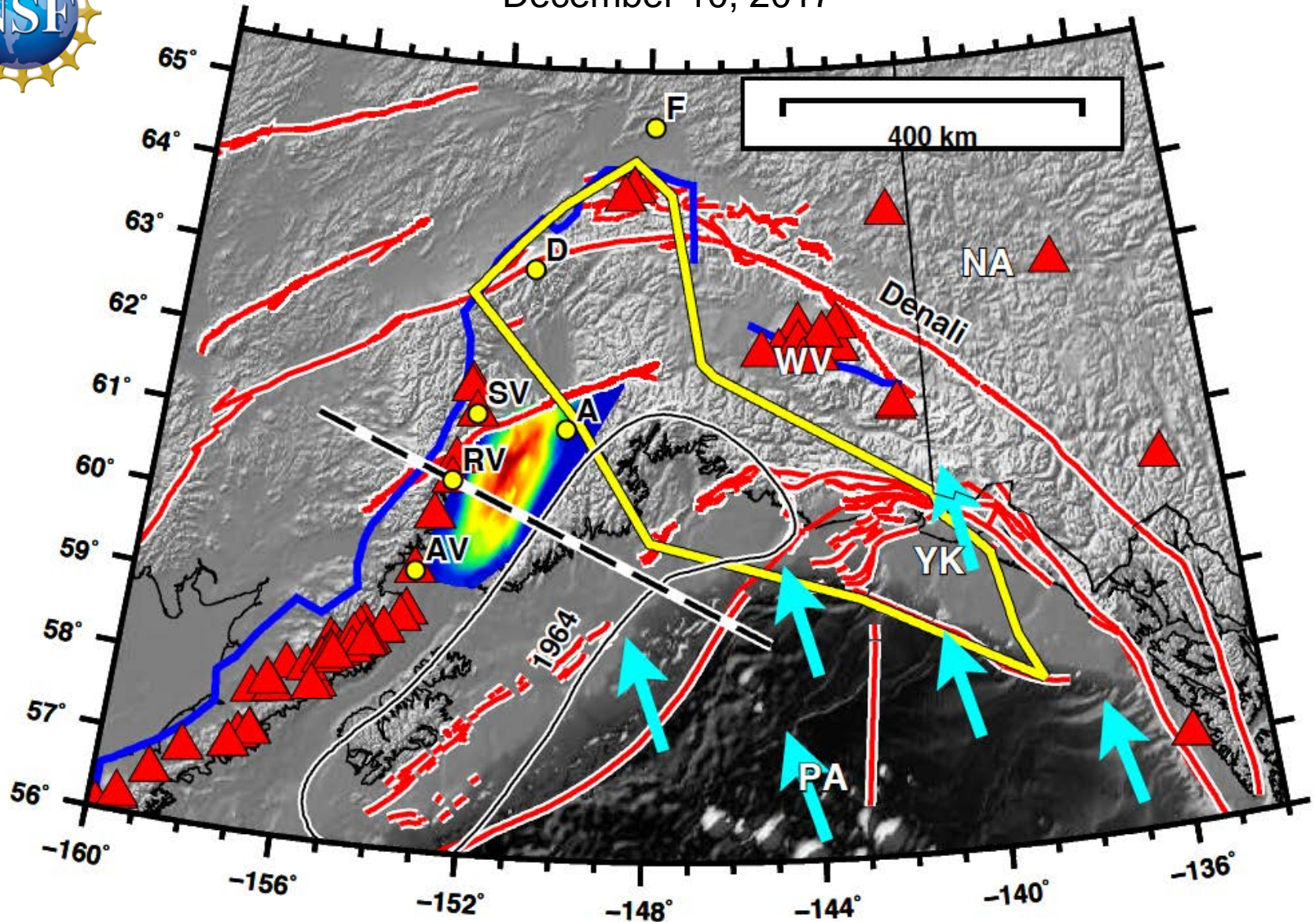


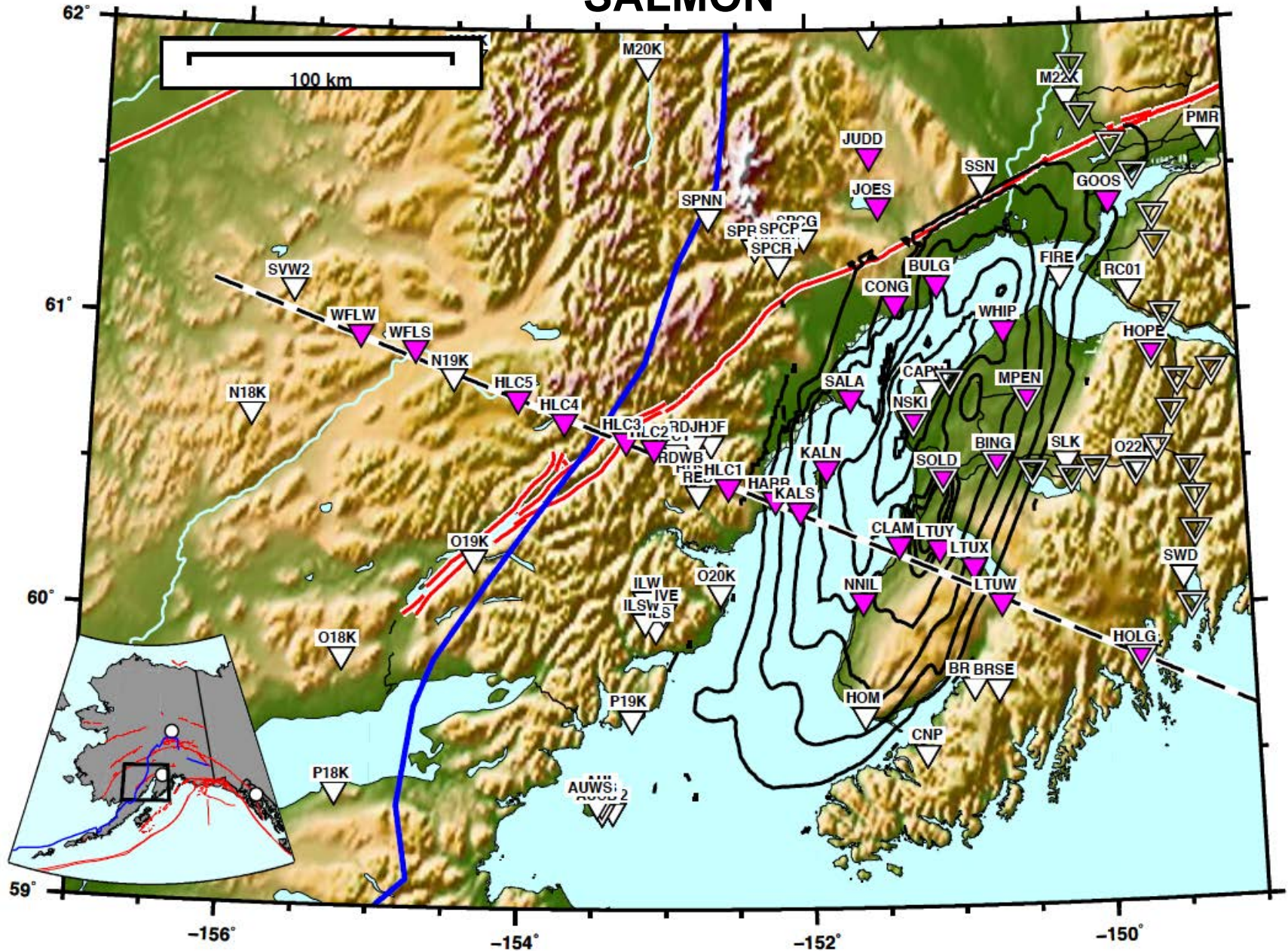
SALMON project (2015–2017): data quality and ongoing science

Carl Tape, Doug Christensen, Melissa Driskell

December 10, 2017



Southern Alaska Lithosphere and Mantle Observation Network SALMON



Southern Alaska Lithosphere and Mantle Observation Network (SALMON): A Seismic Experiment Covering the Active Arc by Road, Boat, Plane, and Helicopter

by Carl Tape, Douglas Christensen, Melissa M. Moore-Driskell, Justin Sweet, and Kyle Smith

Seismological Research Letters, 2017



ELLEN J

epic adventures ALASKA EXTREMES

Summary of SALMON data quality

- Three sensors damaged in shipping
 - One did not pass huddle test
 - Two did pass huddle test and were installed (MPEN, KALS)
- 100% of data losses due to bears
 - 13 out of 54 station-years were lost (all from remote sites)
- Detailed analysis of ambient noise reveals
 - Strong seasonal variations
 - Strong basin effect (0.5 – 2 Hz)
 - Long-period H/V ratio at all stations, including GSN borehole (II.KDAK)

LTUW install 2015-07-02

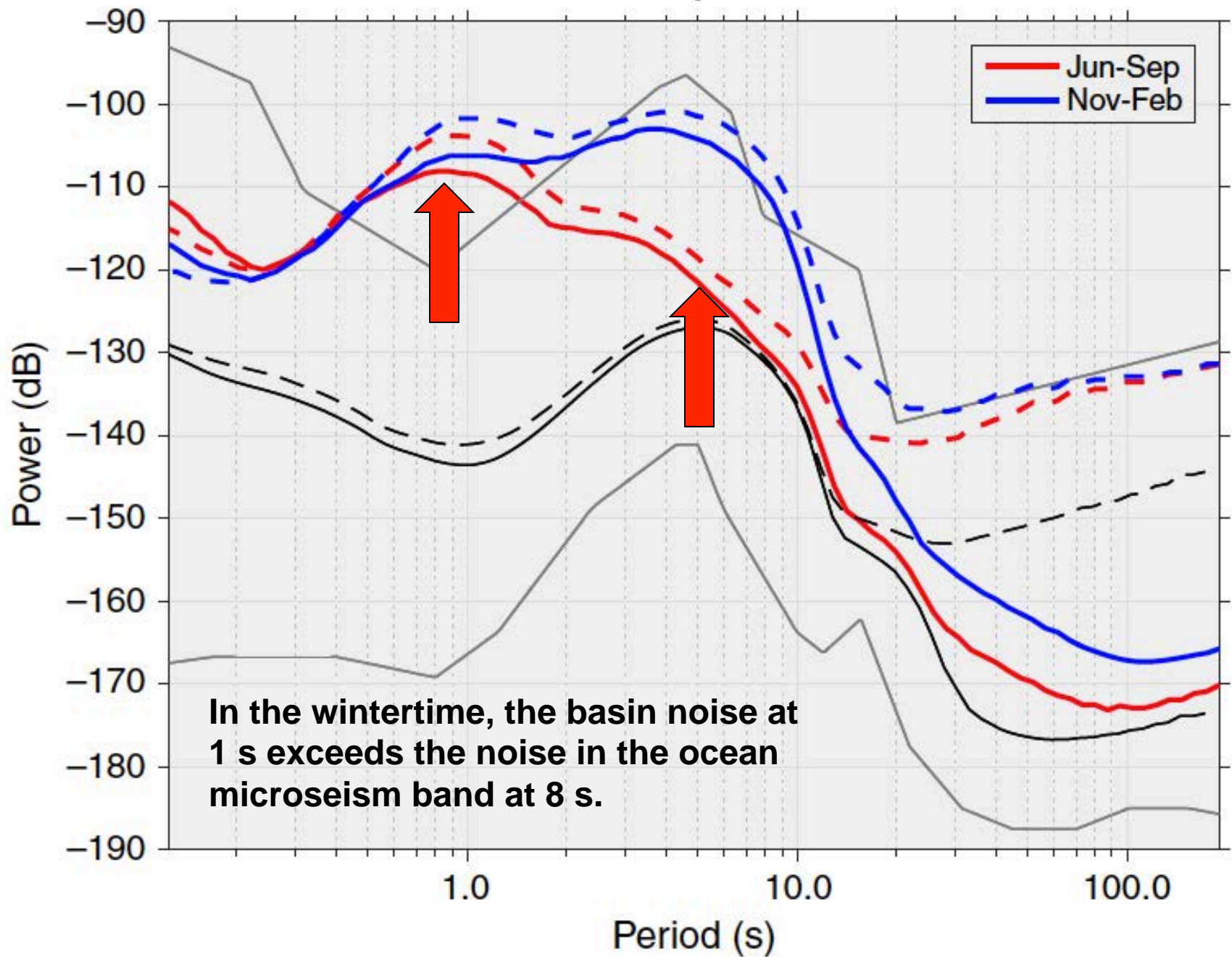


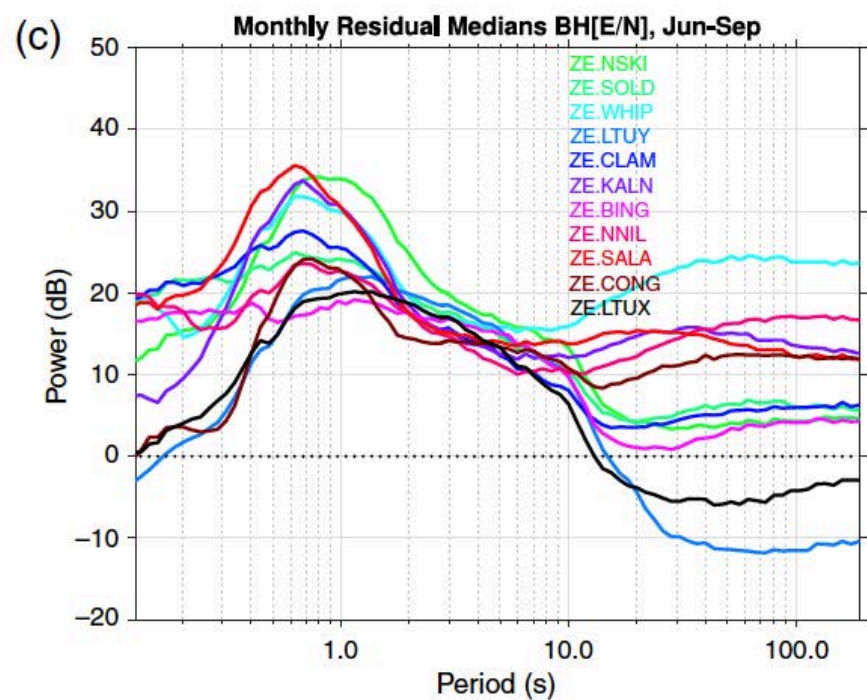
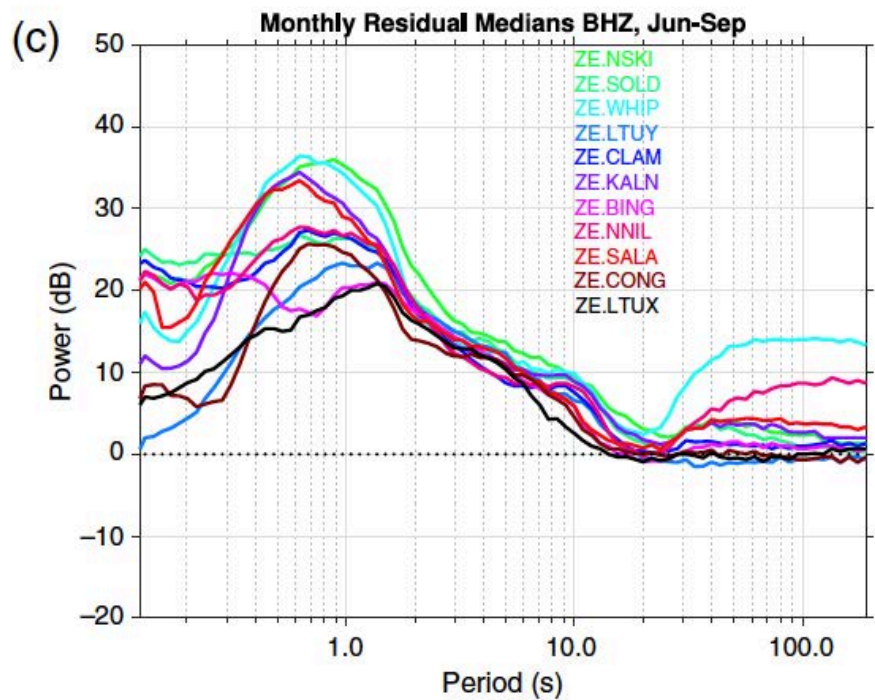
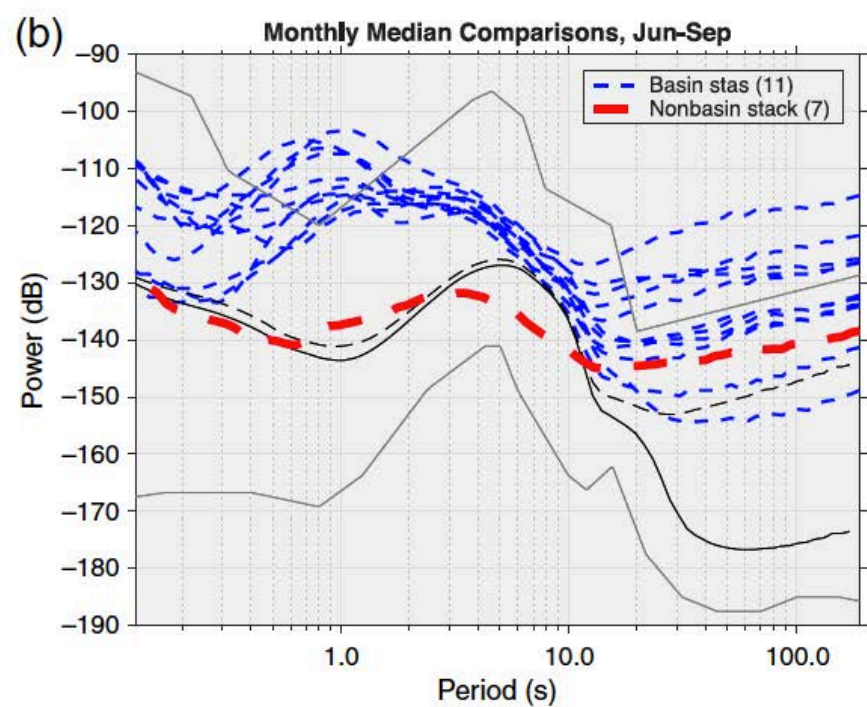
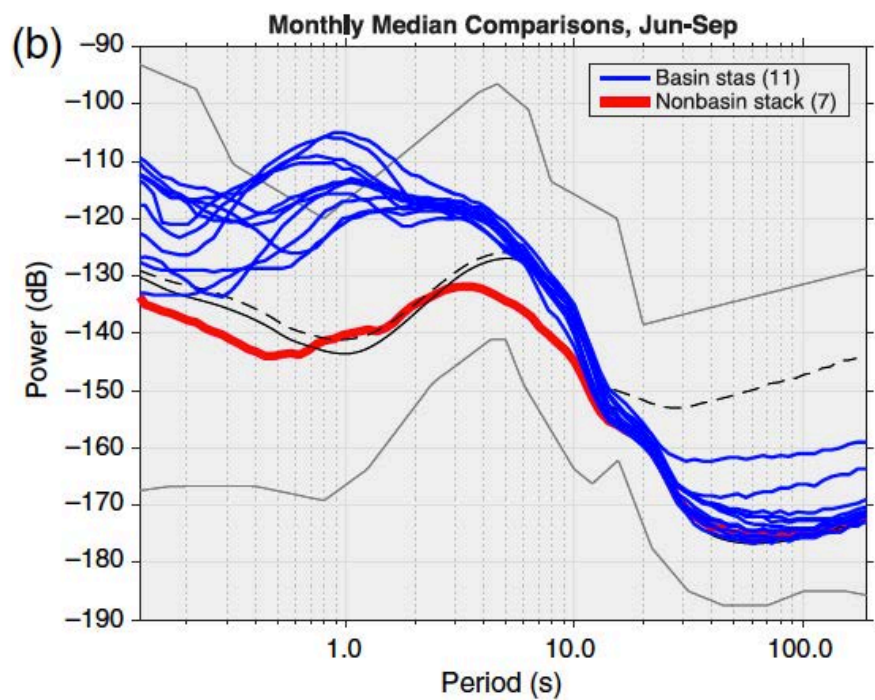
12 days later

(photo taken during servicing
on 2016-05-22)

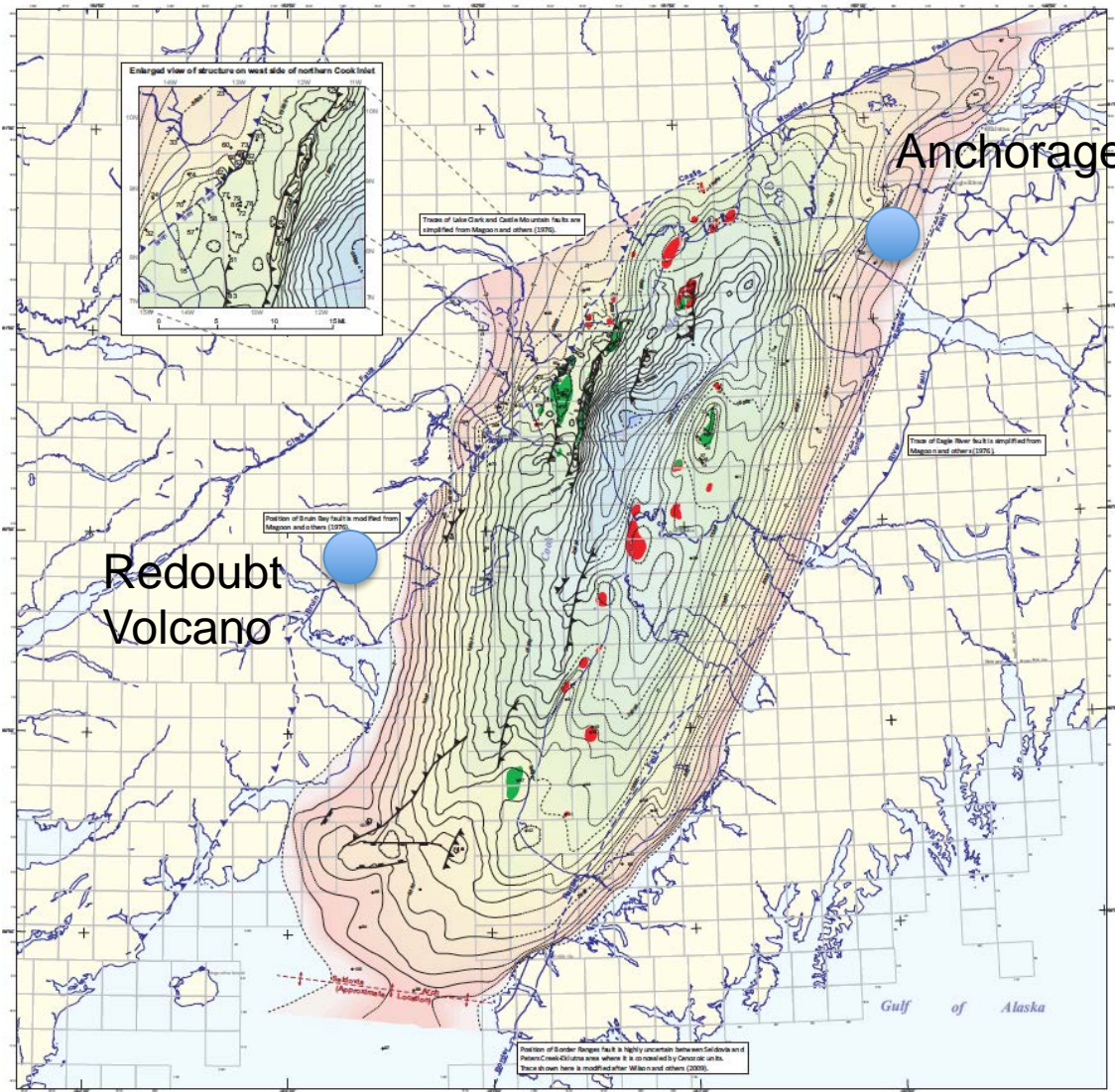


Seasonal Median Comparisons for AK.CAPN





Cook Inlet forearc basin = 160 Ma of sedimentation and subduction

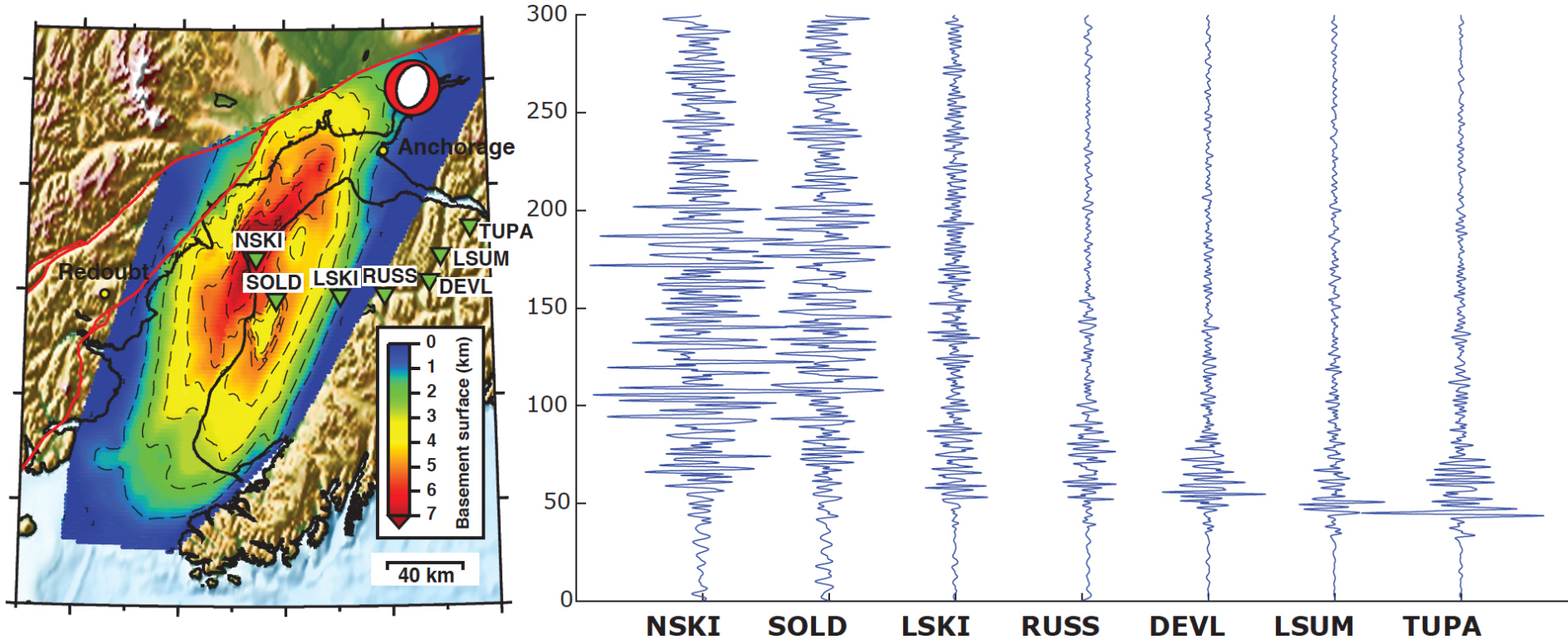


Cook Inlet basin (depth to base Tertiary)
Shellenbaum et al. (2010)

GEOLOGIC TIME M.Y. 18	ERA	SYSTEM	SERIES	STAGE	DATES OF INTRUSION ALASKA- ALEUTIAN BATHTHOLITH		COOK INLET		MAXIMUM THICKNESS (meters)	SEISMIC HORIZON			
					LOWER	UPPER	LOWER	UPPER					
3	C E N O Z O I C A R Y	T E R T I A R Y	PLIOCENE	U	CLAM- GULCHIAN			Sterling Fm.	1850	I A			
4				L				Beluga Fm.	1525				
10			M	MIOCENE	U	HOMERIAN			Kenai Group				
15					L	SELDOVIAN			Tyonek Fm.		2135		
20			O	LIGOCENE	U	ANGOONIAN			Hemlock		Conglomerate	450	
22.5					L	UNNAMED							
35					L	KUMMERIAN							
40			E	OCENE	U	RAVENIAN						I B	
45					M	FULTONIAN							
50					L	FRANKLINIAN					West Foreland Fm.		1000
55	L	UNNAMED						Wishbone Fm. Anchorage Fm. Olatooka Fm.					
60	C	RETACEOUS	PALEOCENE	U					I C				
65				L				Kaguyak Fm.					
70	M E O Z O I C A R Y	C R E T A C E O U S	SENONIAN	MAESTRICHTIAN				Matanuska Fm.	2600				
75				CAMPANIAN									
80				SANTONIAN									
85			UPPER	CONIACIAN						600			
90				TURONIAN									
95			CENOMANIAN										
100			LOWER	ALBIAN						125			
110				BARRERIAN									
120			NEOCOMIAN	HAUTERIVIAN					Kamishak Hills Section	215			
130				VALANGINIAN					Nalchika Ls.				
140	BERRIASIAN												
141	J U R A S S I C	UPPER	PORTLANDIAN						2185				
150			KIMMERIDIAN					Naknek Fm.					
160			OXFORDIAN					Chisik Congl. Mbr.					
170			CALLUVIAN					Chinitna Fm.		715			
180			BATHONIAN					Tuxedni Group		2960			
176	LOWER	TOARCIAN						2575					
180		PLIENSCHACHIAN											
190		SINEMURIAN					Talkeena Fm.						
195	C	TRIASSIC	HETTANGIAN						395				
200				UPPER						Kamishak Fm. Unnamed rocks			
210	L	LOWER											
220													
230													

Cook Inlet stratigraphy
Fisher and Magoon (1978)

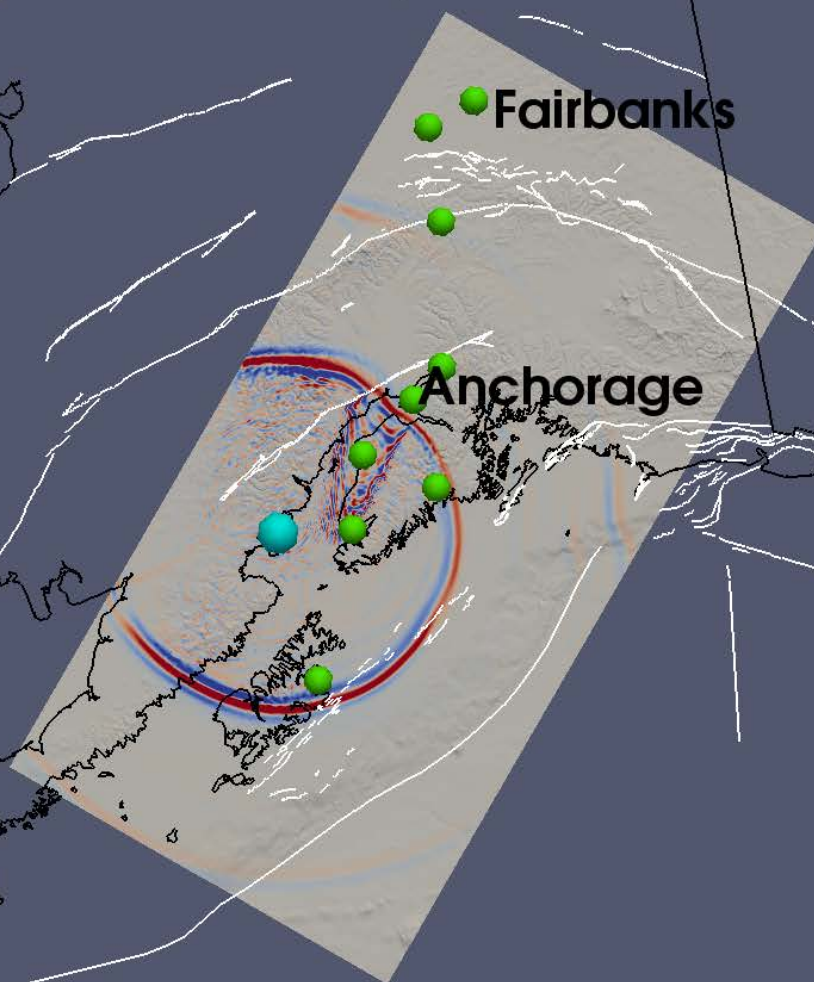
Amplification and extended shaking in sedimentary basins

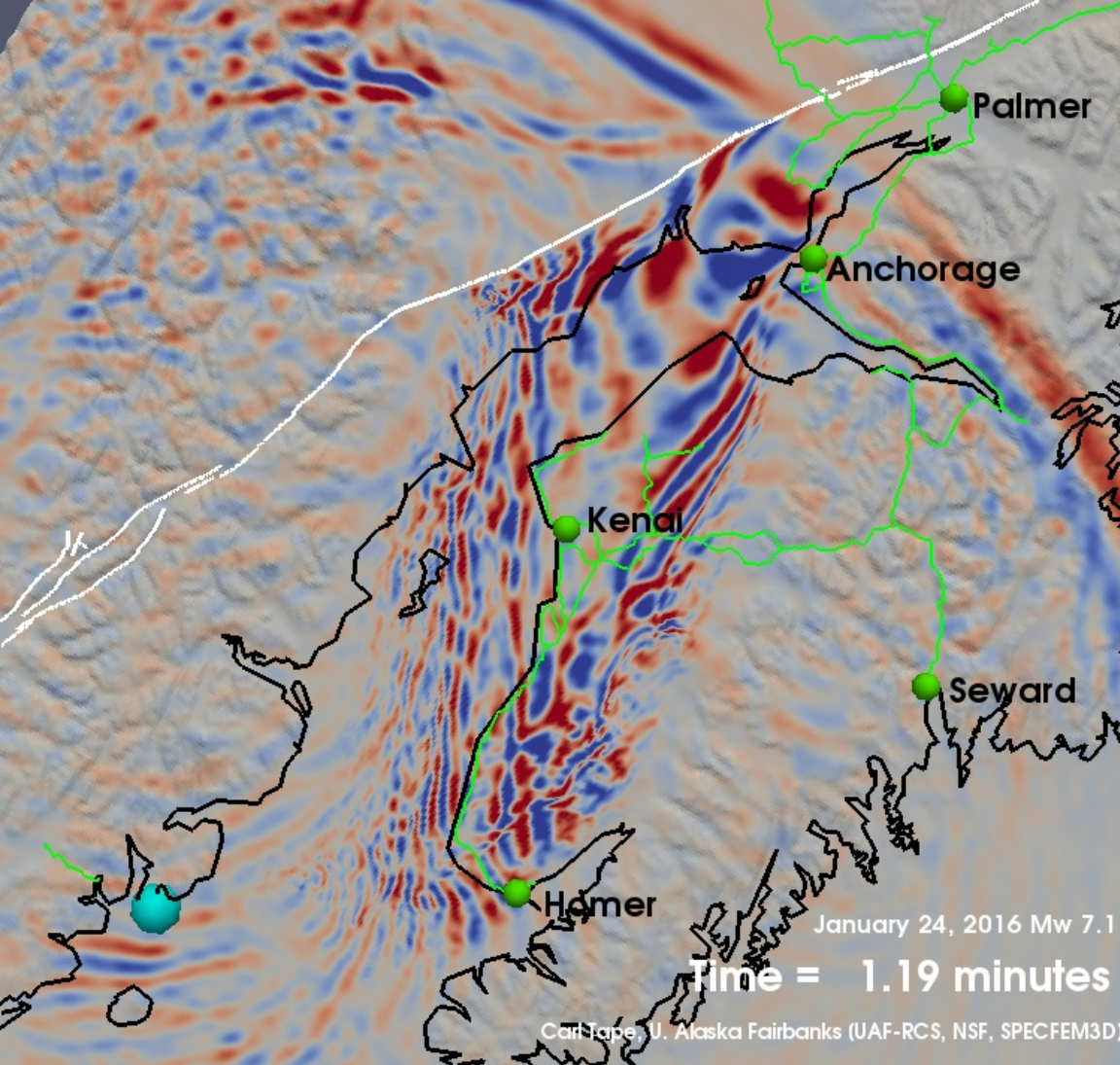


Basin geometry: Shellenbaum et al., 2010

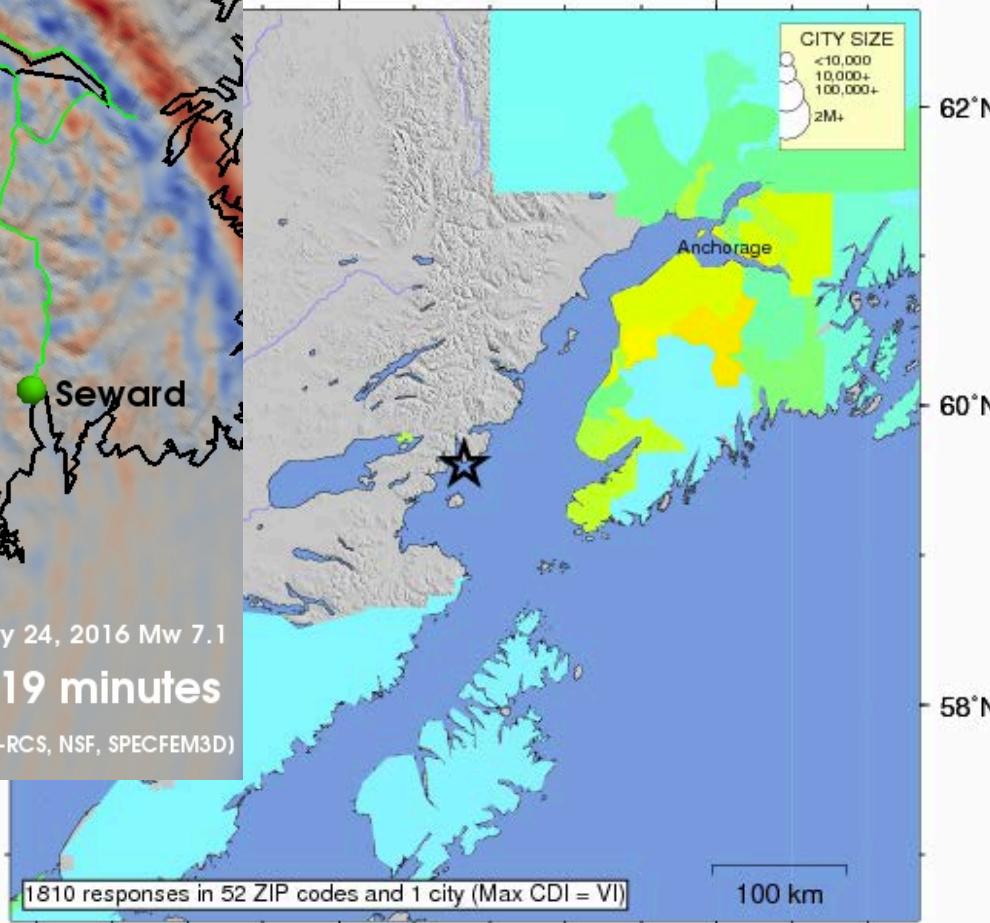
Seismic stations: MOOS experiment (Christensen and Abers, 2007-2009)

2016 Mw 7.1 Iniskin earthquake





SGS Community Internet Intensity Map
 SOUTHERN ALASKA
 M local 59.6047N 153.3405W M6.8 Depth: 123 km ID:ak12496371

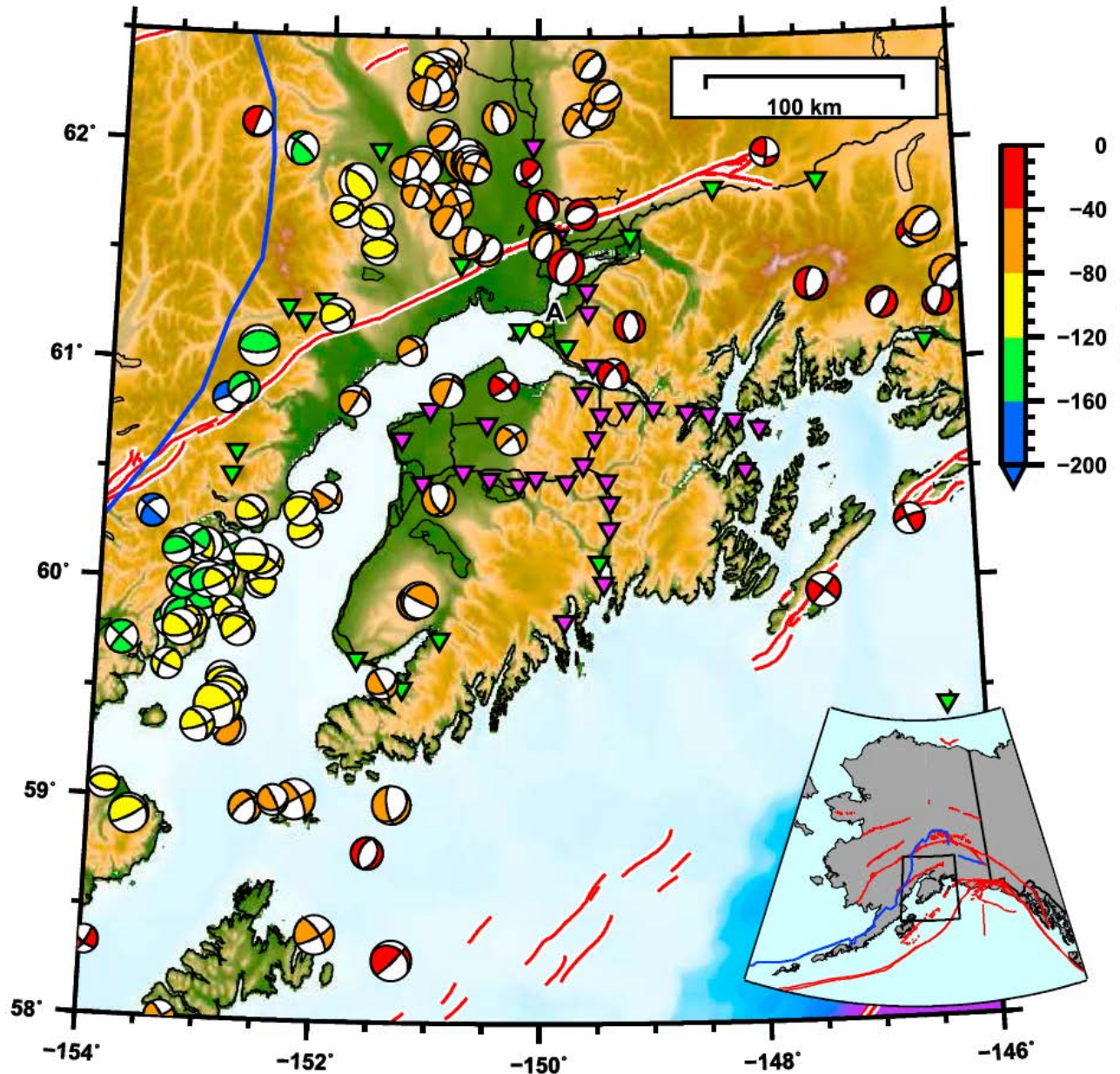


2016 Mw 7.1 Iniskin earthquake

INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+
SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy

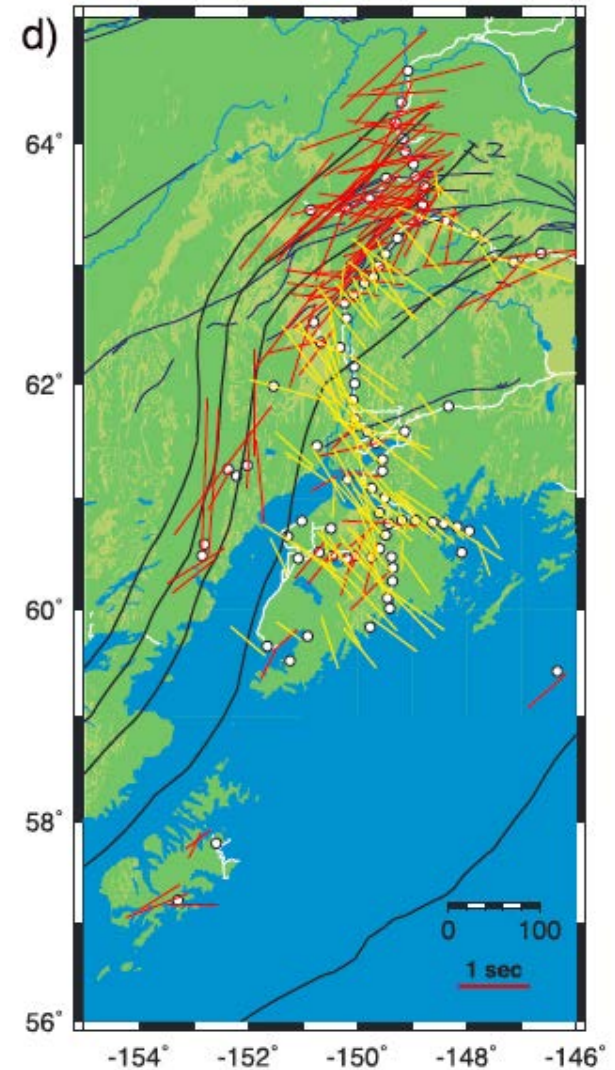
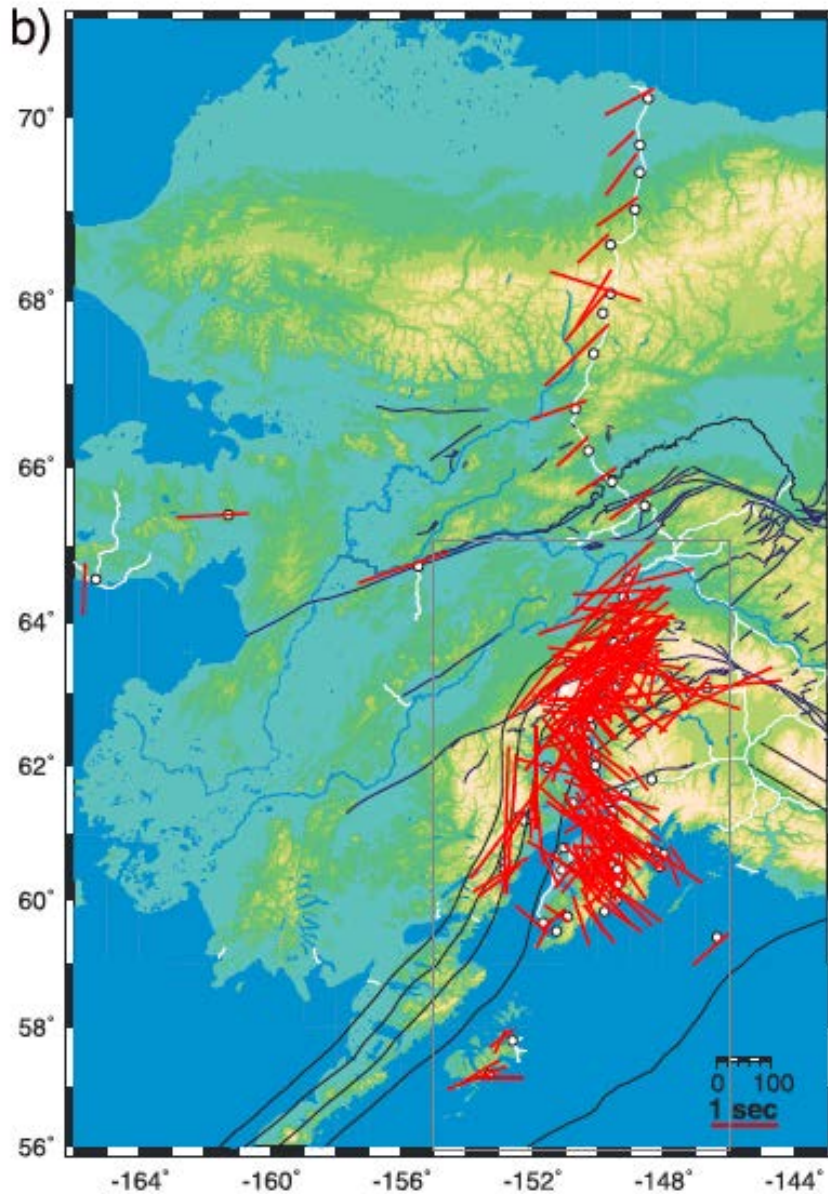
Processed: Sun Jan 24 11:58:22 2016

Moment tensor catalog for adjoint tomographic inversion



Silwal and
Tape, 2016

A remarkably sharp transition in SKS splitting observations



Perttu et al., 2014

EXTRA SLIDES

[SALMON] Each entry in the table corresponds to a station-year, for example BING/15 is for station BING for the time period summer-2015 to summer-2016. Three stations are omitted from the table for sites where there are no bears, on Kalgin Island (KALS+, KALN+) and inside a 2 km² gated moose pen (MPEN+). The * indicates a site where the sensor cable was ruined (which leads to an automatic B5/B6 category). The bold entries denote stations with Lysol used as bear deterrent. HOLG was 2015-6 only; JOES was 2016-7 only.

	B1 <i>undisturbed by bears</i>	B2	B3	B4	B5	B6 <i>most disturbed by bears</i>
R1 [7] <i>least remote site</i> BING, CLAM, GOOS, MPEN+, NNIL, NSKI, SOLD	BING/15, CLAM/15, GOOS/15, NNIL/15, NSKI/15, SOLD/15, BING/16, CLAM/16, GOOS/16, NNIL/16, NSKI/16, SOLD/16					
R2 [2] HOPE, KALS+	HOPE/15				HOPE/16	
R3 [7] BULG, CONG, HOLG, SALA, WHIP, JUDD, JOES	CONG/15, CONG/16, JUDD/15, BULG/16, WHIP/16, JUDD/16, JOES/16			SALA/15, WHIP/15		HOLG/15*, BULG/15, SALA/16*
R4 [12] <i>most remote site</i> HARR, HLC1, HLC2, HLC3, HLC4, HLC5, KALN+, LTUW, LTUX, LTUY, WFLS, WFLW	LTUX/15, LTUY/15, LTUY/16	WFLS/16, WFLW/16, HLC5/16	HLC5/15, WFLW/15, LTUW/16, HLC4/16	HLC3/15, WFLS/15, HLC2/16	HLC3/16	HARR/15, HARR/16*, LTUW/15, LTUX/16, HLC1/15*, HLC1/16, HLC2/15*, HLC4/15*

Non-remote sites [6]: BING, CLAM, GOOS, NNIL, NSKI, SOLD

Remote sites [18]: HOPE, BULG, CONG, HOLG, SALA, WHIP, JUDD or JOES, HARR, HLC1, HLC2, HLC3, HLC4, HLC5, LTUW, LTUX, LTUY, WFLS, WFLW



ANIMALTRIE

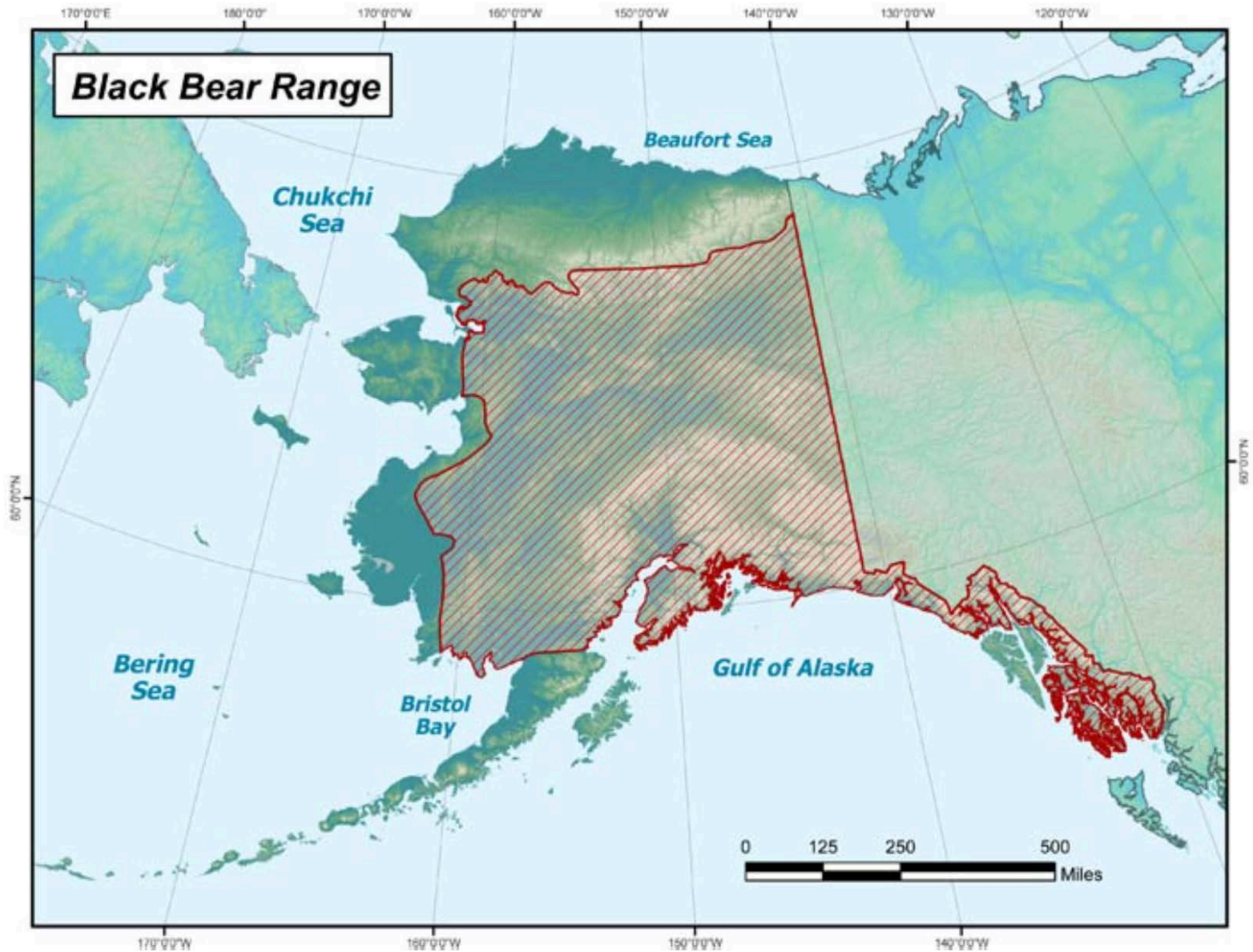


11°C

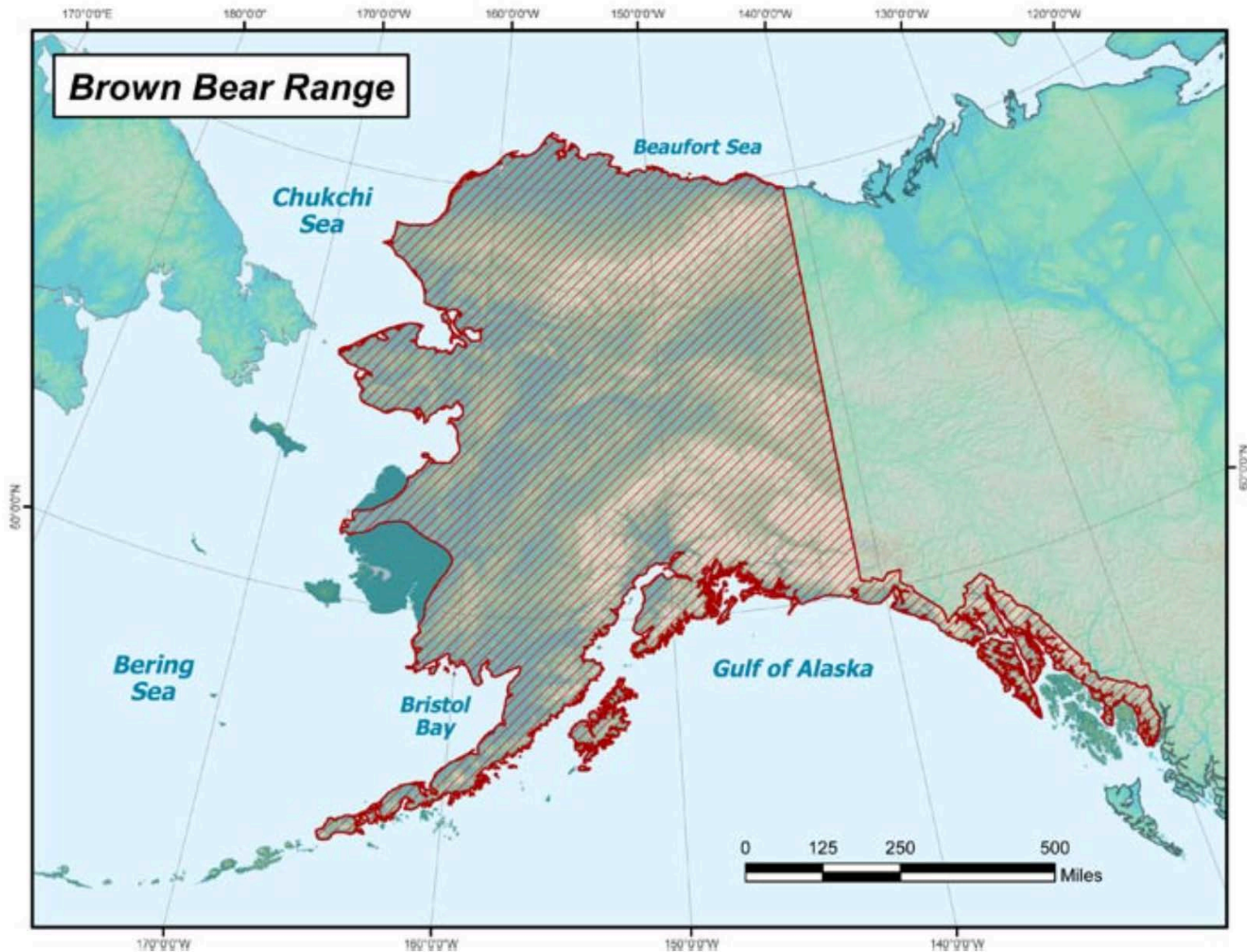
F3TNMOV

18 MAY 2017 10:07 pm

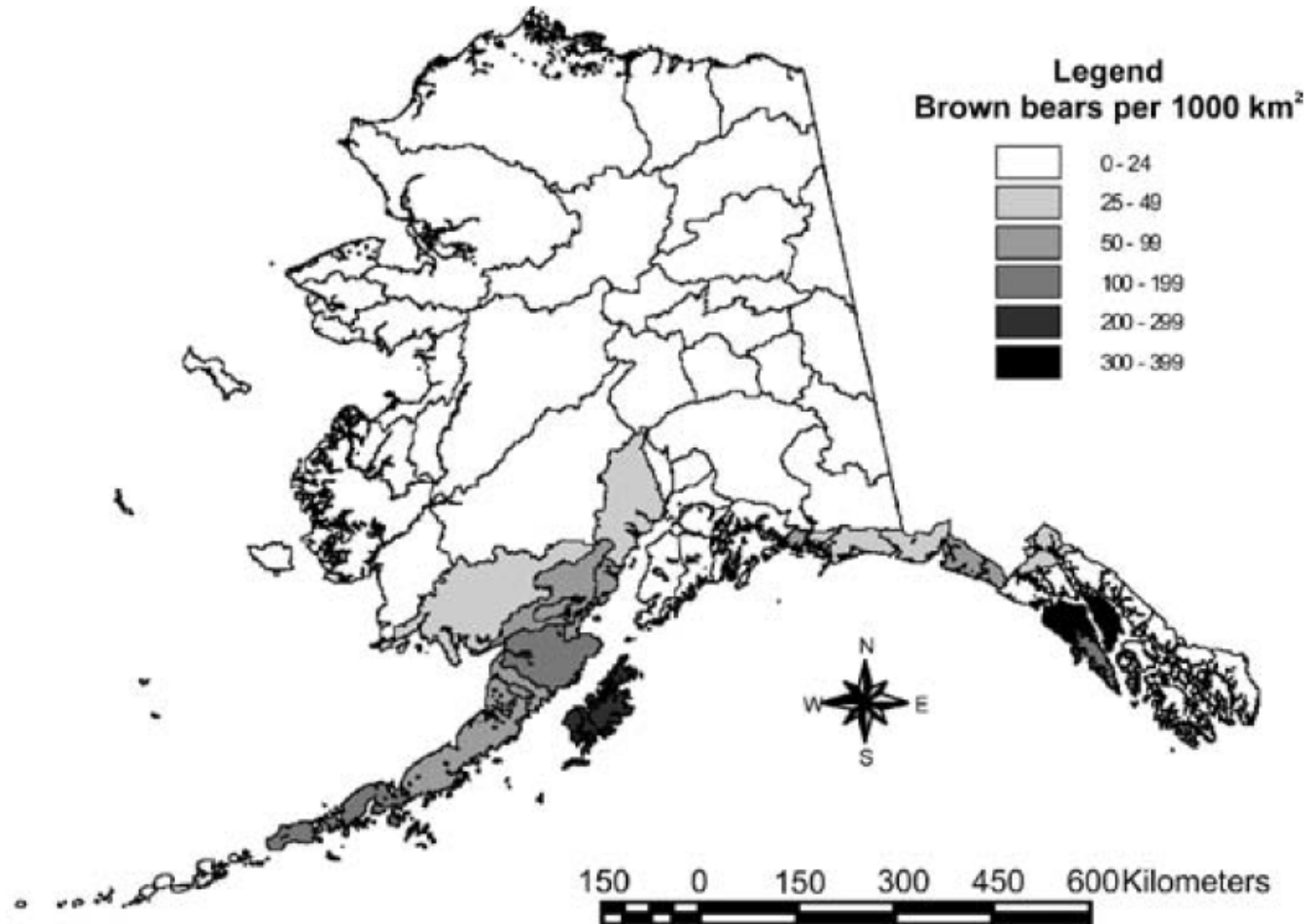
Maps to keep in mind for fieldwork



Maps to keep in mind for fieldwork



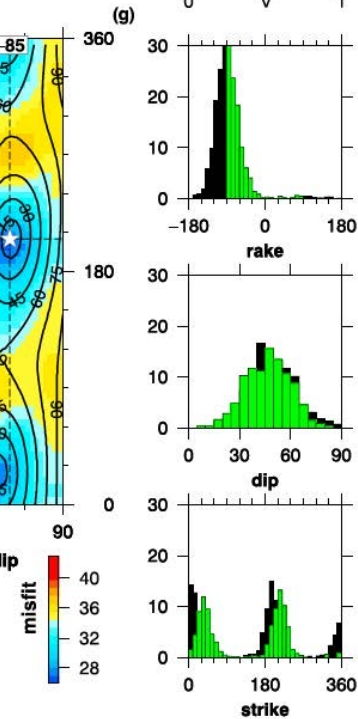
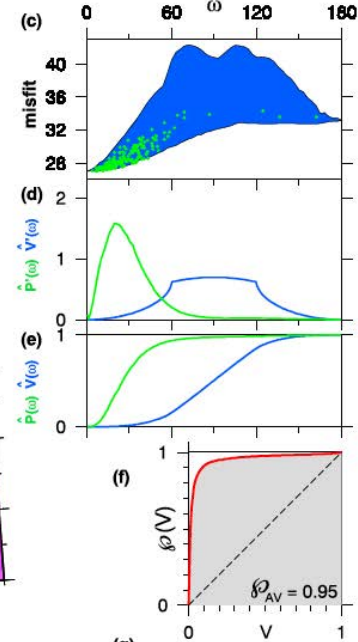
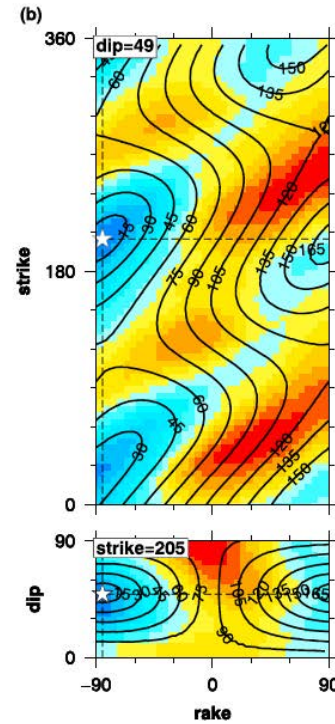
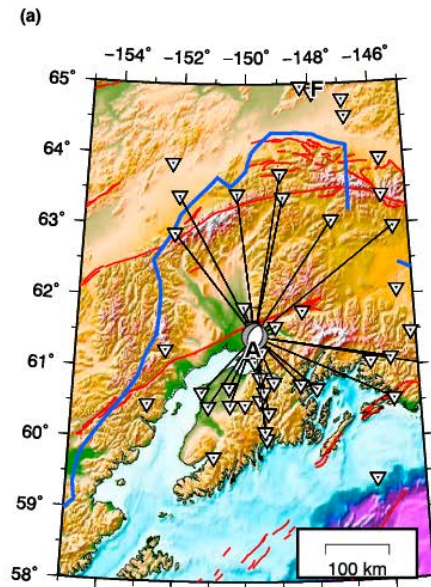
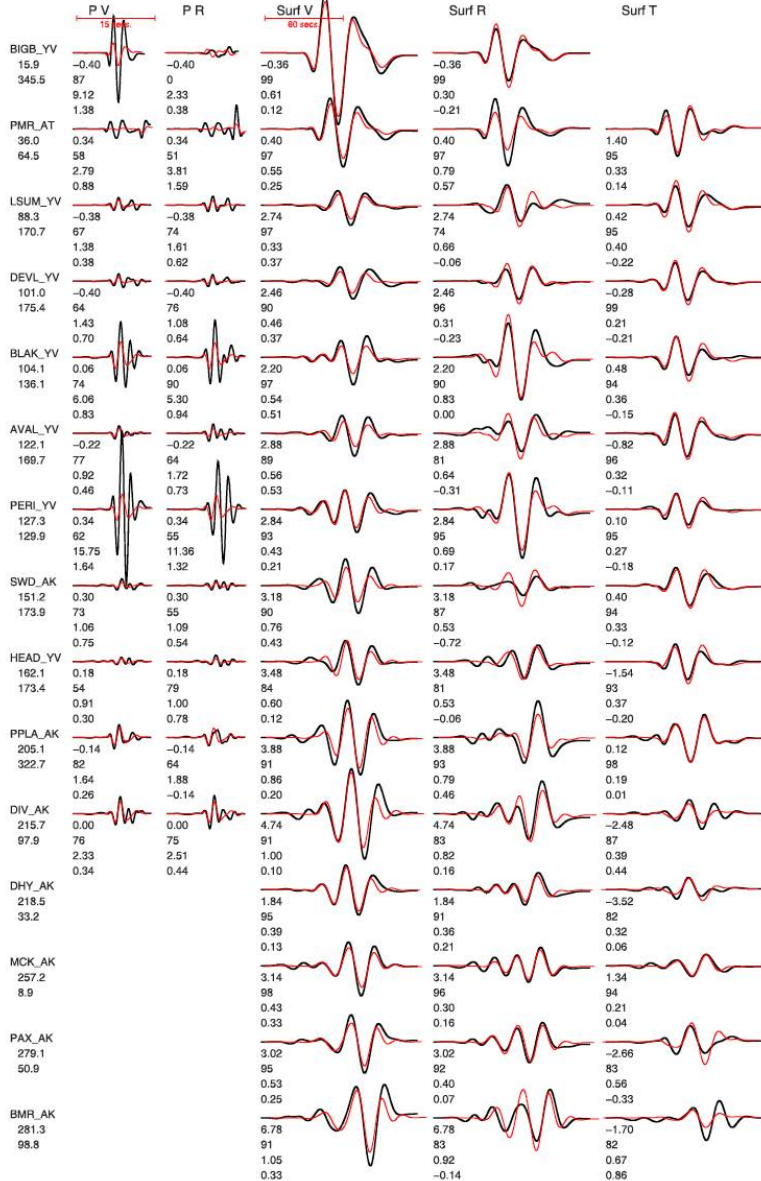
Maps to keep in mind for fieldwork



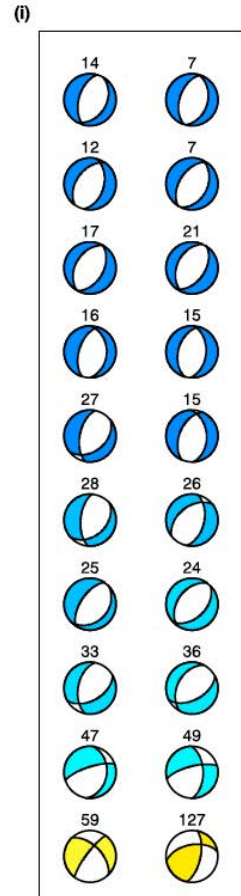
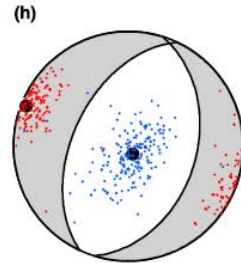
Silwal and Tape (2016)

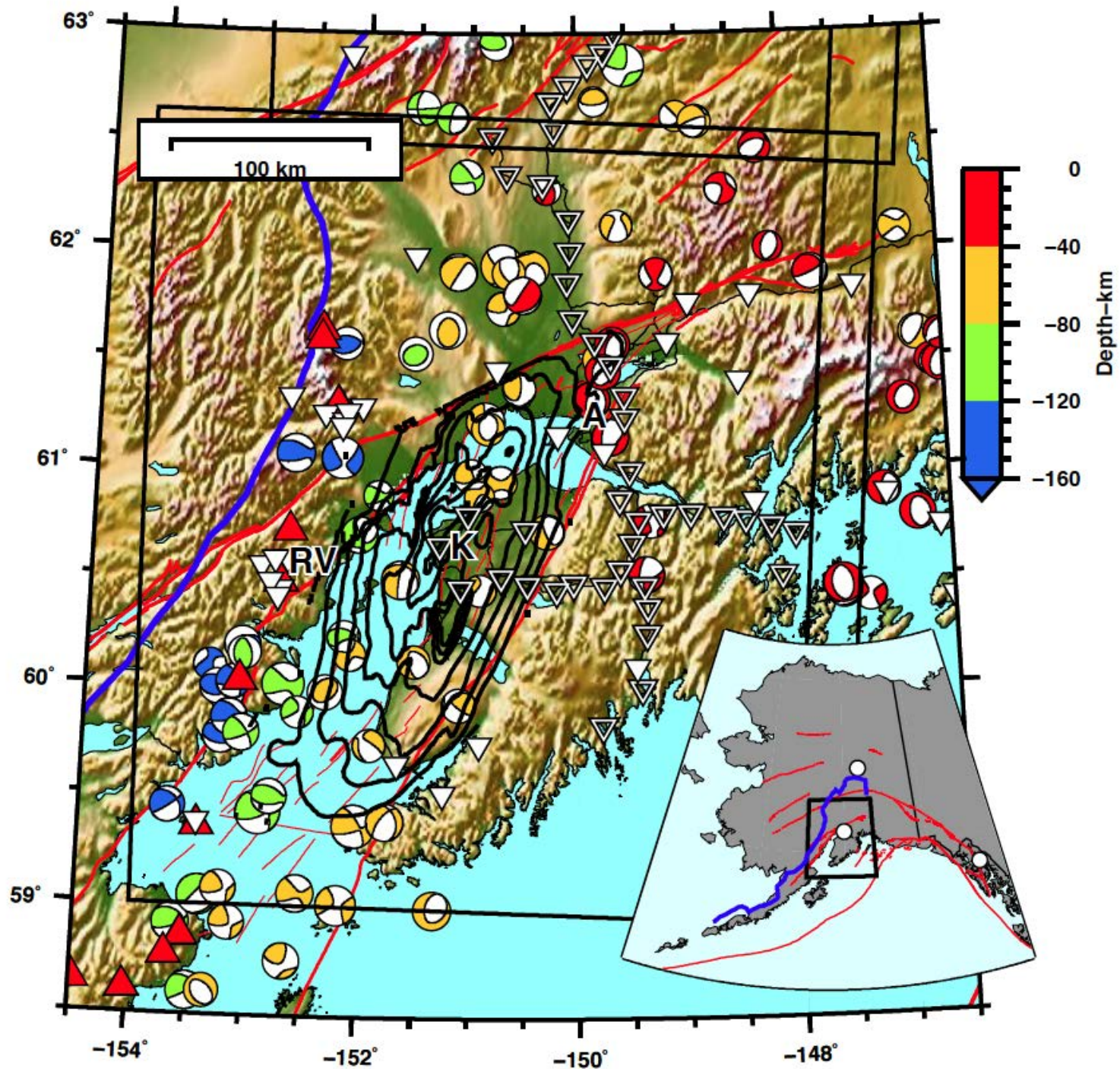


Event 20090407201255351/ Model and Depth sca_k_039
 FM 200 52 -90 Mw 4.50 ISO 0 CLVD 0 rms 9.552e-07 VR 56.2
 Filter periods (seconds): Body:1.50-4.00. Surf:16.00-40.00
 # norm L1 # Pwin 15 Swin 120 # N 15 Np 22 Ns 44



20090407201255351_L1_M11
 Strike 205 Dip 49 Rake -85
 Strike 17 Dip 40 Rake -95
 Mw 4.5 Depth 39 km





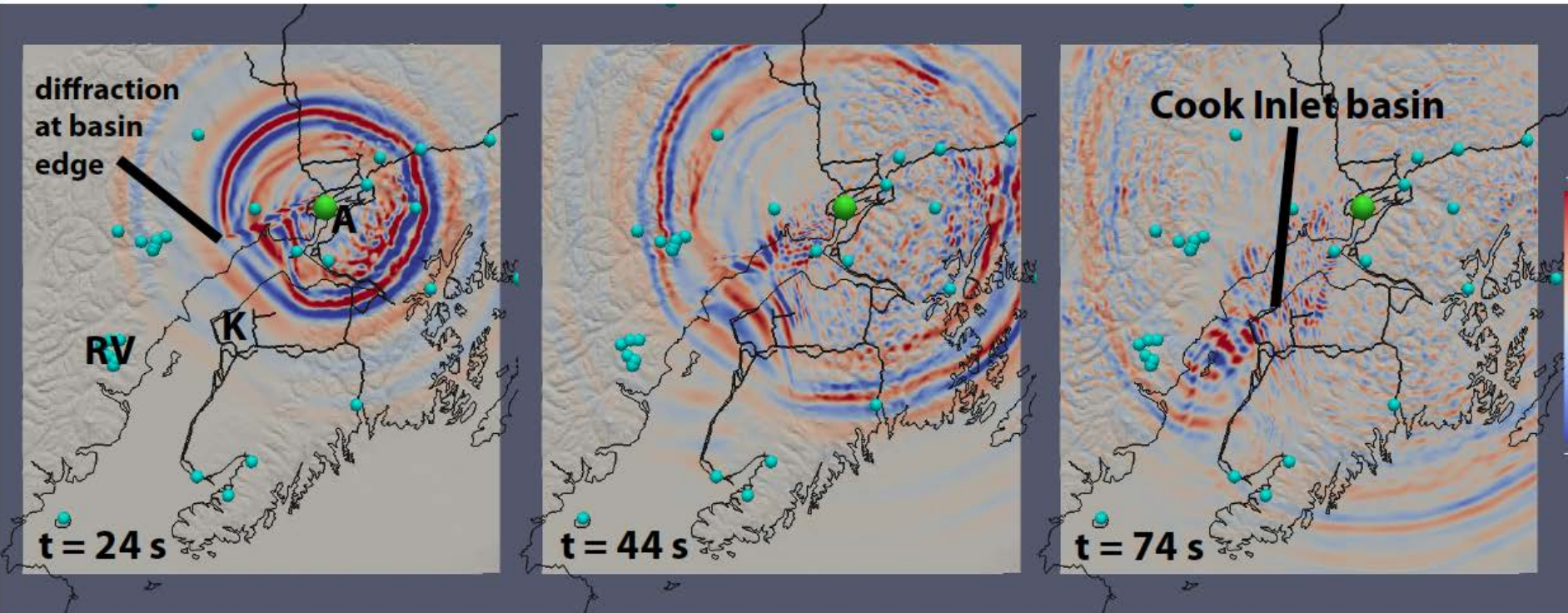
diffraction
at basin
edge

$t = 24 \text{ s}$

$t = 44 \text{ s}$

$t = 74 \text{ s}$

Cook Inlet basin



EarthScope Seismic Array in Alaska (2014–2019)

A monumental achievement by IRIS/NSF !!

