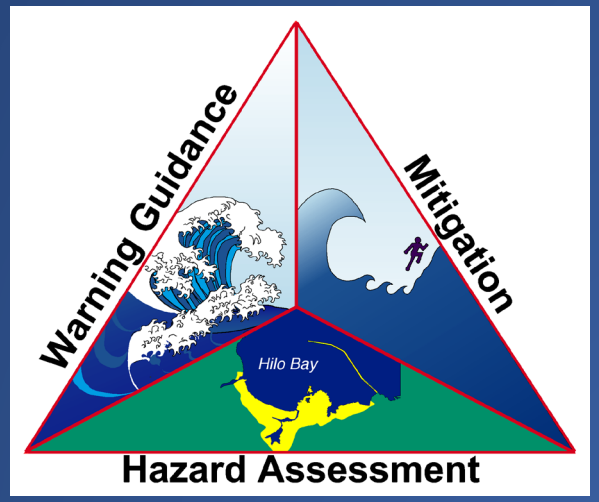


NTHMP: Alaska Tsunami Sources

Barrett Salisbury, PhD

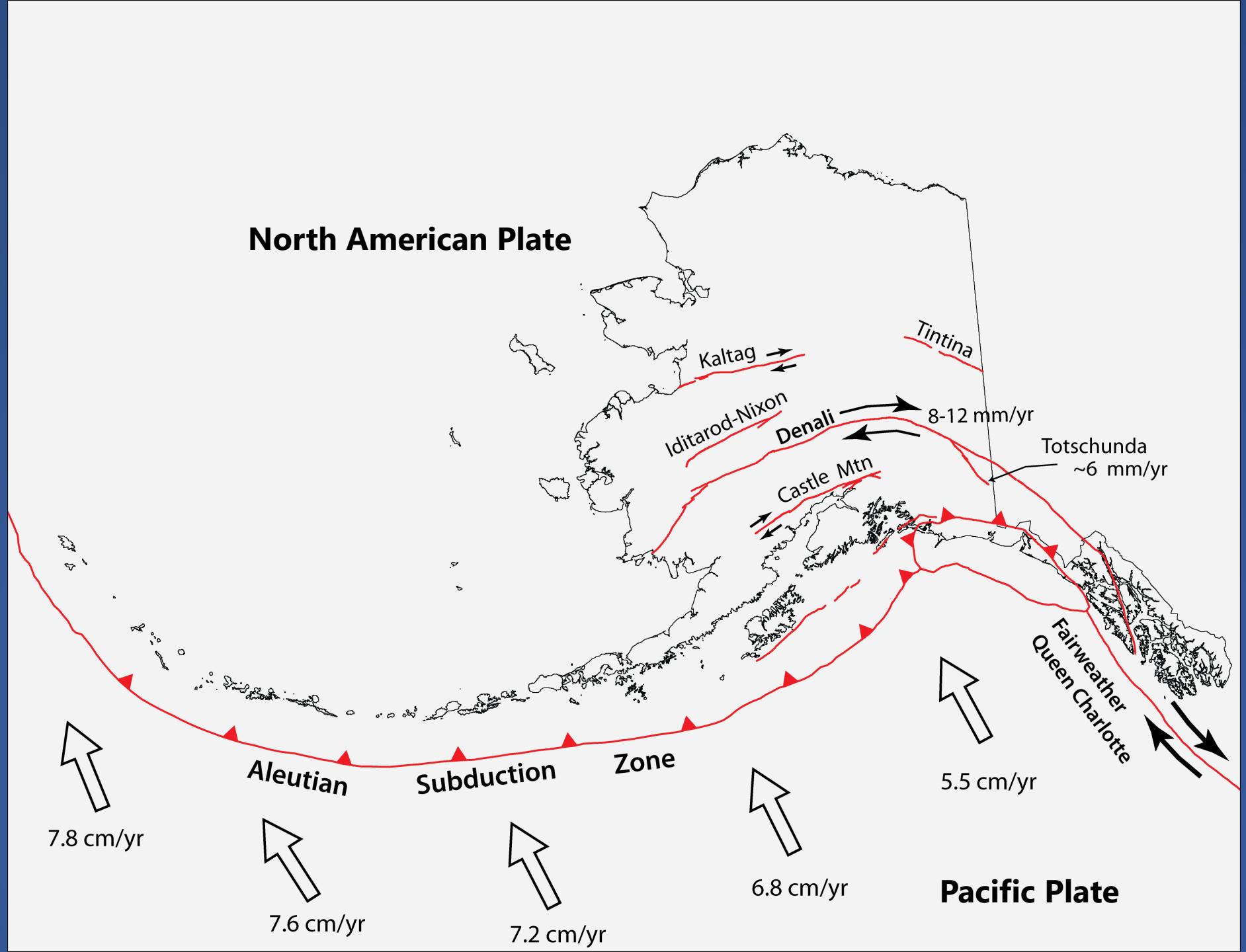
State of Alaska

Division of Geological & Geophysical Surveys

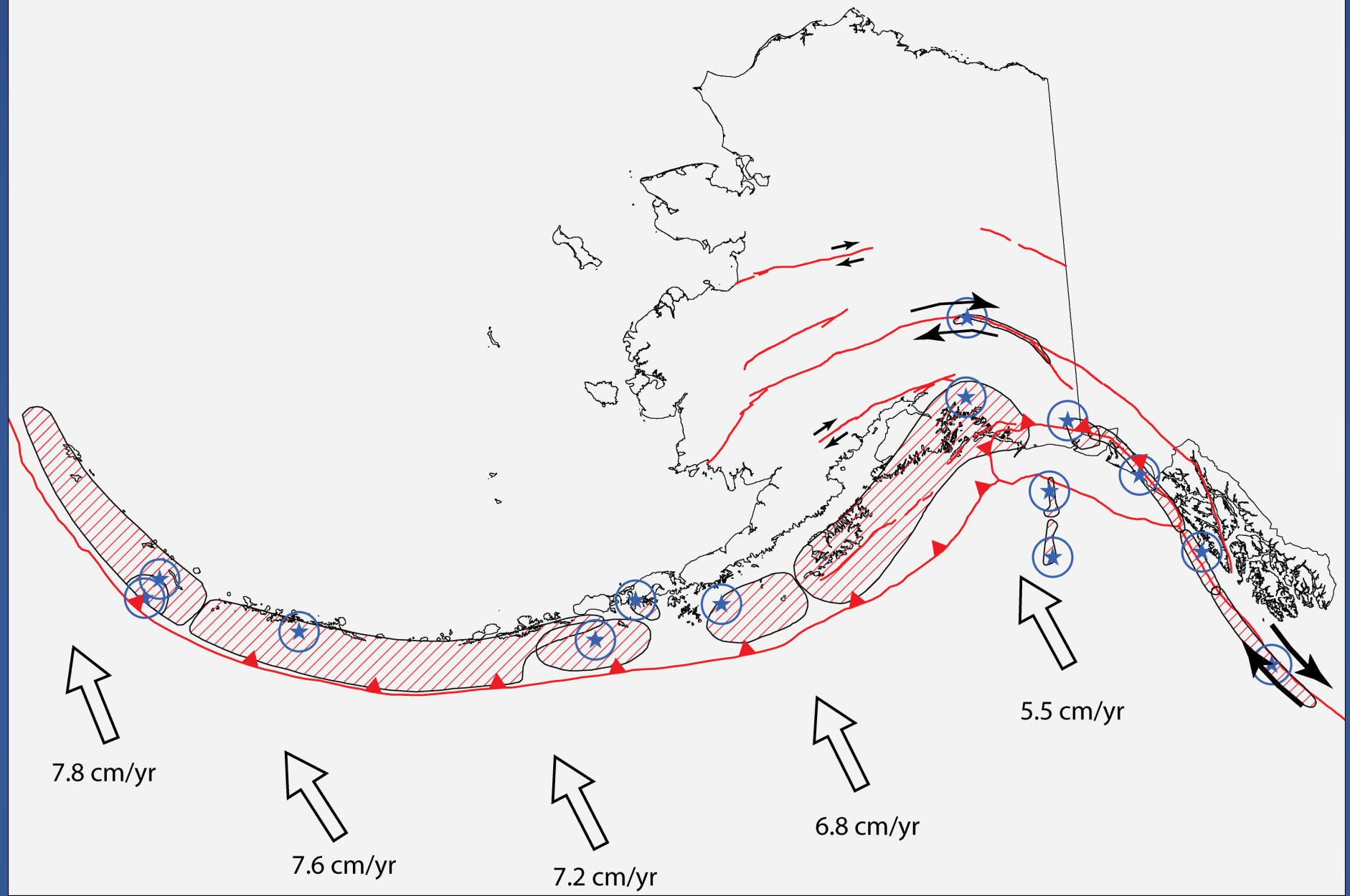
UAF UNIVERSITY OF ALASKA FAIRBANKS ALASKA EARTHQUAKE CENTER

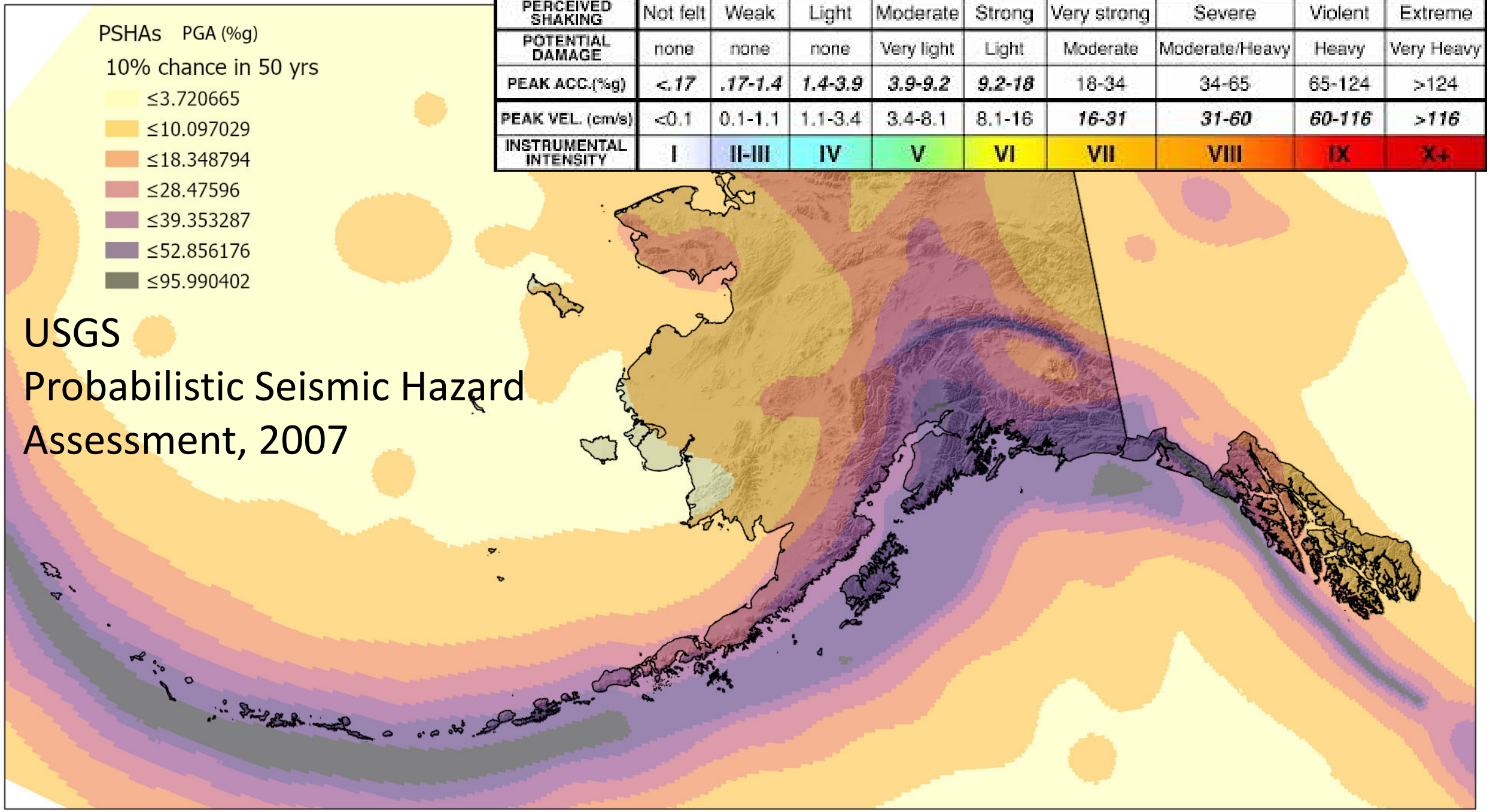
STATE OF ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

STATE OF ALASKA DIVISION OF HOMELAND SECURITY AND EMERGENCY MANAGEMENT


North American Plate
Kaltag
Tintina
Iditarod-Nixon
Denali
8-12 mm/yr
Totschunda
~6 mm/yr
Castle Mtn
Fairweather
Queen Charlotte
Aleutian
Subduction
Zone
7.8 cm/yr
7.6 cm/yr
7.2 cm/yr
6.8 cm/yr
5.5 cm/yr
Pacific Plate

...since 1906




PSHAs PGA (%g)
10% chance in 50 yrs
≤3.720665
≤10.097029
≤18.348794
≤28.47596
≤39.353287
≤52.856176
≤95.990402
USGS
Probabilistic Seismic Hazard
Assessment, 2007
PERCEIVED SHAKING | Not felt | Weak | Light | Moderate | Strong | Very strong | Severe | Violent | Extreme
POTENTIAL DAMAGE | none | none | none | Very light | Light | Moderate | Moderate/Heavy | Heavy | Very Heavy
PEAK ACC.(%g) | <.17 | .17-1.4 | 1.4-3.9 | 3.9-9.2 | 9.2-18 | 18-34 | 34-65 | 65-124 | >124
PEAK VEL. (cm/s) | <0.1 | 0.1-1.1 | 1.1-3.4 | 3.4-8.1 | 8.1-16 | 16-31 | 31-60 | 60-116 | >116
INSTRUMENTAL INTENSITY | I | II-III | IV | V | VI | VII | VIII | IX | X+

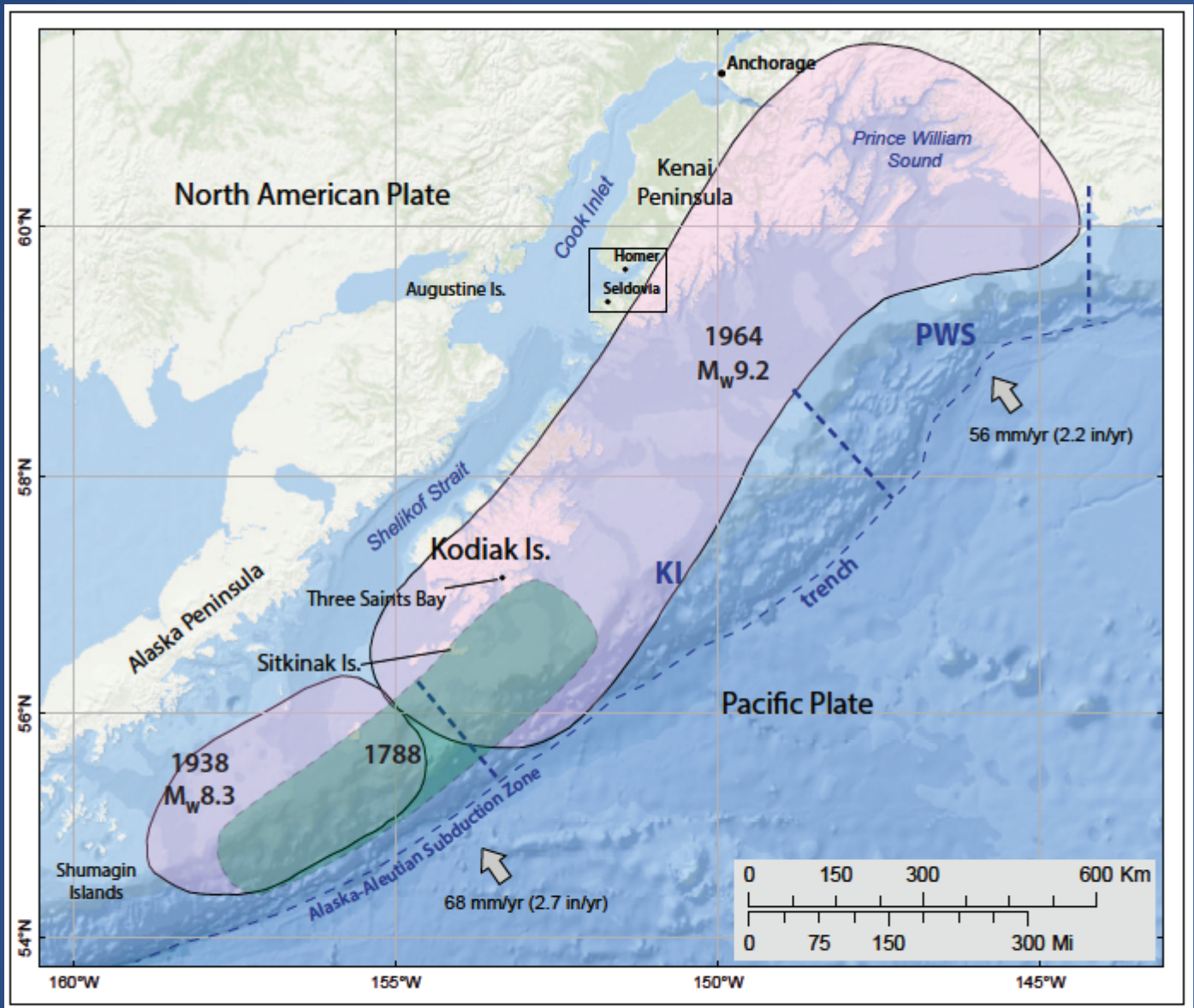


Figure 1. Map of south-central Alaska, showing the location of Kodiak Island, Kenai Peninsula, and the rupture zones of the 1788, 1938, and 1964 Aleutian megathrust earthquakes (shaded areas). The black rectangle marks the area shown in figure 2. KI = Kodiak Island region; PWS = Prince William Sound region.

Report of Investigation 2018-5 v. 2

UPDATED TSUNAMI INUNDATION MAPS FOR HOMER AND SELDOVIA, ALASKA

E.N. Suleimani, D.J. Nicolsky, and J.B. Salisbury

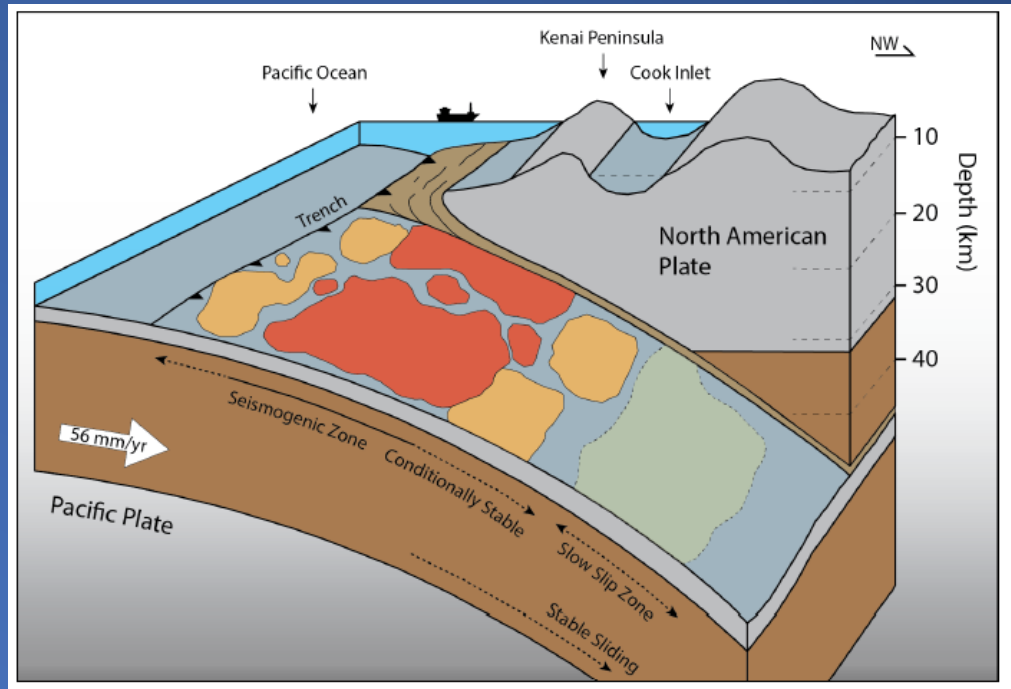


Figure 4. Schematic three-dimensional representation of asperities on a subduction zone plate interface. The colored patches on the plate interface represent three general types of asperities. Red–locked, seismogenic asperities that may rupture independently or in conjunction with other nearby asperities. Orange–conditionally stable, partially locked asperities that may rupture with neighboring seismogenic asperities. Green–deep, slow-slip asperities that may steadily slip, or creep, between earthquake events. Note the depths are for reference and the figure is not to scale.

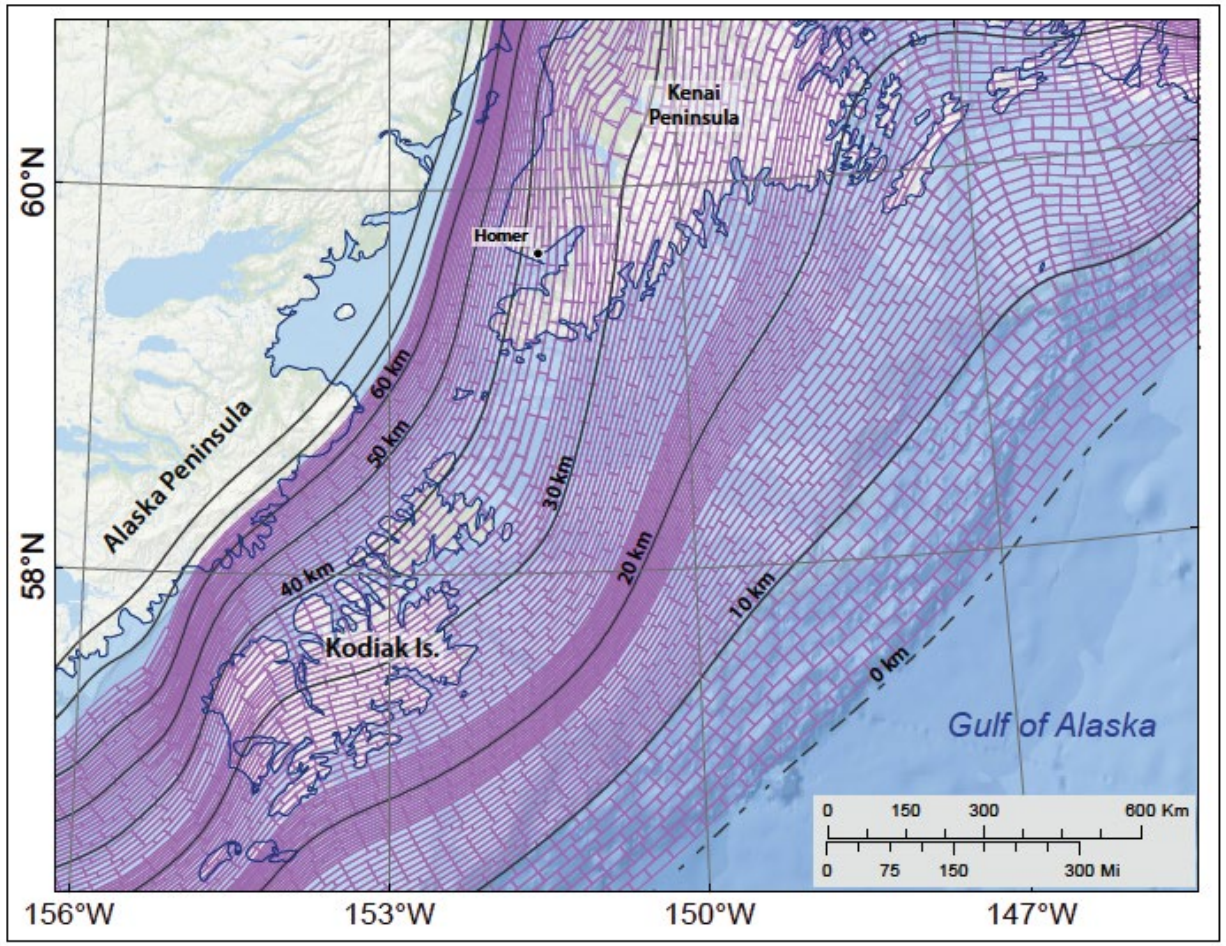


Figure 9B. Discretization of the plate interface used to compute the coseismic vertical displacements with formulae developed by Okada (1985). Black lines mark depth contours (in kilometers) of the plate interface.

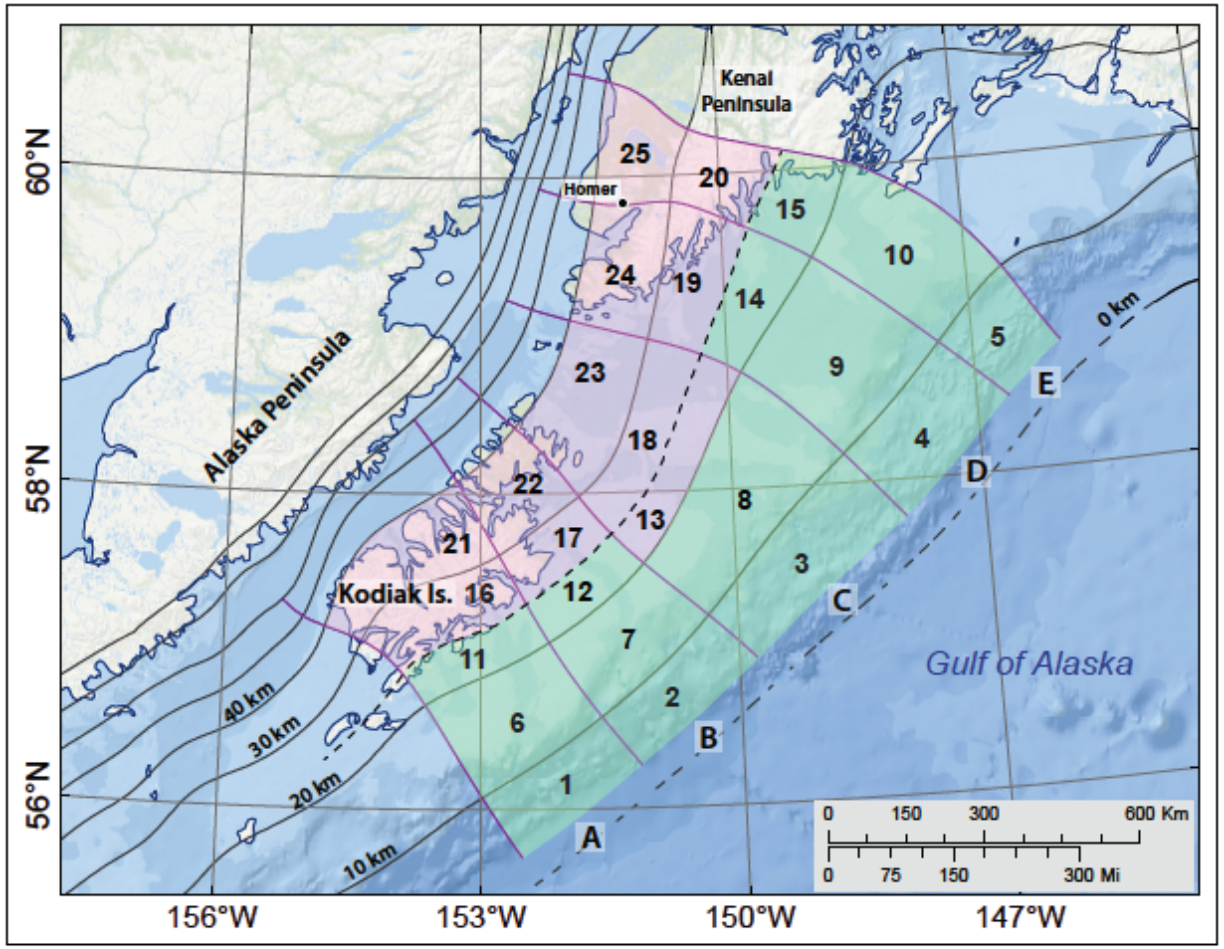
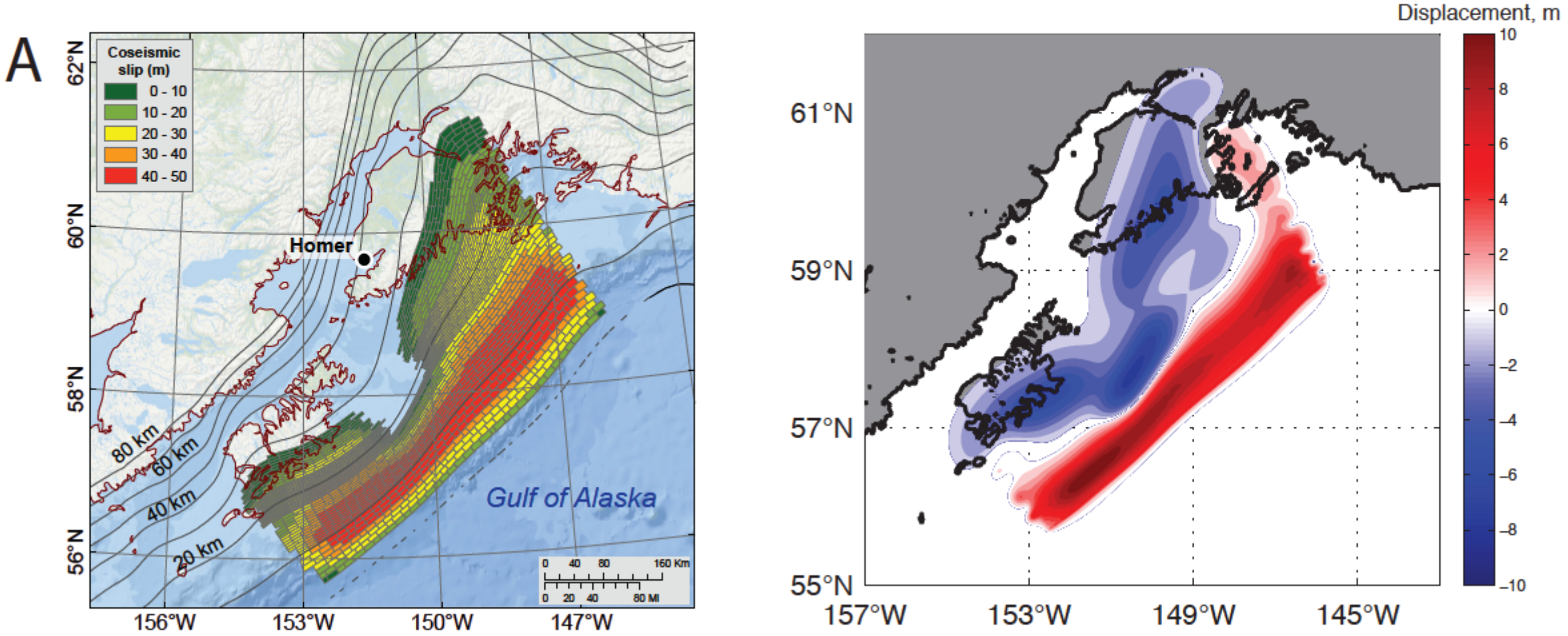


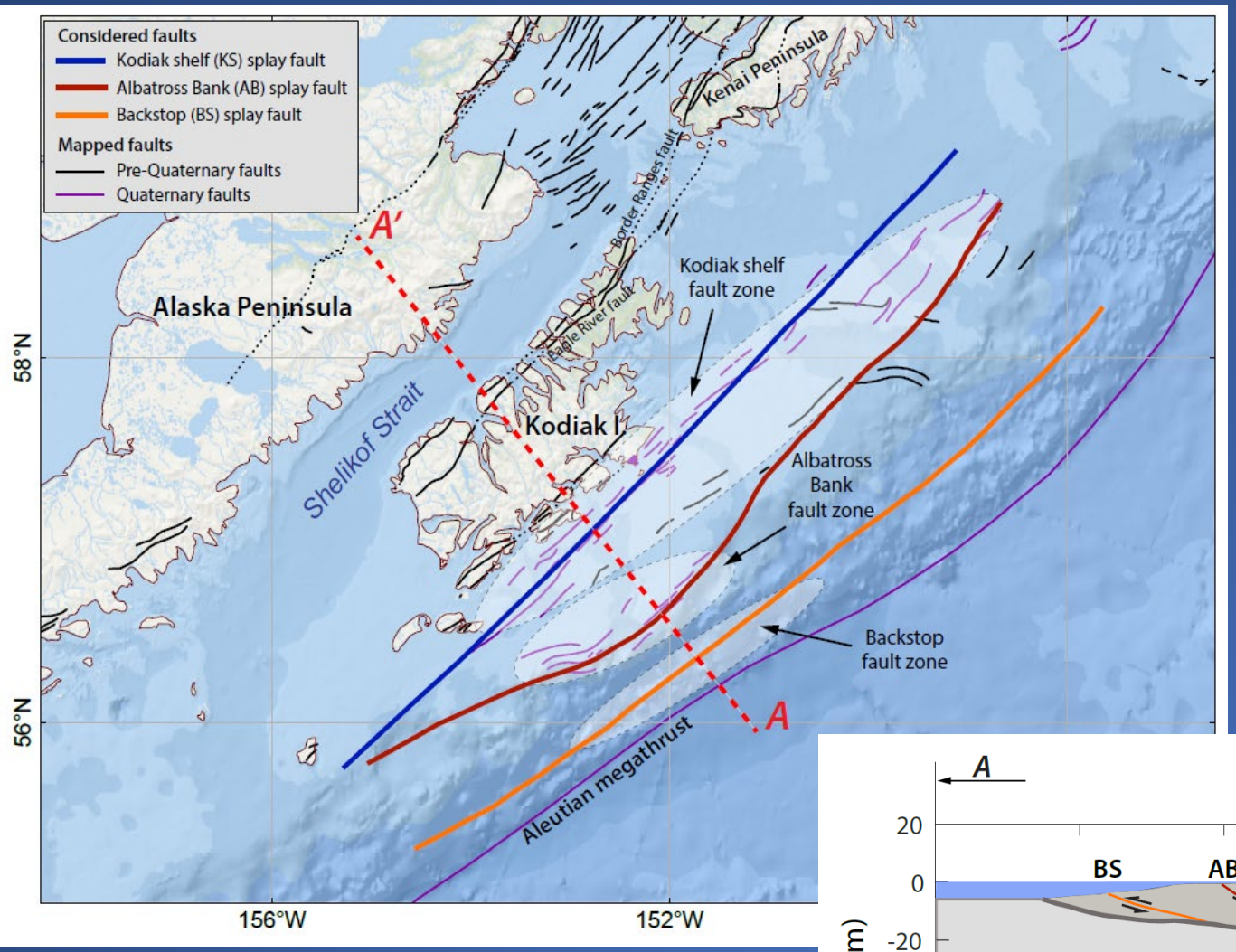
Figure 12. Mosaic of the discretized plate interface used for construction of hypothetical ruptures. Pink shaded area indicate sections that have zero slip in some scenarios due to geodetic constraints.

Suleimani et al., 2019

Scenario 3: M_W 9.2 earthquake in the KI-KP region: Predominantly shallow slip with maximum slip at a depth of 5–15 km (3.1–9.3 mi)



Suleimani et al., 2019



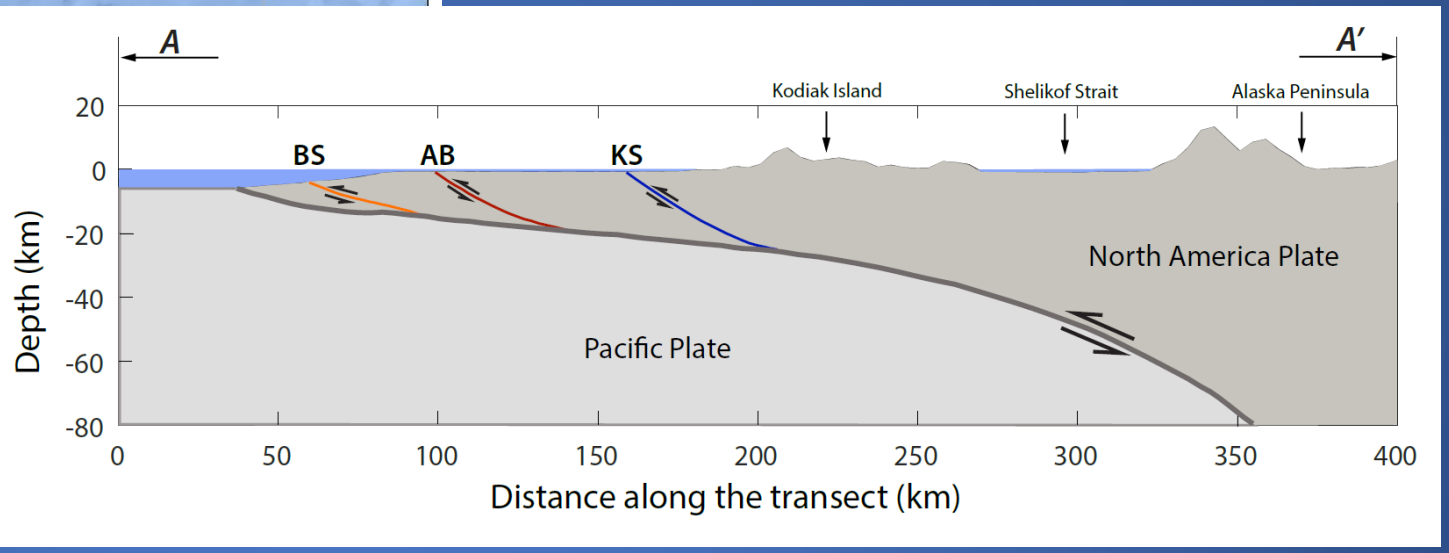
Suleimani, Nicolsky, and Salisbury, *in press*

Research Article | Open Access

The Alaska Convergent Margin Backstop Splay Fault Zone, a Potential Large Tsunami Generator Between the Frontal Prism and Continental Framework

Roland von Huene, John J. Miller, Anne Krabbenhoeft

First published: 13 December 2020 | https://doi.org/10.1029/2019GC008901



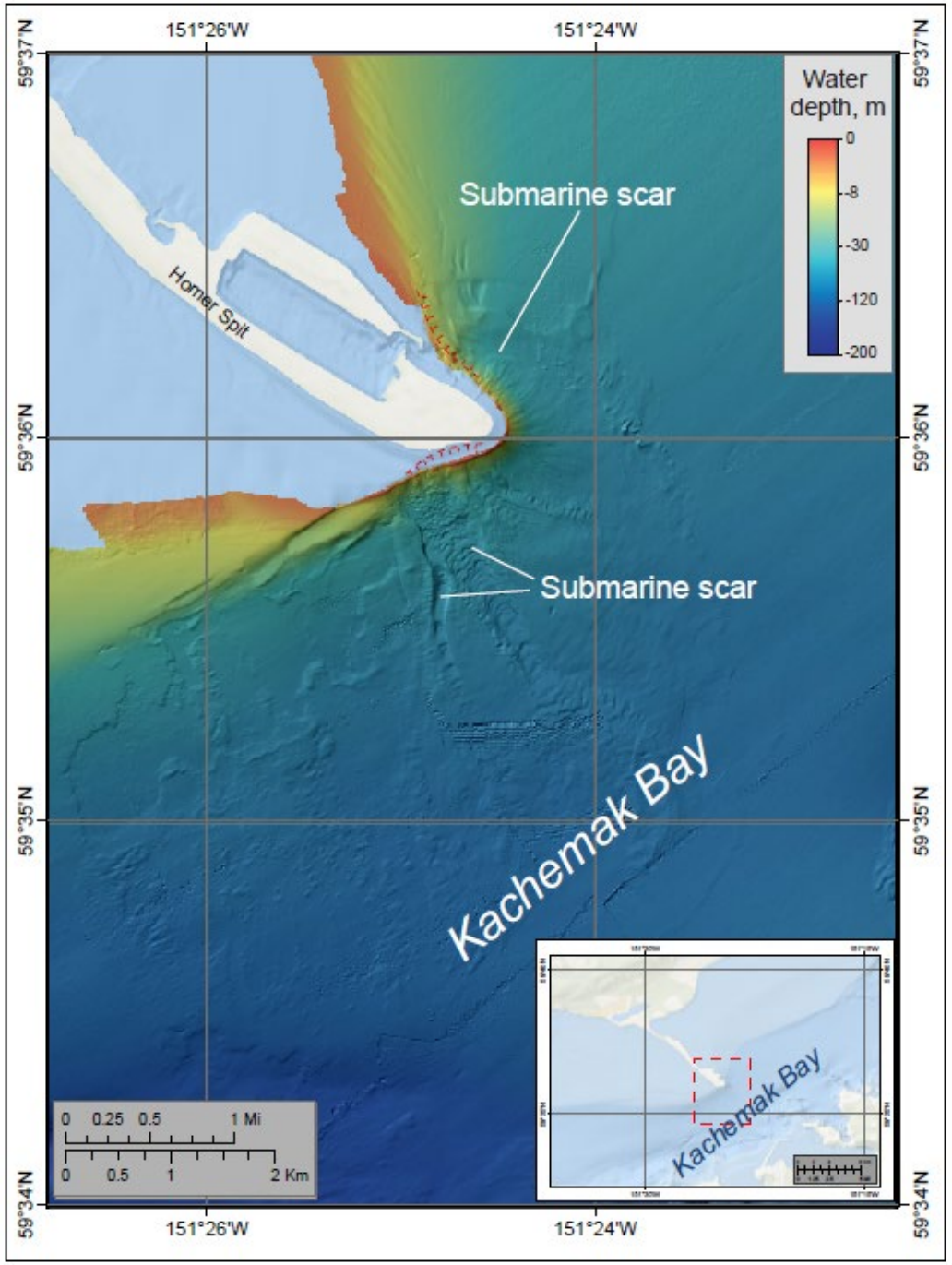


Figure 7A. Bathymetric map of Kachemak Bay around the tip of Homer Spit, showing submarine landslide scars.

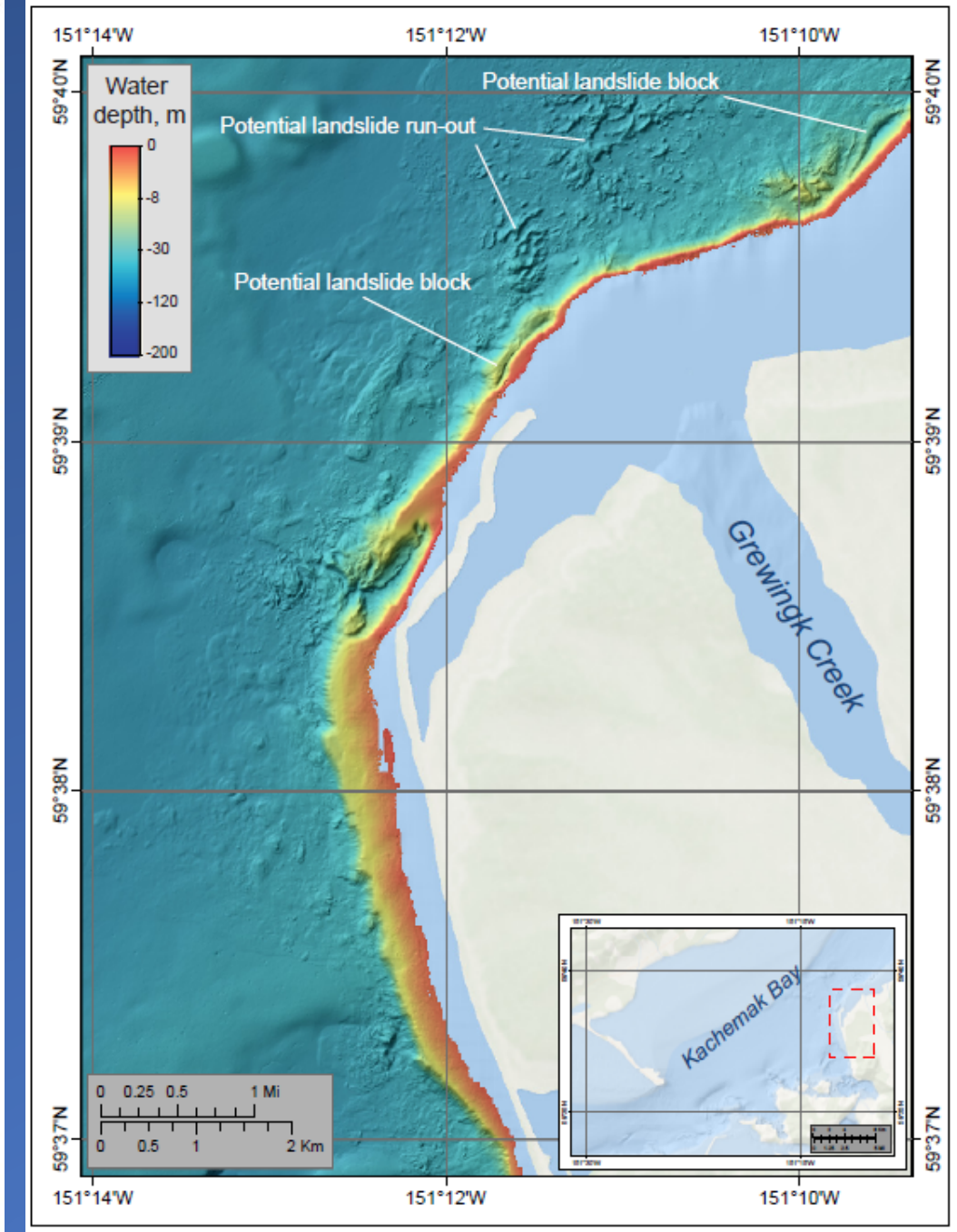
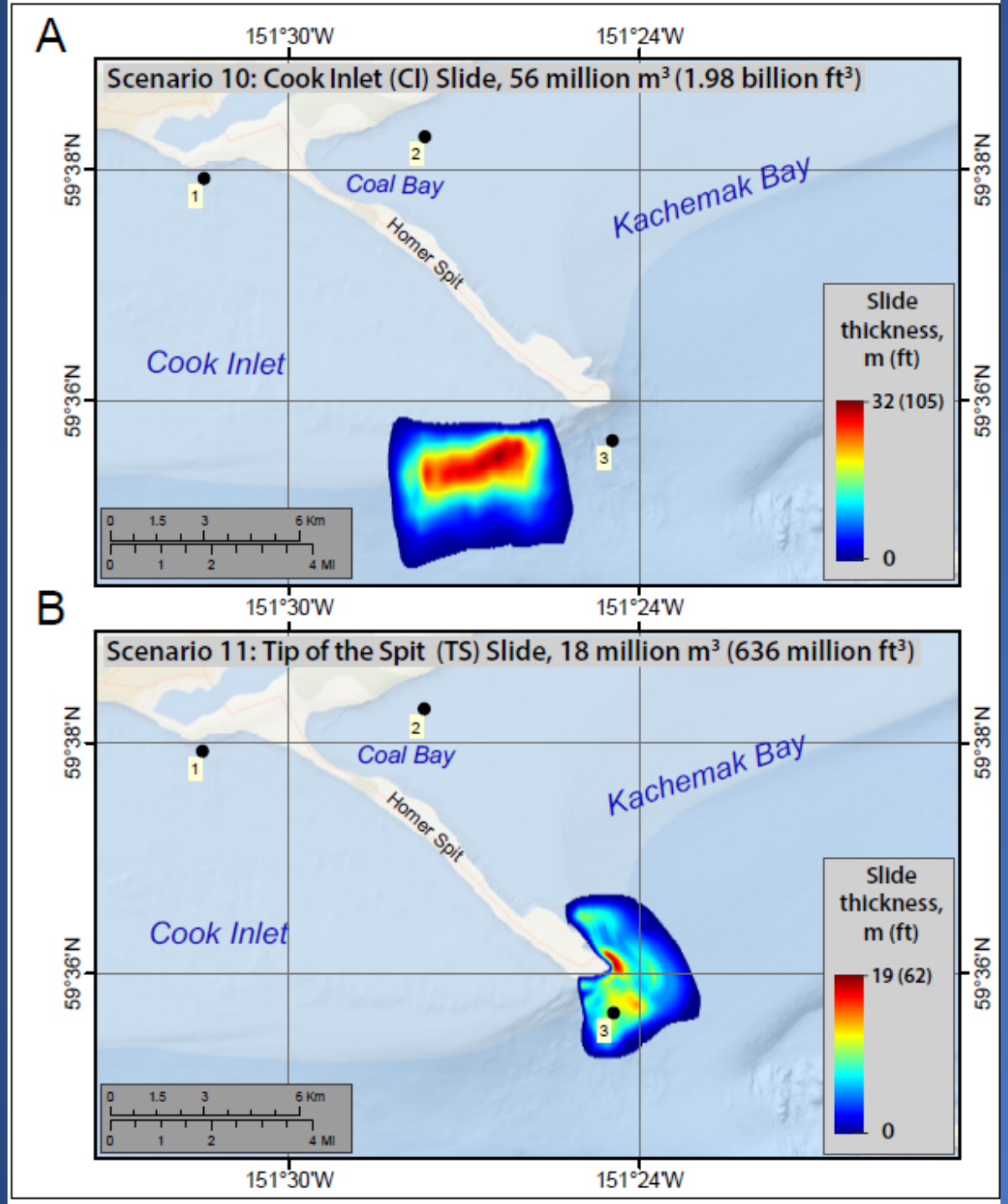
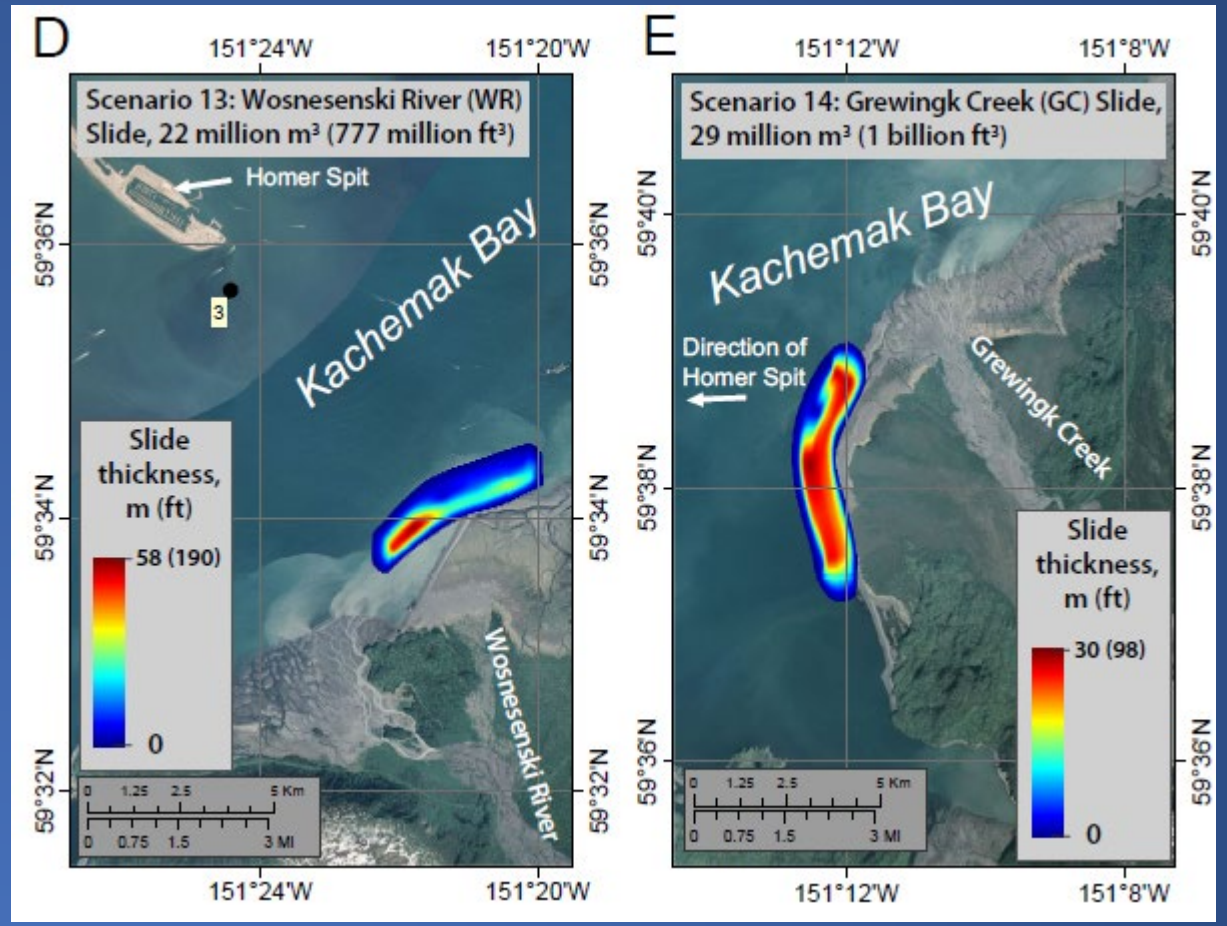


Figure 7B. Bathymetric map of Kachemak Bay in the area of Grewingk Creek, across the bay from Homer. Bathymetric irregularities include hummocky ocean bottom and potential landslide blocks.

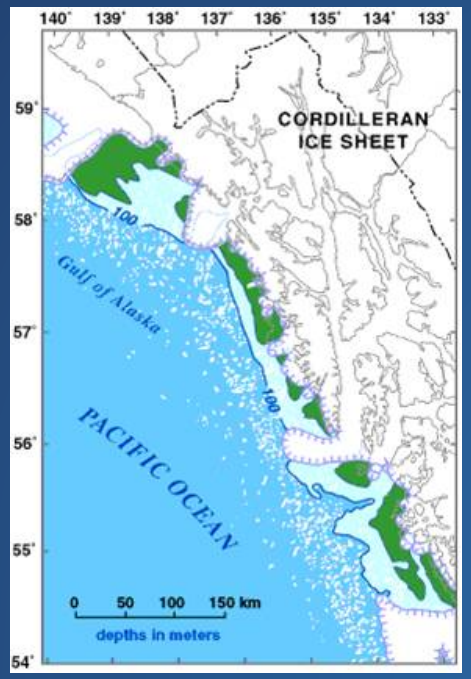
Suleimani et al., 2019





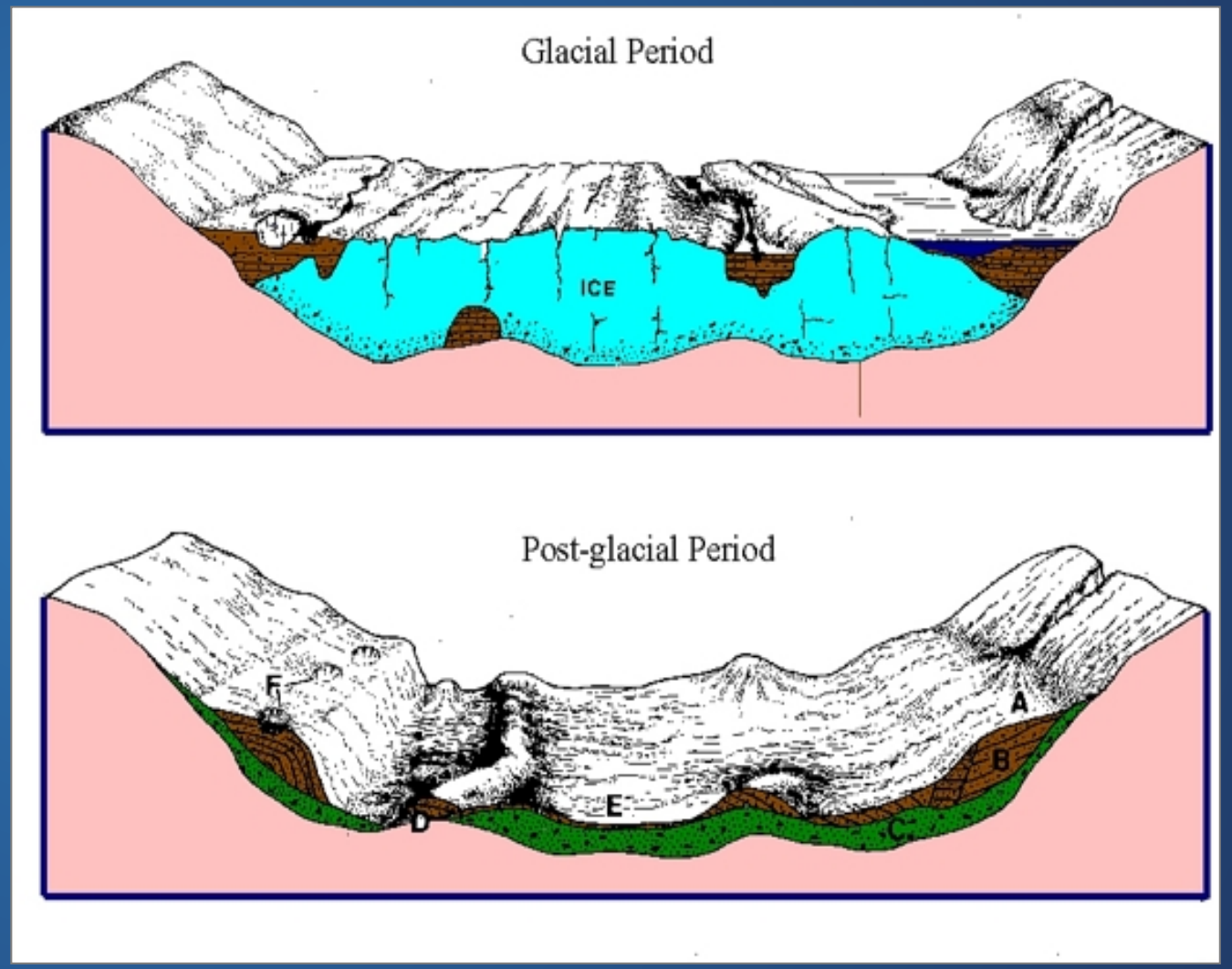
Suleimani et al., 2019

Glacial rebound in Southeast Alaska: Stress fractures and rockfall



18,000 – 23,000 Years Ago

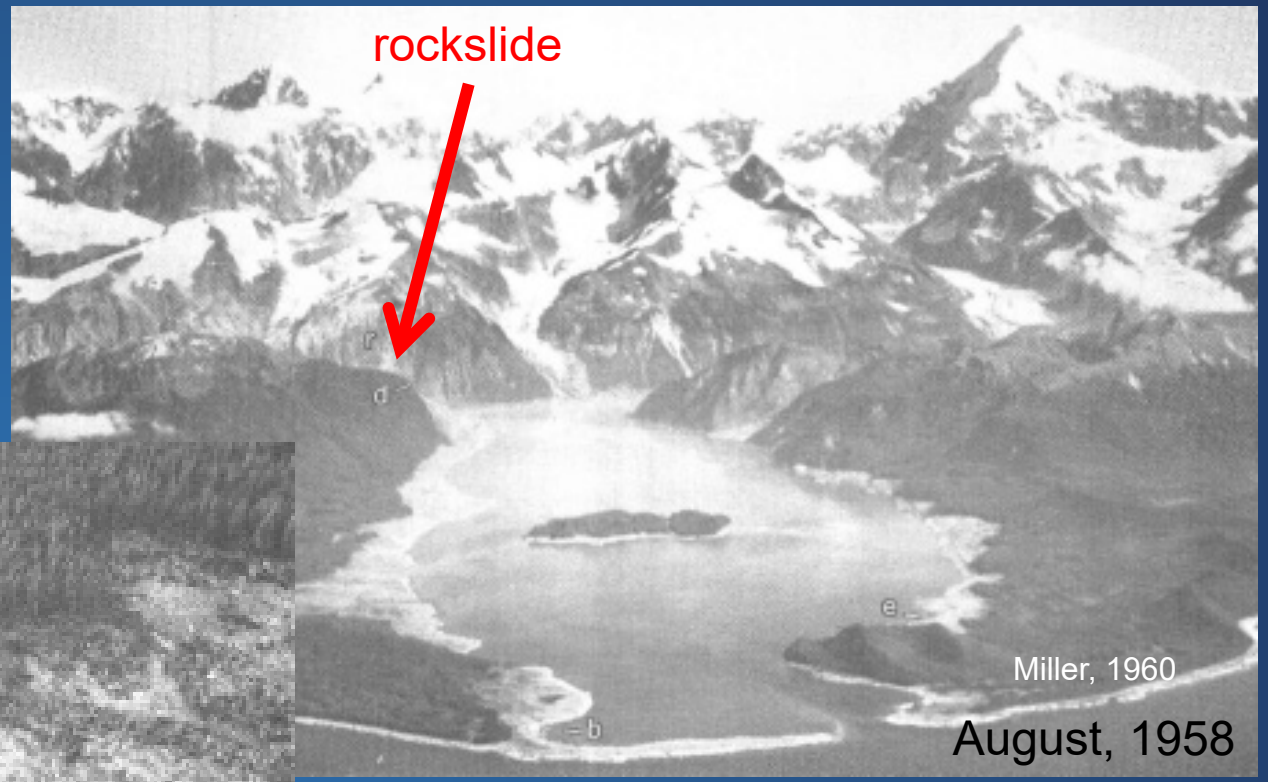
Now



Giant waves in Lituya Bay, AK

Shaking during M 7.8 1958 earthquake on Fairweather fault.

Max wave height 1,720 ft



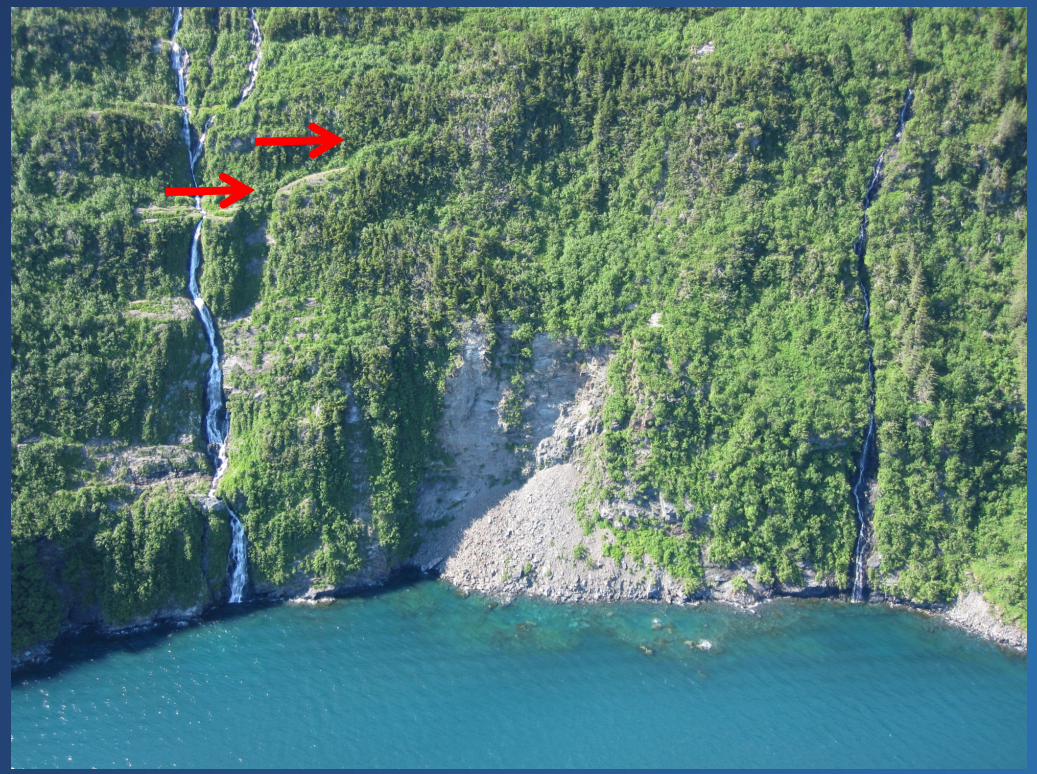
Note trees with limbs and bark removed

Unstable rock wall, Whittier, AK

Report of Investigations 2011-7
Version 1.1

TSUNAMI INUNDATION MAPS OF WHITTIER AND WESTERN PASSAGE CANAL, ALASKA

by
D.J. Nicolsky, E.N. Suleimani, R.A. Combellick, and R.A. Hansen



Max red arrow height ~120 m asl

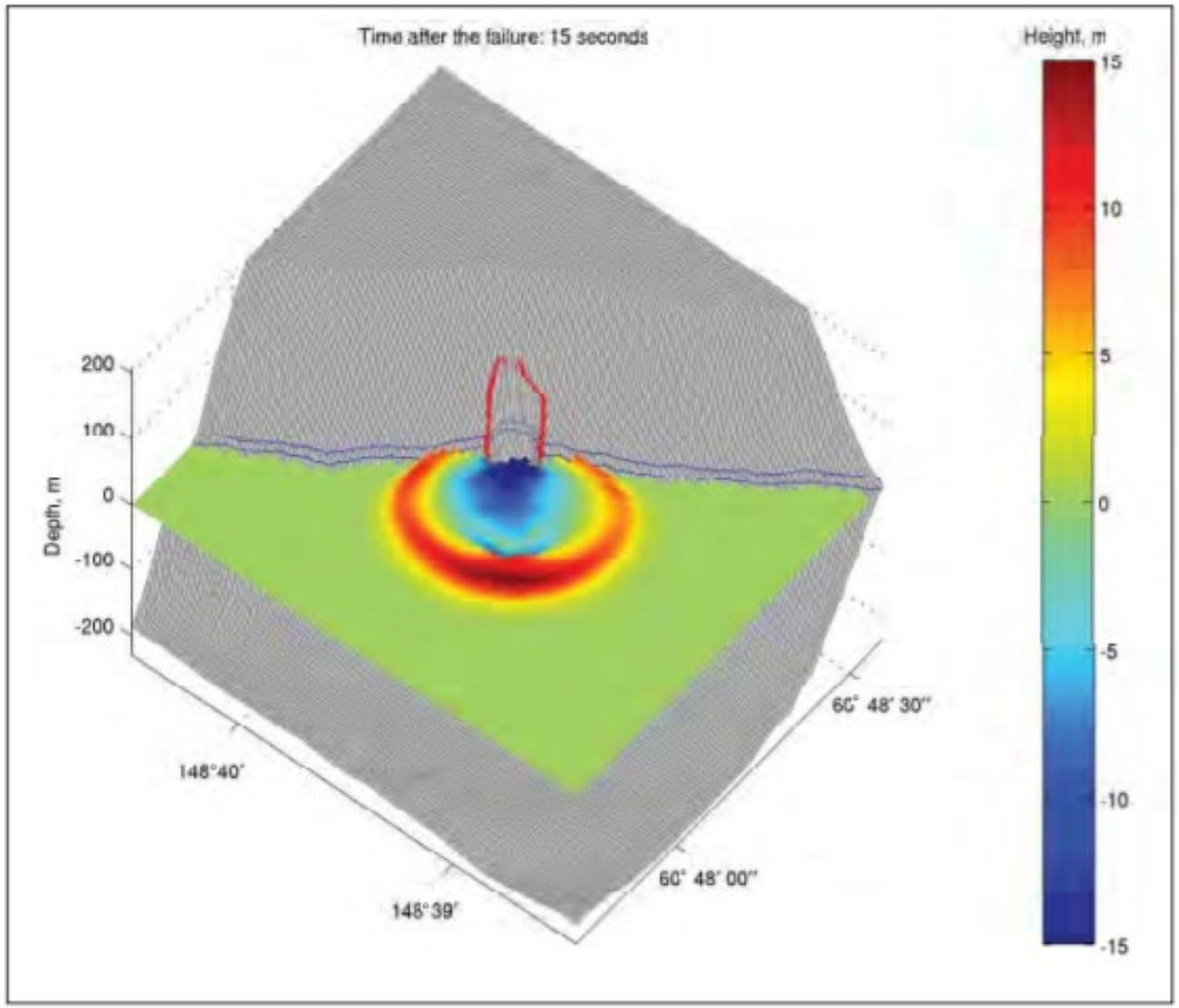


Figure B-6: *Numerically modeled wave leaving the splash zone 15 seconds after the rockfall failure. The extent of the rockfall is marked by a red line. The blue lines correspond to 0 and 10 m (33 ft) elevations above the sea level. The DEM corresponds to the present-day MHHW datum. For the sake of visualization, the elevations are cut at the 200 m (660 ft) level.*

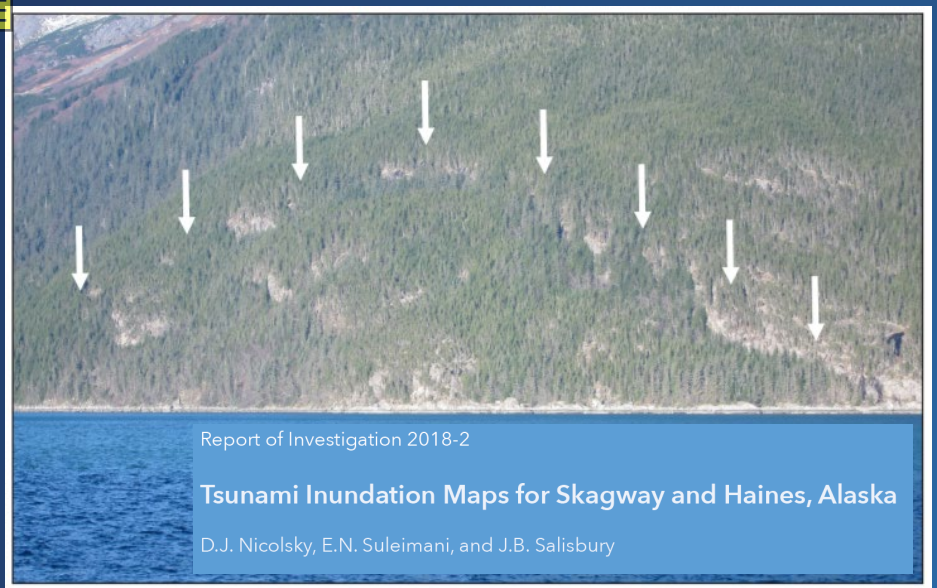
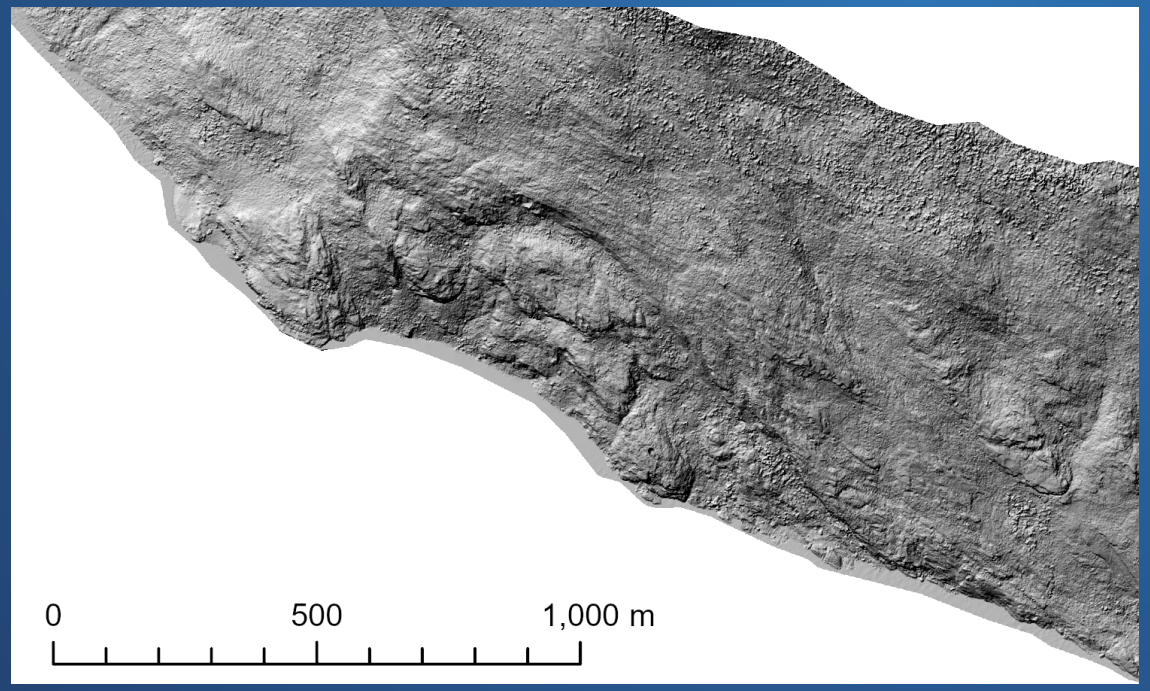


Figure 4C. A potentially unstable rock slump as seen from the Alaska Marine Highway Terminal in Lutak Inlet near Haines.

December 2020, Haines, AK
emergency reconnaissance



Barry Arm Landslide and Tsunami Hazard

Status Report: Updated May 21, 2021

Summary

The interagency science team reports no changes to the landslide that warrant a change in status for the past several months. The potential landslide and tsunami threat remain present and unchanged. Planning is underway for summer fieldwork to evaluate the landslide and its potential for failure and to improve the interagency surveillance program.

Updates

- Aerial reconnaissance on May 13 confirmed that the Alaska Earthquake Center (AEC) seismic station located on the Barry Arm slide was destroyed in late April. The most probable cause was a snow avalanche. The seismic station and webcam across the fjord remain under heavy snow load. We anticipate the return of these data once the solar panels are fully exposed and the system has time to recharge.
- Previous updates have been archived here

Photo courtesy of Katreen Wikstrom Jones, DGGS, May 13, 2021.

News & Resources

- Barry Arm Landslide Status
- Barry Arm Info & FAQ
- Barry Arm News & Resources
- Barry Arm Previous Updates

Contact Information

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Palmer, AK 99645
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Twitter: @NWS_NTWC
Facebook: facebook.com/nwsntwc

https://dggs.alaska.gov/hazards/barry-arm-landslide.html