

Outline

1. Automatic detections
2. Analyst review
3. Catalog compilations

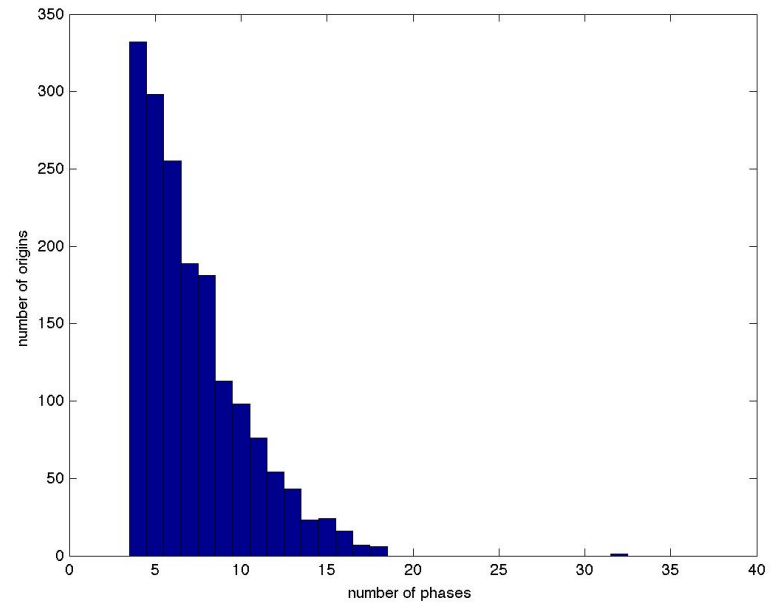
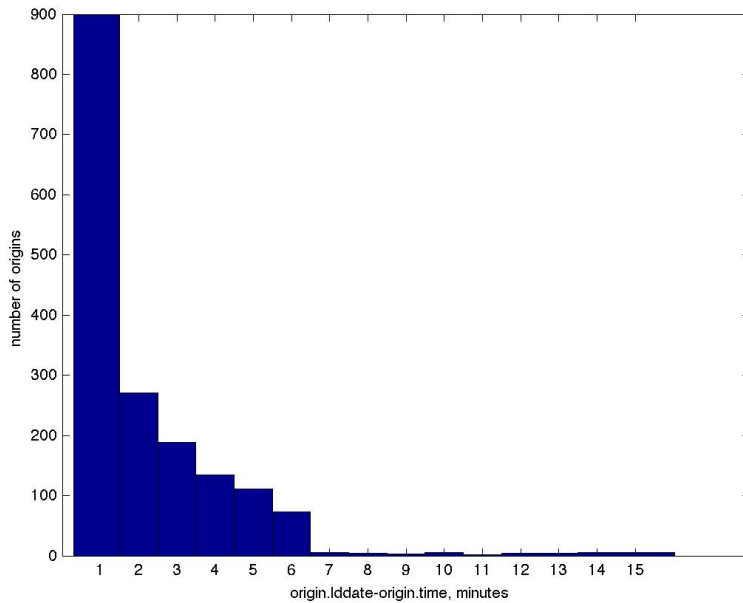
Automatic earthquake detections with Antelope - Positives

1. Ability to associate on multiple grids, including teleseismic
2. Overlapping events are handled mostly well
3. Aftershock sequences are handled satisfactory
4. Ability to relocate after the grid solution

1st automatic origin

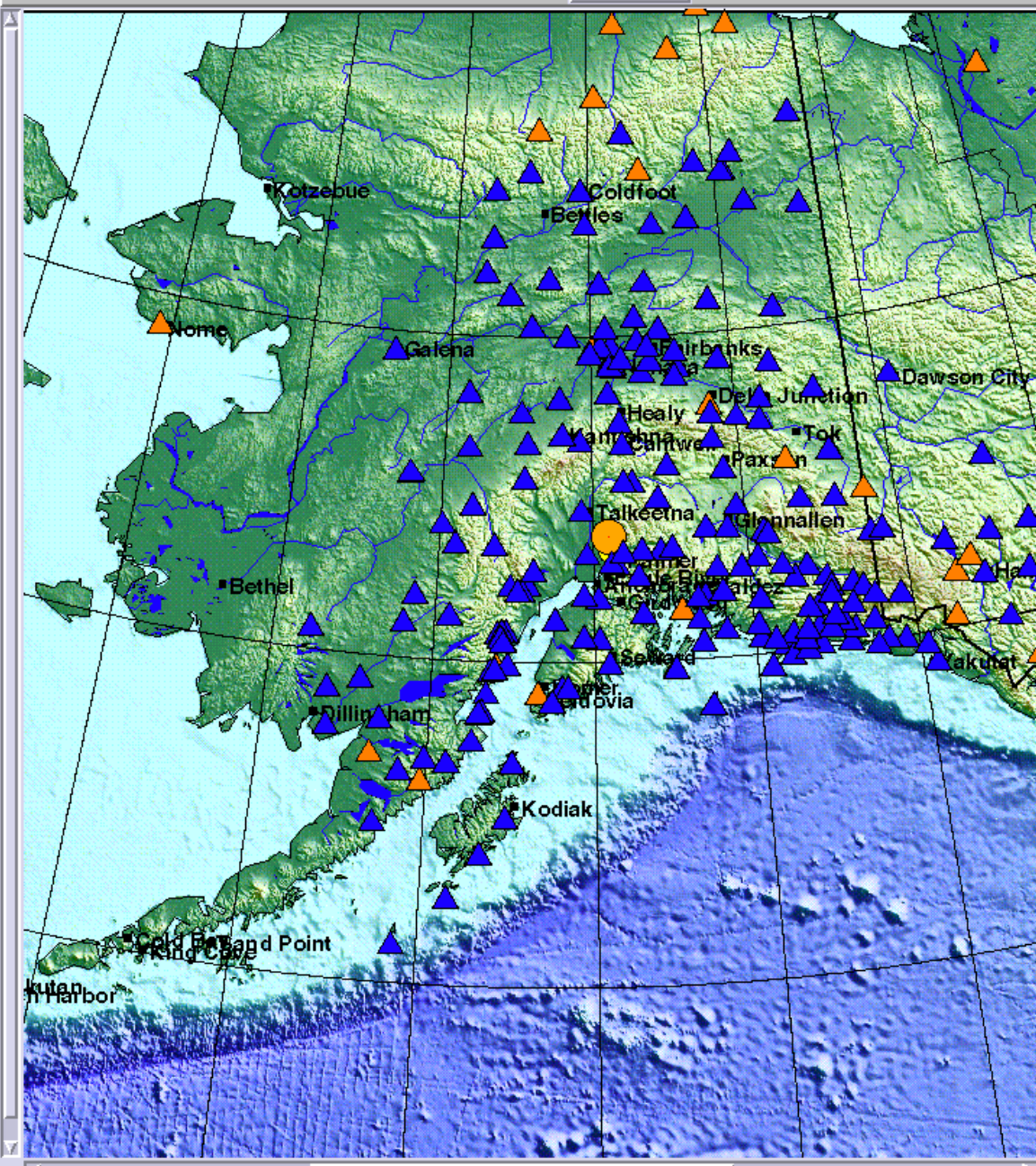
37% within 1 min
61% within 2 min
74% within 3 min
83% within 4 min

Min_pha=4



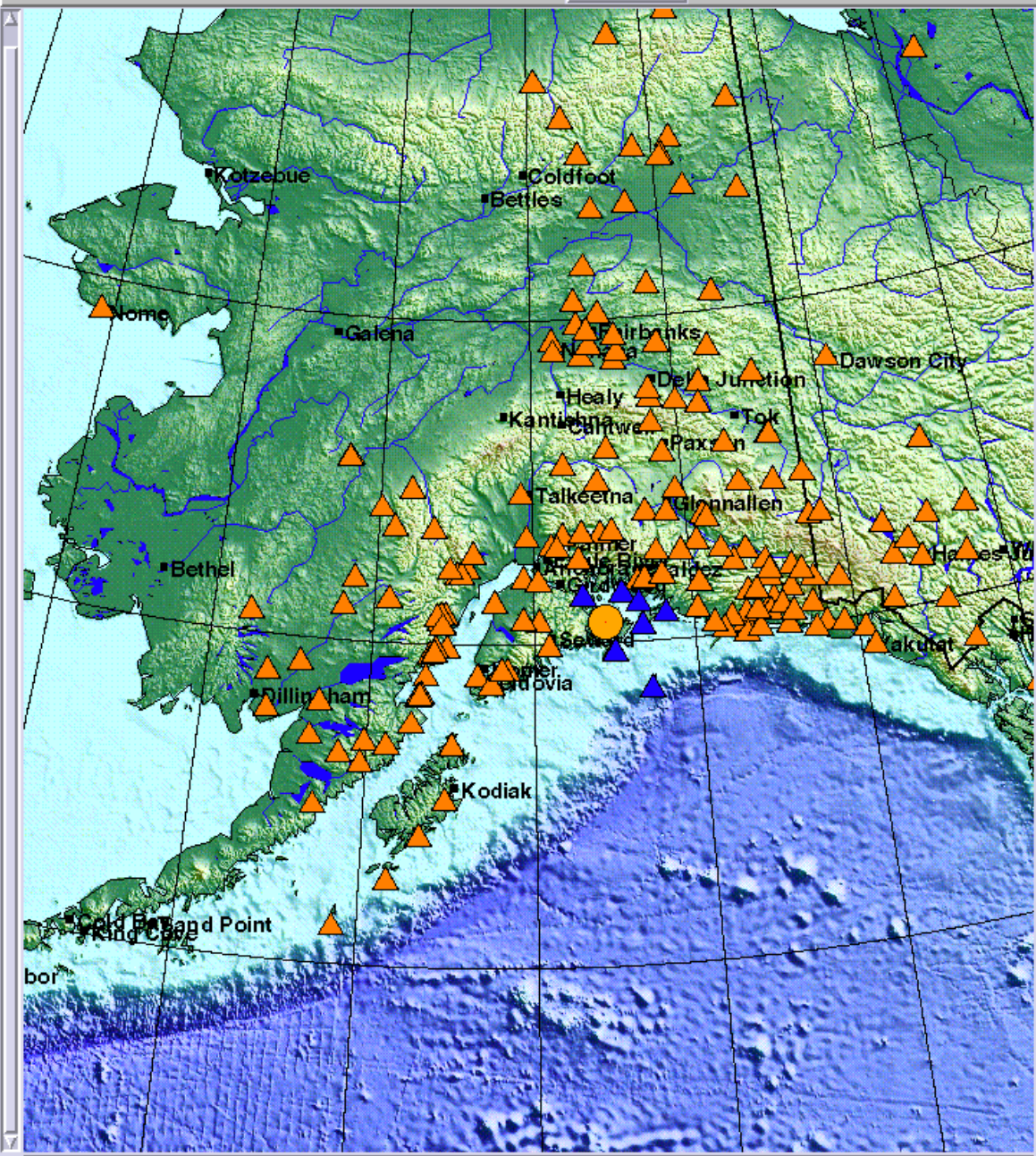
Automatic detections - issues

1. Orbassoc occasionally produces duplicate events when imported solutions are available
2. Orbassoc splits large events when those propagate across different grids or even within a single grid – a balance between orbassoc parameters tuned to produce minimal amount of mis-associations and bogus events
3. Delays in magnitude calculations



Time	Mag	Depth	Station	Location
2016/08/02 00:19:00	1.9nl		r 48	SOUTHERN ALASKA
2016/08/02 00:24:50		4.9mb	0	OFF W COAST OF NORTHERN
2016/08/02 00:25:01	4.1nl		r 213	CENTRAL ALASKA
2016/08/02 00:25:08			8	SOUTHERN ALASKA
2016/08/02 00:25:40			5	SOUTHERN ALASKA
2016/08/02 00:38:13	2.8ml		r 21	ANDREANOF ISLANDS, ALEU
2016/08/02 00:49:42	2.2nl		r 63	KENAI PENINSULA, ALASKA
2016/08/02 00:54:41	1.5nl		r 20	SOUTHERN ALASKA
2016/08/02 00:57:36	1.5nl		r 54	CENTRAL ALASKA
2016/08/02 01:07:05	1.2nl		r 21	SOUTHERN ALASKA
2016/08/02 01:09:39	0.9nl		r 11	NORTHERN ALASKA
2016/08/02 01:13:04	2.0nl		r 19	SOUTHERN ALASKA
2016/08/02 01:45:29	1.8nl		r 28	SOUTHERN ALASKA
2016/08/02 01:45:55	0.3nl		r 14	CENTRAL ALASKA
2016/08/02 01:58:50	2.2nl		r 13	ALASKA PENINSULA
2016/08/02 02:09:05	2.9nl		r 31	ALASKA PENINSULA
2016/08/02 02:17:39	1.3nl		r 23	SOUTHERN ALASKA
2016/08/02 02:31:51	1.6nl		r 21	FOX ISLANDS, ALEUTIAN I
2016/08/02 02:36:29	1.8nl		r 14	SOUTHEASTERN ALASKA
2016/08/02 02:36:52	2.0nl		r 6	SOUTHEASTERN ALASKA
2016/08/02 02:46:05	1.0nl		r 24	CENTRAL ALASKA
2016/08/02 03:02:56	1.7nl		r 48	CENTRAL ALASKA
2016/08/02 03:09:14	0.8nl		r 25	CENTRAL ALASKA
2016/08/02 03:55:41	1.0nl		r 27	SOUTHERN ALASKA
2016/08/02 03:58:09	0.8nl		r 18	SOUTHERN YUKON TERRITOR
2016/08/02 04:11:21	2.3nl		r 18	FOX ISLANDS, ALEUTIAN I
2016/08/02 04:13:15	1.3nl		r 37	SOUTHERN ALASKA
2016/08/02 04:28:24	2.2nl		r 18	ANDREANOF ISLANDS, ALEU
2016/08/02 05:02:49	2.2nl		r 18	SOUTHERN ALASKA
2016/08/02 05:03:03	0.7nl		r 15	NORTHERN ALASKA
2016/08/02 05:12:03	2.6nl		r 117	SOUTHERN ALASKA
2016/08/02 05:12:35			5	ALASKA PENINSULA
2016/08/02 05:38:41			4	ALASKA PENINSULA
2016/08/02 05:43:23	1.4nl		r 40	SOUTHERN ALASKA
2016/08/02 05:55:17	1.7nl		r 46	CENTRAL ALASKA
2016/08/02 06:09:22	0.6nl		r 17	NORTHERN ALASKA
2016/08/02 06:16:15	2.3nl		r 25	ALASKA PENINSULA

2016/08/02 00:25:01	4.1nl	213	CENTRAL ALASKA
lat = 62.0490, lon = -149.3910, depth = 38.1503			
orid = 17309136, nass = 213, evid = 13824636			
auth = AK:qc, algorithm = dbgenloc:scak,			
latency = 9 days 16.6 hours			
31 kn (20 ni) N of {Hatcher Pass}			
46 kn (29 ni) NW of Sutton			
48 kn (30 ni) SE of Talkeetna			
48 kn (30 ni) NE of Willow			
53 kn (33 ni) N of Wasilla			
2016/08/02 00:24:59	4.3nl	65	CENTRAL ALASKA
lat = 62.1148, lon = -149.5396, depth = 15.0000			
orid = 17293326, nass = 66, evid = 13824636			
auth = oa_opM1, algorithm = teleseis(65,67),			
latency = 1:27 minutes			
2016/08/02 00:25:01	4.2nl	0	CENTRAL ALASKA
lat = 62.0433, lon = -149.3921, depth = 37.0000			
orid = 17293542, nass = 123, evid = 13824636			
auth = USGS:ak, algorithm = -,			
latency = 21:17 minutes			
2016/08/02 00:24:59	4.3nl	76	CENTRAL ALASKA
lat = 62.1148, lon = -149.5396, depth = 15.0000			
orid = 17293327, nass = 78, evid = 13824636			
auth = oa_opM1, algorithm = teleseis(76,67),			

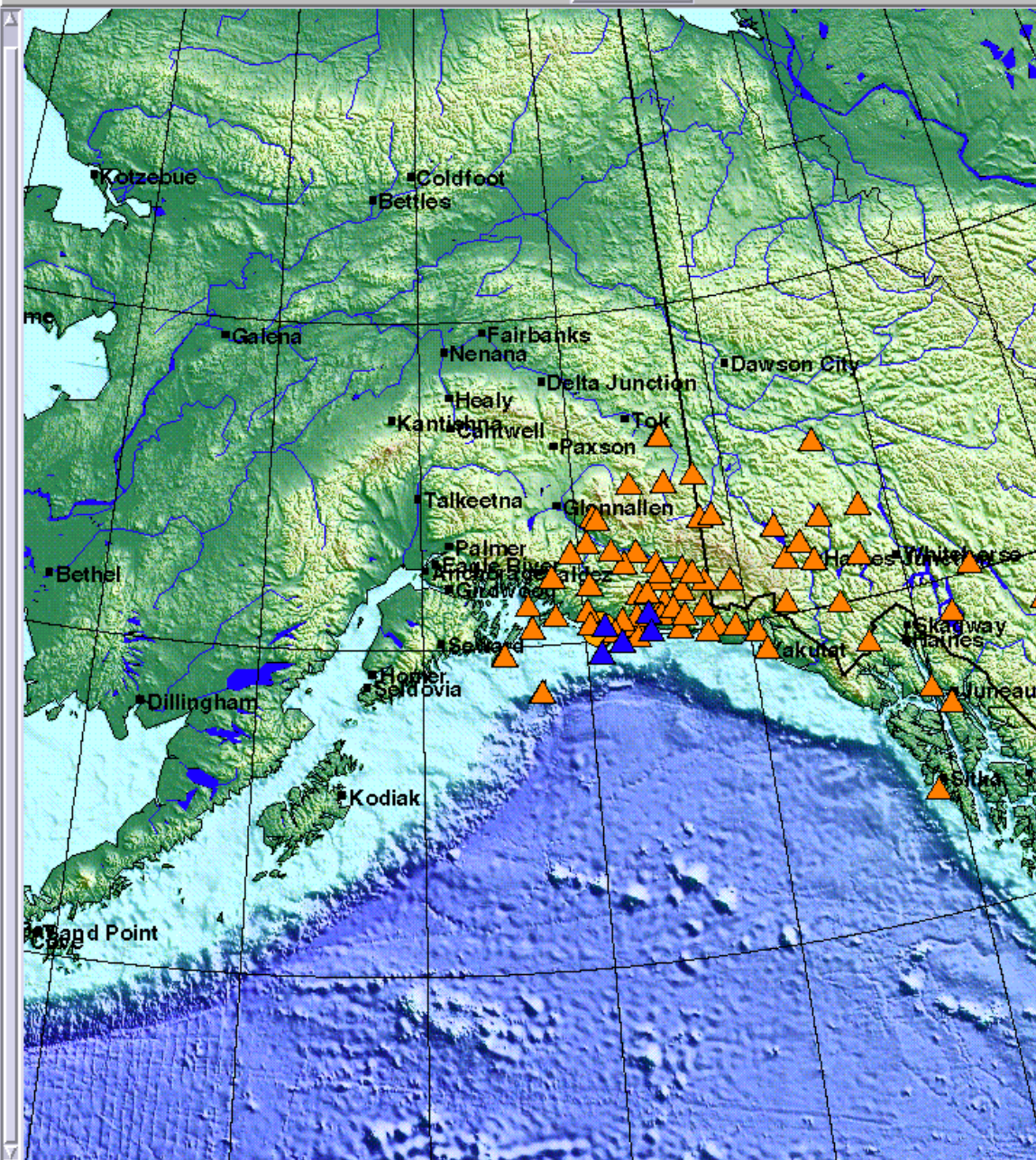


Time	Mag	Depth	Station	Location
2016/08/02 00:19:00	1.9nl		r 48	SOUTHERN ALASKA
2016/08/02 00:24:50		4.9mb	0	OFF W COAST OF NORTHERN
2016/08/02 00:25:01	4.1nl		r 213	CENTRAL ALASKA
2016/08/02 00:25:08			8	SOUTHERN ALASKA
2016/08/02 00:25:40			5	SOUTHERN ALASKA
2016/08/02 00:38:13	2.8ml		r 21	ANDREANOF ISLANDS, ALEU
2016/08/02 00:49:42	2.2nl		r 63	KENAI PENINSULA, ALASKA
2016/08/02 00:54:41	1.5nl		r 20	SOUTHERN ALASKA
2016/08/02 00:57:36	1.5nl		r 54	CENTRAL ALASKA
2016/08/02 01:07:05	1.2nl		r 21	SOUTHERN ALASKA
2016/08/02 01:09:39	0.9nl		r 11	NORTHERN ALASKA
2016/08/02 01:13:04	2.0nl		r 19	SOUTHERN ALASKA
2016/08/02 01:45:29	1.8nl		r 28	SOUTHERN ALASKA
2016/08/02 01:45:55	0.3nl		r 14	CENTRAL ALASKA
2016/08/02 01:58:50	2.2nl		r 13	ALASKA PENINSULA
2016/08/02 02:09:05	2.9nl		r 31	ALASKA PENINSULA
2016/08/02 02:17:39	1.3nl		r 23	SOUTHERN ALASKA
2016/08/02 02:31:51	1.6nl		r 21	FOX ISLANDS, ALEUTIAN I
2016/08/02 02:36:29	1.8nl		r 14	SOUTHEASTERN ALASKA
2016/08/02 02:36:52	2.0nl		r 6	SOUTHEASTERN ALASKA
2016/08/02 02:46:05	1.0nl		r 24	CENTRAL ALASKA
2016/08/02 03:02:56	1.7nl		r 48	CENTRAL ALASKA
2016/08/02 03:09:14	0.8nl		r 25	CENTRAL ALASKA
2016/08/02 03:55:41	1.0nl		r 27	SOUTHERN ALASKA
2016/08/02 03:58:09	0.8nl		r 18	SOUTHERN YUKON TERRITOR
2016/08/02 04:11:21	2.3nl		r 18	FOX ISLANDS, ALEUTIAN I
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2016/08/02 04:28:24	2.2nl		r 18	ANDREANOF ISLANDS, ALEU
2016/08/02 05:02:49	2.2nl		r 18	SOUTHERN ALASKA
2016/08/02 05:03:03	0.7nl		r 15	NORTHERN ALASKA
2016/08/02 05:12:03	2.6nl		r 117	SOUTHERN ALASKA
2016/08/02 05:12:35			5	ALASKA PENINSULA
2016/08/02 05:38:41			4	ALASKA PENINSULA
2016/08/02 05:43:23	1.4nl		r 40	SOUTHERN ALASKA
2016/08/02 05:55:17	1.7nl		r 46	CENTRAL ALASKA
2016/08/02 06:09:22	0.6nl		r 17	NORTHERN ALASKA
2016/08/02 06:16:15	2.3nl		r 25	ALASKA PENINSULA

2016/08/02 00:25:08 8 SOUTHERN ALASKA
 lat = 60.4798, lon = -147.6658, depth = 20.0000
 orid = 17293328, nass = 8, evid = 13824640
 auth = oa_ophl, algorithm = scak_sha(12.15),
 latency = 1:38 minutes
 48 kn (30 ni) NNE of {Chena Bay}
 64 kn (40 ni) ESE of Whittier
 69 kn (43 ni) SW of Tatitlek
 93 kn (58 ni) E of {Moose Pass}
 96 kn (60 ni) ESE of Girdwood

2016/08/02 00:25:08 3.1nl 7 SOUTHERN ALASKA
 lat = 60.4798, lon = -147.6658, depth = 40.0000
 orid = 17293325, nass = 7, evid = 13824640
 auth = oa_ophl, algorithm = scak_sha(11.30),
 latency = 1:08 minutes

2016/08/02 00:25:08 3.1nl 5 SOUTHERN ALASKA
 lat = 60.4798, lon = -147.6658, depth = 35.0000
 orid = 17293323, nass = 5, evid = 13824640
 auth = oa_ophl, algorithm = scak_shal(9.34),
 latency = 56.523 seconds

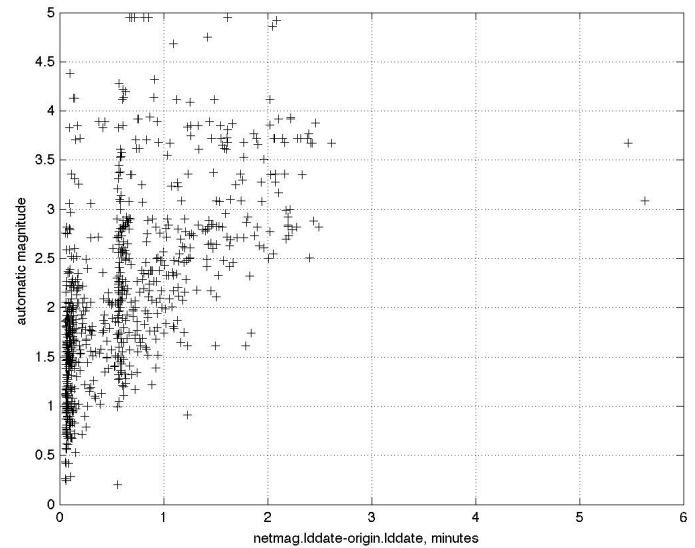
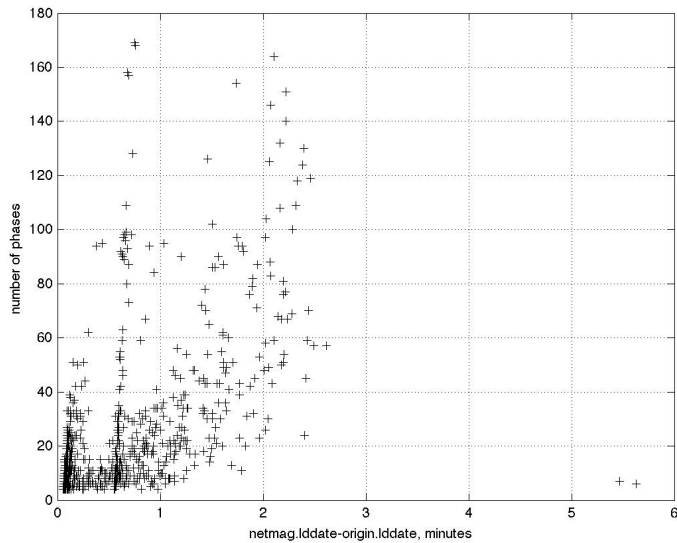
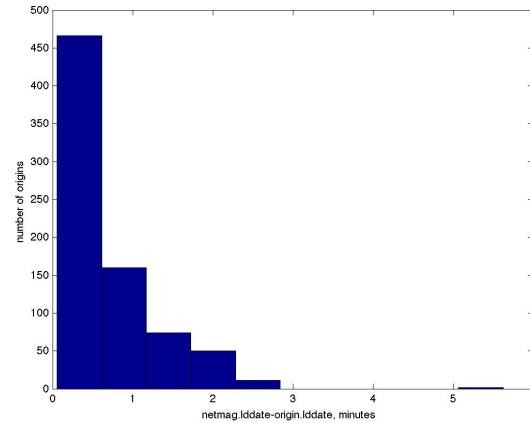


Date	Time	Magnitude	Type	Location
2016/08/02	00:19:00	1.9nl	r	48 SOUTHERN ALASKA
2016/08/02	00:24:50	4.9mb	r	0 OFF W COAST OF NORTHERN
2016/08/02	00:25:01	4.1nl	r	213 CENTRAL ALASKA
2016/08/02	00:25:08		r	8 SOUTHERN ALASKA
2016/08/02	00:25:40		r	5 SOUTHERN ALASKA
2016/08/02	00:38:13	2.8nl	r	21 ANDREANOF ISLANDS, ALEU
2016/08/02	00:49:42	2.2nl	r	63 KENAI PENINSULA, ALASKA
2016/08/02	00:54:41	1.5nl	r	20 SOUTHERN ALASKA
2016/08/02	00:57:36	1.5nl	r	54 CENTRAL ALASKA
2016/08/02	01:07:05	1.2nl	r	21 SOUTHERN ALASKA
2016/08/02	01:09:39	0.9nl	r	11 NORTHERN ALASKA
2016/08/02	01:13:04	2.0nl	r	19 SOUTHERN ALASKA
2016/08/02	01:45:29	1.8nl	r	28 SOUTHERN ALASKA
2016/08/02	01:45:55	0.3nl	r	14 CENTRAL ALASKA
2016/08/02	01:58:50	2.2nl	r	13 ALASKA PENINSULA
2016/08/02	02:09:05	2.9nl	r	31 ALASKA PENINSULA
2016/08/02	02:17:39	1.3nl	r	23 SOUTHERN ALASKA
2016/08/02	02:31:51	1.6nl	r	21 FOX ISLANDS, ALEUTIAN I
2016/08/02	02:36:29	1.8nl	r	14 SOUTHEASTERN ALASKA
2016/08/02	02:36:52	2.0nl	r	6 NORTHEASTERN ALASKA
2016/08/02	02:46:05	1.0nl	r	24 CENTRAL ALASKA
2016/08/02	03:02:56	1.7nl	r	48 CENTRAL ALASKA
2016/08/02	03:09:14	0.8nl	r	25 CENTRAL ALASKA
2016/08/02	03:55:41	1.0nl	r	27 SOUTHERN ALASKA
2016/08/02	03:58:09	0.8nl	r	18 SOUTHERN YUKON TERRITOR
2016/08/02	04:11:21	2.3nl	r	18 FOX ISLANDS, ALEUTIAN I
2016/08/02	04:13:15	1.3nl	r	37 SOUTHERN ALASKA
2016/08/02	04:28:24	2.2nl	r	18 ANDREANOF ISLANDS, ALEU
2016/08/02	05:02:49	2.2nl	r	18 SOUTHERN ALASKA
2016/08/02	05:03:03	0.7nl	r	15 NORTHERN ALASKA
2016/08/02	05:12:03	2.6nl	r	117 SOUTHERN ALASKA
2016/08/02	05:12:35		r	5 ALASKA PENINSULA
2016/08/02	05:38:41		r	4 ALASKA PENINSULA
2016/08/02	05:43:23	1.4nl	r	40 SOUTHERN ALASKA
2016/08/02	05:55:17	1.7nl	r	46 CENTRAL ALASKA
2016/08/02	06:09:22	0.6nl	r	17 NORTHERN ALASKA
2016/08/02	06:16:15	2.3nl	r	25 ALASKA PENINSULA

2016/08/02 00:25:40 5 SOUTHERN ALASKA
 lat = 60.3350, lon = -144.4376, depth = 35.0000
 orid = 17293335, nass = 5, evid = 13824652
 auth = oa_ophl, algorithm = scak_shal(8.93),
 latency = 3:21 minutes
 76 km (47 mi) ESE of Cordova
 115 km (72 mi) NNW of {Cape Yakataga}
 116 km (72 mi) SE of {Thompson Pass}
 131 km (82 mi) S of Chitina
 133 km (83 mi) SSE of {Pump Station #12}

1st automatic MI

47% within 0.5 min
77% within 1 min
94% within 2 min



Analyst review

1. Define some standards:
 - regional velocity models
 - minimum magnitude/number of phases
 - maximum location errors/RMS
 - quality of picks (all picks vs all “Clear” picks)
2. Define data flow and distribute work load
(e.g., working on real time database vs local copy, daily data volumes and other)
3. ??

Catalog compilations

1. **Event names/ids**, important for submissions into ComCat, for event-specific webpages; it is non-trivial to maintain the same event across different processing stages (automatic, analyst review, seismologist QC, final catalog)
2. Dealing with different **magnitude types**
3. Merging solutions from **different sources** into a single database

evname vs evid – Pros? Cons?

	evid	prefor	auth	evname
0	11746539	15215222	oa_opDbgM1	
	11742833	15211517	oa_opDbgM1	
	11742835	15211521	oa_opDbgM1	
	11742857	15211540	oa_opDbgM1	
	11742865	15211548	oa_opDbgM1	
	11742887	15211570	oa_opDbgM1	
	11742889	15211572	oa_opDbgM1	
	11742914	15211597	oa_opDbgM1	
	11742918	15211601	oa_opDbgM1	
	11742919	15211602	oa_opDbgM1	
	11742921	15211606	oa_opDbgM1	
	11742951	15211636	oa_opDbgM1	
	11742956	15211640	oa_opDbgM1	
	11742960	15211649	oa_opDbgM1 Mb	
	11743000	15211685	oa_opDbgM1	
	11743003	15211689	oa_opDbgM1	
	11743007	15211690	oa_opDbgM1	
	11743116	15211802	oa_opDbgM1	
	11743118	15211803	oa_opDbgM1	
	11743122	15211805	oa_opDbgM1	
	11743123	15211841	oa_opDbgM1	
	11743163	15211846	oa_opDbgM1	
	11743166	15211850	oa_opDbgM1	
	11743168	15211851	oa_opDbgM1	
	11743169	15211852	oa_opDbgM1	

393	magid	orid	evid	magtype	nsta	magnitude	uncertainty	auth
	819691	17310808	13842125	mb		4.80		USGS:us
	819699	17310868	13842182	mb		4.50		USGS:us
	819707	17310947	13842264	mb		5.00		USGS:us
	819331	17309482	13840799	mb1g		4.00		USGS:us
	818593	17308095	13839412	mb1g		4.00		USGS:us
	819666	17310730	13842047	m1		4.30		USGS:us
	819760	17311360	13841660	mwb		5.00		USGS:us
	813864	17266885	13798189	mwb		6.30		USGS:us
	813817	17266403	13797330	mwb		5.30		USGS:us
	819866	17312218	13843488	mwb		5.50		USGS:us
	820115	17313635	13844922	mwb		5.30		USGS:us
	817015	17298946	13830212	mwb		6.20		USGS:us
	819857	17312213	13843488	mwb		5.50		USGS:us
	819912	17312735	13843488	mwb		5.60		USGS:us
	816961	17298739	13830049	mwb		6.00		USGS:us
	816963	17298742	13830059	mwb		6.00		USGS:us
	817010	17298933	13830212	mwb		6.20		USGS:us
	814358	17273659	13804976	mwc		6.00		USGS:us
	816979	17298819	13830136	mwc		6.10		USGS:us
	819430	17310328	13840690	mwc		6.20		USGS:us
	819305	17309383	13840690	mwp		6.10		USGS:us
	819272	17309313	13840614	mwp		7.60		USGS:us
	814327	17272932	13804249	mwp		6.30		USGS:us
	819281	17309318	13840614	mwp		7.60		USGS:us
	819284	17309323	13840614	mwp		7.60		USGS:us
	819303	17309379	13840690	mwp		6.10		USGS:us
	819839	17312170	13843154	mwr		5.00		USGS:us
	818145	17305834	13837151	mwr		4.90		USGS:us
	818467	17307861	13839178	mwr		4.50		USGS:us
	819034	17308955	13840272	mwr		4.60		USGS:us
	813813	17266211	13797528	mwr		4.70		USGS:us
	815183	17287398	13818669	mww		7.70		USGS:us
	815179	17287392	13818669	mww		7.70		USGS:us
	817832	17302625	13830212	mww		6.30		USGS:us
	815177	17287390	13818669	mww		7.70		USGS:us
	813848	17266852	13797724	mww		6.10		USGS:us

Navigating
multitude of
magnitude values:
Important for event
distributions to the
public,
stakeholders,
researchers