SEISMIC NETWORK OPERATIONS IN ALASKA

Final Project Report

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Abstract

AEIC and AVO jointly operate, record and analyze data from ~500 seismic stations, with ~800 channels of seismic data throughout Alaska and neighboring areas of Canada and Russia. Part of the operation and maintenance of the network is supported by USGS/NEHRP. At the end of the reporting period, the seismic network contained numerous short-period seismic stations, 83 accelerometers, 66 broadband stations, and the associated receiving and telemetry systems. Many of these stations are in remote areas with extreme climatic conditions and can only be reached by helicopter, after the snow has melted. The major thrust of this work is to provide continued operation of the south Alaska seismic network together with the routine analysis of the combined network data

Investigations Undertaken

Seismicity

For the period between May 1, 2004 and January 30, 2007 AEIC reported a total of 51,729 events within the combined seismic network. Seismicity in the western Aleutian arc and Bering sea is supplemented by teleseismic locations in cooperation with NEIC. A map of all reported events is shown in Figure 1. The events range in depth from 0 to 310 km (Figure 2), with the deepest earthquakes located in the central Aleutian Arc. Figure 3 shows a cross-section across Cook Inlet region in south-central Alaska illustrating a typical WBZ seismicity distribution in the region. The magnitude range of reported events is between -0.3 and 6.8. There were 853 events with magnitude 4.0 or above (~26 events per month on average) and 111 events with magnitude 5.0 or above (~3 events per month on average). Nine events had magnitudes M_W 6.0 or above. The largest earthquakes (M_W 6.8) occurred on June 28, 2004 in the Queen Charlotte Islands region of Alaska and on June 14, 2005 in the Rat Islands region of Aleutian Islands. The AEIC continued recording the 2002 M_W 7.9 Denali Fault earthquake aftershocks and located ~6,540 aftershocks within the reported time interval (~200 per month, the largest aftershock m_b=5.0). Figures 4a and 4b illustrate the frequency-magnitude relation for the earthquakes located in the core network area of the mainland Alaska and in the Aleutian Islands region, respectively. From this relation, the magnitude of completeness of the AEIC earthquake catalog for the reported time period is estimated to be 1.4 for the network core area and 2.5 for the Aleutians.

Earthquake Sources

The AEIC routinely determines P-wave first motion focal mechanisms for earthquakes with ML>=3.5 located within the network core area. There are 342 first motion focal mechanisms for this time period; the largest event is M_W=5.4 in northern Alaska, the deepest event is at 224 km depth in the Alaska Peninsula region (Figure 5). Regional seismic moment tensors are also determined for earthquakes with M_W>= 3.8 in the mainland Alaska and M_W>=4.0 in the Aleutians, depending on the data availability and broad-band station coverage. The AEIC determined a total of 148 moment tensors for this time period with the largest event of M_W=6.7 in the Queen Charlotte Islands region (Figure 6). An example of the moment tensor output with waveform fits is shown in Figure 7 for a M4.3 event in Southern Alaska.

2004-2006 Field Work

AEIC maintains about nearly 200 sites throughout Alaska. Many are remotely powered with telemetry. We made about 400 site-visits during the three years. This included routine maintenance, the addition of 27 new stations, closing four and upgrading several.

Upgrading included: hardening the sites by installing huts, redundant solar power systems, back-up primary batteries. At several sites we replaced or added the old analog short period stations with broad-band digital systems. Many of the older analog short period sites required radio upgrades to comply with the new narrow-band FM standards. Several of these had VCO upgrades to the more modern, non-gain ranging McVCO.

We added to the "nodes" in Kenai, Homer, Anchorage, Palmer and Valdez where the analog data is digitized, time-tagged and appropriately formatted for transmission over "high capacity DDS circuits" or over the internet.

The telemetry system includes about 50 Freewave digital radio links, 50 VHF/UHF analog radio links, 31 leased analog, 8 digital telephone circuits, 3 DSL and 3 VSAT satellite earth-stations, .We also use internet at several village schools and leverage the University of Alaska's intranet services at some of the "nodes".

Implementation of ShakeMap System at AEIC

The ShakeMap (SM) system is in the final stages of testing at AEIC. The real-time SM production is controlled by the Antelope seismic monitoring system. A SM generation sequence is triggered once a new SM-eligible event appears in the event database. This database receives automatically generated hypocenters as well as analysts-reviewed solutions from AEIC, NEIC and WCATWC. An association algorithm maintains the consistency of event identification numbers in the database.

A SM is generated and posted on the AEIC website a few minutes after an eligible event is recorded in the database. The processing time mostly depends on the number of waveforms that are being utilized in the calculation process. Afterwards, several SM updates may be issued for the same event as new data become available and more reliable hypocenters are calculated. A filtering algorithm is used to determine the eligibility of each hypocenter for SM, and to activate a cancellation script if the updated hypocenter is no longer eligible for SM. Furthermore, a manual run can be executed for significant events in order to utilize any additional information, such as extended source geometry, data from additional sources, etc.

The ground shaking grids for SMs are produced on the basis of observed ground motion values (maximum peak ground accelerations and velocities of two horizontal components), complemented by calculated ones using empirical attenuation relationships. The following attenuation relationships are currently utilized: Boore et al. (1997) for crustal events with M>5.3, Youngs et al. (1997) for subduction-zone events and SM Small Regression model for shallow events with M<=5.3. Overall, there are 7 strong motion, 63 broadband, and 21 broadband+ strong-motion stations contributing into SM generation at AEIC.

See example in Figure 8.

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Boore, D. M., W. B. Joyner, and T. E. Fumal (1997). Equations for estimating horizontal response spectral and peak acceleration from western North American earthquakes: A summary of recent work, Seism. Res. Lett., 68, 128-153.

Youngs, R. R., S.-J. Chiou, W. J. Silva, and J. R. Humphrey (1997). Strong ground-motion relationships for subduction zones, Seism. Res. Letters, 68, No.1, 58-73.

Reporting

During the contract period, the Alaska Earthquake Information Center has released the following documents and publications on a regular basis:

Weekly Seismicity Reports

Weekly reports include summary listings of all located earthquakes in or near Alaska for the previous week, with date and time of origin, latitude, longitude and hypocentral depth, magnitude, solution quality parameters and a brief comment regarding approximate region, alternate magnitudes and any felt information. Each weekly listing also includes an epicenter map of the whole state (including the Aleutian Islands), a close-up map focusing on the central and south central part of the state which is most heavily populated, and a brief verbal summary of largest or most significant earthquakes to have occurred during the week. The seismicity maps and earthquake summary are available over the Worldwide Web, updated on a weekly basis.

Monthly Earthquake Catalogs

Approximately two to four months after the end of each month, AEIC issues "Earthquakes in Alaska," a monthly catalog of earthquakes in and near Alaska. The catalogs include full-state seismicity maps, south-central seismicity maps, cross-sections through the two Wadati-Benioff Zones which exist beneath Alaska, a comprehensive listing of the month's earthquakes with additions from the National Earthquake Information Center, the Pacific Coast and Alaska Tsunami Warning Center, and data from the Geological Survey of Canada where appropriate. A "Highlights" section discusses in detail several of the month's most interesting or significant earthquakes, each of which is presented with an individual map and, when available, its focal mechanism. Detected and located mine and suarry blasts are also itemized in the monthly catalogs.

Information Releases

As a part of the 24-hour earthquake monitoring carried out by AEIC, any earthquake whose magnitude is large enough to be considered significant (M>=3.5 in the mainland Alaska and M>=4.0 in the Aleutians), or an earthquake which was felt by locals, will have a formal "Information Release" issued. The Information Release is sent out in two forms: electronic mail is broadcast to a suite of recipients, with a text message providing location, magnitude and any other pertinent information; also, a FAX release is transmitted which includes all the above information as well as a map illustrating the epicenter of the earthquake. These email and FAX releases are sent to numerous state, local, and federal government agencies, news media, utilities, other seismic observatories and interested parties. In addition, all Information Releases are now available on the Web.

ANSS Catalog Contribution

We have implemented regular submission of our earthquake catalogs to the ANSS system at UC Berkeley. Catalogs are submitted several days after completion of each month. In addition, we have retroactively submitted all catalogs from July 1988 until present, meaning that the catalogs from the full period of the grant have been submitted to the ANSS.

Outreach and Education

During the contract period, faculty, staff, and students at AEIC conducted a variety of outreach activities to school children and the general public, as well as local, state, and federal government officials through lectures, tours, interviews and correspondence. These contacts took the form of tours of AEIC facilities, offsite demonstrations, public speaking engagements, responses to e-mail and telephone inquiries, and interviews with the news media.

Tours of the seismology laboratory were conducted an average of twice each month throughout the year. School groups and members of the general public, as well as emergency managers and visiting professionals, were shown AEIC facilities at the UAF Geophysical Institute. They were given an introduction to Alaska seismicity and the methods and equipment employed by AEIC to monitor seismic activity and respond to significant earthquakes.

In addition to tours of AEIC facilities, faculty, staff and students made offsite presentations to a variety of audiences. Prominently, AEIC Tsunami Modeler Elena Sulemani gave a series of high profile public lectures in the major urban centers of Fairbanks, Anchorage, and Juneau on the subject of tsunamis in Alaska. Part of the Geophysical Institute's "Science for Alaskans" lectures series, these events were highly publicized and attendance number in the hundreds for each public lecture. AEIC also participated in the National Weather Service's outreach efforts for the "Tsunami Ready" community certification program. As part of a team of representatives from the National Weather Service's West Coast/Alaska Tsunami Warning Center, the Alaska Department of Homeland Security and Emergency Management, and the American Red Cross, an AEIC staff member traveled to Juneau to speak with the public and local government officials about regional earthquake hazards and safety. AEIC's outreach coordinator was also invited to give presentations on earthquakes in Alaska to students at a Fairbanks elementary school during their annual "Earth Week" activities.

AEIC operated an earthquake information booth at the annual Tanana Valley State Fair in Fairbanks, and at the University of Alaska Fairbanks' annual "Science Potpourri" outreach event. Science Potpourri is a day long event in which children and families are able to participate in experiments and demonstrations put on by the various departments within the UAF College of Natural Sciences. The earthquake information booth was staffed by AEIC personnel at each venue and featured an interactive display explaining how earthquakes happen and how seismometers are used to detect earthquake signals. AEIC staff also answered the public's questions during these events and distributed literature on earthquakes and emergency preparedness.

AEIC personnel responded to numerous e-mail and telephone inquiries from state-wide news media regarding earthquake activity throughout the year. Additionally, Elena Sulemani participated in a press conference with the national news media regarding tsunami modeling and inundation mapping during the 2006 Fall meeting of the American Geophysical Union.

The AEIC website underwent a significant revision and upgrade during 2006, resulting in improved organization and easier access to earthquake data and information for the public. Through the website, members of the public are able to access near-real time earthquake information and may submit "felt reports" through a link to the USGS Earthquake Hazards program. Felt reports submitted to AEIC by the public have resulted in numerous earthquake information releases for seismic events that were not large enough to automatically trigger AEIC's earthquake alarm system. In this way, the public has been able to participate in the earthquake monitoring process and assist AEIC in our response to seismic activity. The AEIC website also provides descriptions of personnel, network

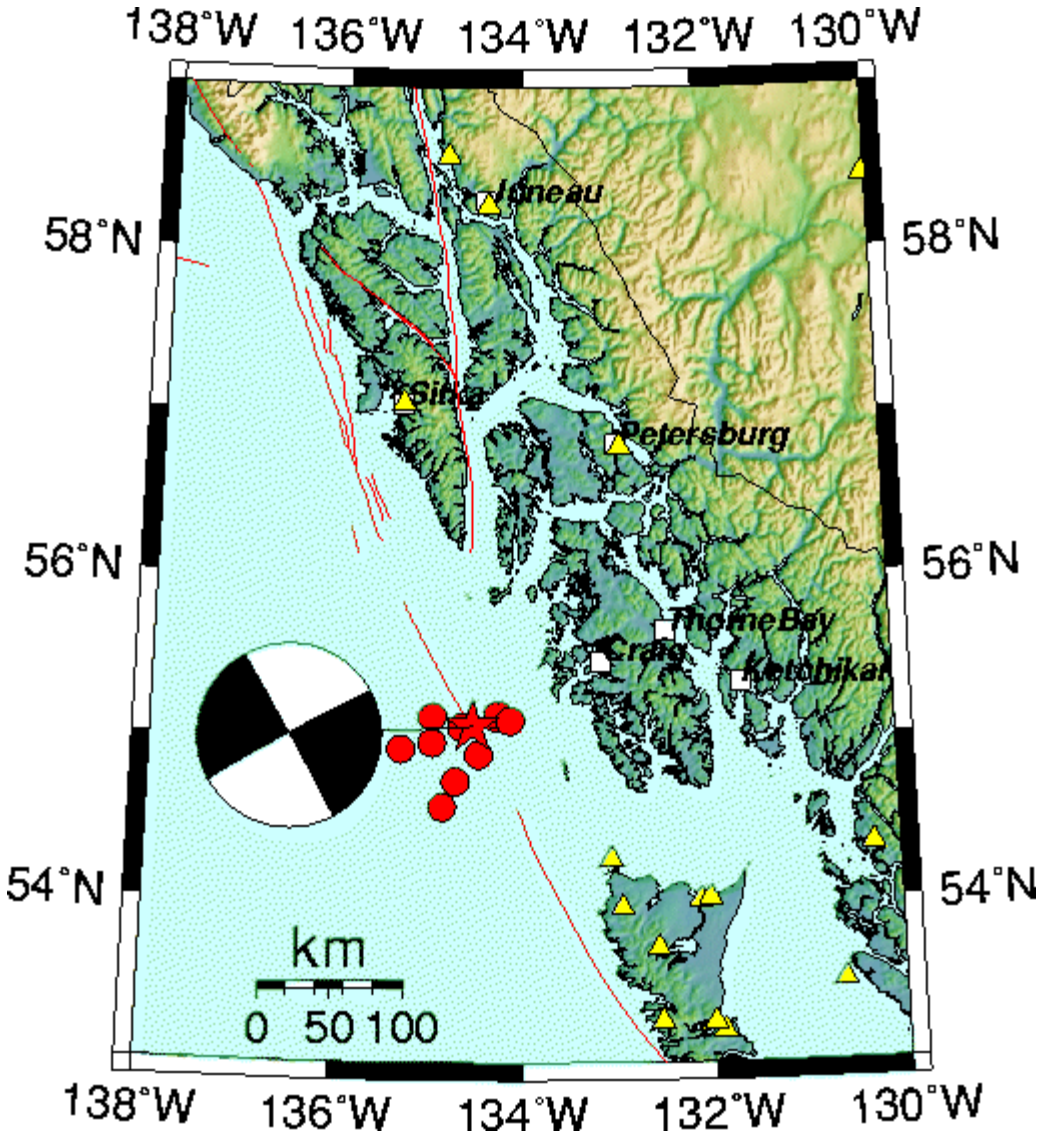
topology, network processing, earthquake occurrence, research activities, and links to a variety of related sites.

Significant Events

M6.8 Queen Charlotte Fault Earthquake of June 28, 2004

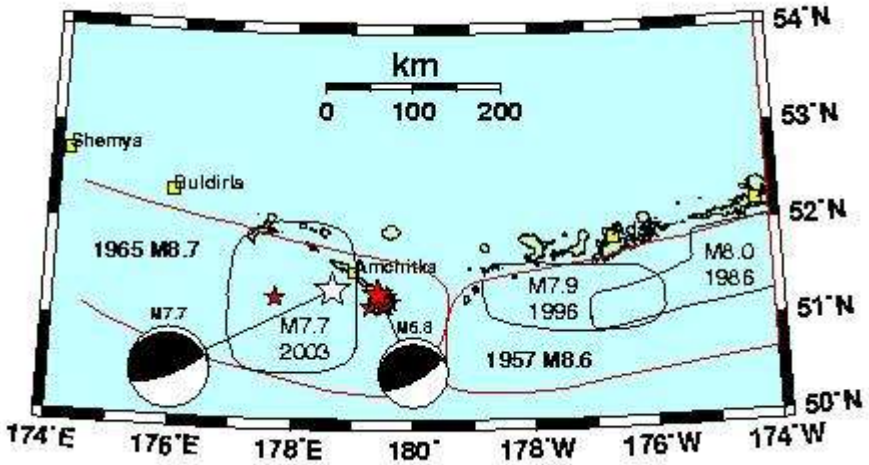
At 1:49 a.m. ADT (9:49 UTC) on Monday, June 28, 2004, a strong earthquake occurred in the Queen Charlotte Islands region near Alaskan/Canadian border. This earthquake was situated 112 kilometers (70 miles) southwest of Craig, the nearest population center. It was felt strongly in southeastern Alaska and northern British Columbia. No injuries and only minor damage have been reported. Based on the Alaska regional seismic network data, the earthquake location (red star) is at 55.072N and 134.532E at a depth of 20 km, the estimated magnitude is 6.8. This earthquake is the largest to occur in the Queen Charlotte Islands region since the magnitude 6.3 earthquake on February 17, 2001. The M6.3 shock was located at 53.987N and 133.612W, 135 km (84 miles) south of the recent M6.8 event.

The M 6.8 earthquake occurred on the Queen Charlotte fault system. This is a strike-slip fault which marks the boundary between the Pacific crustal plate to the southwest and the North American plate to the northeast. The largest recorded earthquake that had previously ruptured this section of the fault was the magnitude 8.1 earthquake on August 22, 1949. The elastic-wave radiation pattern of the M6.8 event is consistent with the earthquake occurring as the result of right-lateral strike-slip faulting on a northwest-striking fault - as expected from the tectonic situation of the earthquake.



Ten aftershocks (red circles), magnitude 2.3 or larger, have been located by AEIC within 24 hours of the mainshock occurrence. The largest aftershock occurred at 8:44 a.m. ADT on June 28 (16:44 UTC) and had a magnitude of 3.8. Due to the sparse station coverage (yellow triangles) in the area the earthquakes have large location uncertainties. The nearest seismic station is located 140 km away from the epicentral region of the M6.8 event. Therefore, only aftershocks with magnitude of about 3 and greater can be located.

June 14, 2005 Rat Islands Earthquake

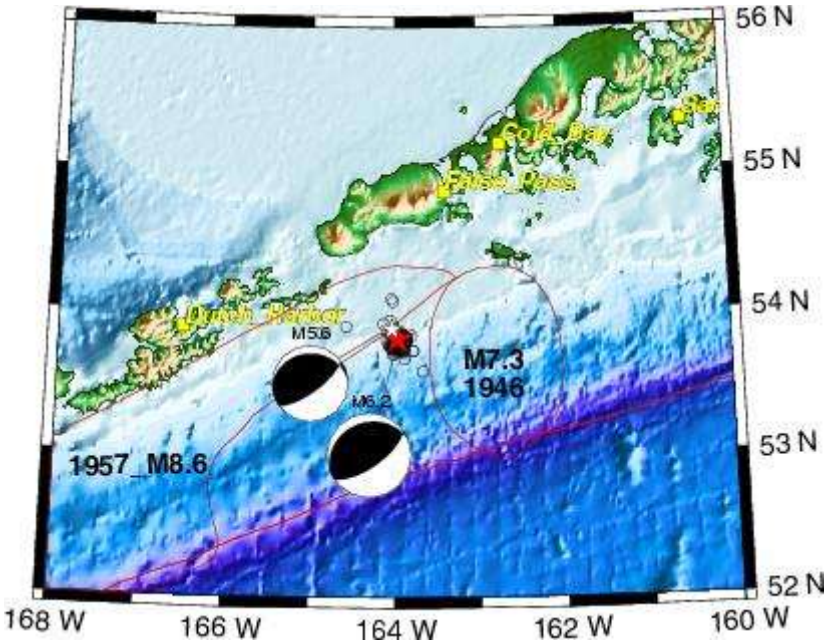


On June 14, 2005, a series of moderate to strong earthquakes occurred in the Rat Islands region of the Aleutian Islands (red stars on the above map). The sequence started with a M5.2 event at 08:03 UTC and the largest event of M6.8 followed 9 hours later (at 17:10 UTC). The largest earthquake was situated 49 kilometers (31 miles) south-southeast of Amchitka. The epicenter (largest star) was located at 51.31N and 179.41E at 51.7 km depth. This earthquake is the largest to occur in this region since the magnitude 7.7 event on November 17, 2003 (white star on the map). The AEIC located several foreshocks and aftershocks of the M6.8 event with the largest aftershock of M5.6 four and a half hours after the main shock. This page will be updated as more aftershocks are located.

The M 6.8 earthquake occurred on the convergent boundary between the subducting Pacific and overriding North American crustal plates. This region, where the two plates are being forced directly into one another, is one of the world's most active seismic zones. Over one hundred earthquakes of magnitude seven or larger have occurred along this boundary in the past hundred years. Each major rupture is labelled with the earthquake's year and magnitude. With the exception of the Unalaska and Shumagin seismic gaps, all portions of this plate boundary have ruptured within the past hundred years.

The 1965 Mw 8.7 Rat Islands earthquake ruptured a ~600 km-long portion of the plate boundary to the west of the Amchitka Island. In November 17, 2003 M7.7 earthquake, the easternmost part of the 1965 zone failed again. The current sequence of earthquakes is located east of the 2003 rupture zone, at the easternmost end of the 1965 rupture zone. The 1957 M8.6 earthquake ruptured segment of the meguthrust east of the 1965 zone. A M7.9 event in 1996 and a M8.0 event in 1986 re-ruptured the western segment of the 1957 fault zone.

M6.2 November 20, 2005 Unimak Island Earthquake



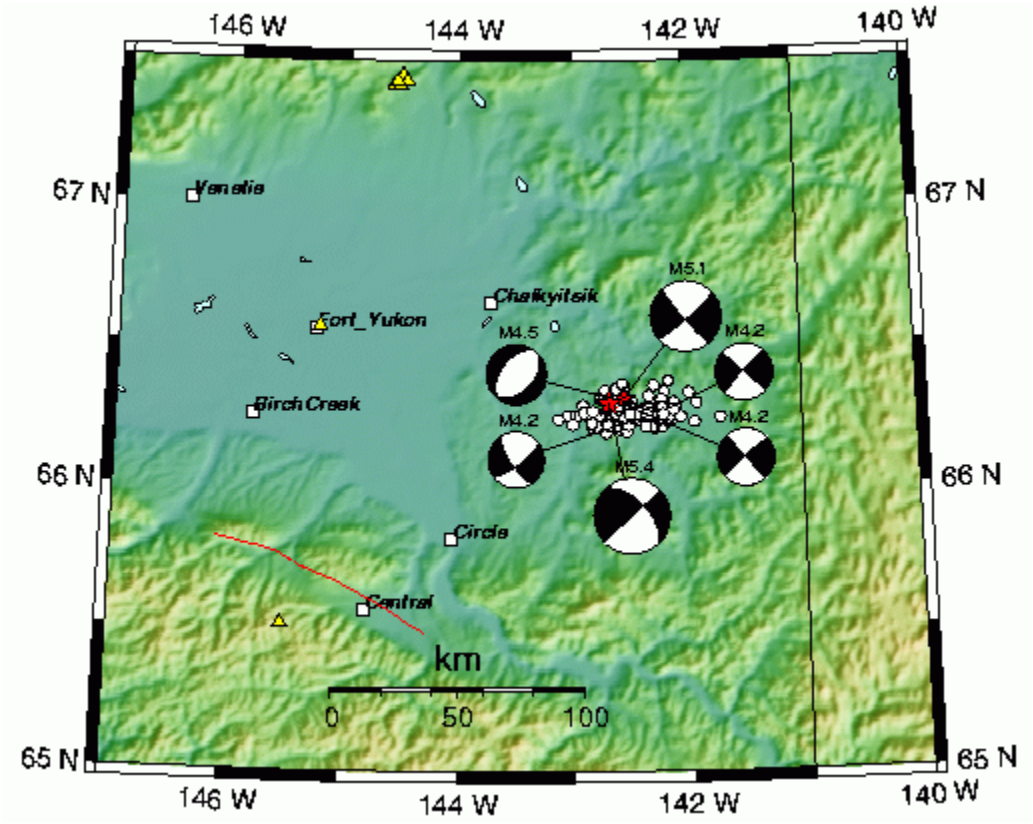
The Alaska Earthquake Information Center located a strong earthquake that occurred on Sunday, November 20, 2005 at 3:53 AM local time (12:53 UTC) in the Unimak Island region of Alaska (red star on the above map). The AEIC located nearly 100 aftershocks (open circles) through the end of the month (M>=1.9). The largest aftershock of magnitude M5.6 occurred on November 22 at 6:09 AM local time (15:09 UTC, white star).

The mainshock was felt strongly in Unalaska and False Pass (Internet Community Intensity Map). Several aftershocks were also felt.

The M 6.2 earthquake occurred on the convergent boundary between the subducting Pacific and overriding North American crustal plates. This region, where the two plates are being forced directly into one another, is one of the world's most active seismic zones. Over one hundred earthquakes of magnitude seven or larger have occurred along this boundary in the past hundred years. Each major rupture is labeled with the earthquake's year and magnitude. With the exception of the Unalaska and Shumagin seismic gaps, all portions of this plate boundary have ruptured within the past hundred years.

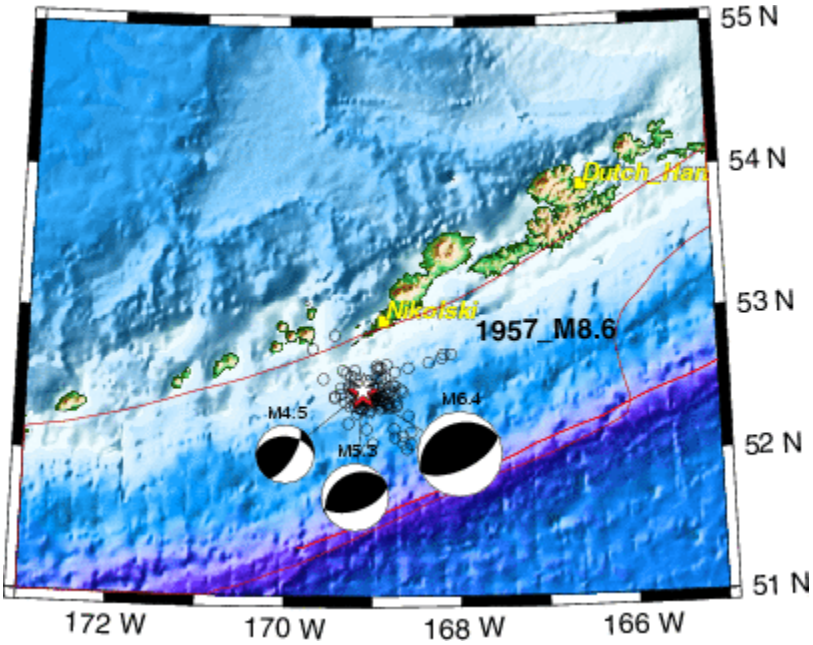
The 1957 Mw 8.6 Andreanof Islands earthquake ruptured a ~600 km-long portion of the plate boundary to the west of Unimak Island. The current sequence of earthquakes is located at the eastern end of the 1957 rupture zone.

M5.4 February 5, 2006 Yukon Flats Earthquake



The Alaska Earthquake Information Center located a moderate earthquake that occurred on Saturday, February 4th at 11:17 PM AKST in the north-central region of Alaska. This earthquake had a moment magnitude of 5.4 and was located at a depth of about 9 km (larger red star). It was located 54 km (34 miles) SE of Chalkyitsik and 67 km (42 miles) NE of Circle. The largest aftershock (M5.1) occurred at 7:43 AM AKST on February 5th (smaller red star). Both events were felt as far as Fairbanks. The AEIC located a total of 125 aftershocks through the end of February (white circles). All events are located north of the Tintina fault, a strike-slip structure striking SE-NW (red line). Due to the sparse station coverage in the area (yellow triangles), the earthquake locations have rather large uncertainties. The source parameters of the mainshock and larger aftershocks from wave-form modelling indicate strike-slip faulting, either left-lateral on a NE-striking focal plane or right-lateral on a SE-striking plane. The latter is consistent with the sense of motion along the Tintina fault. The former is similar to the NNE-trending seismic zones located farther south between the Denali and Tintina faults. A M4.5 aftershock later in the sequence has a normal faulting focal mehcanism, consistent with faulting on the NE-striking plane. Therefore, the NE-striking focal plane is a more likely fault plane of this sequence.

M6.4 May 10, 2006 Fox Islands Earthquake



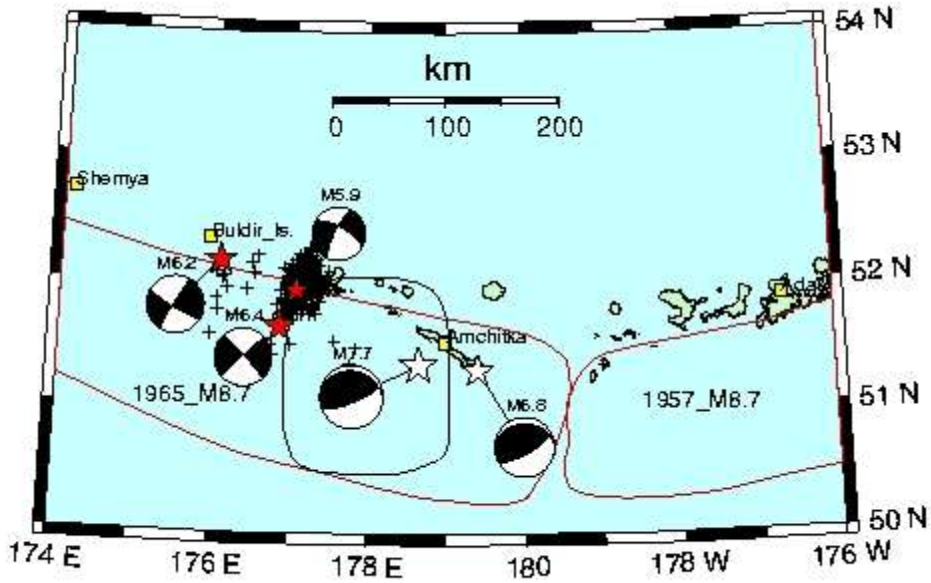
The Alaska Earthquake Information Center located a strong earthquake that occurred on Tuesday, May 9, 2006 at 6:42 pm local time (May 10, 2:42 am UTC) in the Fox Islands region of Alaska (red star on the above map). The AEIC located about 130 aftershocks through the end of May (open circles). The largest aftershock of magnitude 5.3 occurred on May 9 at 9:07 pm local time (May 10, 5:07 am UTC, white star). Majority of the aftershocks (~80 total) occurred within the first 24 hours of the mainshock. Due to the sparse seismic station coverage in the region, the smallest located afterschoks have magnitudes of ~2.0.

The mainshock was felt strongly in Nikolski and Unalaska (Internet Community Intensity Map). No damage have been reported.

The M6.4 earthquake occurred on the convergent boundary between the subducting Pacific and overriding North American crustal plates. This region, where the two plates are being forced directly into one another, is one of the world's most active seismic zones. Over one hundred earthquakes of magnitude seven or larger have occurred along this boundary in the past hundred years. Each major rupture is labeled with the earthquake's year and magnitude. With the exception of the Unalaska and Shumagin seismic gaps, all portions of this plate boundary have ruptured within the past hundred years.

The 1957 Mw 8.6 Andreanof Islands earthquake ruptured a ~600 km-long portion of the plate boundary in central Aleutian Islands. The current sequence of earthquakes is located within the eastern segment of the 1957 rupture zone.

June 14, 2006 Rat Islands Earthquake



On June 14, 2006, at 4:18 am UTC (June 13, 8:18 pm ADT) a strong earthquake occurred in the Rat Islands region of the Aleutian Islands (larger red star on the above map). The mainshock (M6.4) was situated 87 kilometers (54 miles) southeast of Buldir Island. The epicenter was located at 51.86N and 176.92E at shallow depth. This earthquake is the largest to occur in this region since the magnitude 6.8 event on June 14, 2005 (smaller white star on the map). The AEIC located a little over 1,200 aftershocks of the M6.4 event through the end of June (crosses). The largest aftershock of magnitude 5.9 occurred 30 minutes after the main shock. This page will be updated as more aftershocks are located.

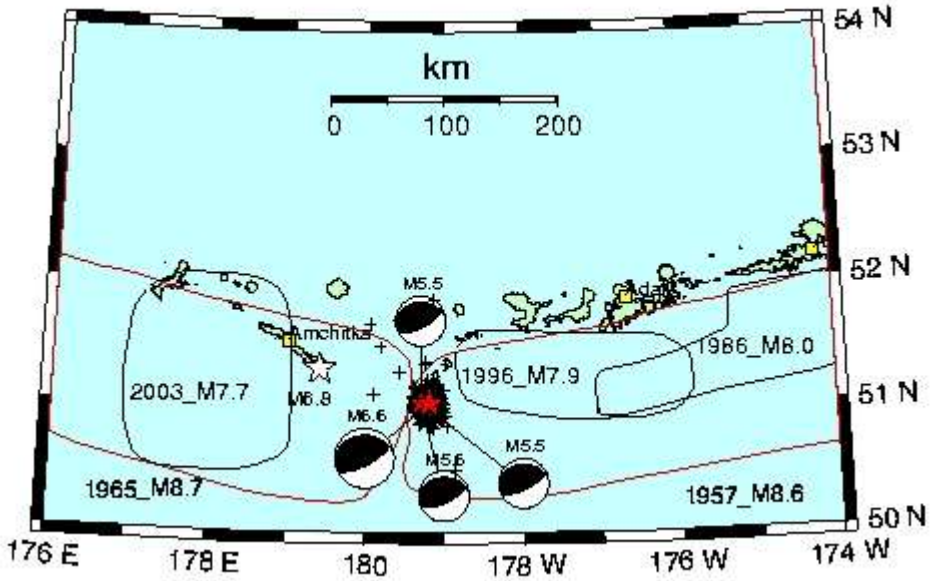
The June 14, 2006 earthquake occurred near the margin of the rupture zone of the M7.7 earthquake of November 17, 2003. The M7.7 event ruptured the boundary between the subducting Pacific and overriding North American plates (approximate extent of the rupture zone is shown by the black line). This region, where the two plates are being forced directly into one another, is one of the world's most active seismic zones. Over one hundred earthquakes of magnitude seven or larger have occurred along this boundary in the past hundred years. The 1965 Mw 8.7 Rat Islands earthquake ruptured a ~600 km-long portion of the plate boundary to the west of the Amchitka Island. In November 17, 2003 M7.7 earthquake, the easternmost part of the 1965 zone failed again. The June 2005 sequence of earthquakes was located east of the 2003 rupture zone, at the easternmost end of the 1965 rupture zone. The 1957 M8.6 earthquake ruptured segment of the megathrust east of the 1965 zone.

The current sequence of events is of a different origin than the above mentioned underthrusting events. The faulting parameters estimated from the waveform inversion indicate strike-slip type of motion for both the mainshock and the largest aftershock. It's location, shallow, and above the down-dip end of the locked interface, is more consistent with this event occurring within the crust of overriding North American plate. In the

western Aleutians, the crust is partitioned into rotating blocks, such as Buldir Block to the east and Near block to the west of the June 14, 2006 event location. If this event is the manifestation of the block rotation processes, then the NE-striking focal plane is the fault plane for this sequence. It's mechanism is consistent with the clockwise rotation of the crustal blocks. The aftershock locations are also consistent with the rupture along the NE-trending fault plane.

The June 14 sequence continued with a magnitude 6.2 earthquake that occurred on June 26 at 6:39 pm ADT (June 27, 2:39 am UTC). It was located at 52.178N 176.077E at 10.1 km depth, which is 75 km or 47 miles NE of the M6.4 event (shown by M6.2 red star on the map). It was felt strongly at Shemya. No reports of damage have been received. Faulting parameters for this event are similar to the M6.4 event - strike-slip faulting. Most likely, it is also a crustal event associated with the faulting within the overriding North American plate.

July 2006 Andreanof Islands Earthquakes



On July 8, 2006, at 12:39 pm ADT (8:39 pm UTC) a strong earthquake, magnitude 6.6, occurred in the Andreanof Islands region of the Aleutian Islands (larger red star on the above map). The event was situated 138 kilometers (86 miles) east-southeast of Amchitka and 204 km (128 miles) west-southwest of Adak. The epicenter was located at 50.97N and 179.22W. It was felt at Adak. This earthquake is the largest to occur in this region since the magnitude 6.8 event on June 14, 2005 (smaller white star on the map). The July 8th event was preceded by a series of moderate foreshocks that started on July 1st. The strongest foreshocks (M5.5-5.6) occurred on July 1st at 11:34 am ADT, and on July 2nd at 8:57 am and 9:20 am ADT. The AEIC located over 250 aftershocks of the M6.6 event

within the first week after the mainshock and over 500 events total between July 1st and 31st in the source region of the M6.6 earthquake (crosses). There were three aftershocks with magnitudes greater than 5.0 through the end of July. The largest aftershock (M5.5) occurred on July 8 at 8:16 pm ADT (July 9, 4:16 am UTC).

The July 2006 earthquake sequence occurred in the area separating the rupture zones of the 1965 M8.7 Rat Islands earthquake to the west and the 1957 M8.6 Andreanof Islands earthquake to the east. The westernmost area of the 1957 fault zone was reruptured repeatedly in the 1986 M8.0 and 1996 M7.9 earthquakes. The eastern portion of the 1965 fault zone was reruptured recently in the M7.7 earthquake on November 17, 2003. The June 2005 sequence of earthquakes was located east of the 2003 rupture zone, at the easternmost end of the 1965 rupture zone. All these events ruptured the boundary between the subducting Pacific and overriding North American plates (approximate extent of the rupture zones is shown in red for the 1957 and 1965 events, and in black for smaller events). The Aleutian megathrust, where the two plates are being forced directly into one another, is one of the world's most active seismic zones. Over one hundred earthquakes of magnitude seven or larger have occurred along this boundary in the past hundred years, or one magnitude 7+ earthquake every year or two.

1/9/2007 M5.7 Event near Southeastern Alaska

The Alaska Earthquake Information Center located a moderate earthquake that occurred on Tuesday, January 9th at 6:49 AM AKST (15:49 UTC) in Canada near the border with southeastern Alaska (red star). This earthquake had a magnitude of 5.7 and was located at a depth of about 6 km. It was located 91 km (57 miles) W of Haines and 99 km (62 miles) W of Skagway. This event was felt in many southeastern Alaska communities from Yakutat to Petersburg and in Canada as far as Whitehorse. Maximum intensity of shaking was reported in Gustavus (V, moderate). The AEIC located a total of 37 aftershocks in the first two days after the mainshock, with the magnitudes ranging from 1.5 to 3.2 (white circles). This event was located in an area between the two main strike-slip fault systems in the region, the Denali fault in the east and the Fairweather fault in the west (red lines). The Fairweather fault system marks the transverse boundary between the North American plate to the east and the Pacific plate to the west. The Denali fault is an intraplate structure that traverses Alaska and Canada for about 1,200 km. The source parameters of the M5.7 earthquake indicate reverse faulting on a NW-SE oriented fault plane. This event was located in the region directly affected by the ongoing collision of the Yakutat block with North America. This collision causes buildup of tectonic stress in the earth crust that is released in events similar to the M5.7 earthquake of January 9, 2007.

140 W
138 W
136 W
134 W
60 N
58 N
Haines_Junction
Whitehorse
M5.5
Yakutat
Klukwan
Skagway
Haines
Gustavus
Juneau
Douglas
Elfin_Cove
Hoonah
Pelican
Tenakee_Springs
Angoon

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Figures

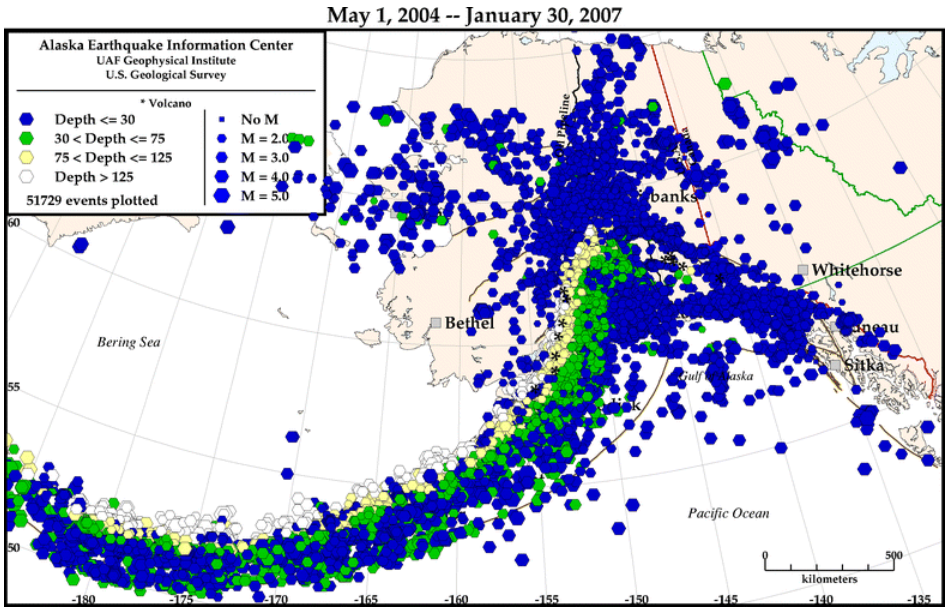


Figure 1. Map of reported events by AEIC for the period between May 1, 2004 and January 30, 2007 within the combined Alaska regional seismic network.

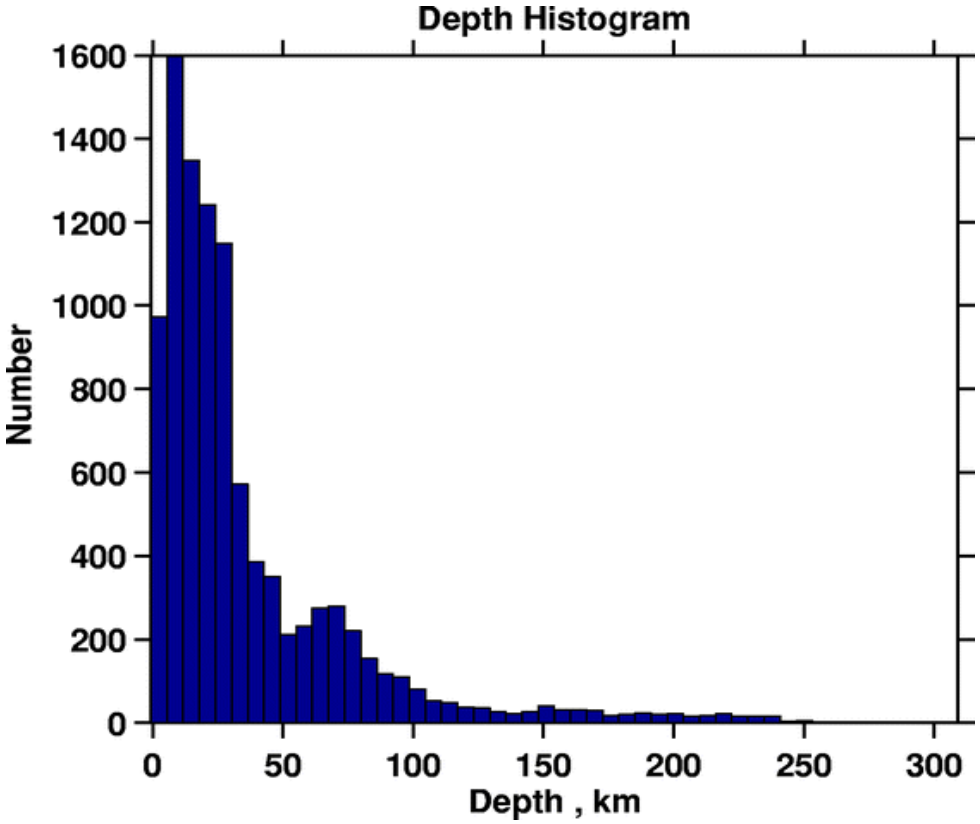


Figure 2. Depth histogram of reported events for the period between May 1, 2004 and January 30, 2007 within the combined Alaska regional seismic network.

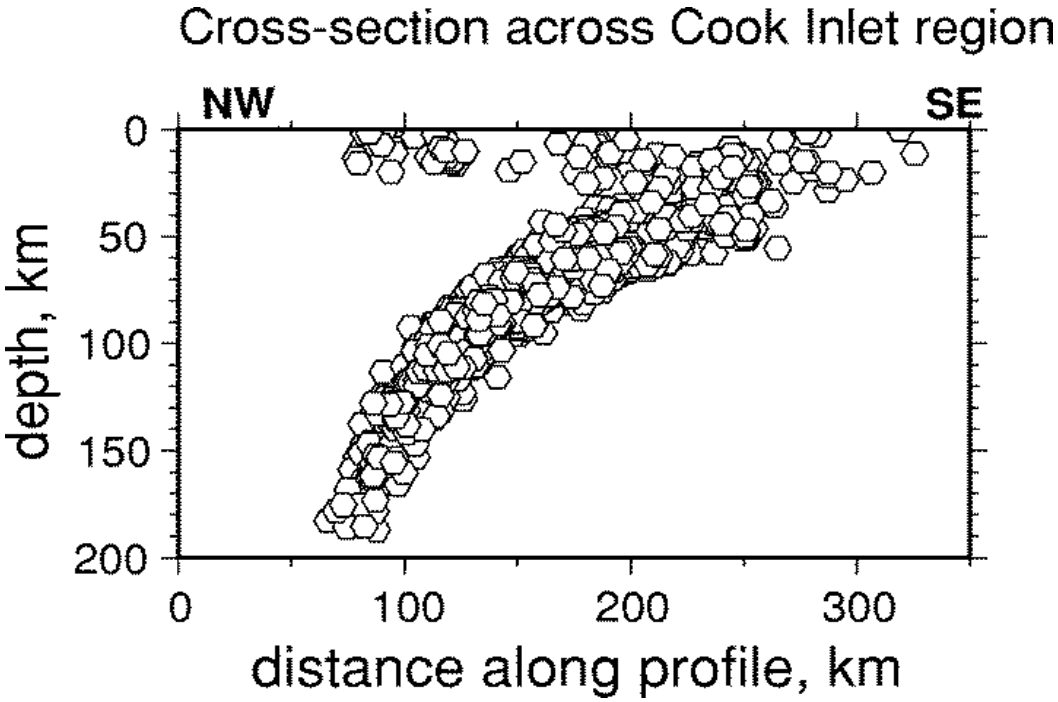


Figure 3. Cross-section across Cook Inlet region in south-central Alaska illustrating a typical WBZ seismicity distribution in the region.

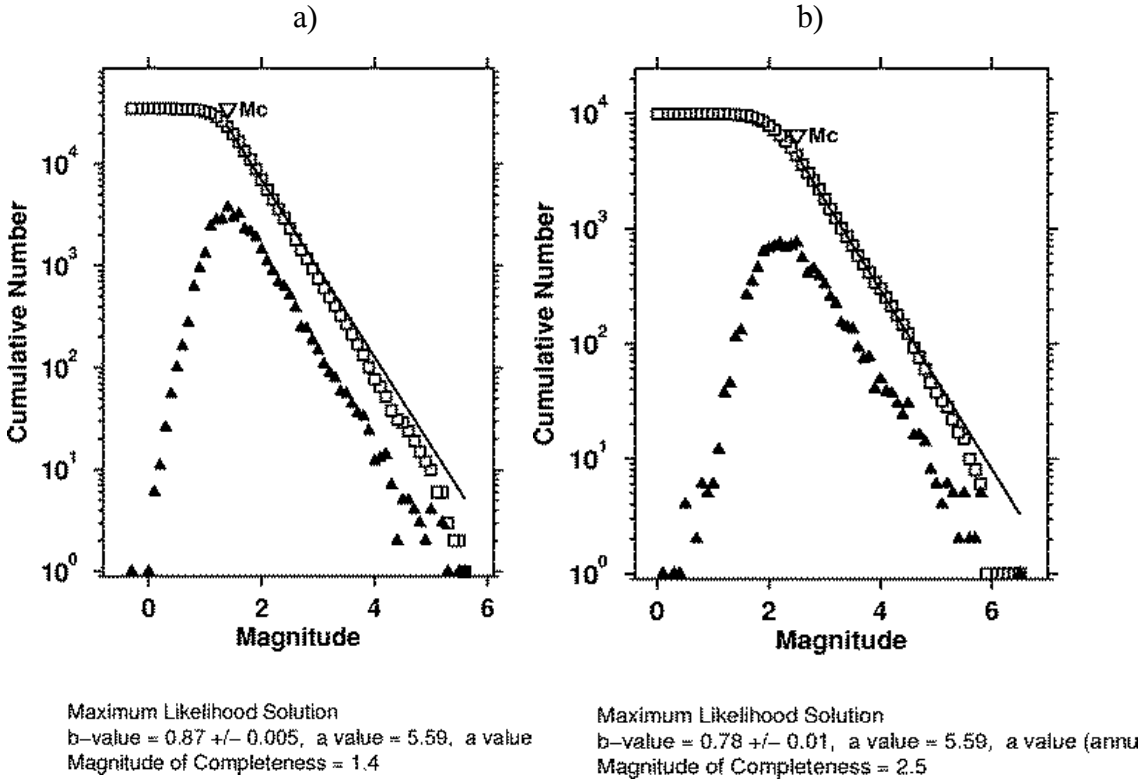


Figure 4. Frequency-magnitude relation for reported earthquakes: (a) within the core network area of the mainland Alaska (southern and central Alaska), and (b) Aleutian Islands.

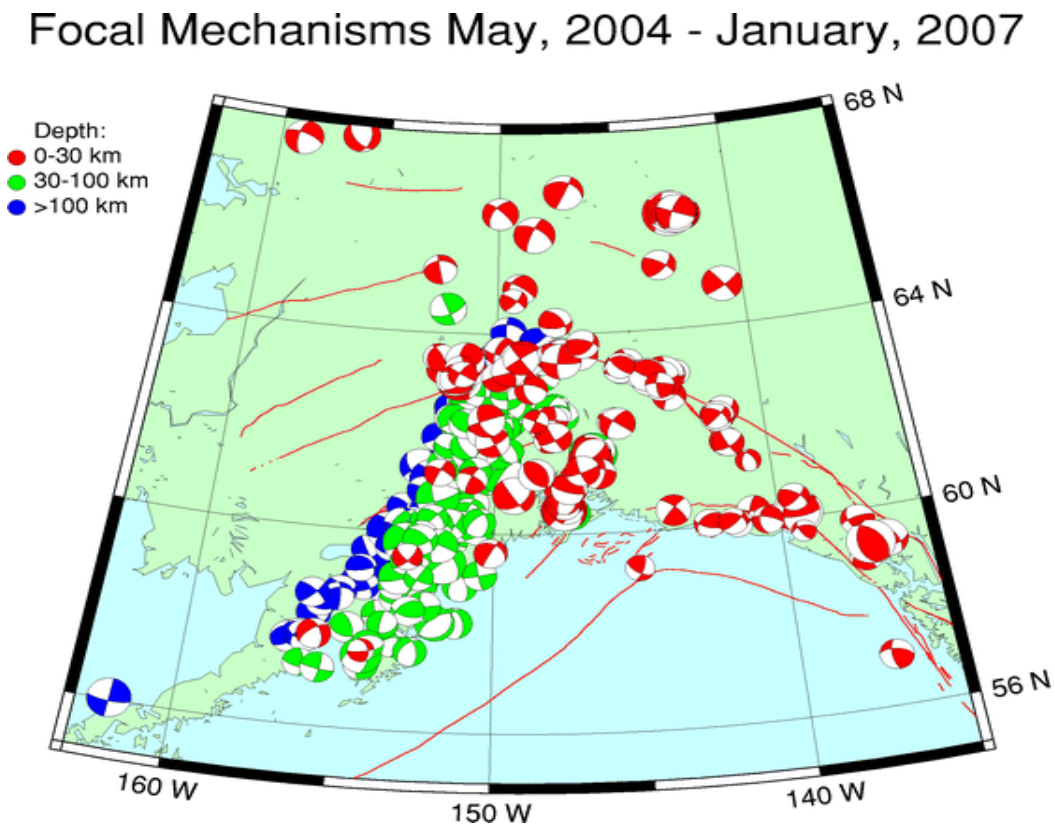


Figure 5. P-wave first motion focal mechanisms for 342 earthquakes that occurred between May 1, 2003 and January 30, 2007.

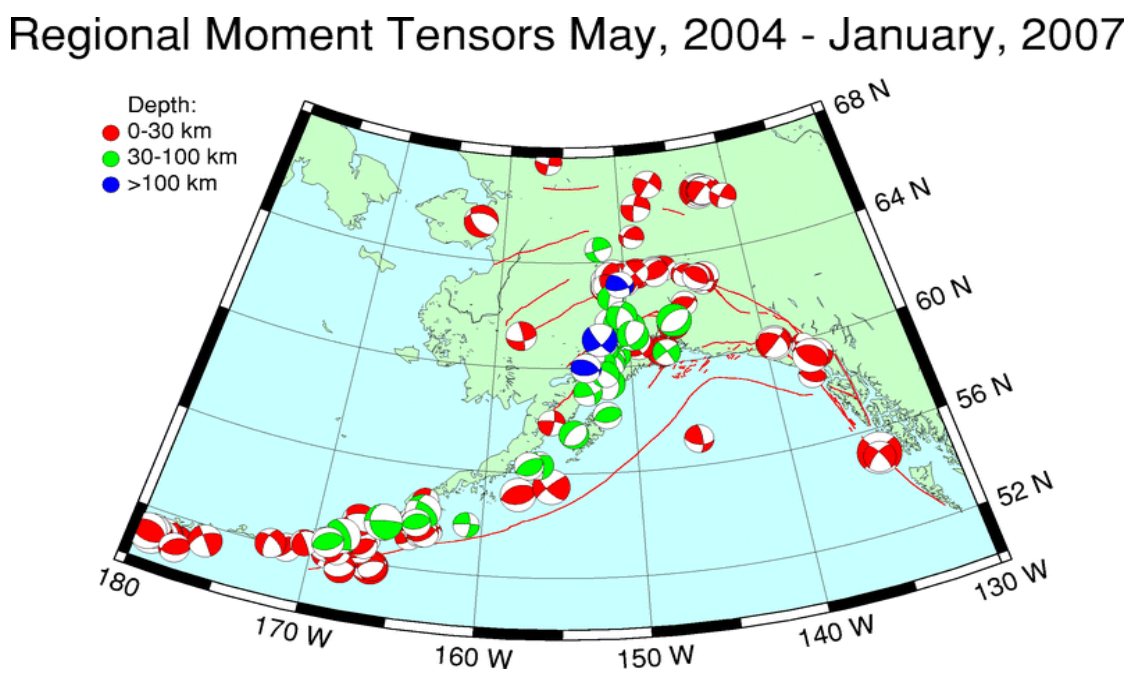
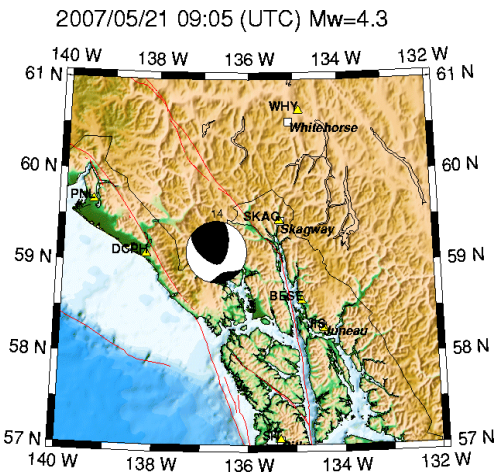


Figure 6. Regional moment tensor solutions for 148 earthquakes that occurred between May 1, 2003 and January 30, 2007.

Moment tensor inversion summary for event 2007/05/21 09:05

Date: 2007/05/21 **Time:** 09:05 (UTC)
Region: Southeastern Alaska
Mw=4.3



Location:

```
Lat.  59.1141;  Lon.  -136.6902;
Depth     5 km
(Best-fitting depth from moment
tensor inversion)
Solution quality: good;
Number of stations = 7
```

Best Double Couple:

	strike	dip	rake
Plane 1:	13.4	62.0	141.6
Plane 2:	123.8	56.8	34.2

Moment Tensor Parameters:

```
Mo = 2.76161e+22 dyn-cm
Mxx = 0.75; Mxy = -1.35; Mxz =  1.34
Myy =-2.13; Myz = -0.73; Mzz =  1.38
```

Principal Axes:

	value	azimuth	plunge
T:	84.00	336.41	46.02
N:	80.00	69.70	3.17
P:	78.00	162.74	43.80

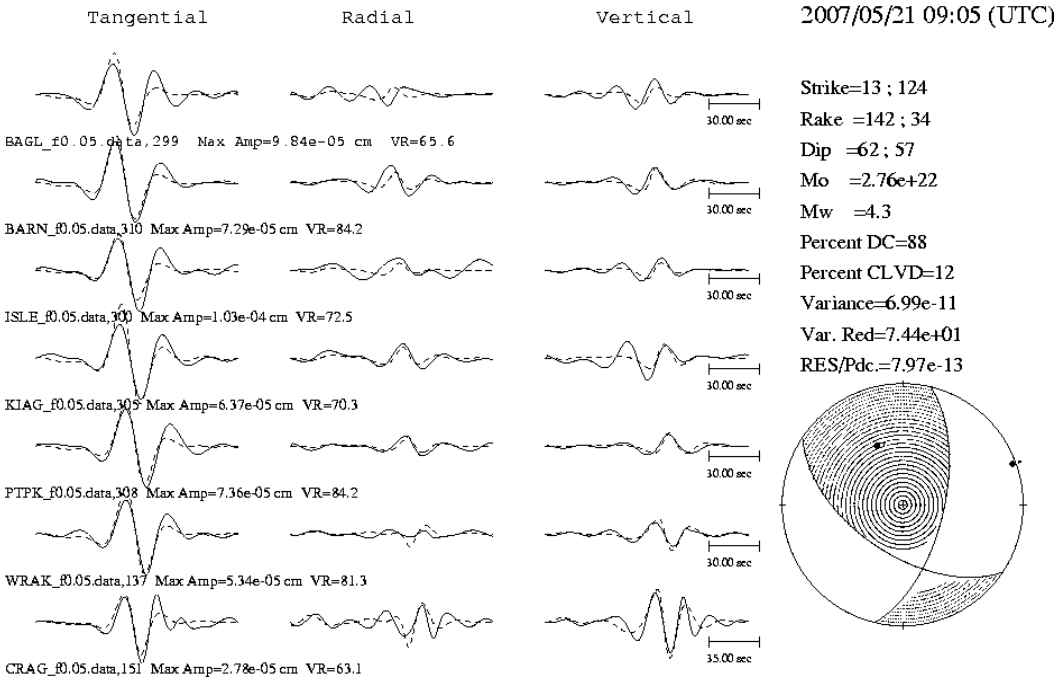
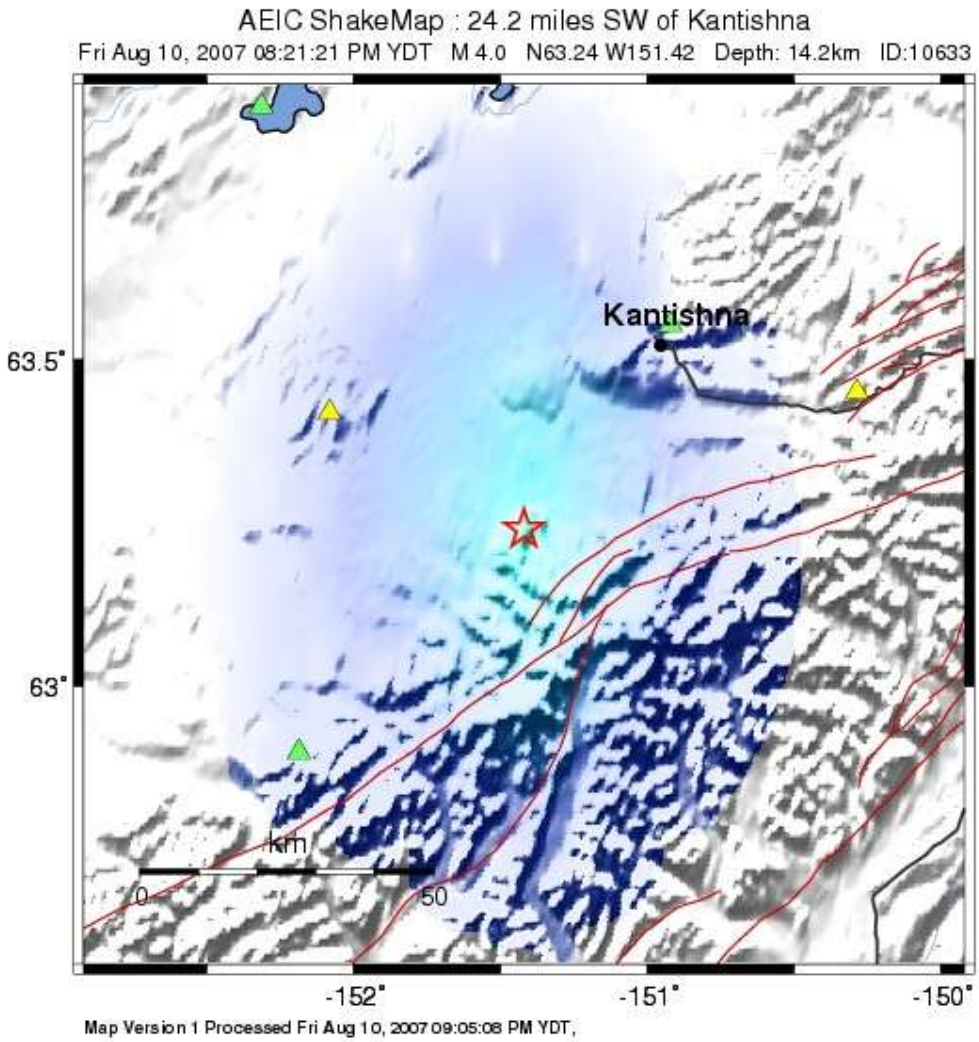


Figure 7. Example of a regional moment tensor inversion for a M4.3 event in Southern Alaska.



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 8. Example of a shakemap fpr a M4.0 near the Denali Fault in the Katishna region of Denali National Park.