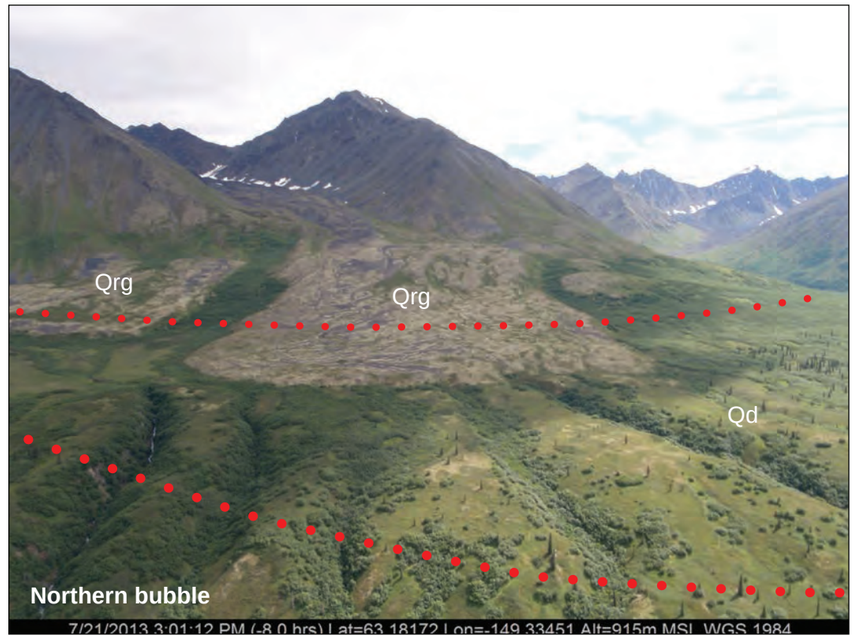
FUGRO Date 10/18/13	STATE OF ALASKA ALASKA ENERGY AUTHORITY ALASKA ENERGY AUTHORITY	SUSITNA-WATANA HYDROELECTRIC PROJECT BROAD PASS AREA PHOTOGRAPHS	FIGURE A-BP.2

I)



View looking west at creek exposure shown in Photograph H, Figure A-BP.2, showing morphology of Quaternary deposits along strike.

J)



View looking east at uninterrupted interfluves in dissected Quaternary glacial drift along with the mapped fault projects. Undisturbed surfaces support absence of Quaternary faulting.

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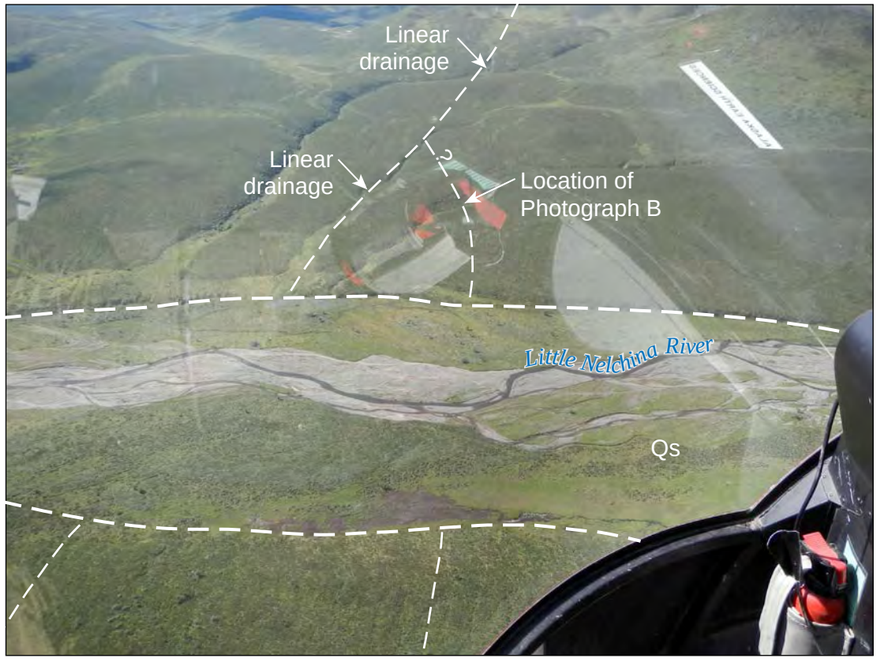
SUSITNA-WATANA HYDROELECTRIC PROJECT

BROAD PASS AREA
PHOTOGRAPHS

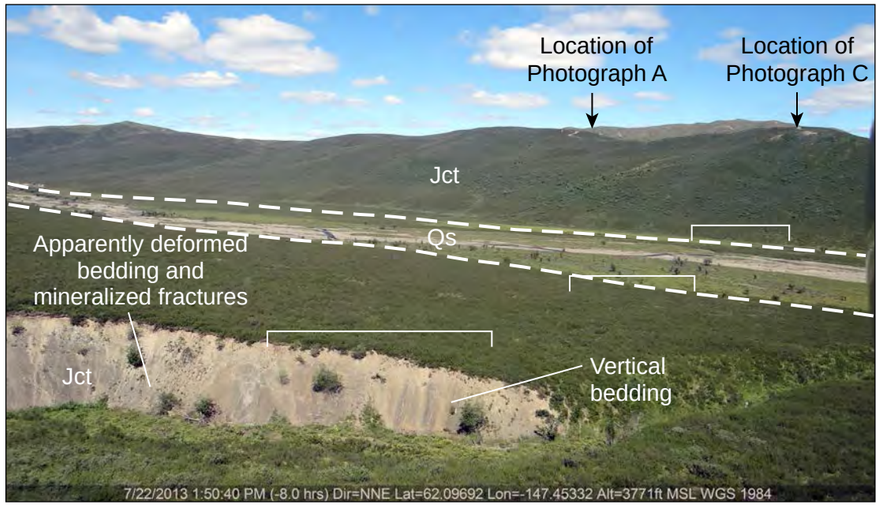
FIGURE
A-BP.3

A)



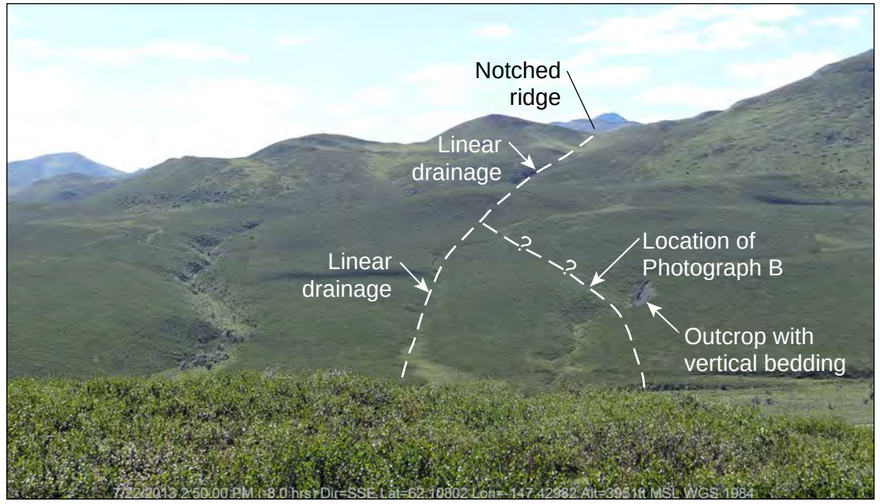
View looking southwest from location A, nearly along-strike with Csejtey et al. (1978) mapped faults. Note clear expression of linear features on bedrock landscape and absence of linear expression in Quaternary deposits.

B)



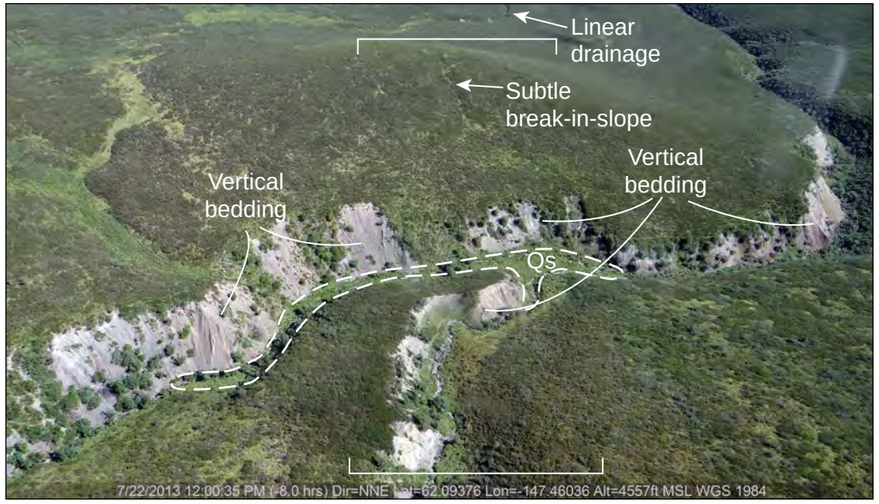
View looking northeast from location B nearly along-strike with Csejtey et al. (1978) mapped fault. The mapped fault segment projects through the vertical beds observed in the outcrop towards photograph location C. Note apparent undeformed hillslope and Quaternary deposits over projected trace of fault.

C)



View looking southwest from location C. Note alignment of features over mapped trace of fault.

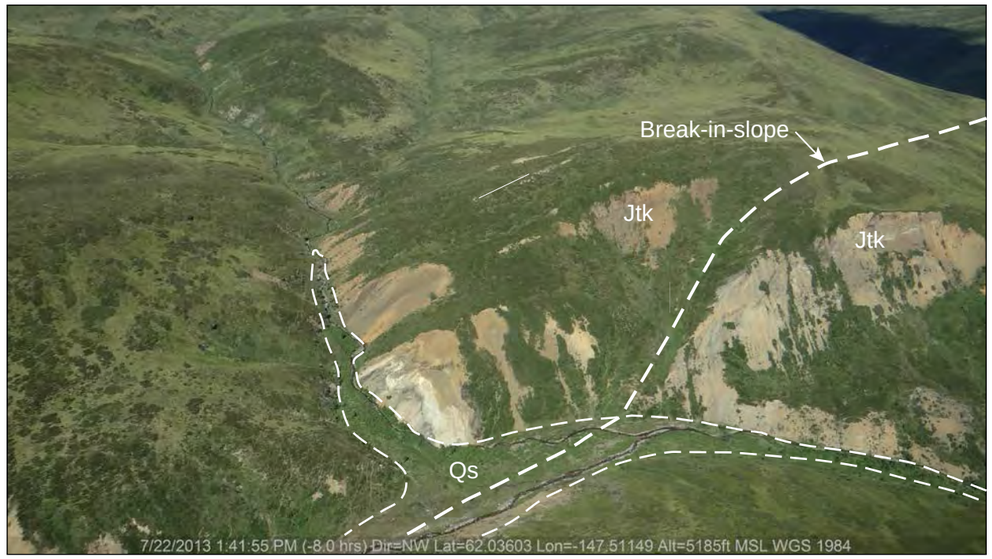
D)



View looking northeast from location D along-strike with a Csejtey et al. (1978) mapped fault. A wide zone of deformation is expressed as vertical bedding exposed in outcrops. Note alignment of the break-in-slope on ridge crest, linear drainage, and the deformation zone.

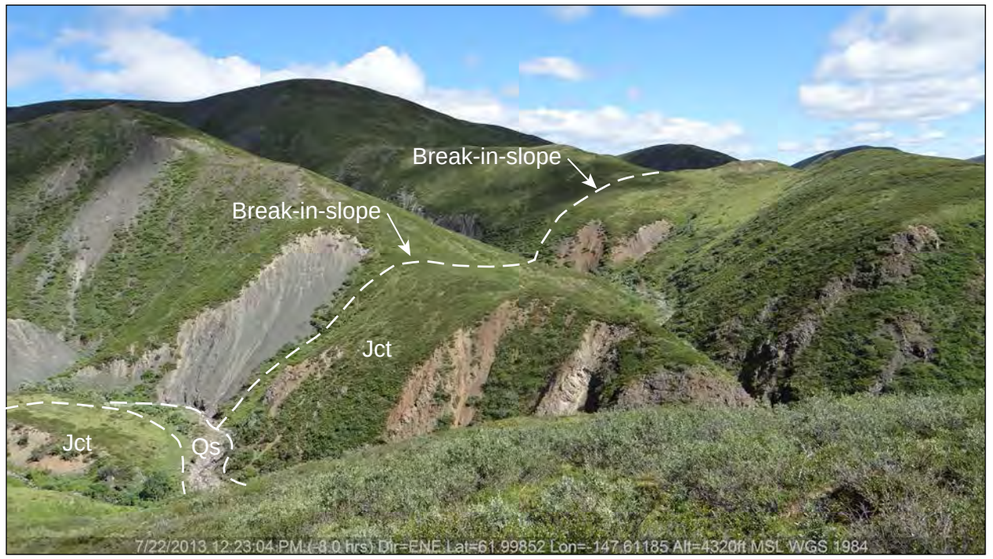
FUGRO Date 10/18/13	STATE OF ALASKA ALASKA ENERGY AUTHORITY ALASKA ENERGY AUTHORITY	SUSITNA-WATANA HYDROELECTRIC PROJECT CASTLE MOUNTAIN EXTENSION AREA PHOTOGRAPHS	FIGURE A-CME.1

E)



View looking northwest from location E at faulted Jurassic units. The fault occupies the linear valley then climbs the hill-slope where it correlates with a clear break-in-slope on the ridge crest.

F)



View looking north-northeast from location F. The fault juxtaposes Cretaceous against Jurassic bedrock and coincides with a break-in-slope on each ridge crest.

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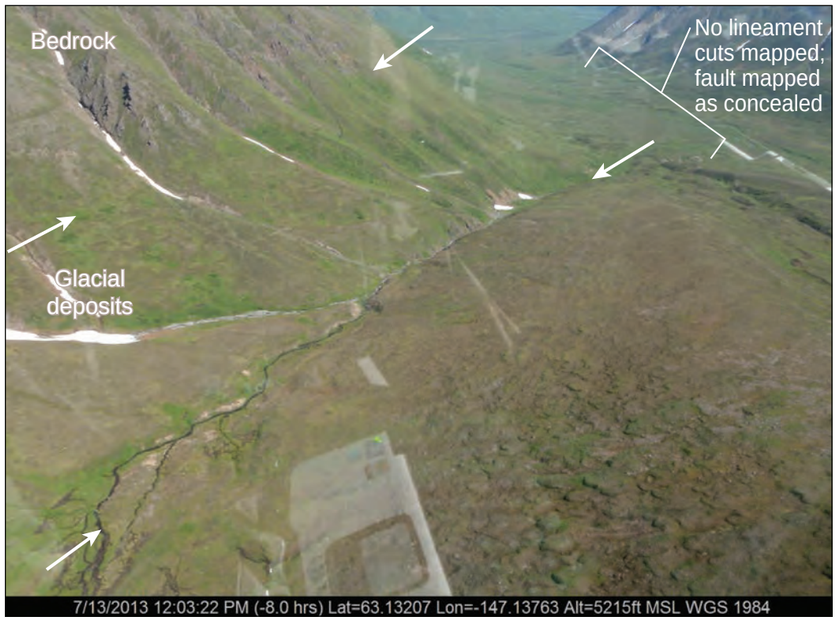
FUGRO Date 10/18/13	STATE OF ALASKA ALASKA ENERGY AUTHORITY ALASKA ENERGY AUTHORITY	SUSITNA-WATANA HYDROELECTRIC PROJECT CASTLE MOUNTAIN EXTENSION AREA PHOTOGRAPHS	FIGURE A-CME.2

A)

View looking northwest at mine site located along apparent rock type contrast and mapped fault. Arrows point along mapped fault.

B)



View looking northeast along linear drainage mapped as a lineament by FCL that coincides with a mapped fault. Another FCL-mapped lineament lies at the subtle break-in-slope and may correspond to the ice limit elevation.

C)

View looking northeast through the broad saddle at the head of the linear drainage shown in Photograph B. Note the absence of any tectonic geomorphic features.

D)

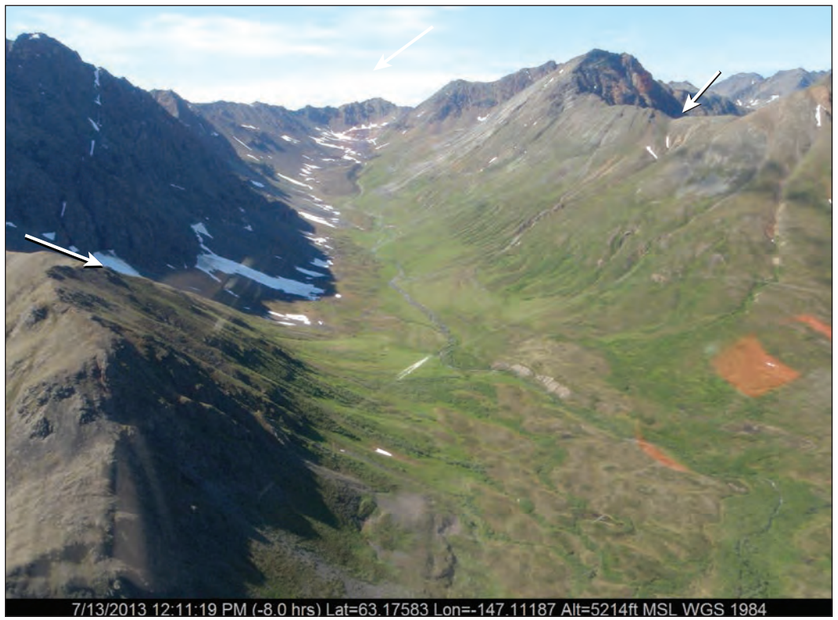
View looking northwest at location of FCL-mapped lineaments and mining roads partly shown in Photograph C. Note that FCL-mapped lineaments on the sidehill are not readily apparent and correspond to subtle break-in-slope like that shown in Photograph B.

FUGRO Date 10/18/13	STATE OF ALASKA ALASKA ENERGY AUTHORITY ALASKA ENERGY AUTHORITY	SUSITNA-WATANA HYDROELECTRIC PROJECT CLEARWATER MOUNTAINS AREA PHOTOGRAPHS	FIGURE A-CWM.1

E)

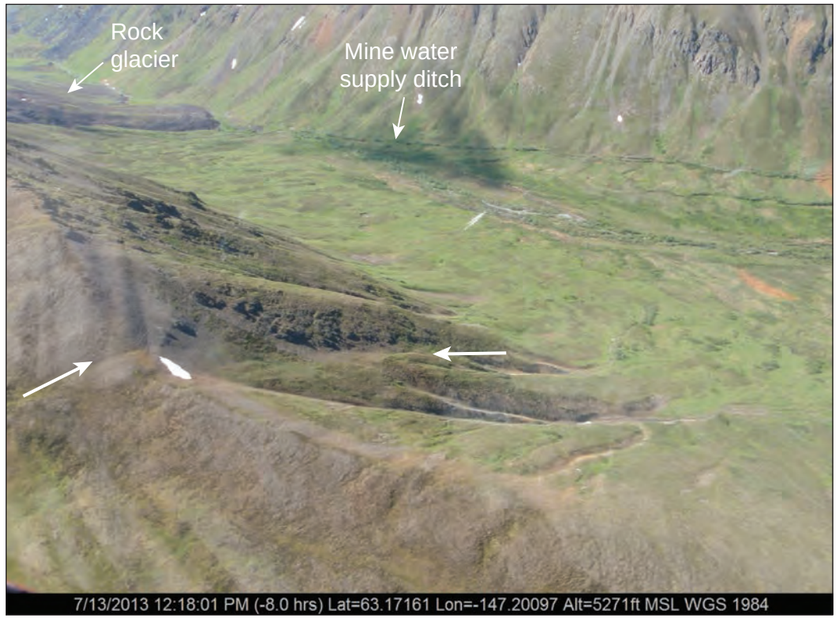
View looking southwest at several rock type contrasts (shown by arrows) that coincide with previously mapped faults.

F)



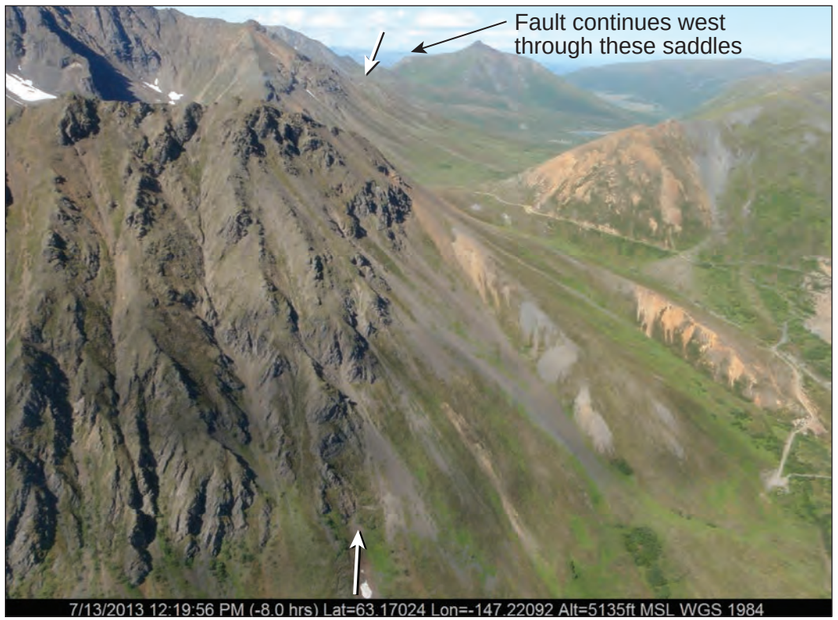
View looking south-southwest up glaciated valley that shows no expression of the mapped Black Creek fault that is present in adjacent bedrock ridges.

G)



View looking southwest across an FCL-mappped lineament that corresponds to the trace of mapped Black Creek fault marked by a rock contrast. Note that no expression of faulting exists along trend in the glacial sediments of the valley floor.

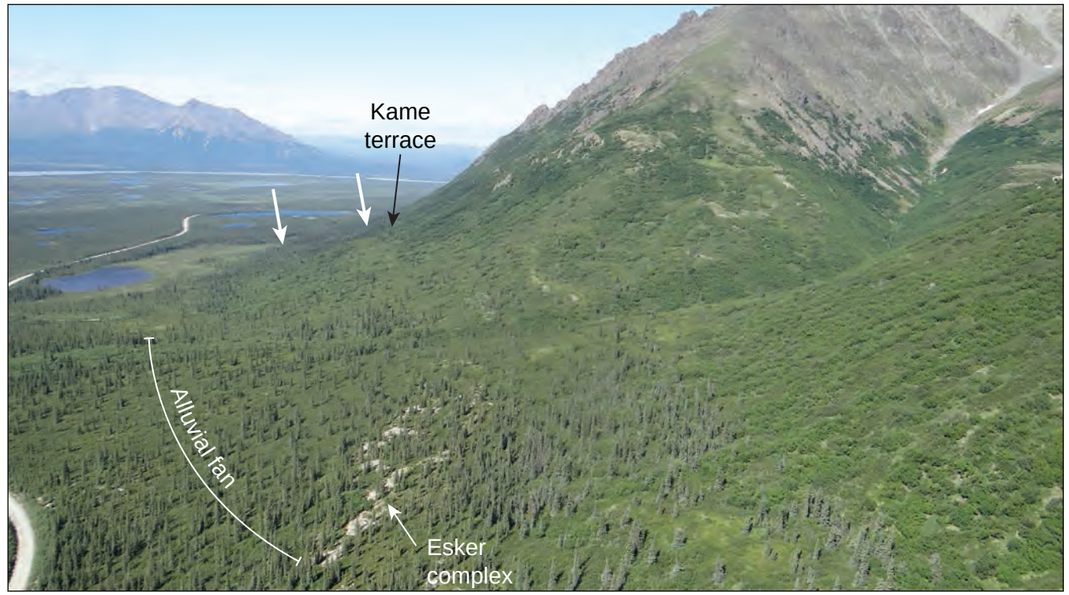
H)



View looking west along the Black Creek fault. Note the obvious rock type contrast across the fault. Aerial reconnaissance confirmed the presence of the fault in bedrock ridges to the west and the lack of expression in glacial sediments in adjacent valley bottoms.

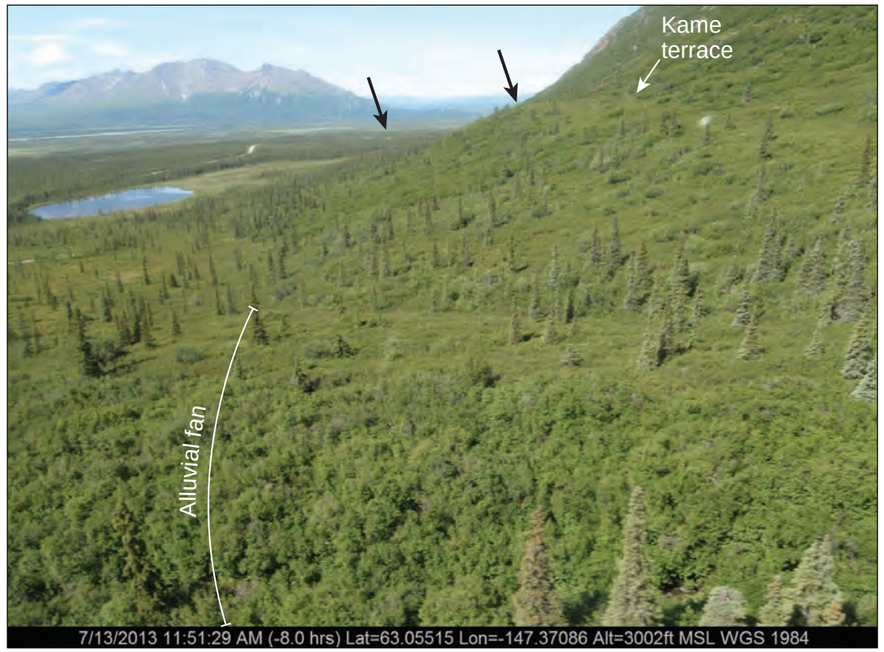
FUGRO Date 10/18/13	STATE OF ALASKA ALASKA ENERGY AUTHORITY ALASKA ENERGY AUTHORITY	SUSITNA-WATANA HYDROELECTRIC PROJECT CLEARWATER MOUNTAINS AREA PHOTOGRAPHS	FIGURE A-CWM.2

I)



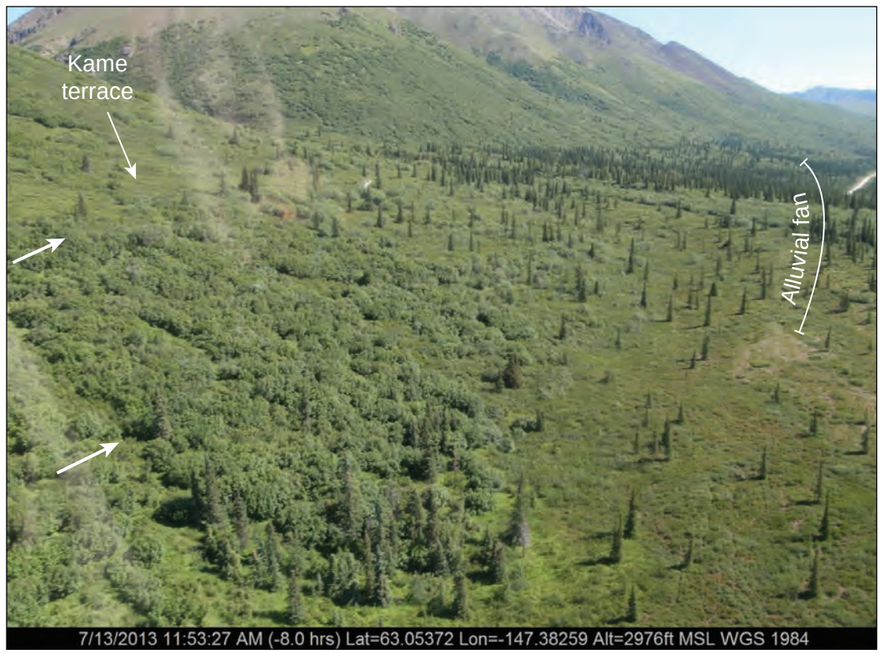
Overview looking west along mapped FCL-mapped lineaments that coincide with left-lateral moraines and kame terraces. The lineaments are interrupted by an alluvial fan and esker complex. Large arrows point along the mapped lineaments.

J)



Close-up view looking west along FCL-mapped lineaments.

K)



Close-up view looking east along FCL-mapped lineaments.

FUGRO Date 10/18/13	STATE OF ALASKA ALASKA ENERGY AUTHORITY ALASKA ENERGY AUTHORITY	SUSITNA-WATANA HYDROELECTRIC PROJECT CLEARWATER MOUNTAINS AREA PHOTOGRAPHS	FIGURE A-CWM.3

Appendix B:
Strip Maps and Photographic Documentation of Lineament Data for Lineaments Mapped by Reger et al. (1990)

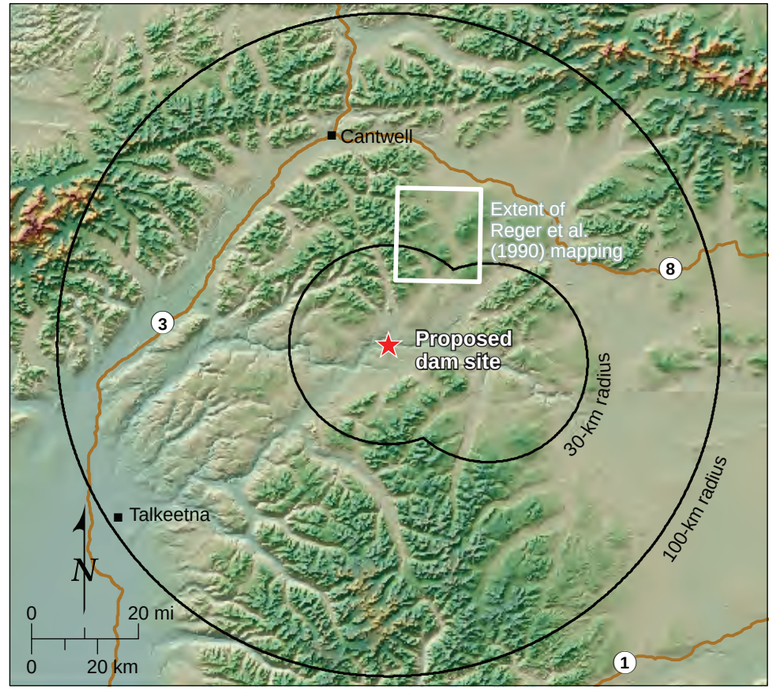
Explanation

- (1) Feature ID
- GPS track
- 21a — No previously mapped fault or lineament coincides with lineament group

Features (Reger et al., 1990)

- Photo lineament
- Fault (dashed where inferred)

Feature Number	Appendix B Figure Number
1	B-02
2	B-03
3	B-04
4	B-05
5	B-05
6	B-06
7	B-07a, B-07b
8	B-07a, B-07b
9	B-08
10	B-09a, B-09b
11	B-10
12	B-10
13	B-11a
14	B-11a
15	B-11a, B-11b
16	B-11a, B-11b
17	B-12a
18	B-12a, B-12b
19	B-12a, B-12b
20	B-12a, B-12b
21	B-13
22	B-14a, B-14b
23	B-14a, B-14b
24	B-15
25	B-15
26	B-16
27	B-16
28	B-17



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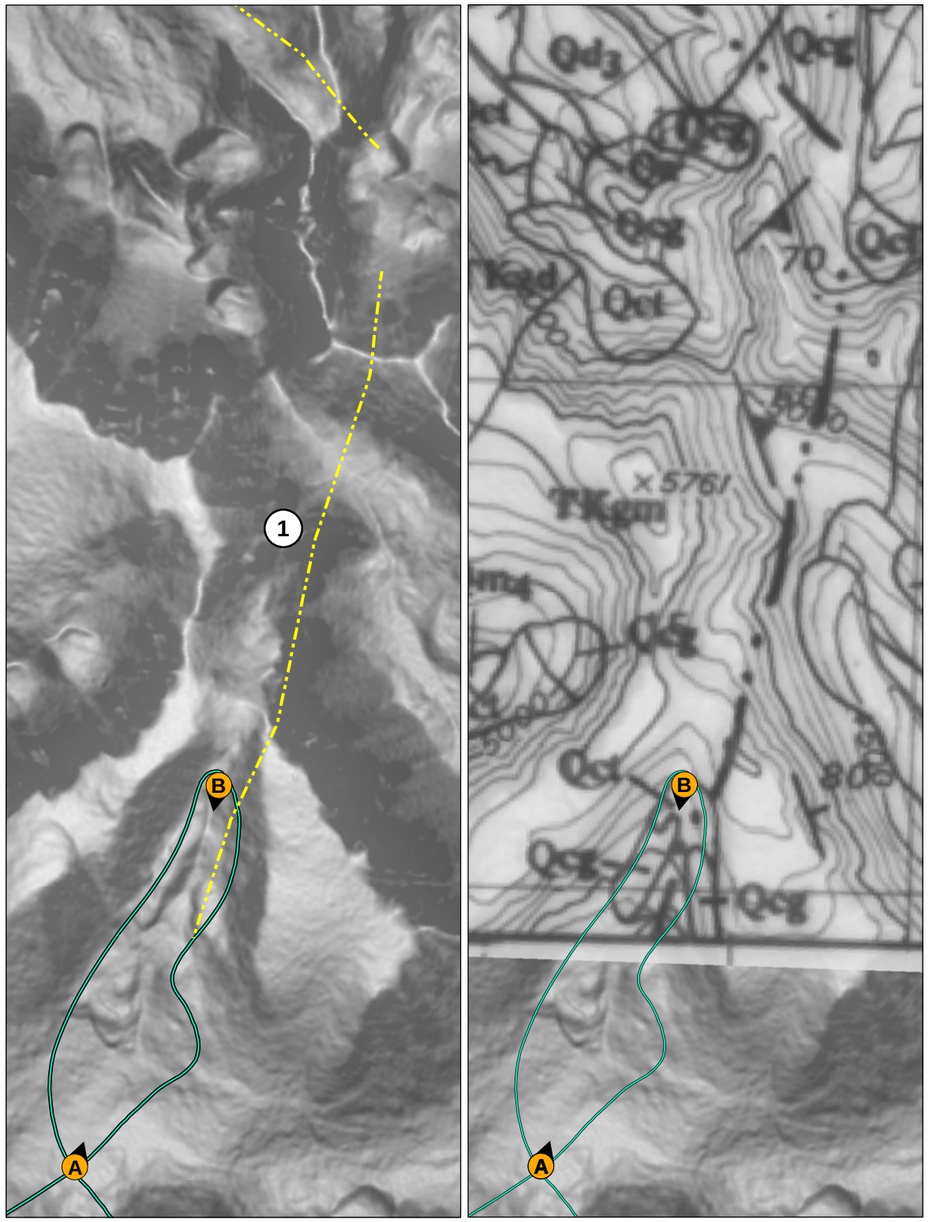
FUGRO Date 12/19/13	STATE OF ALASKA ALASKA ENERGY AUTHORITY	SUSITNA-WATANA HYDROELECTRIC PROJECT LINEAMENTS REGER ET AL. (1990)	FIGURE B-01



N

0 0.25 0.5 mi

0 0.25 0.5 km

A)

View looking northeast from location A. Arrows show location of mapped trace of lineament.

B)

View looking southwest from location B. Arrows show the location of lineament. Note the semi-linear and lobate toe of talus deposit.

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FUGRO

Date 10/18/13

STATE OF ALASKA
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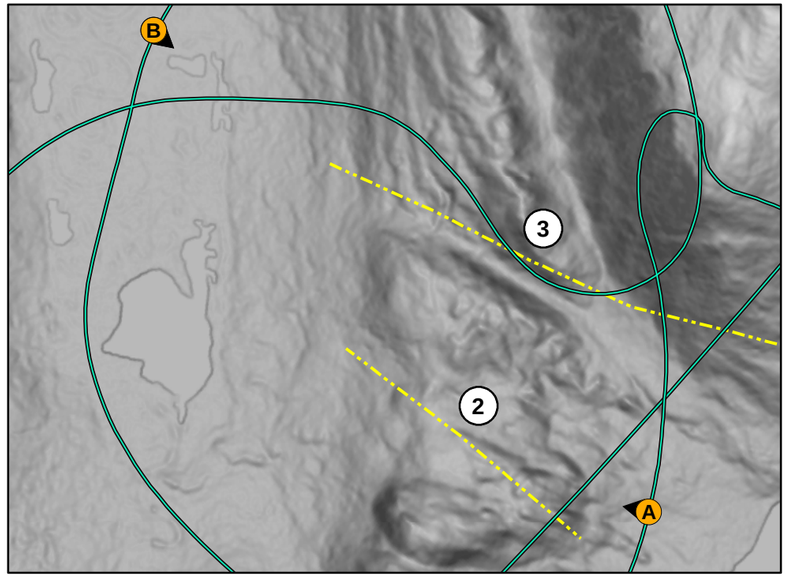
SUSITNA-WATANA HYDROELECTRIC PROJECT

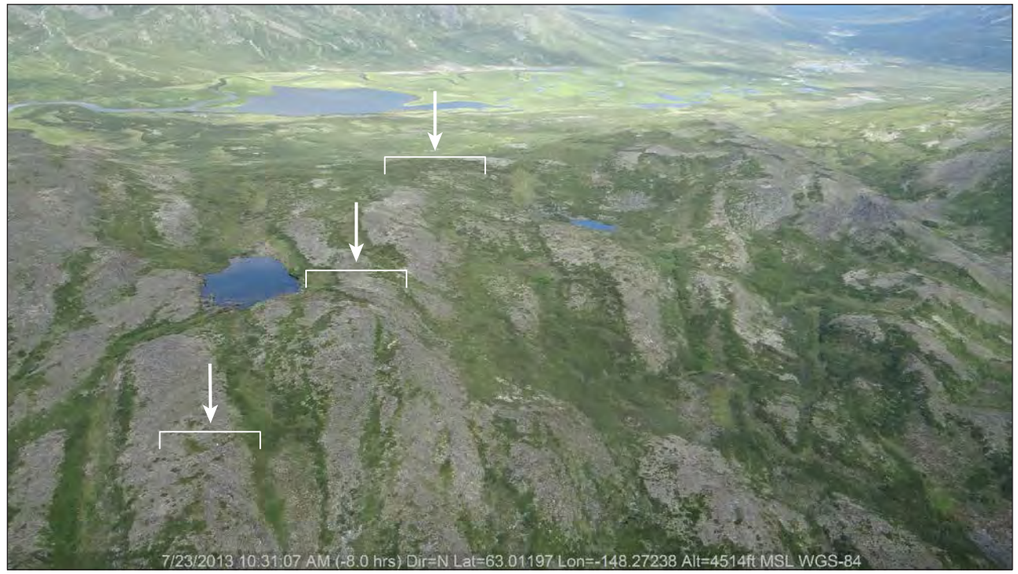
FEATURE 1
LINEAMENTS ANALYSIS
REGER ET AL. (1990)

FIGURE

B-02

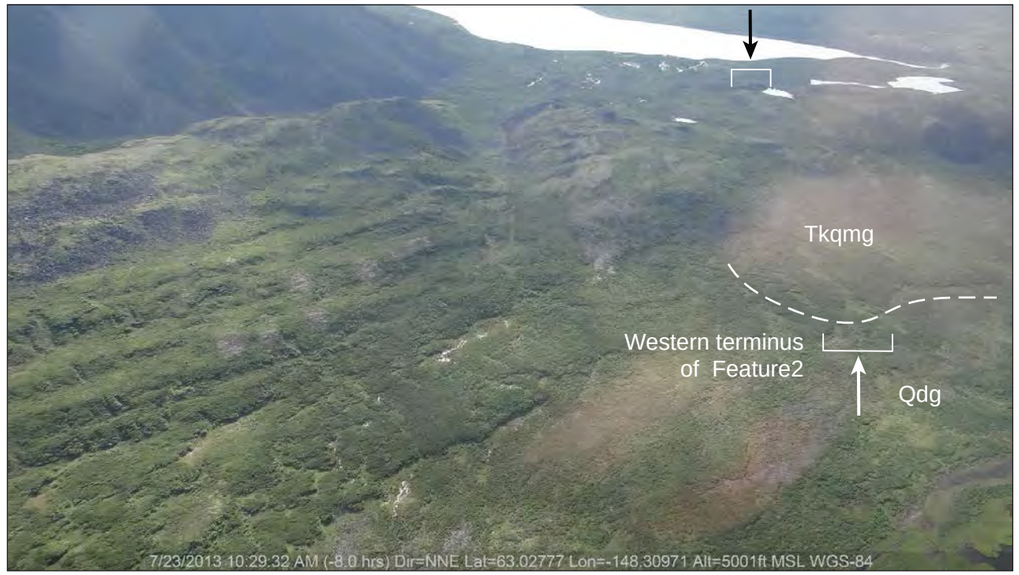


A)



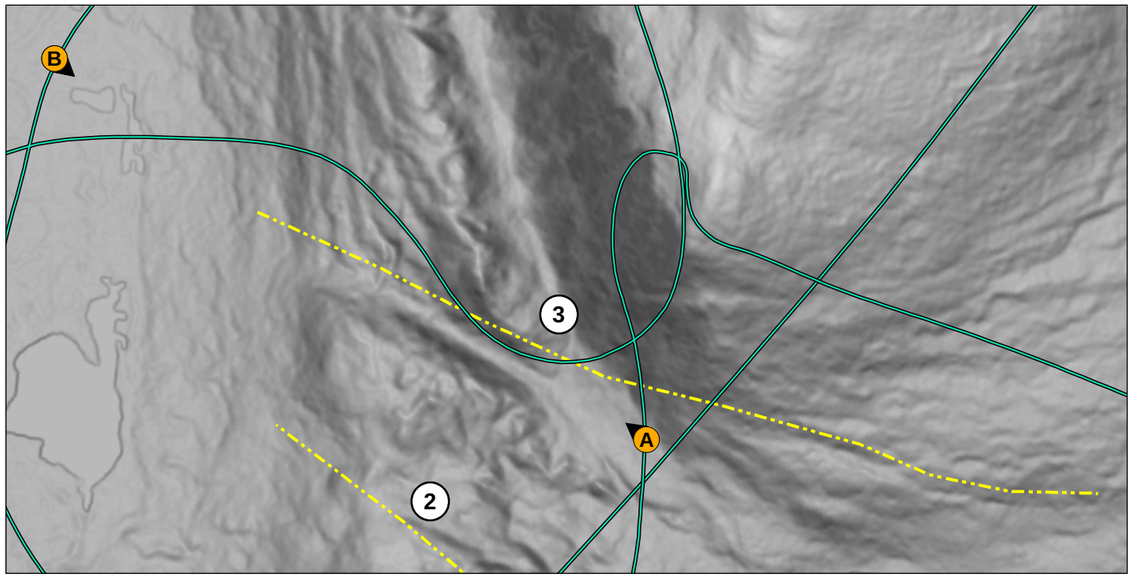
View looking northwest from location A. Arrows and brackets show projected trace of lineament. Note absence of continuous lineament across projected trace.

B)

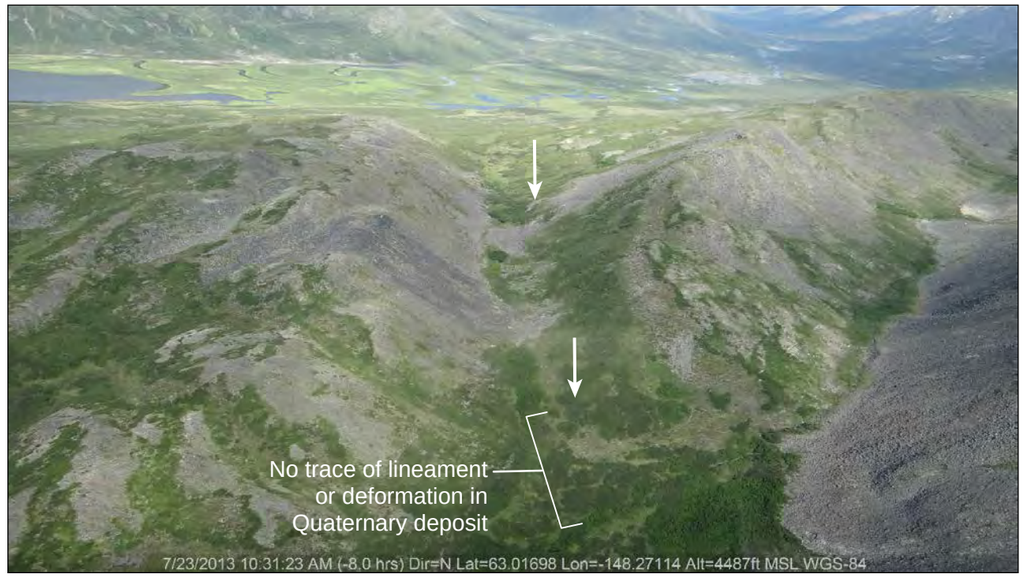


View looking southeast from location B. Arrows and brackets show projected trace of lineament. Note lack of deformation or lineament trace in foreground within Quaternary deposits.

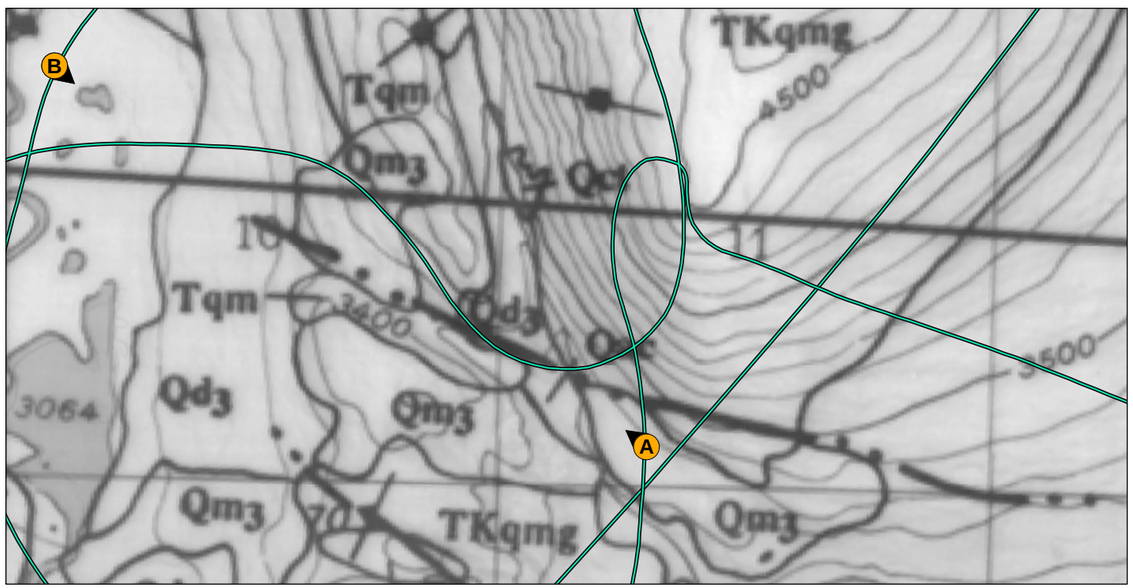
FUGRO Date 10/18/13	STATE OF ALASKA ALASKA ENERGY AUTHORITY ALASKA ENERGY AUTHORITY	SUSITNA-WATANA HYDROELECTRIC PROJECT FEATURE 2 LINEAMENTS ANALYSIS REGER ET AL. (1990)	FIGURE B-03



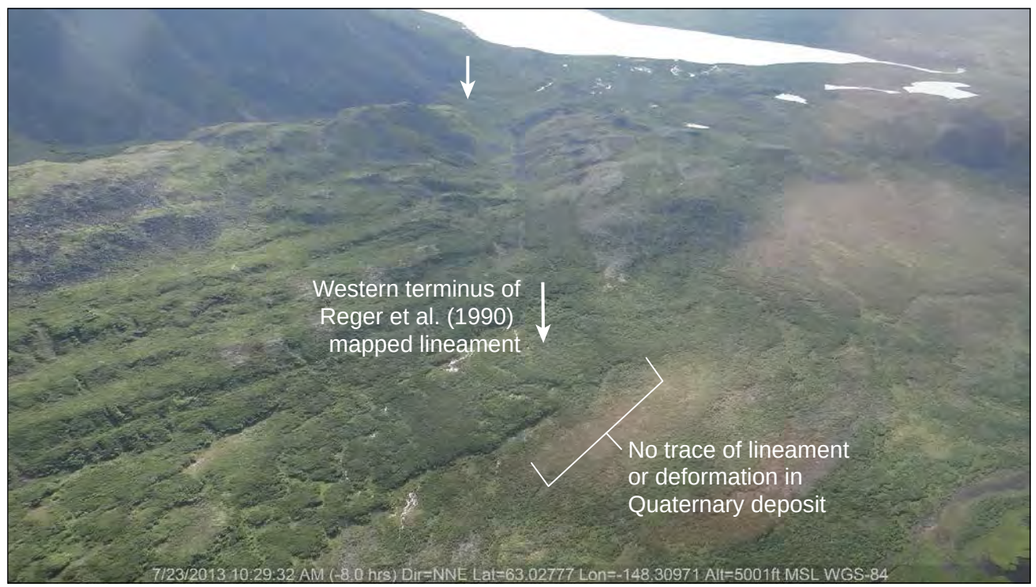
A)



View looking northwest from location A. Arrows show the projected trace of lineament. Note absence of lineament or deformation in Quaternary deposits.

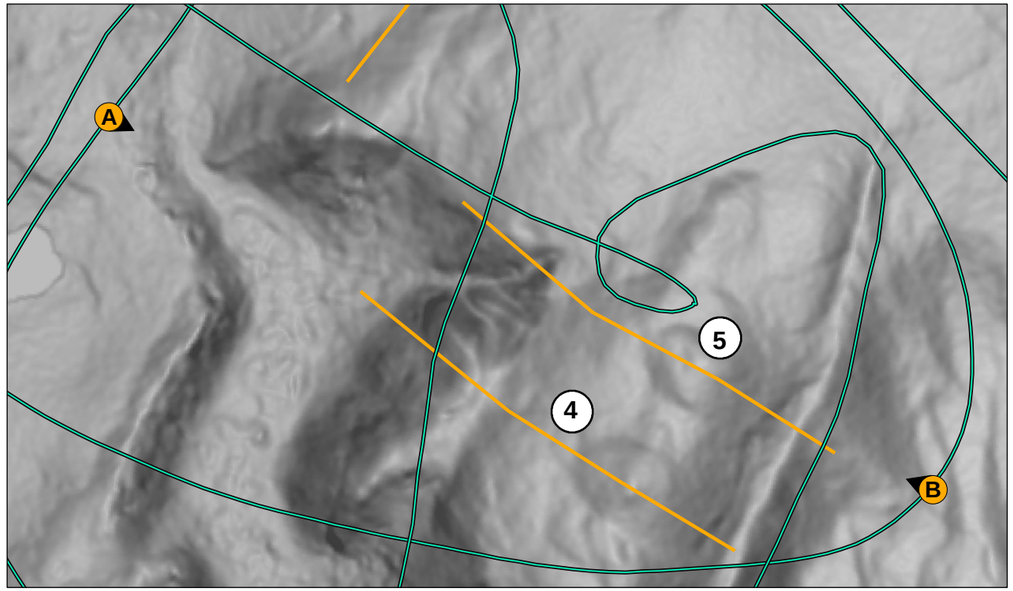


B)

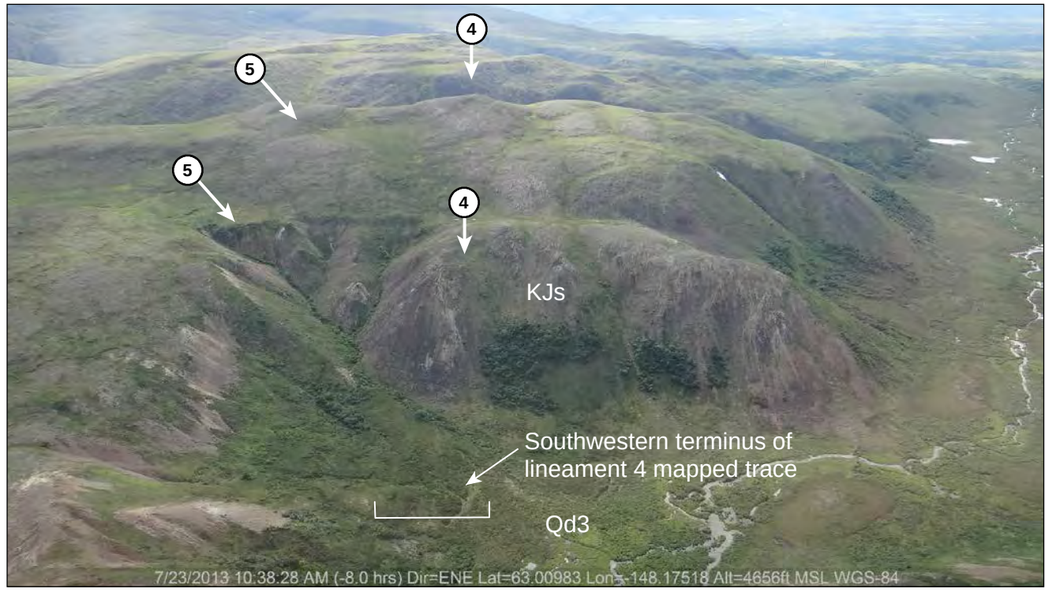


View looking southeast from location B. Arrows show the projected trace of lineament. Note absence of lineament or deformation in Quaternary deposits.

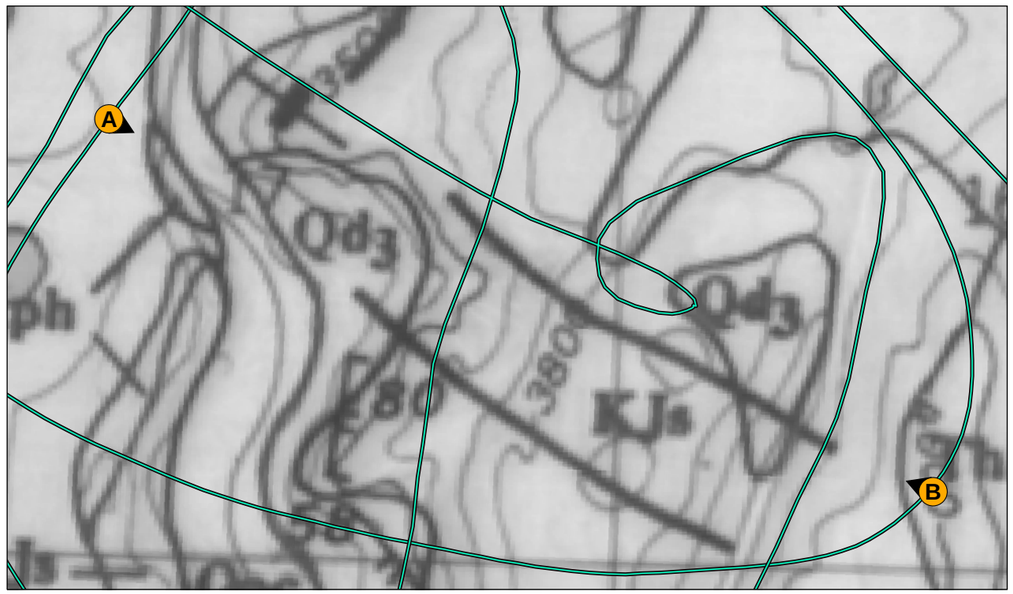
FUGRO Date 10/18/13	STATE OF ALASKA ALASKA ENERGY AUTHORITY ALASKA ENERGY AUTHORITY	SUSITNA-WATANA HYDROELECTRIC PROJECT FEATURE 3 LINEAMENTS ANALYSIS REGER ET AL. (1990)	FIGURE B-04



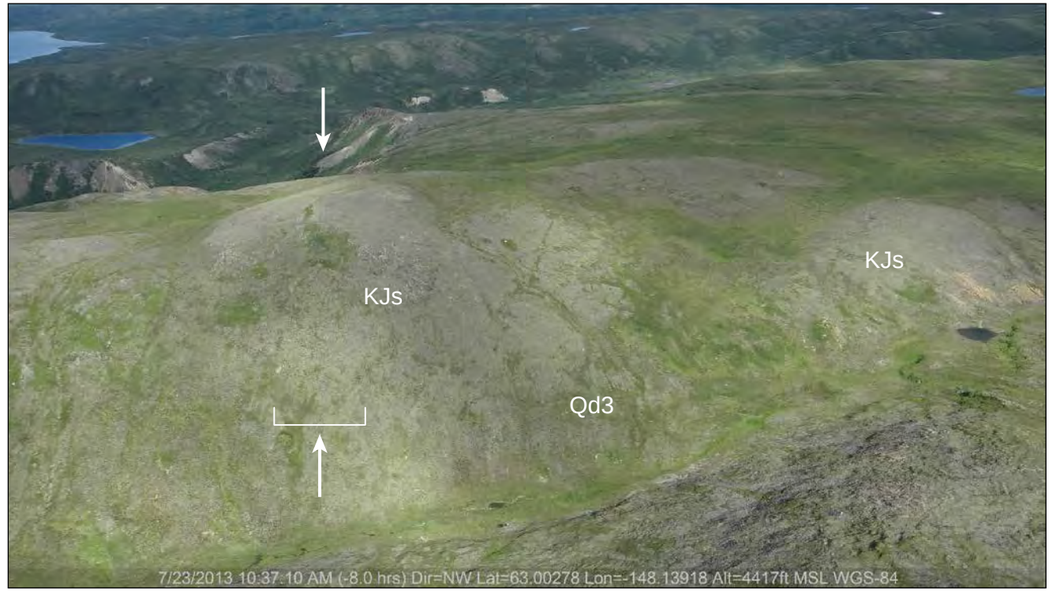
A)



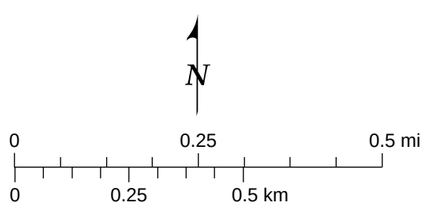
View looking southeast from location A. Arrows show the projected traces of Features 4 and 5. Note absence of lineament or deformation in Quaternary deposits in foreground.



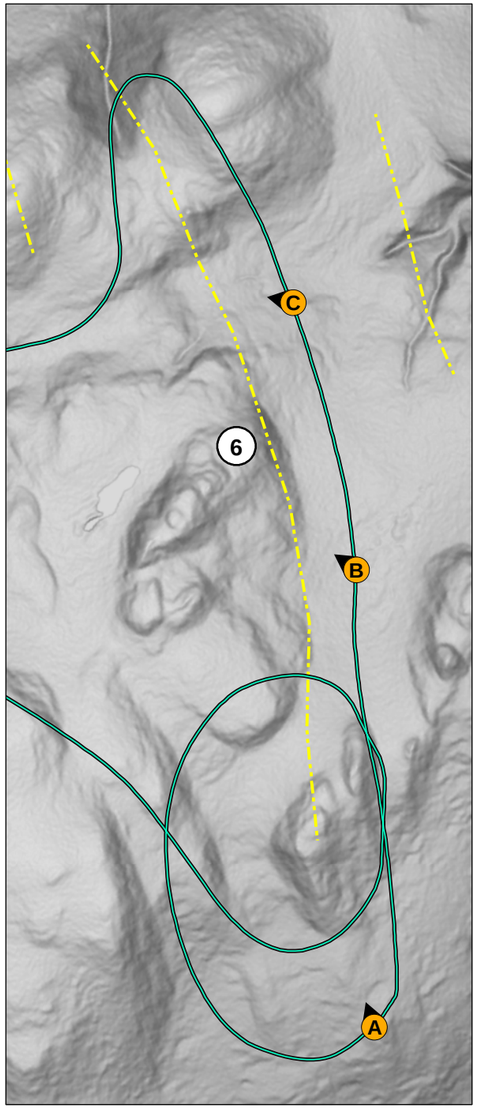
B)

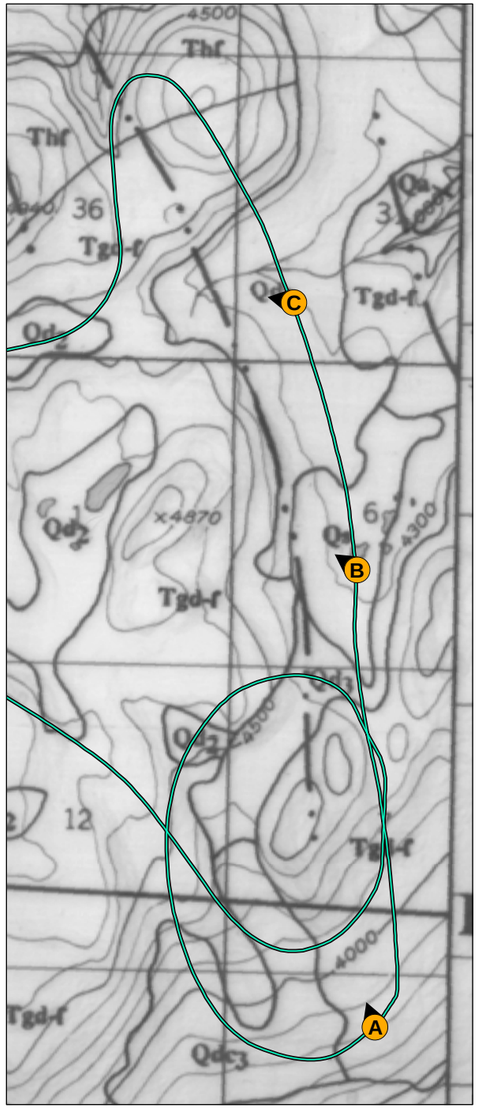


View looking northwest from location B. Arrows show the projected trace of Feature 5. Note absence of discernable lineament along mapped trace.



FUGRO Date 10/18/13	STATE OF ALASKA ALASKA ENERGY AUTHORITY ALASKA ENERGY AUTHORITY	SUSITNA-WATANA HYDROELECTRIC PROJECT FEATURES 4 AND 5 LINEAMENTS ANALYSIS REGER ET AL. (1990)	FIGURE B-05



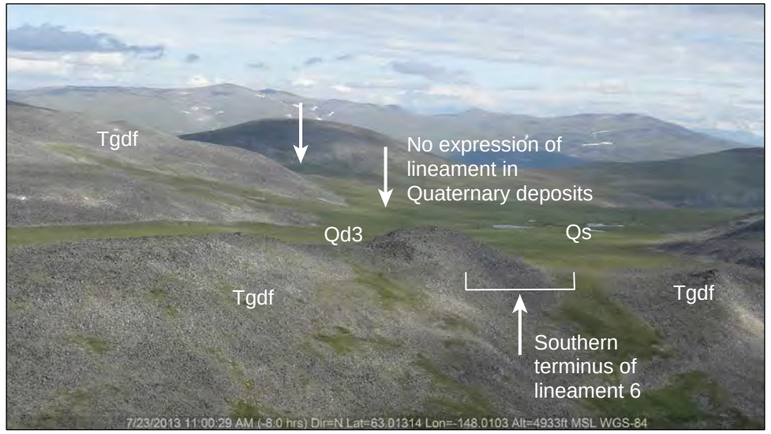


N

0 0.5 1 mi

0 0.5 1 km

A)

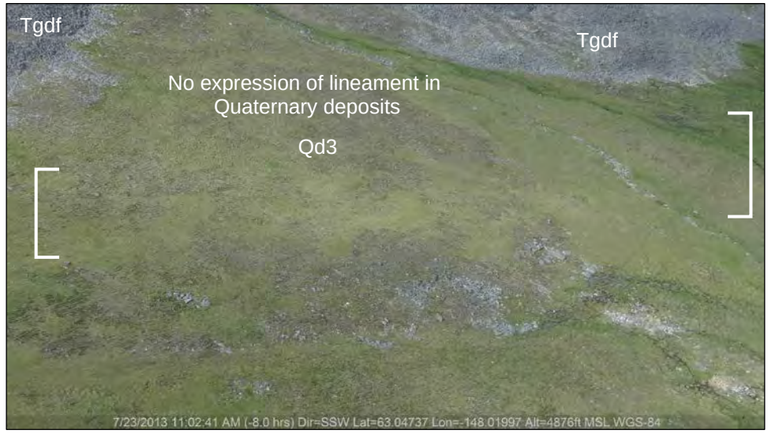


View looking northwest from location A. Arrows and brackets show the projected trace of mapped lineament. Note absence of lineament or deformation in Quaternary deposits.

B)

View looking northwest from location B. Arrows show the projected trace of lineament.

C)



View looking west from location C. Brackets indicate the projected trace of lineament. Note absence of lineament or deformation in Quaternary deposits.

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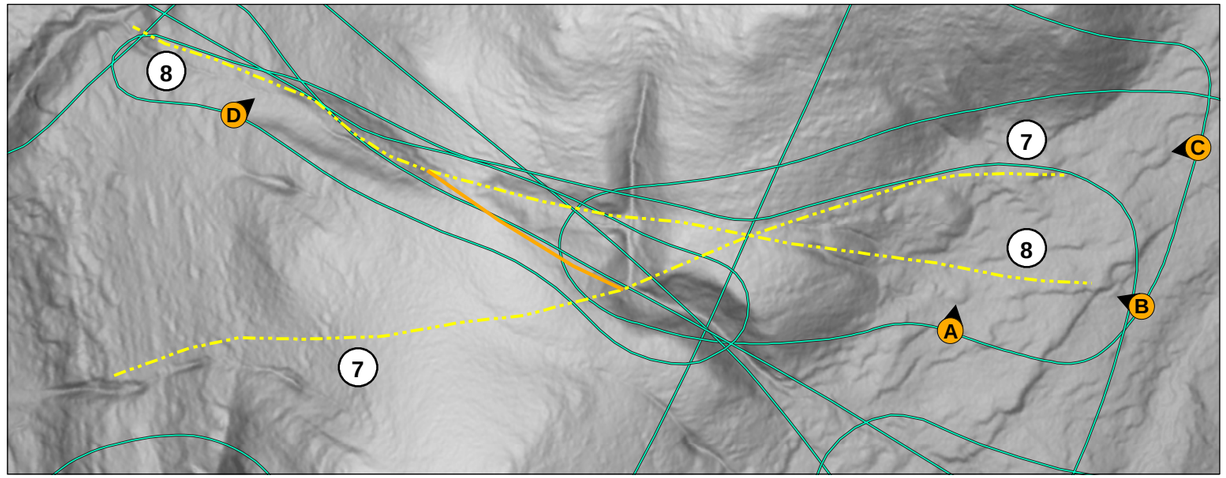
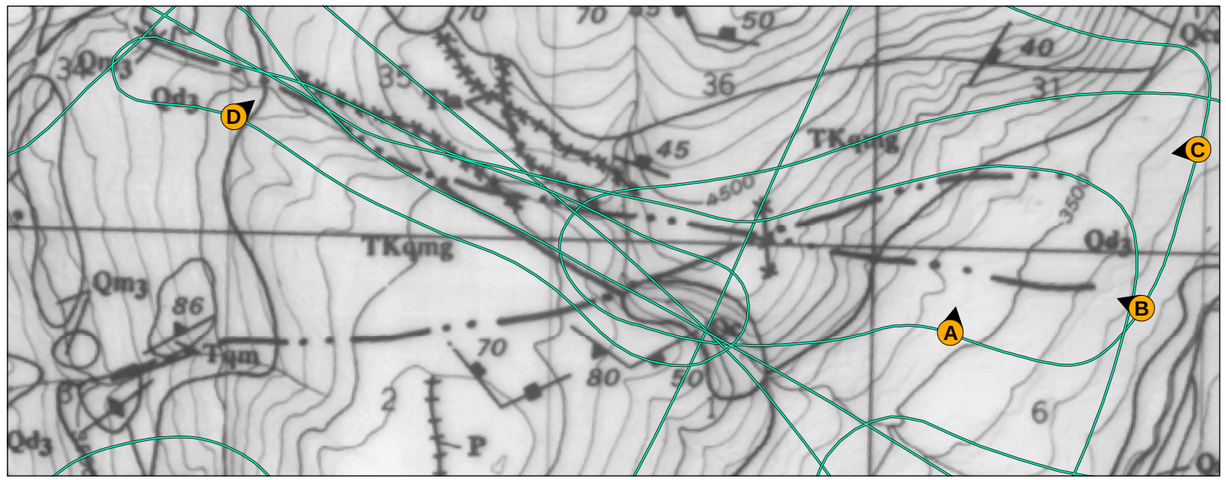
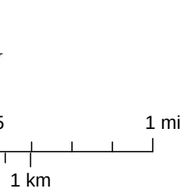
FUGRO Date 10/18/13	STATE OF ALASKA ALASKA ENERGY AUTHORITY ALASKA ENERGY AUTHORITY	SUSITNA-WATANA HYDROELECTRIC PROJECT FEATURE 6 LINEAMENTS ANALYSIS REGER ET AL. (1990)	FIGURE B-06



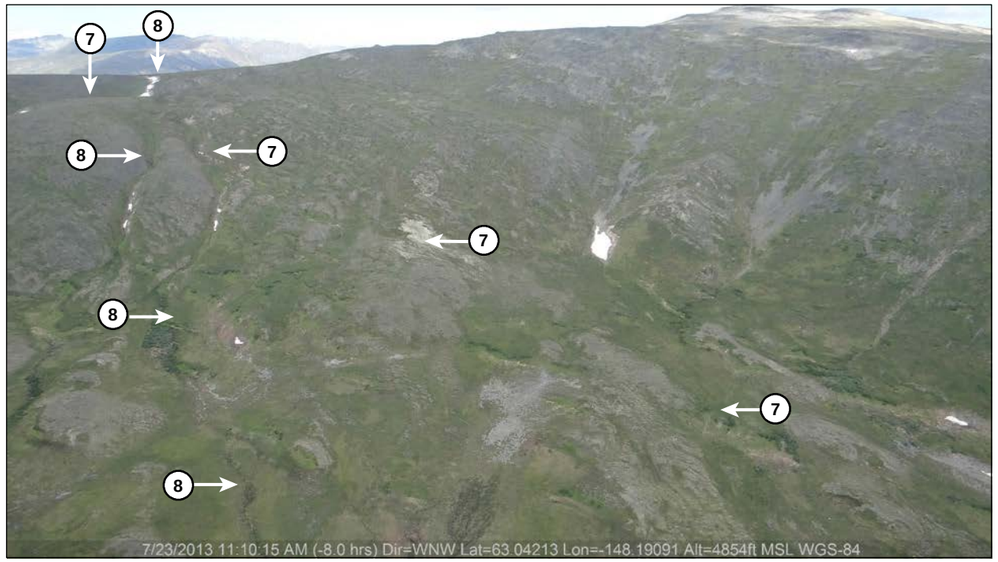




A)

View looking northeast at lineaments 7 and 8 from photograph location A.

B)



View looking west at lineaments 7 and 8 from photograph location B. Note that lineament 7 is a linear series of unrelated features.

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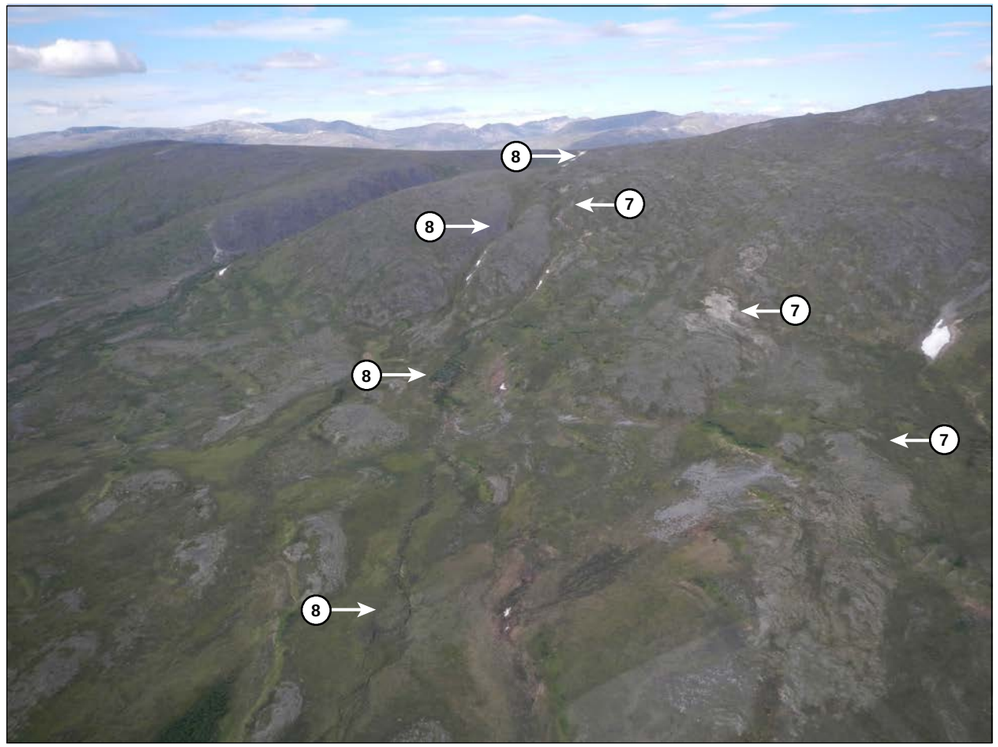
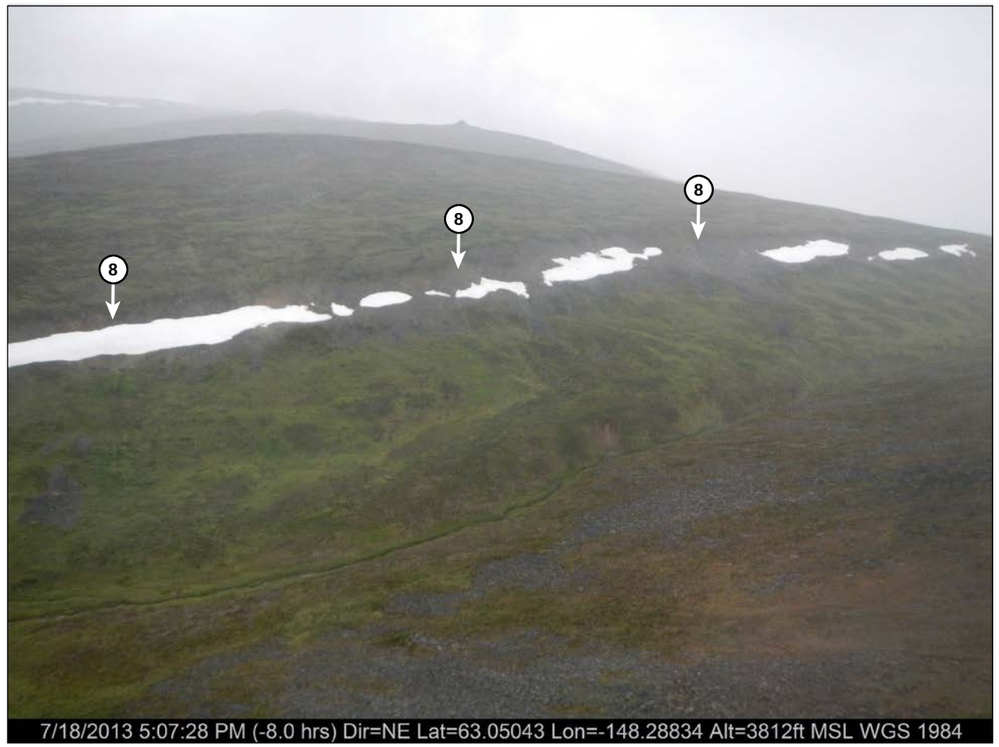
FUGRO Date 10/18/13	STATE OF ALASKA ALASKA ENERGY AUTHORITY ALASKA ENERGY AUTHORITY	SUSITNA-WATANA HYDROELECTRIC PROJECT FEATURES 7 AND 8 LINEAMENTS ANALYSIS REGER ET AL. (1990)	FIGURE B-07a

C)



View looking southwest at lineaments 7 and 8 from photograph location C.

D)



View looking northeast at lineament 7 from photograph location D.

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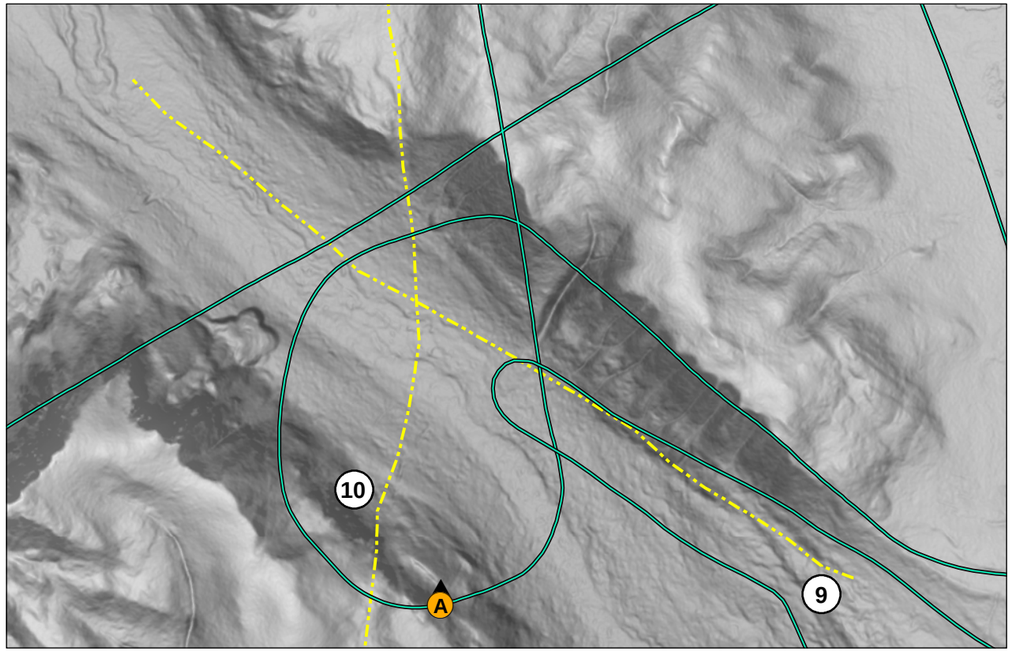
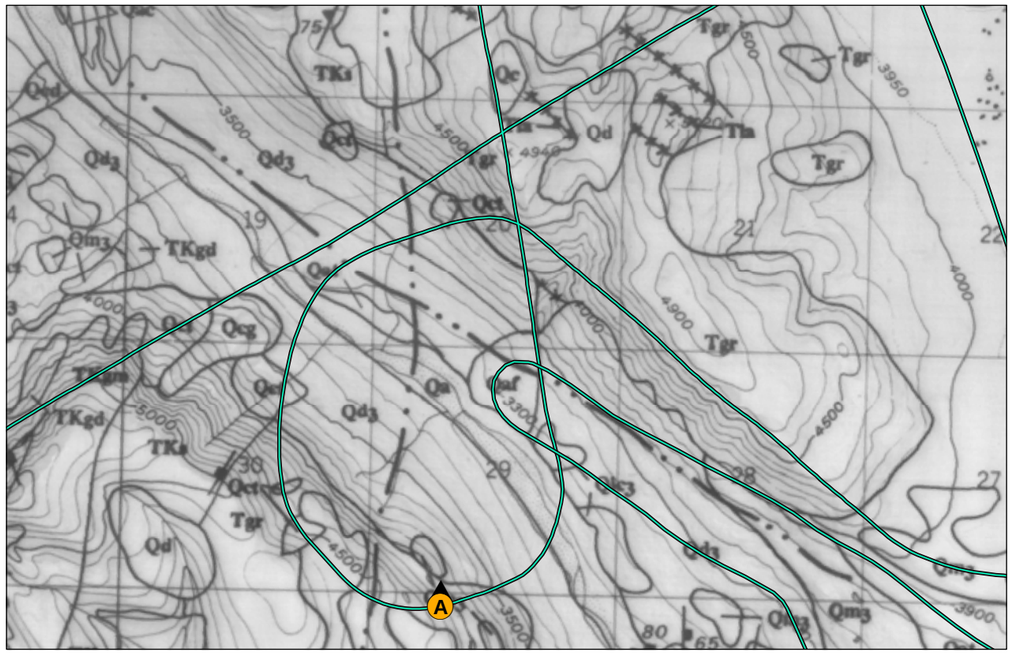
FUGRO
Date 10/18/13

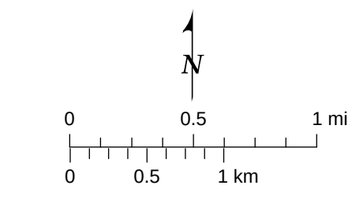
STATE OF ALASKA
ALASKA ENERGY AUTHORITY
ALASKA ENERGY AUTHORITY

SUSITNA-WATANA HYDROELECTRIC PROJECT
FEATURES 7 AND 8
LINEAMENTS ANALYSIS
REGER ET AL. (1990)

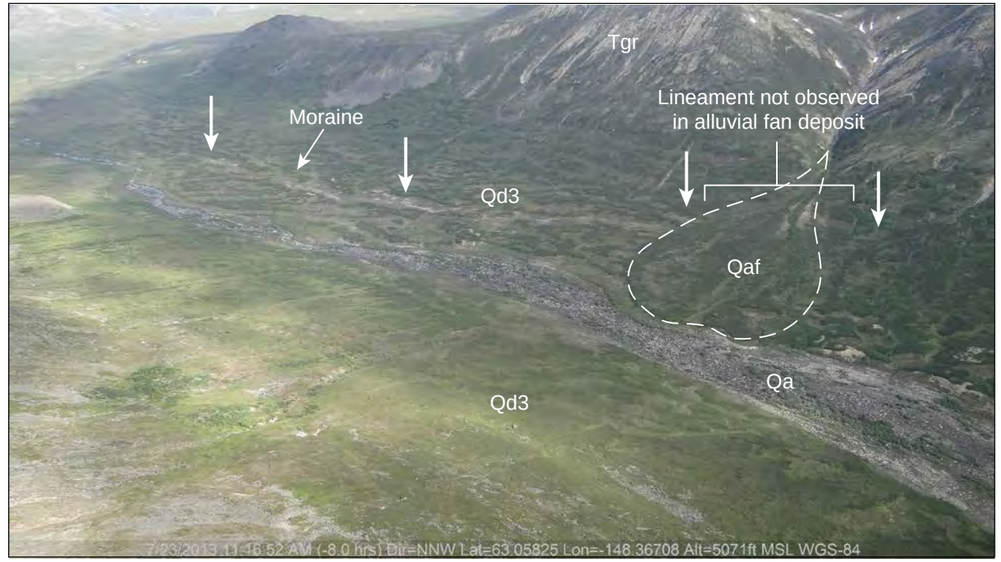
FIGURE
B-07b







A)



View looking north from location A. Arrows show projected trace of Feature 9 lineament. Note lineament is overprinted with Quaternary alluvial fan deposit.

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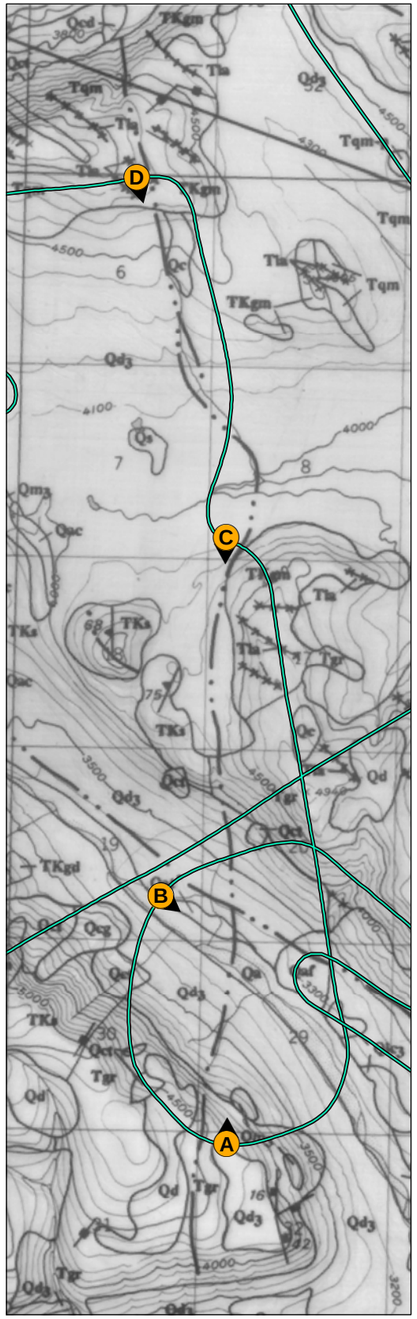
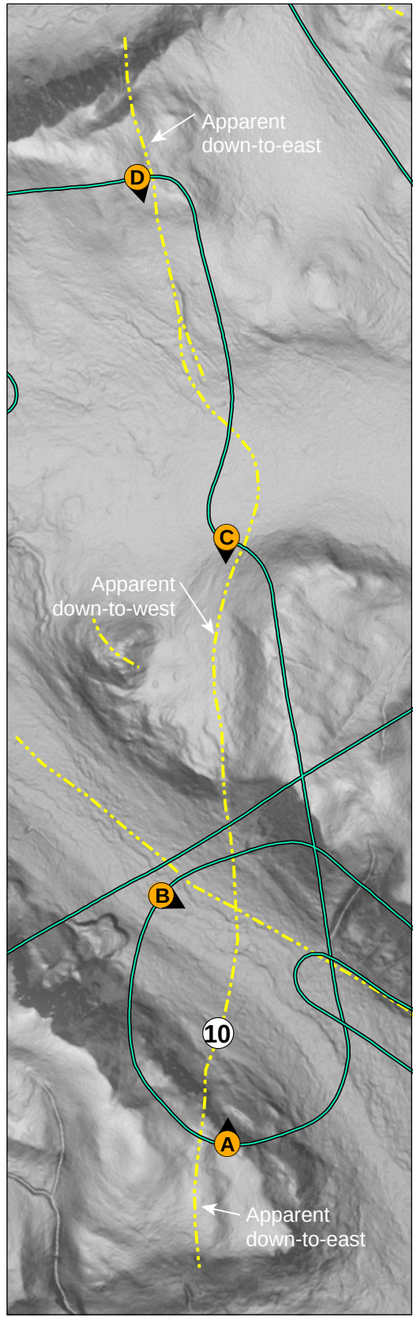
Date 10/18/13	STATE OF ALASKA ALASKA ENERGY AUTHORITY	SUSITNA-WATANA HYDROELECTRIC PROJECT FEATURE 9 LINEAMENTS ANALYSIS REGER ET AL. (1990)	FIGURE B-08



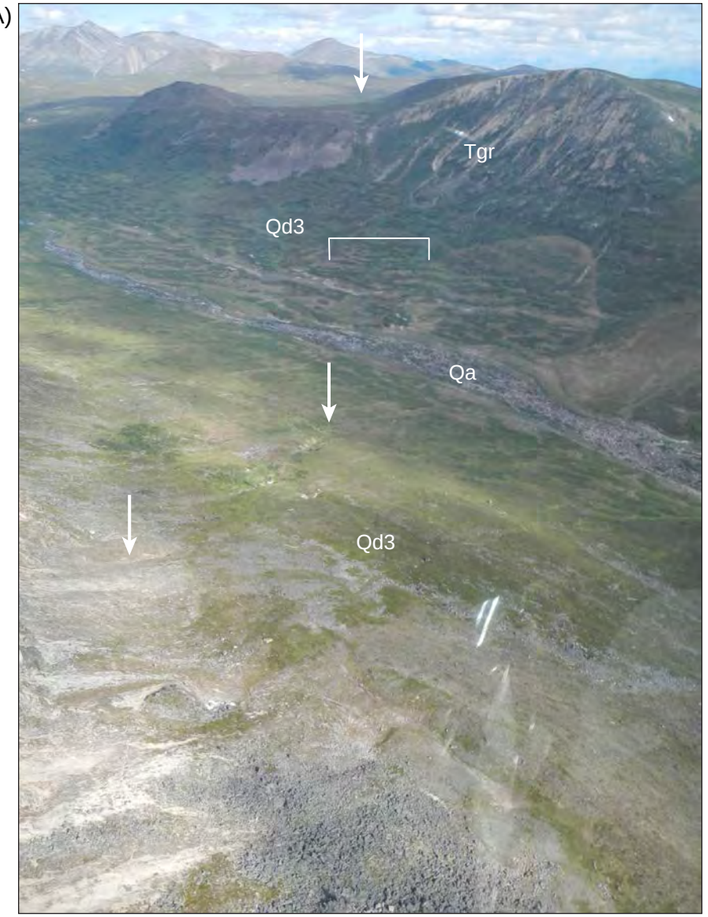


N

0 0.5 1 mi

0 0.5 1 km

A)



View looking north from location A. Arrows and brackets show the projected trace of lineament.

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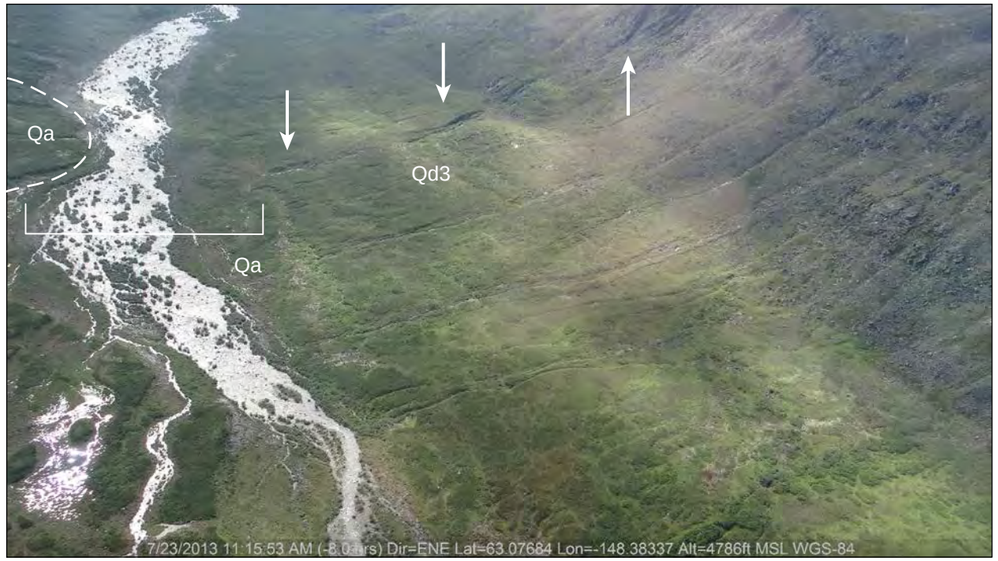
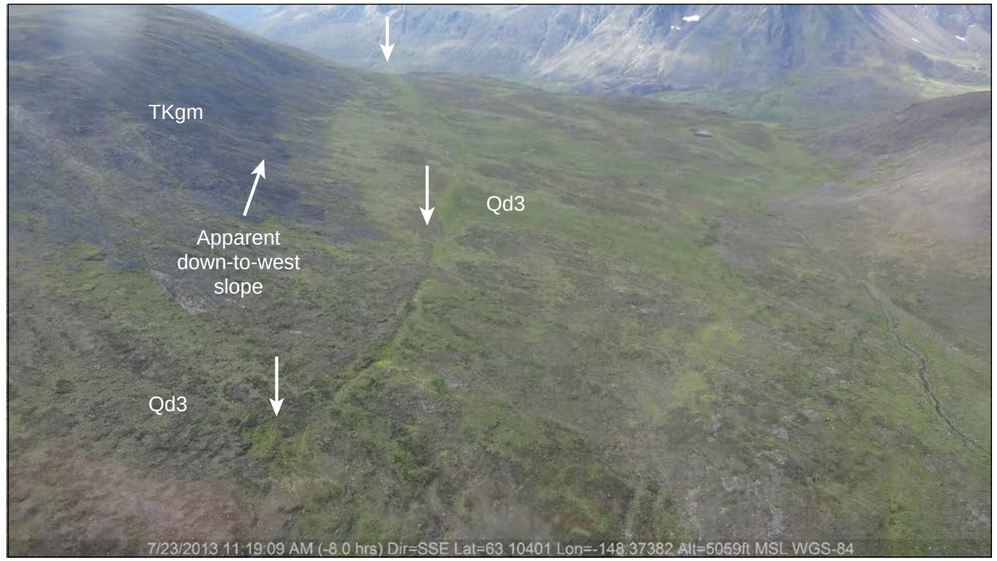
Date 10/18/13	STATE OF ALASKA ALASKA ENERGY AUTHORITY ALASKA ENERGY AUTHORITY	SUSITNA-WATANA HYDROELECTRIC PROJECT FEATURE 10 LINEAMENTS ANALYSIS REGER ET AL. (1990)	FIGURE B-09a

B)



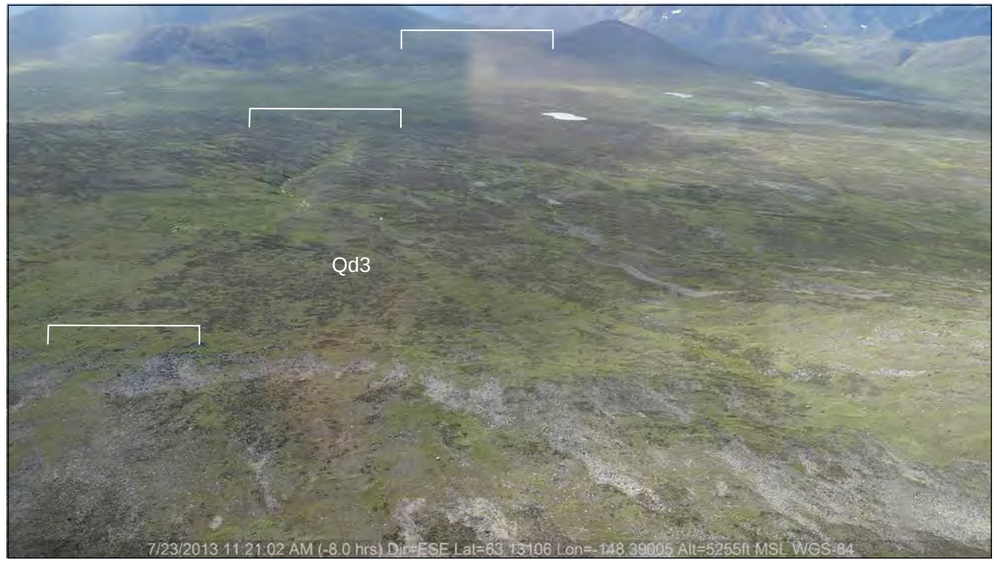
View looking south from photograph location B. Arrows show the projected trace of lineament. In Qd3 (till) the lineament is coincident with linear drainage in till deposit. Note absence of lineament in Qa deposit.

C)



View looking south from photograph location C. Arrows show the projected trace of lineament. Note lineament is coincident with a linear drainage in this view.

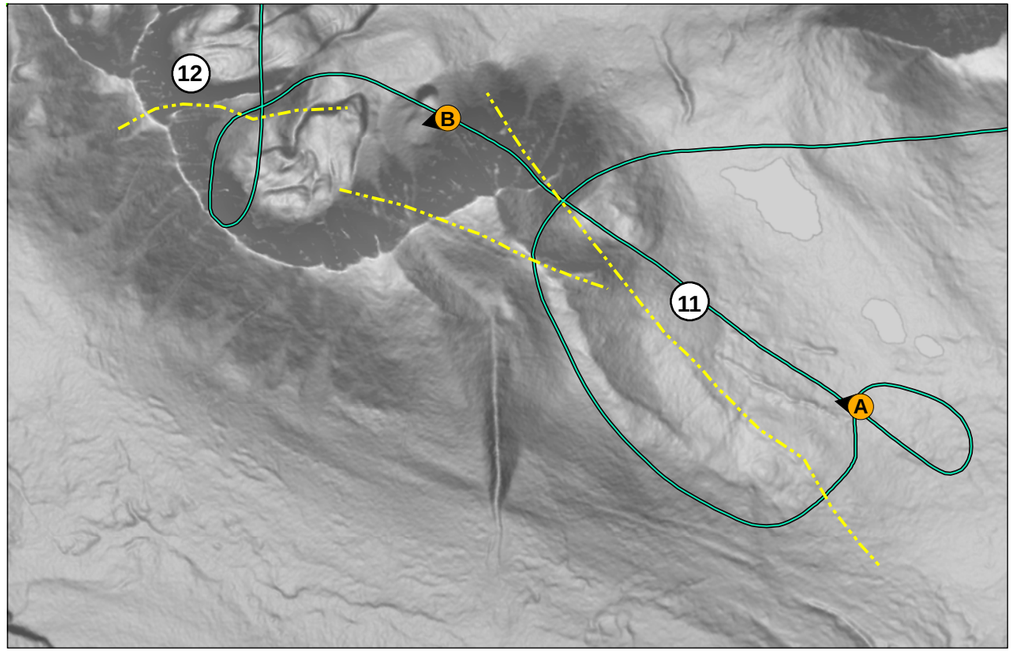
D)

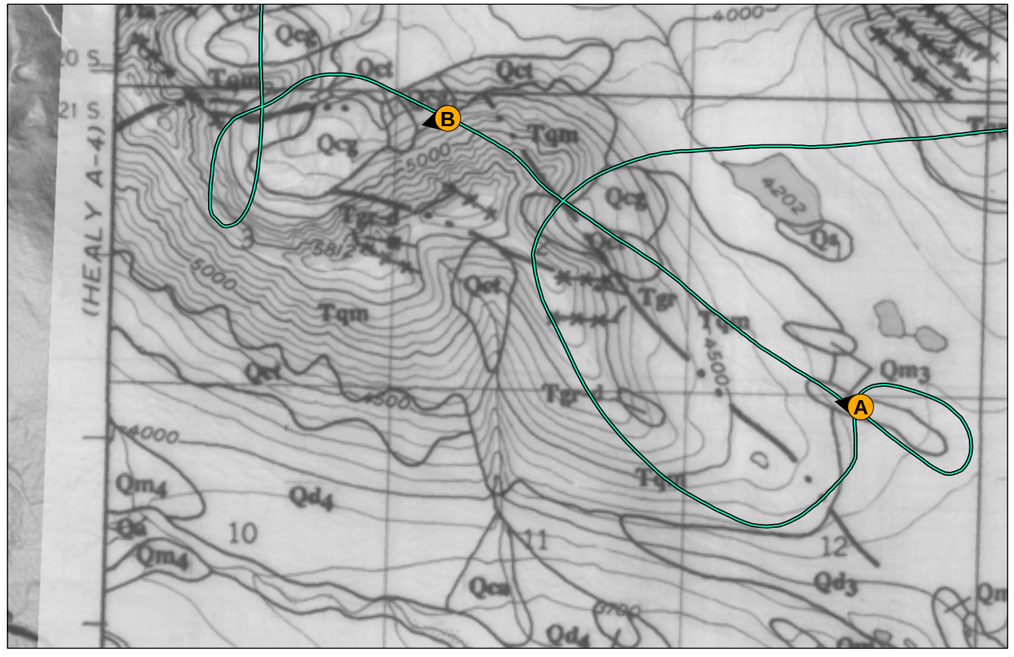


View looking south from location C. Brackets show the projected trace of lineament.

FUGRO Date 10/18/13	STATE OF ALASKA ALASKA ENERGY AUTHORITY ALASKA ENERGY AUTHORITY	SUSITNA-WATANA HYDROELECTRIC PROJECT FEATURE 10 LINEAMENTS ANALYSIS REGER ET AL. (1990)	FIGURE B-09b

79_218900_Alaska_Railbelt/2189_Lineament Report October 2013, modified 10.18.13



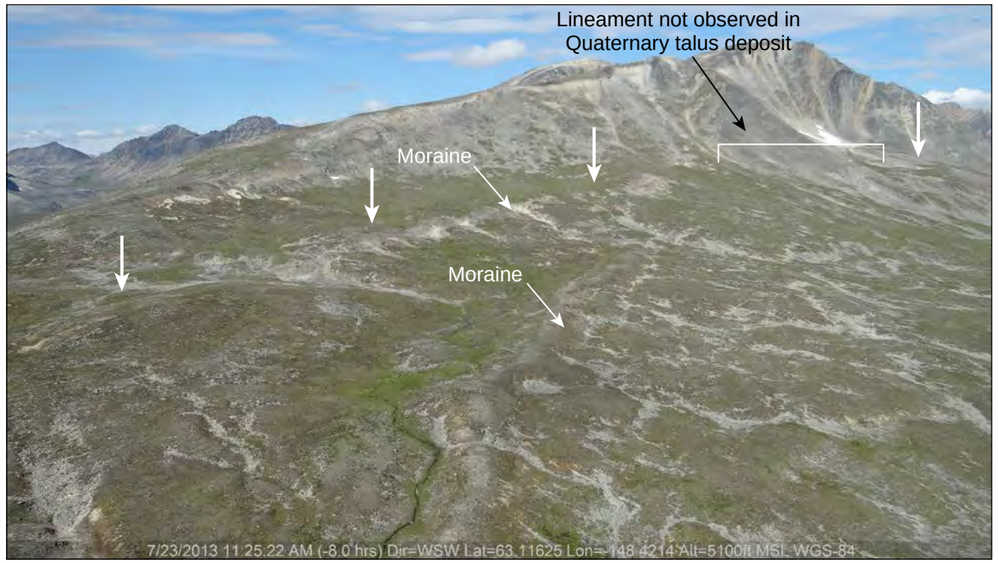


N

0 0.5 1 mi

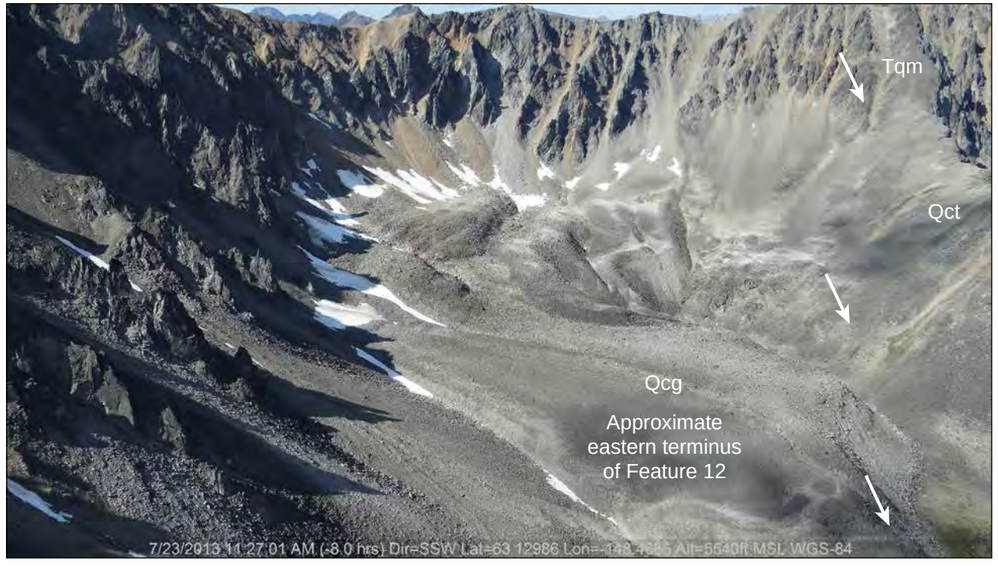
0 0.5 1 km

A)



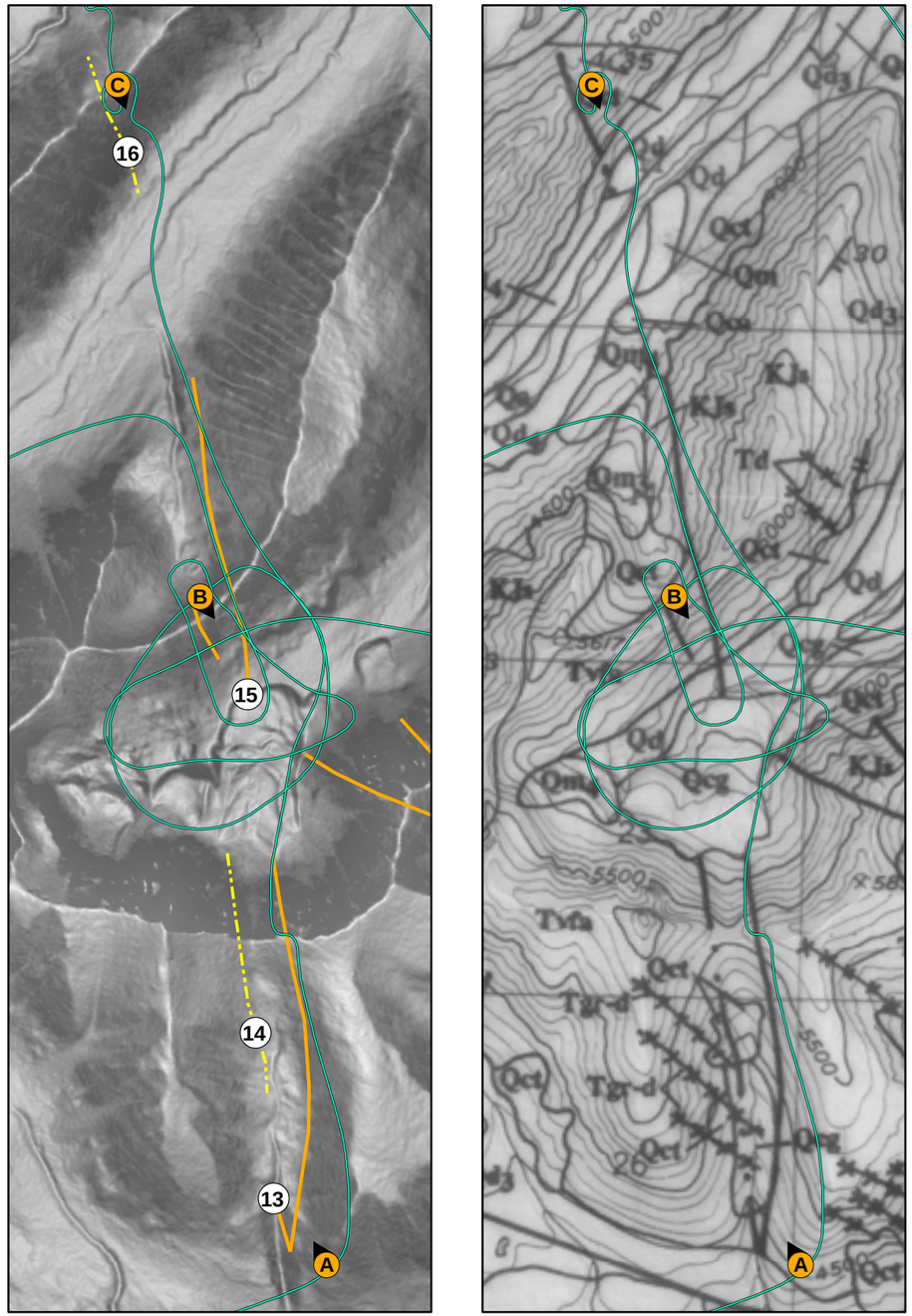
View looking west from location A. Arrows and brackets show projected trace of Feature 11 lineament. Note the mapped lineament correlates with a moraine crest.

B)



View looking west from location A. Brackets show projected trace of Feature 12 lineament. Note the trace of the lineament is a collection of unrelated features rather than a through-going feature.

FUGRO Date 10/18/13	STATE OF ALASKA ALASKA ENERGY AUTHORITY ALASKA ENERGY AUTHORITY	SUSITNA-WATANA HYDROELECTRIC PROJECT FEATURES 11 AND 12 LINEAMENTS ANALYSIS REGER ET AL. (1990)	FIGURE B-10



N

0 0.5 1 mi

0 0.5 1 km

A)

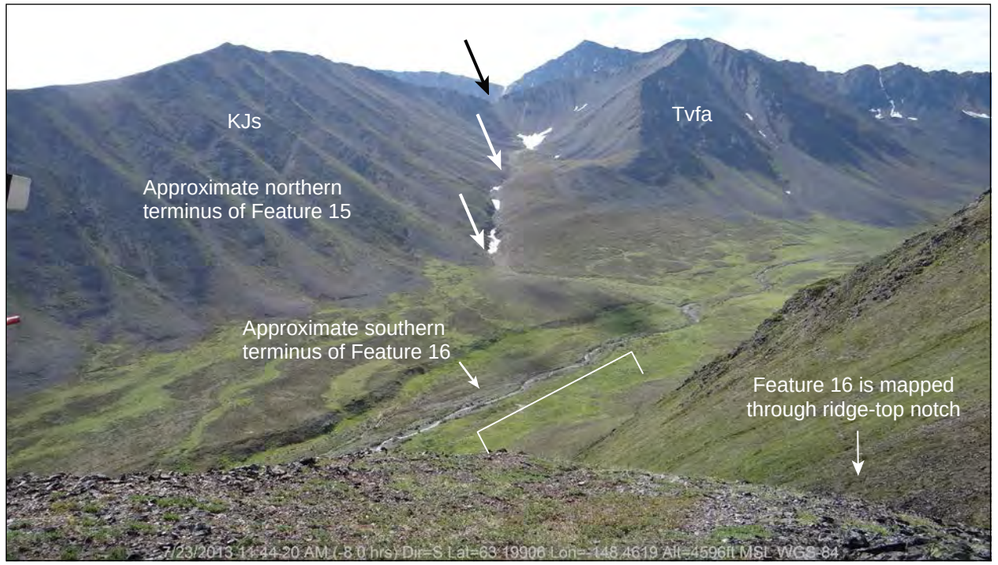
View looking north-northwest from location A. The bracket indicates the projected path of Feature 13 fault. Arrows show the projected trace of Feature 14 lineament. Note absence of evidence of fault under bracket in Quaternary deposits.

B)

View looking southeast from photograph location B. The brackets indicates the projected path of Feature 15 fault. Note absence of evidence of fault under bracket in Quaternary deposits.

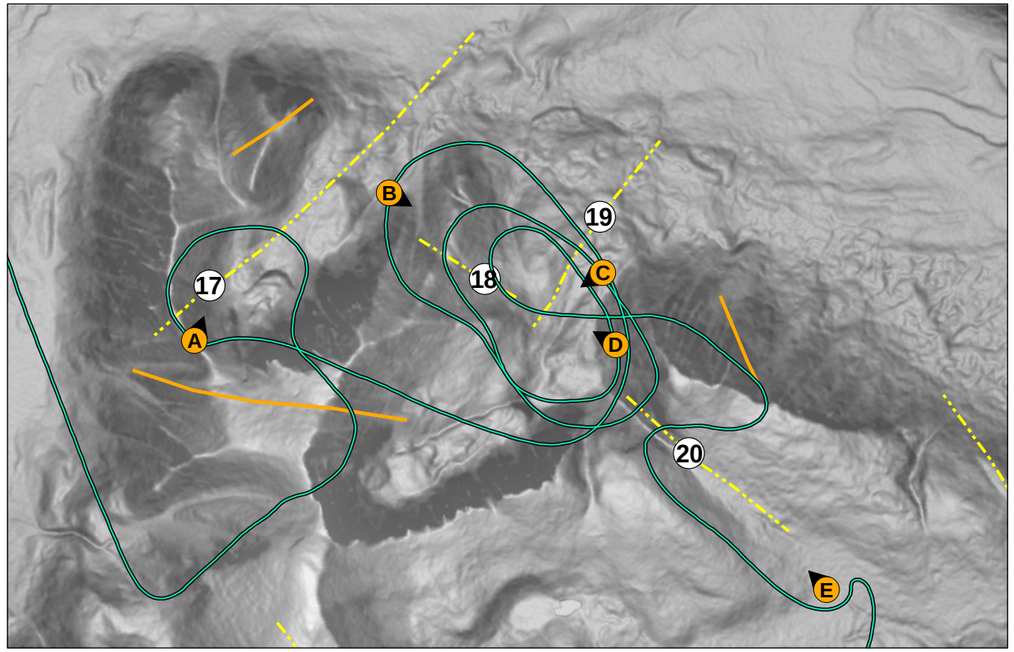
FUGRO Date 10/18/13	STATE OF ALASKA ALASKA ENERGY AUTHORITY ALASKA ENERGY AUTHORITY	SUSITNA-WATANA HYDROELECTRIC PROJECT FEATURES 13, 14, 15 AND 16 LINEAMENTS ANALYSIS REGER ET AL. (1990)	FIGURE B-11a

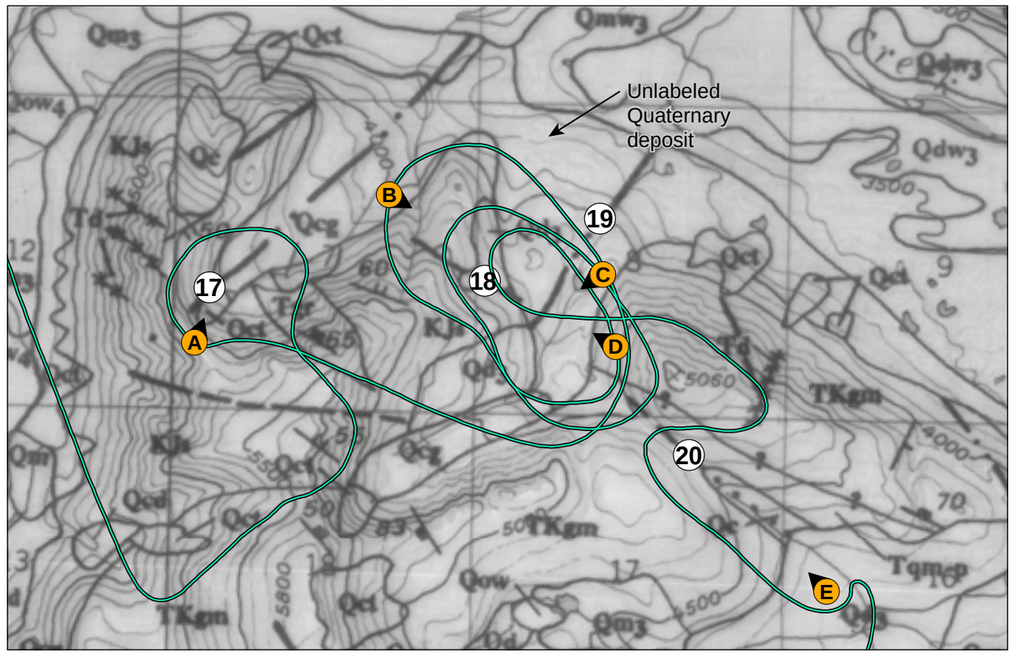
C)



View looking south from location C. The arrows and bracket indicates the projected path of Feature 15 and 16 faults. Note absence of linear expression in valley floor within Quaternary deposits.

FUGRO Date 10/18/13	STATE OF ALASKA ALASKA ENERGY AUTHORITY ALASKA ENERGY AUTHORITY	SUSITNA-WATANA HYDROELECTRIC PROJECT FEATURE 13, 14, 15, AND 16 LINEAMENTS ANALYSIS REGER ET AL. (1990)	FIGURE B-11b

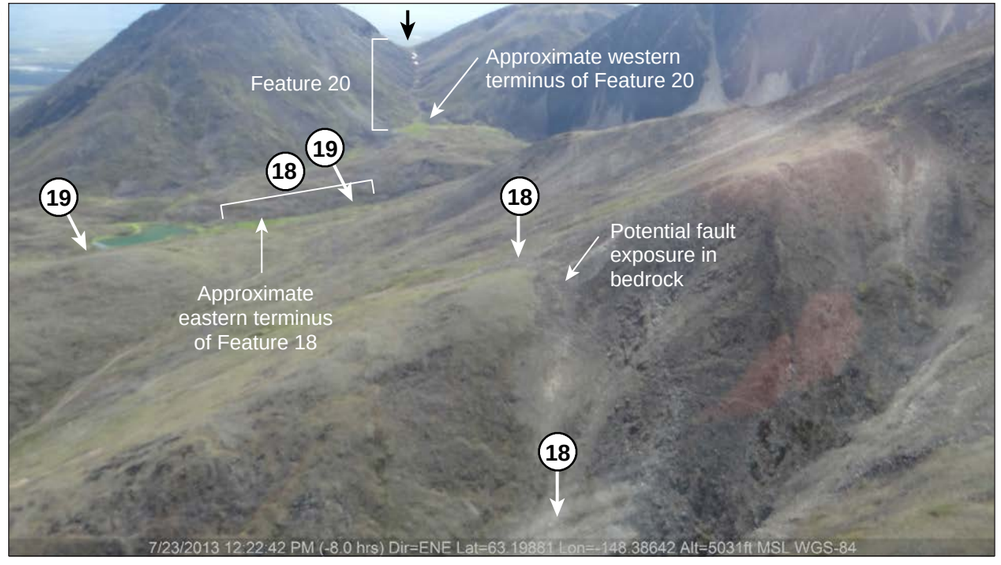




A)

View looking northeast from location A. Arrows and brackets show projected trace of lineament 17.

B)



View looking southeast from photograph location B. Arrows and brackets indicated the projected trace of lineaments 18, 19, and 20.

FUGRO Date 10/18/13	STATE OF ALASKA ALASKA ENERGY AUTHORITY ALASKA ENERGY AUTHORITY	SUSITNA-WATANA HYDROELECTRIC PROJECT FEATURES 17, 18, 19, AND 20 LINEAMENTS ANALYSIS REGER ET AL. (1990)	FIGURE B-12a

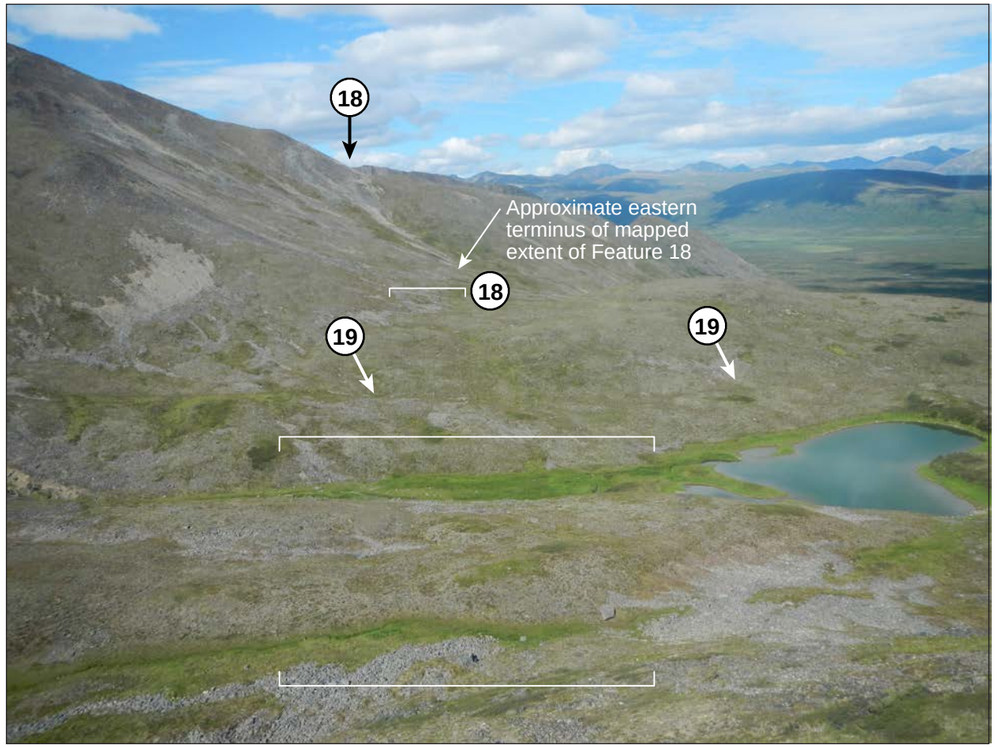
C)

View looking southwest from photograph location C. The arrows indicate the projected path of Feature 19 lineament.

E)

View looking northwest from photograph location E. Arrows show the mapped trace of Feature 20 lineament. Note mapped trace of Feature 20 is coincident with linear drainage.

D)



View looking northwest from photograph location D. Arrows show the mapped trace of Features 18 and 19. Note absence of lineaments or apparent deformation in Quaternary deposits between brackets in lower middle portion of photograph.

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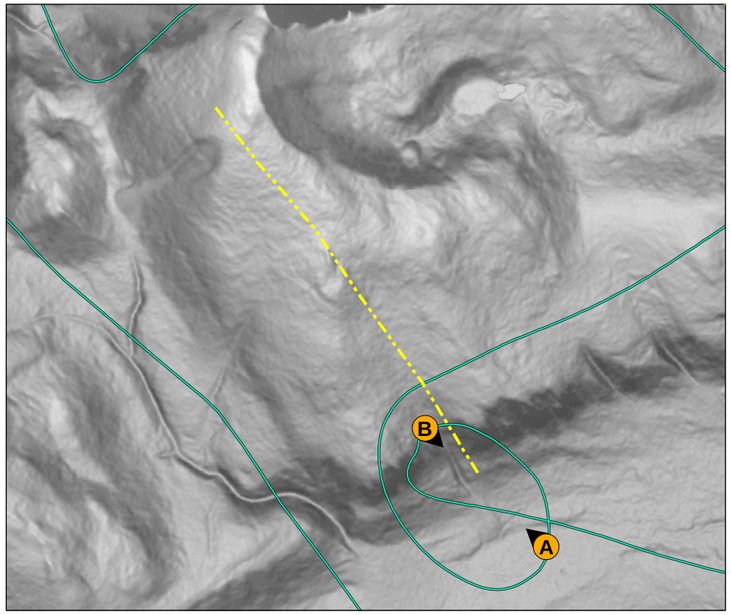
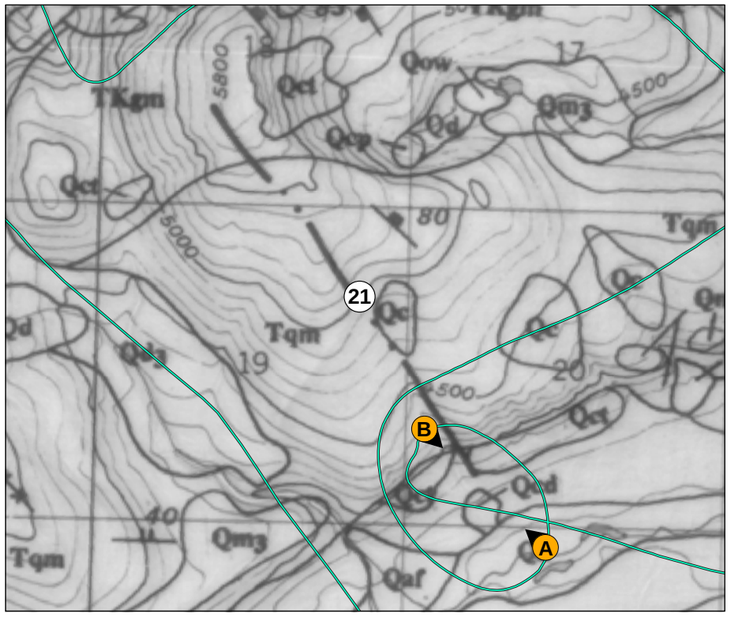
FUGRO Date 10/18/13	STATE OF ALASKA ALASKA ENERGY AUTHORITY ALASKA ENERGY AUTHORITY	SUSITNA-WATANA HYDROELECTRIC PROJECT FEATURES 17, 18, 19, 20 LINEAMENTS ANALYSIS REGER ET AL. (1990)	FIGURE B-12b



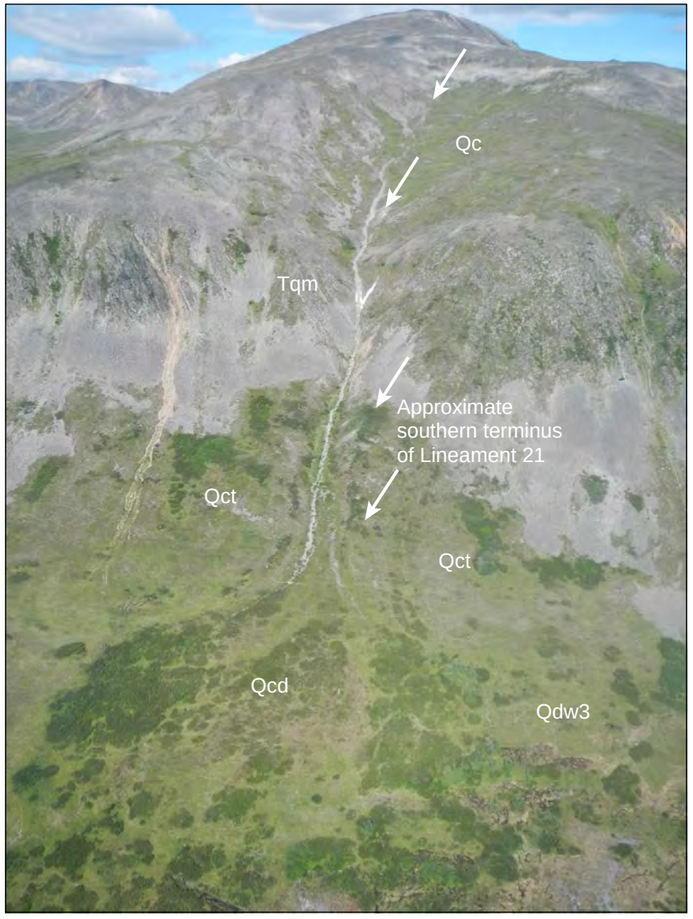


N

0 0.5 1 mi

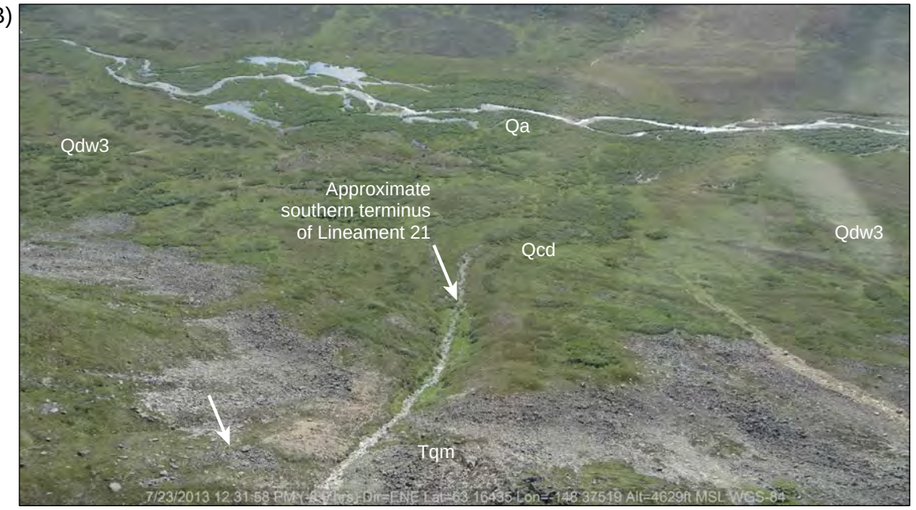
0 0.5 1 km

A)



View looking northwest from photograph location A. Arrows indicate the projected path of Feature 21 lineament.

B)



View looking southeast from photograph location B. Arrows show the projected trace of Feature 21 lineament.

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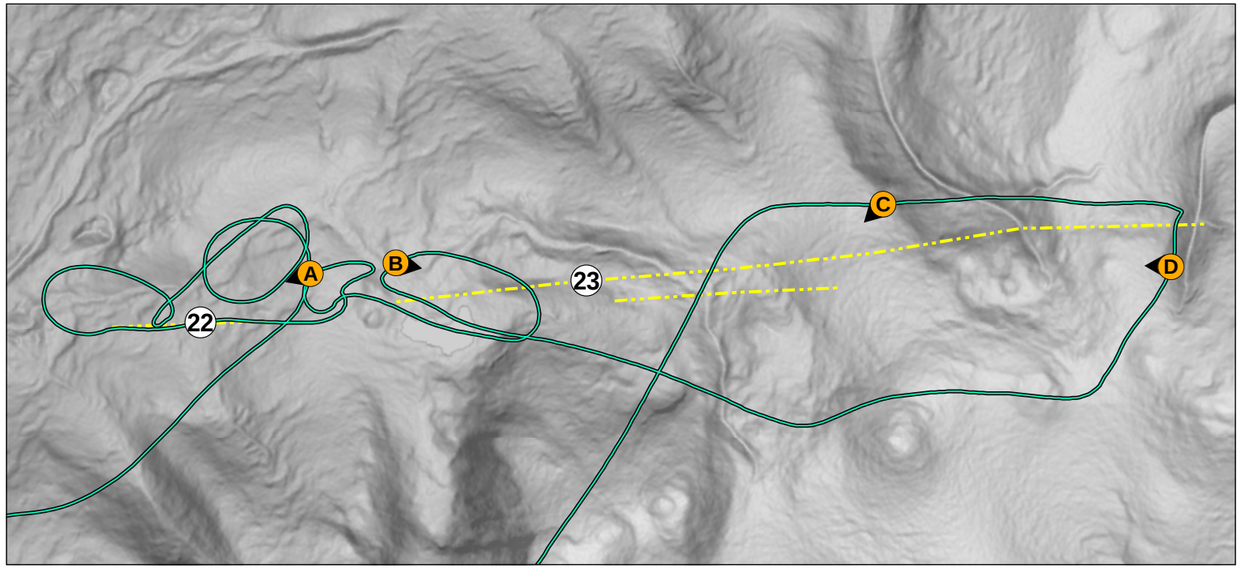
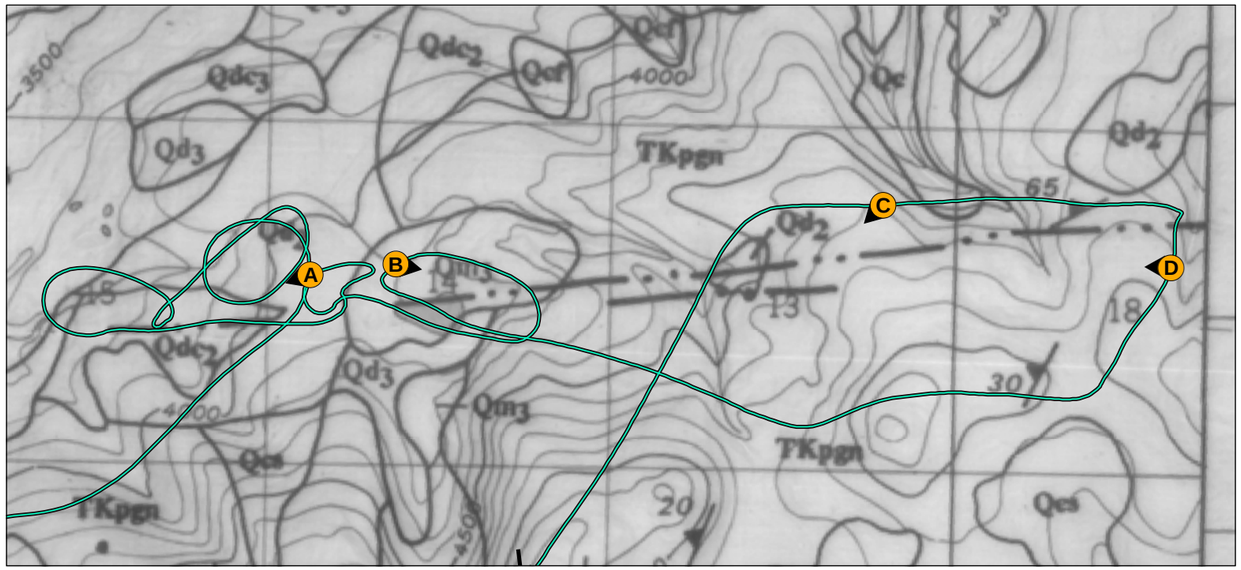
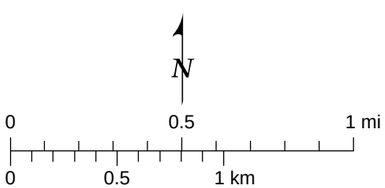
FUGRO Date 10/18/13	STATE OF ALASKA ALASKA ENERGY AUTHORITY ALASKA ENERGY AUTHORITY	SUSITNA-WATANA HYDROELECTRIC PROJECT FEATURE 21 LINEAMENTS ANALYSIS REGER ET AL. (1990)	FIGURE B-13



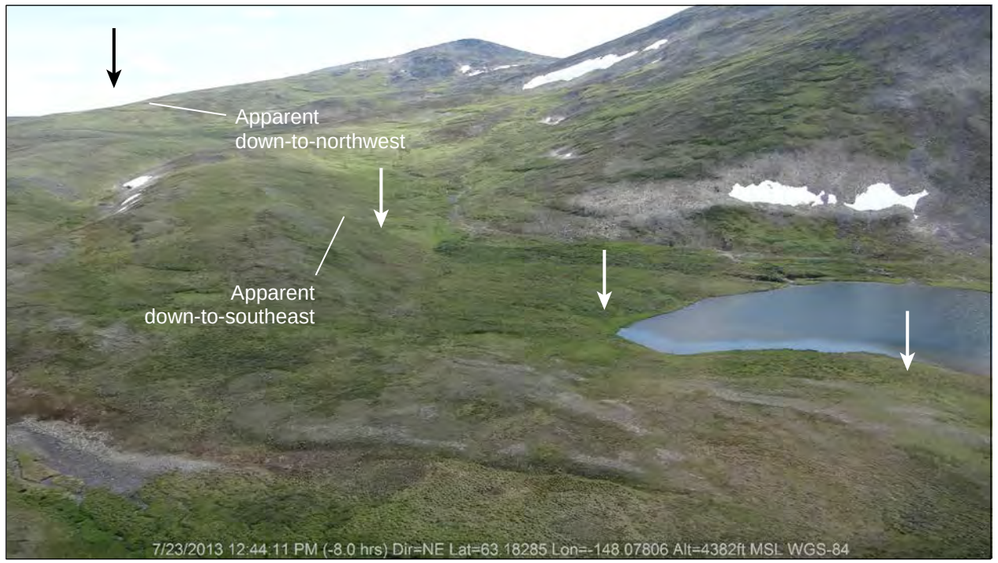
A)

View looking west from photograph location A. Brackets show the projected trace of Feature 22. Note the absence of a continuous lineament along the projected trace and exposed till on low relief ridge crest between drainages.





B)



View looking east from photograph location B. Arrows and brackets indicate the projected path of Feature 22 lineament. Note change in apparent vertical displacement.

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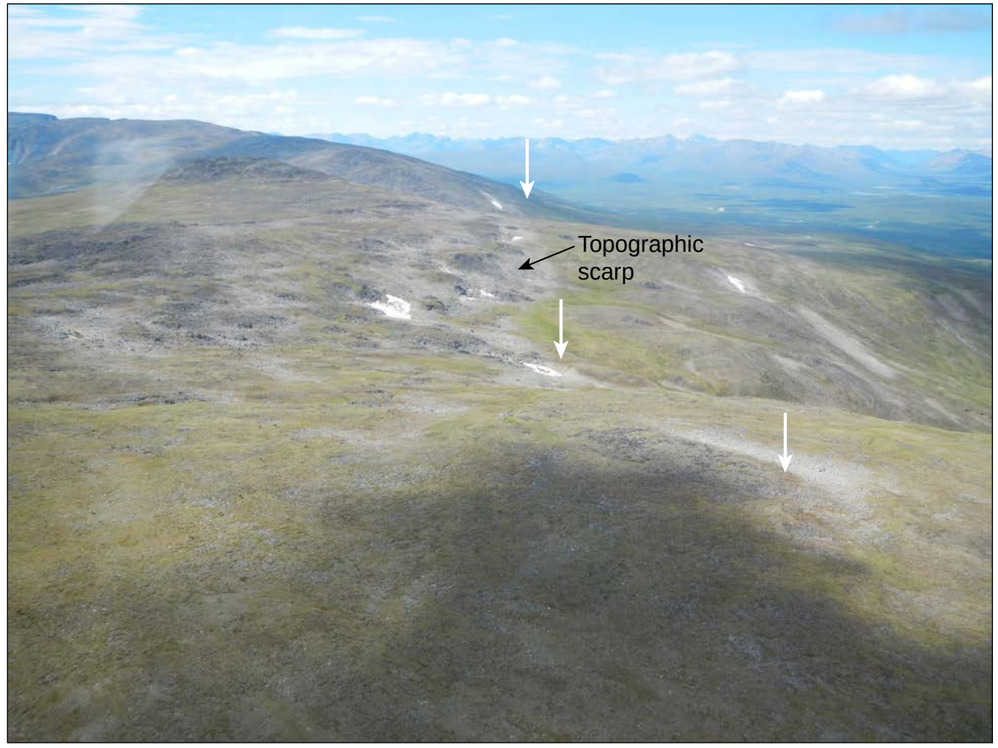
FUGRO Date 10/18/13	STATE OF ALASKA ALASKA ENERGY AUTHORITY ALASKA ENERGY AUTHORITY	SUSITNA-WATANA HYDROELECTRIC PROJECT FEATURES 22 AND 23 LINEAMENTS ANALYSIS REGER ET AL. (1990)	FIGURE B-14a

C)

View looking west from photograph location C. Arrows show the projected trace of the Feature 22 lineament. Note linear expression is coincident with solufluction lobes and not continuous.

D)



View looking west from photograph location C. Arrows show the projected trace of the Feature 22 lineament. Note topographic scarp in Photograph D is not proportional to minor scarps associated with solufluction in Photograph C.

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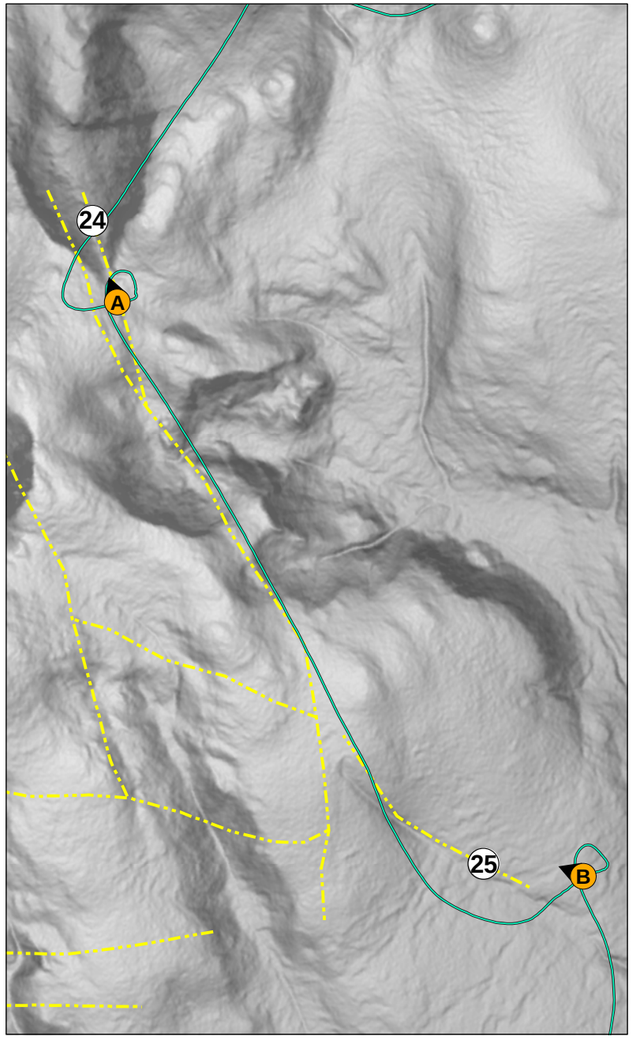
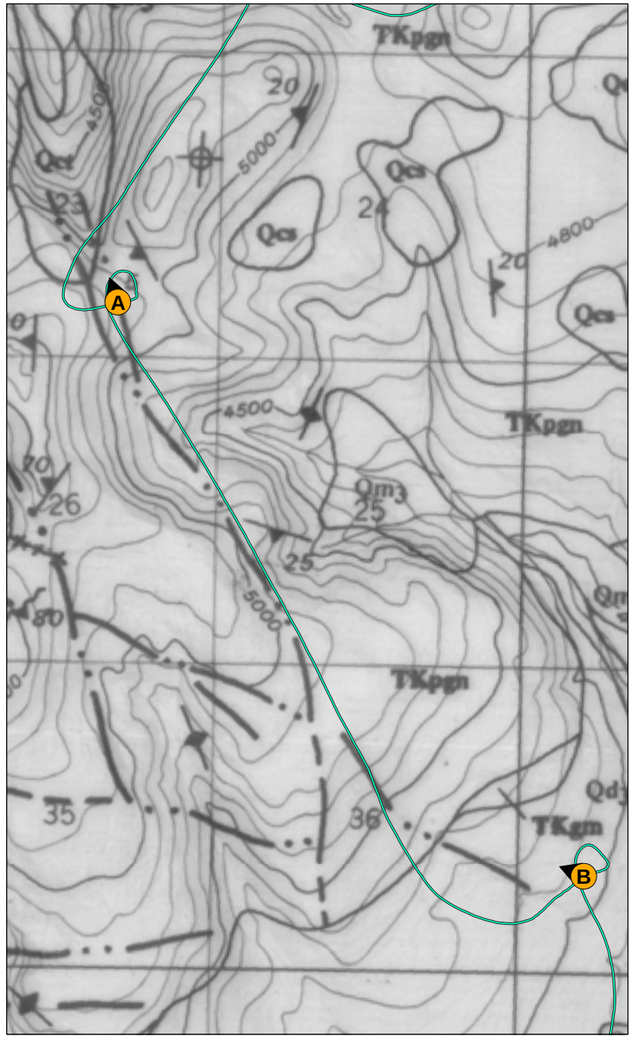
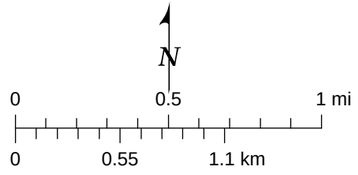
FUGRO Date 10/18/13	STATE OF ALASKA ALASKA ENERGY AUTHORITY ALASKA ENERGY AUTHORITY	SUSITNA-WATANA HYDROELECTRIC PROJECT FEATURES 22 AND 23 LINEAMENTS ANALYSIS REGER ET AL. (1990)	FIGURE B-14b







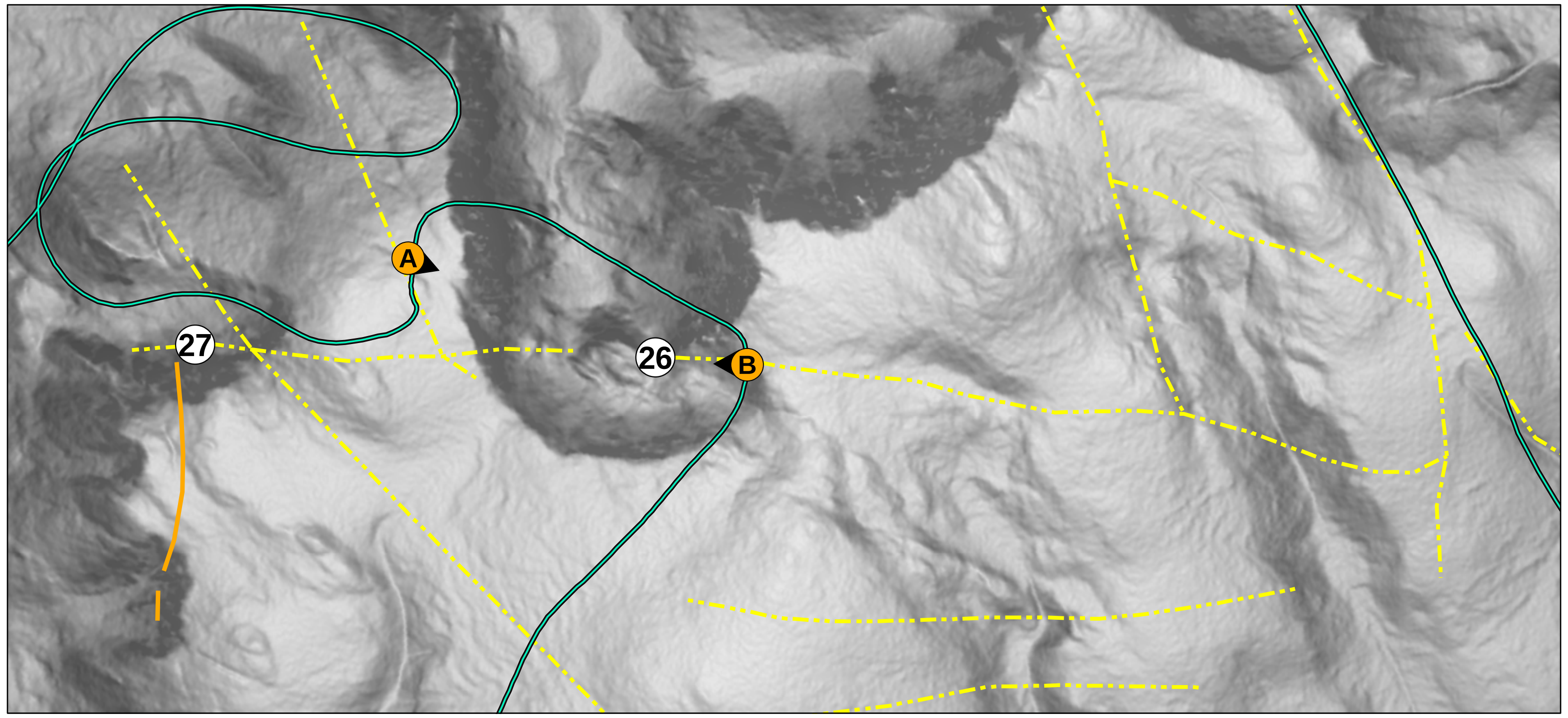
A)

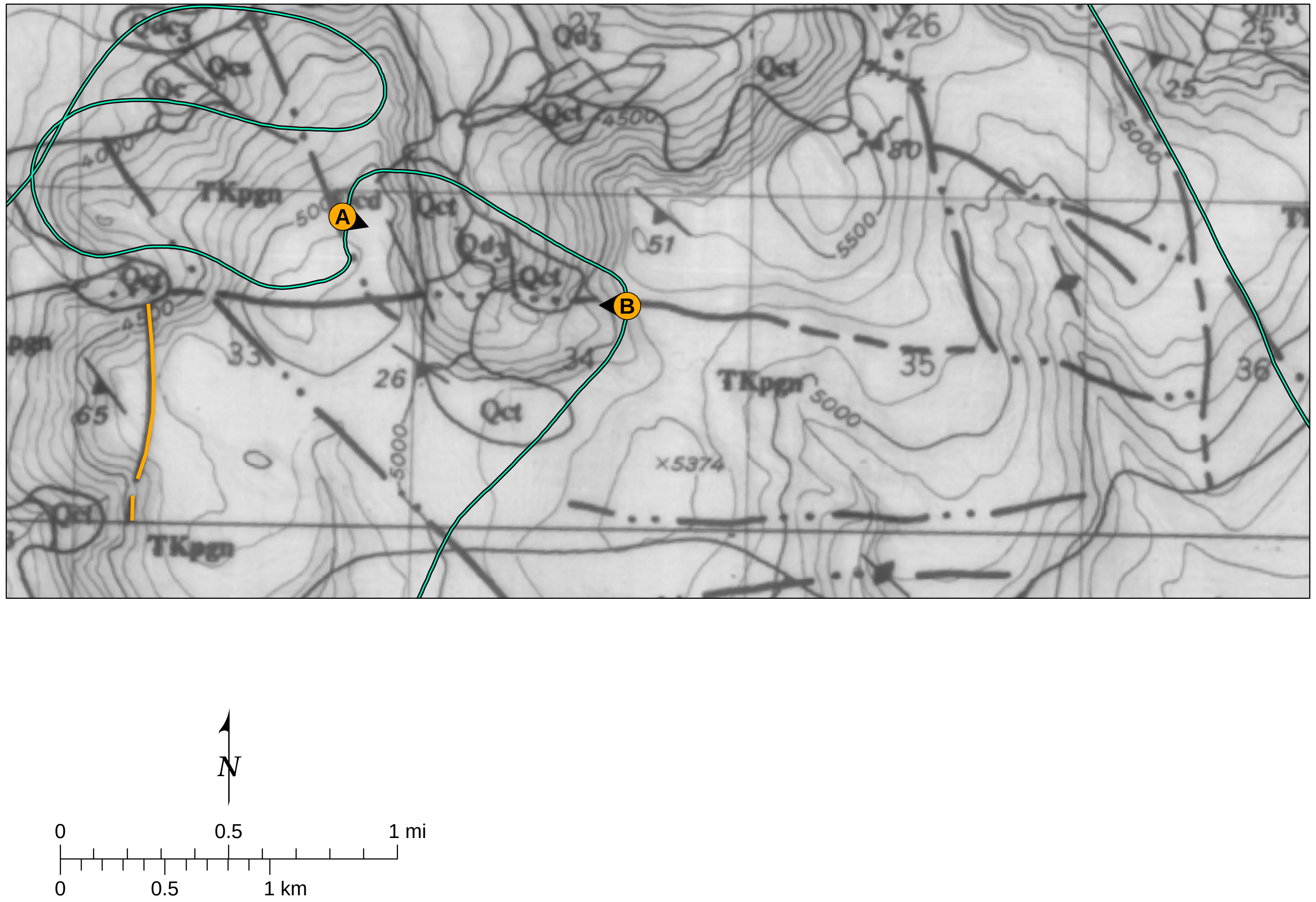
View looking west from photograph location C. Arrows indicate the projected path of the Feature 24 lineament.

B)

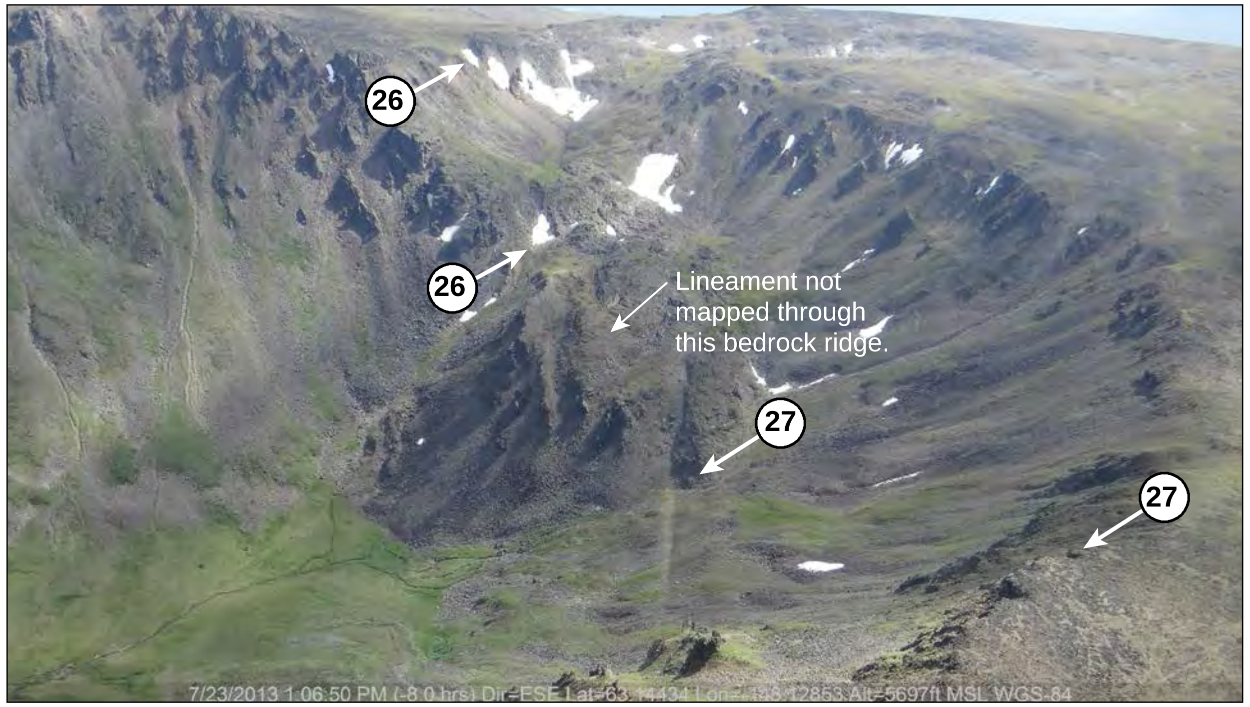
View looking west from photograph location C. Arrows indicate the projected path of the Feature 25 lineament.

FUGRO Date 10/18/13	STATE OF ALASKA ALASKA ENERGY AUTHORITY ALASKA ENERGY AUTHORITY	SUSITNA-WATANA HYDROELECTRIC PROJECT FEATURES 24 AND 25 LINEAMENTS ANALYSIS REGER ET AL. (1990)	FIGURE B-15



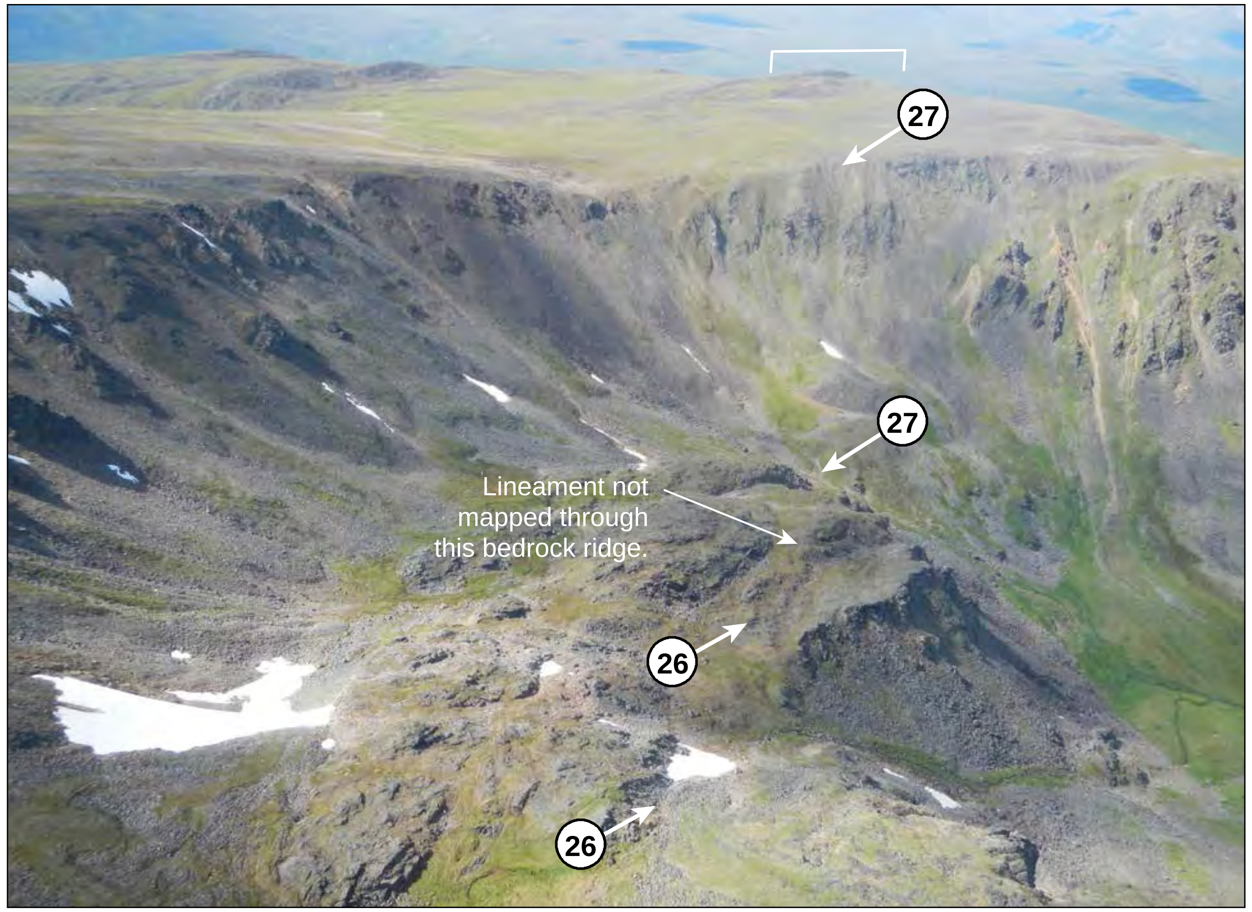


A)



View looking west from photograph location A. Arrows show the projected trace of Features 26 and 27. Note the absence of a continuous and clear lineament along projected traces.

B)



View looking east from photograph location B. Arrows and brackets indicate the projected path of Feature 26 and 27 lineaments. Note the absence of a continuous and clear lineament along projected traces.

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SUSITNA-WATANA HYDROELECTRIC PROJECT
FEATURES 26 AND 27
LINEAMENTS ANALYSIS
REGER ET AL. (1990)

FIGURE
B-16

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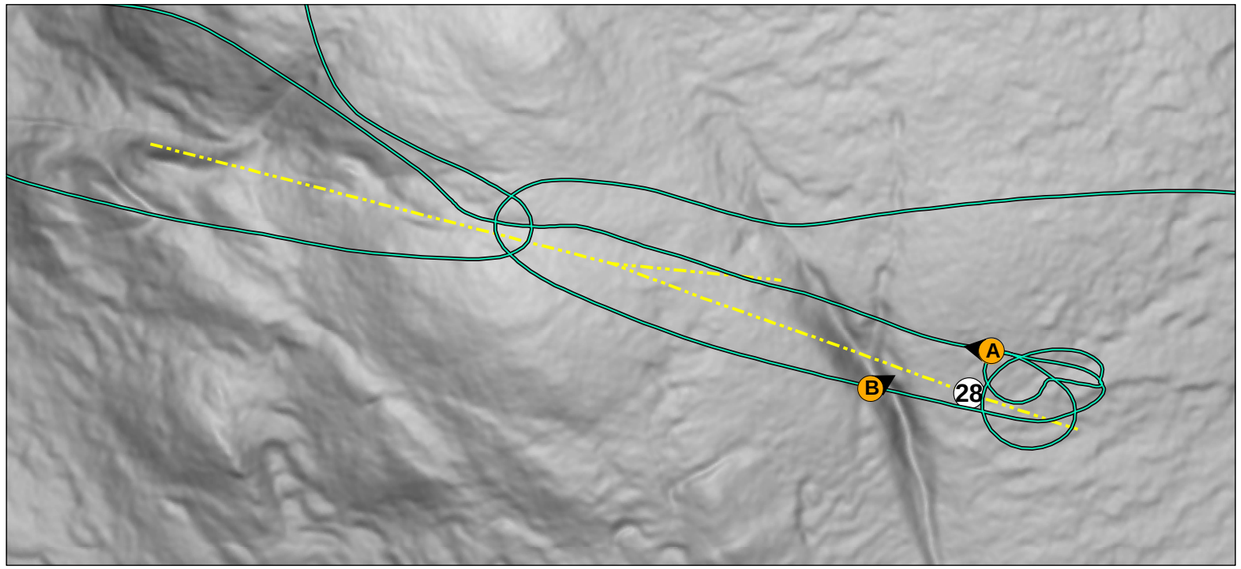
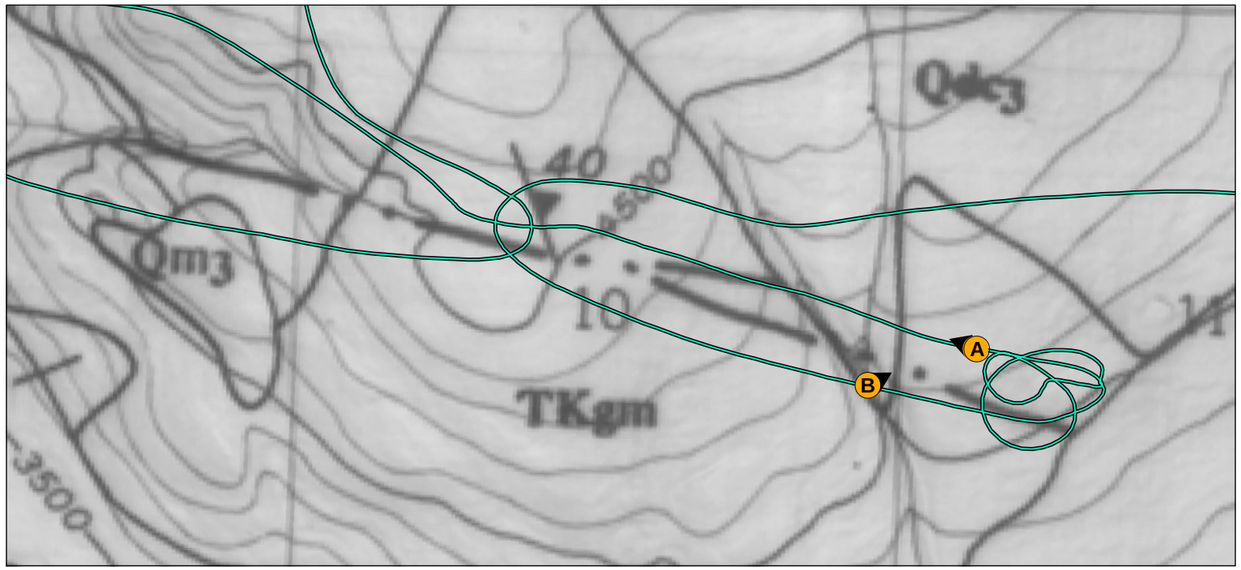
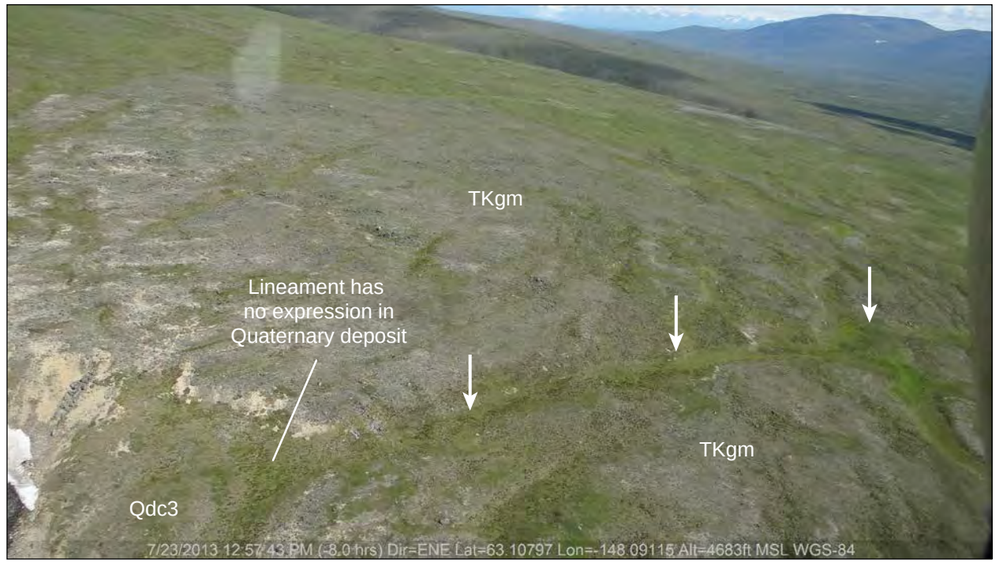


A)

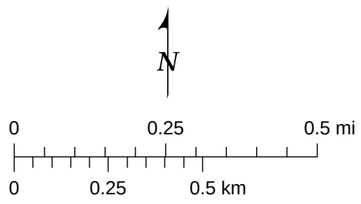
View looking west-northwest from photograph location A. Arrows show mapped trace of Feature 28. Note lineament corresponds to subtle linear trough and linear vegetation trend.



B)



View looking east from photograph location B. Arrows indicate the mapped trace of Feature 28. Note absence of linear expression in Quaternary deposits.



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FUGRO Date 10/18/13	STATE OF ALASKA ALASKA ENERGY AUTHORITY ALASKA ENERGY AUTHORITY	SUSITNA-WATANA HYDROELECTRIC PROJECT FEATURE 28 LINEAMENTS ANALYSIS REGER ET AL. (1990)	FIGURE B-17

Appendix C:

Final Luminescence Age Report, Prepared by Utah State University Luminescence Laboratory

USU LUMINESCENCE LABORATORY
http://usu.edu/geo/luminlab
1770 North Research Parkway, Suite 123, North Logan, Utah 84341

Project: **Susitna-Watana Dam, AK** Project: **204**
Scientist: **Dean Ostenaa, Fugro Consultants** Report date: **March 31, 2015**

Preliminary Luminescence Age Report

Optically Stimulated Luminescence Age Information[1]

Sample num.	USU num.	Depth (m)	Num. of aliquots[2]	Dose Rate (Gy/ka)	D_e[3] ± 2σ (Gy)	OD[4] (%)	*Preliminary* OSL age ± 2σ (ka)
DMC-14-S1-1	USU-1890	0.43	15 (24)	2.49 ± 0.13	34.0 ± 14.2	41.8	**14 ± 6**
DMC-14-S1-2	USU-1891	0.53	17 (24)	2.67 ± 0.14	34.0 ± 3.7[5]	15.7	**13 ± 2**
DMC-14-S1-3	USU-1892	0.85	14 (23)	2.57 ± 0.13	42.8 ± 9.4	14.7	**17 ± 4**
DMC-14-S1-4	USU-1893	1.03	13 (21)	2.44 ± 0.13	37.5 ± 8.4[6]	24.6	**15 ± 4**

[1] Preliminary age analysis using the single-aliquot regenerative-dose procedure of Murray and Wintle (2000) on 2mm small-aliquots of quartz sand.
[2] Number of aliquots used in preliminary age calculation and number of aliquots analyzed in parentheses.
[3] Equivalent dose (D_e) calculated using the Minimum Age Model of Galbraith and Roberts (2012), except where noted otherwise.
[4] Overdispersion (OD) represents variance in D_e data beyond measurement uncertainties, OD >20% may indicate significant scatter due to depositional or post-depositional processes.
[5] D_e calculated using the Central Age Model of Galbraith and Roberts (2012).
[6] D_e calculated using the arithmetic mean.

Dose Rate Information[1]

Sample num.	USU num.	Grain size (µm)	H_2O[2] (%)	K (%)	Rb (ppm)	Th (ppm)	U (ppm)	Cosmic (Gy/ka)
DMC-14-S1-1	USU-1890	125-212	6.1	1.70±0.04	55.5±2.2	6.1±0.6	1.4±1.0	0.19±0.02
DMC-14-S1-2	USU-1891	125-250	20.5	1.74±0.04	55.0±2.2	6.9±0.6	1.8±0.1	0.22±0.02
DMC-14-S1-3	USU-1892	125-250	7.0	1.81±0.05	53.9±2.2	7.4±0.7	1.0±0.1	0.22±0.02
DMC-14-S1-4	USU-1893	90-250	3.3	1.71±0.04	51.4±2.1	6.6±0.6	1.0±0.1	0.21±0.02

[1] Radioelemental concentrations determined by ALS Chemex using ICP-MS and ICP-AES techniques, dose rate is derived from concentrations by conversion factors from Guerin et al. 2011.
[2] *In-situ* gravimetric water content, assumed 6.5±3.0% (average of USU-1890 and USU-1892) for moisture content to represent burial history for USU-1891 and USU-1893.