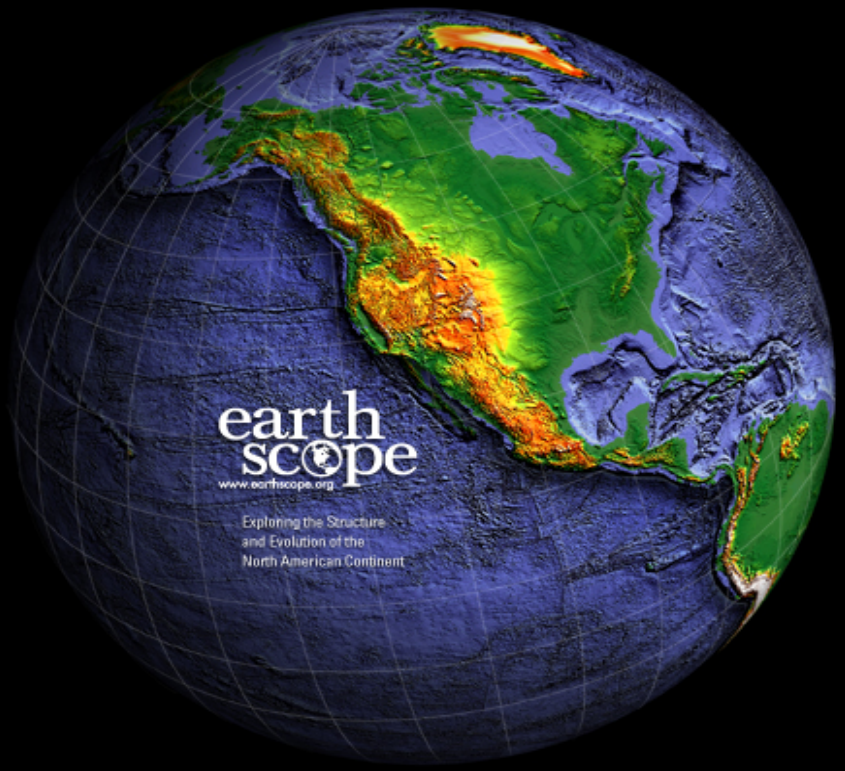
ANF analyst procedure for incorporating phase picks from different contributors within USArray project (Alaska example)



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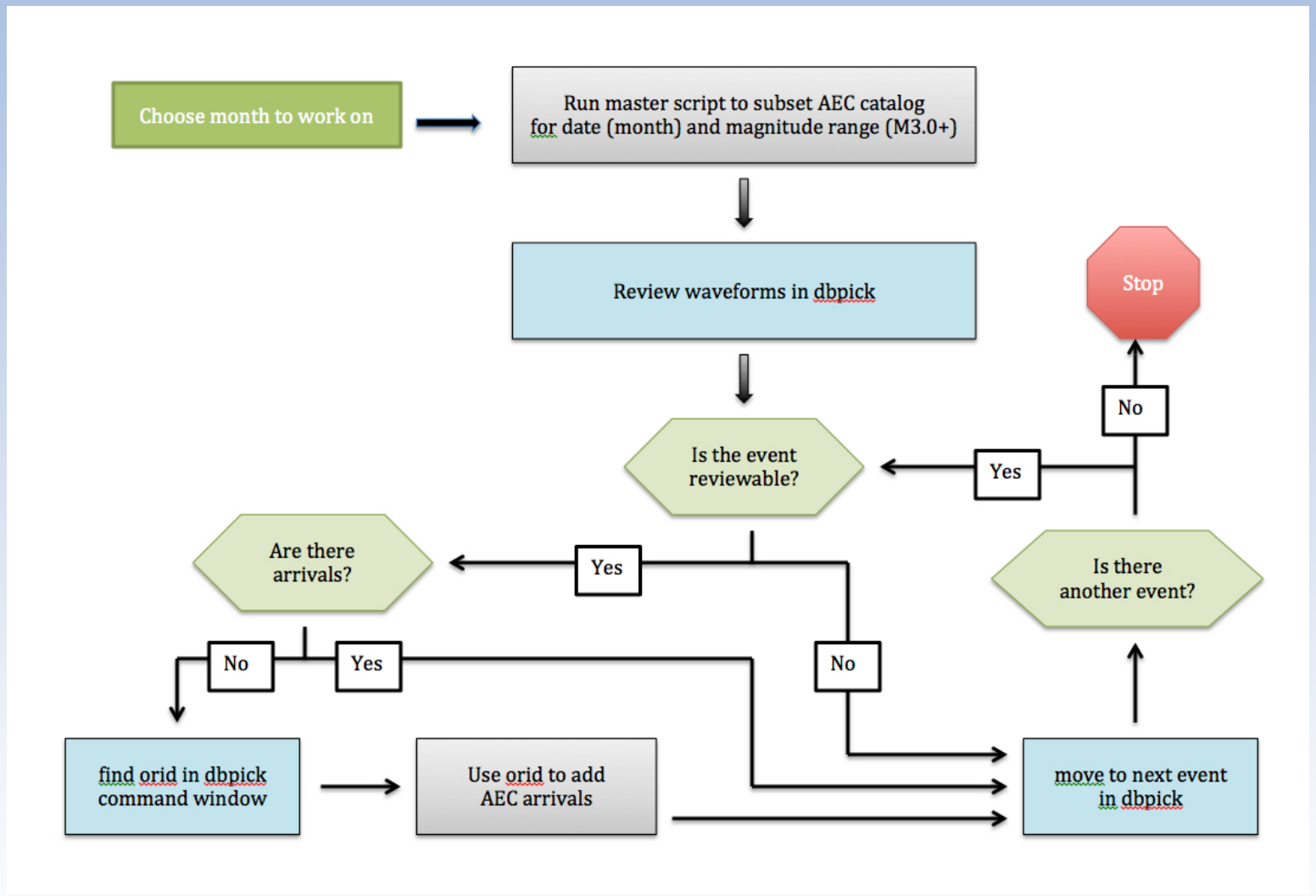
USArray ANF at UCSD

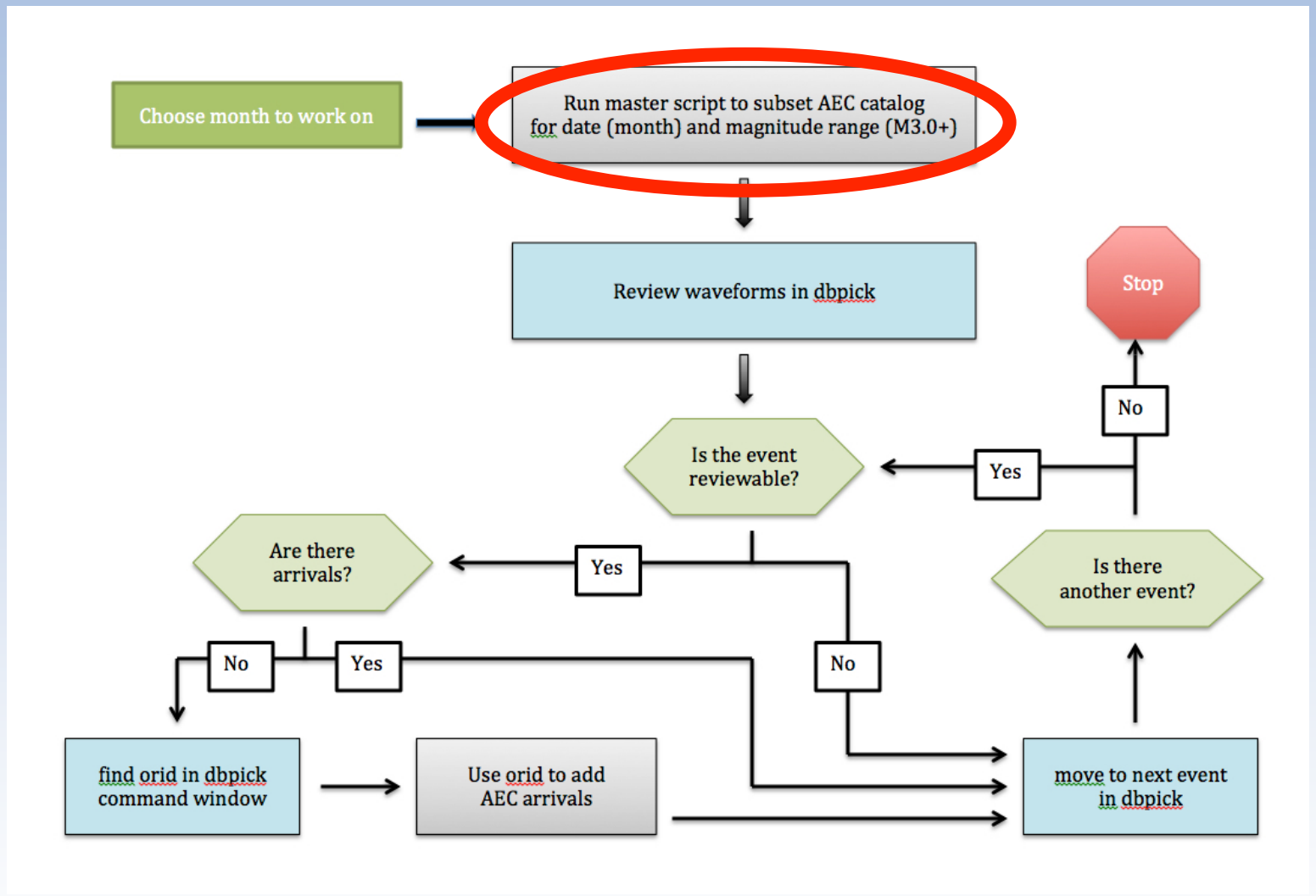
AUG Mtg, August 18, 2016

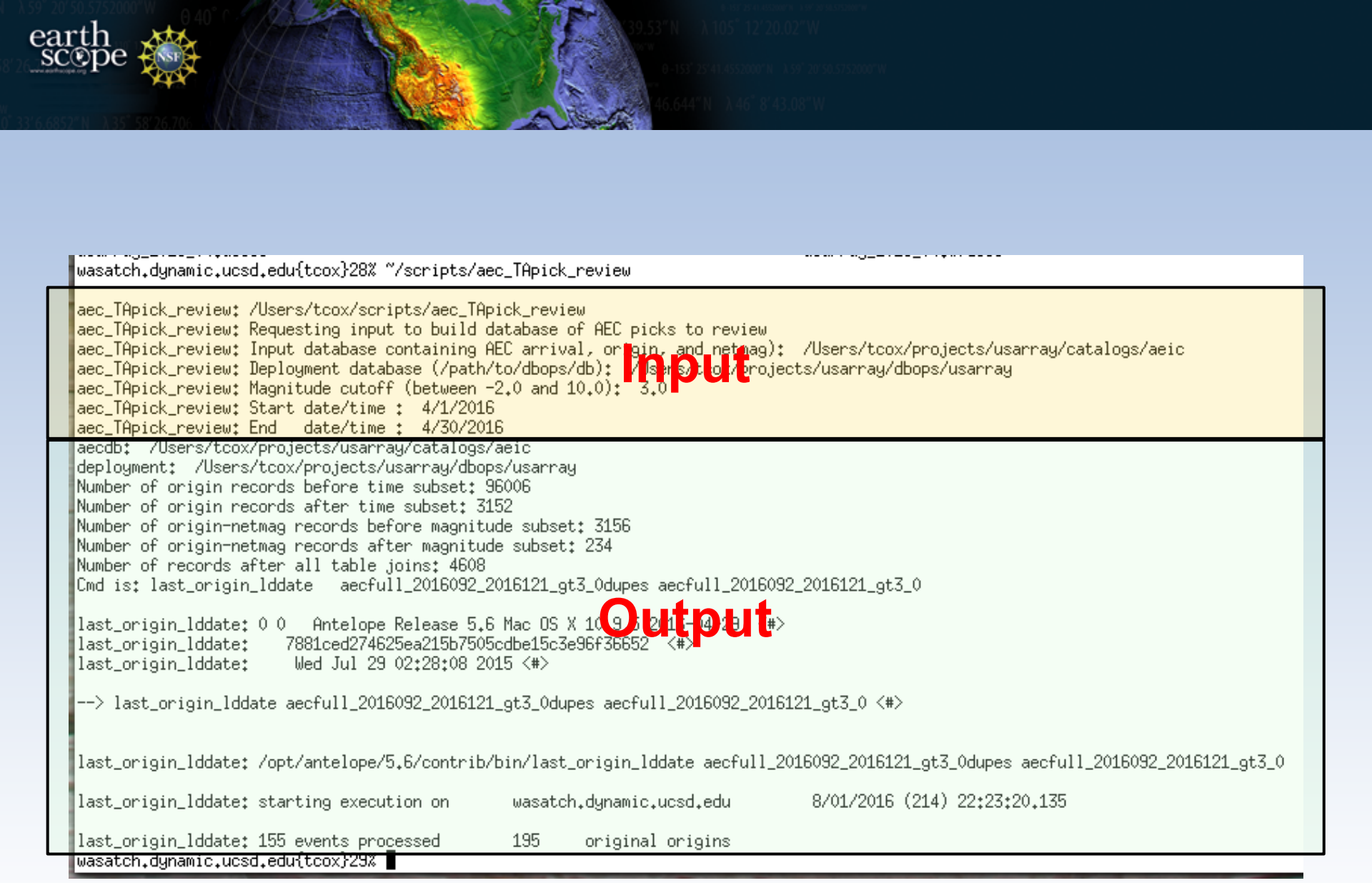
In all previous areas where the TA overlapped with a regional network, ANF analysts worked to locate/associate all events M3.0+

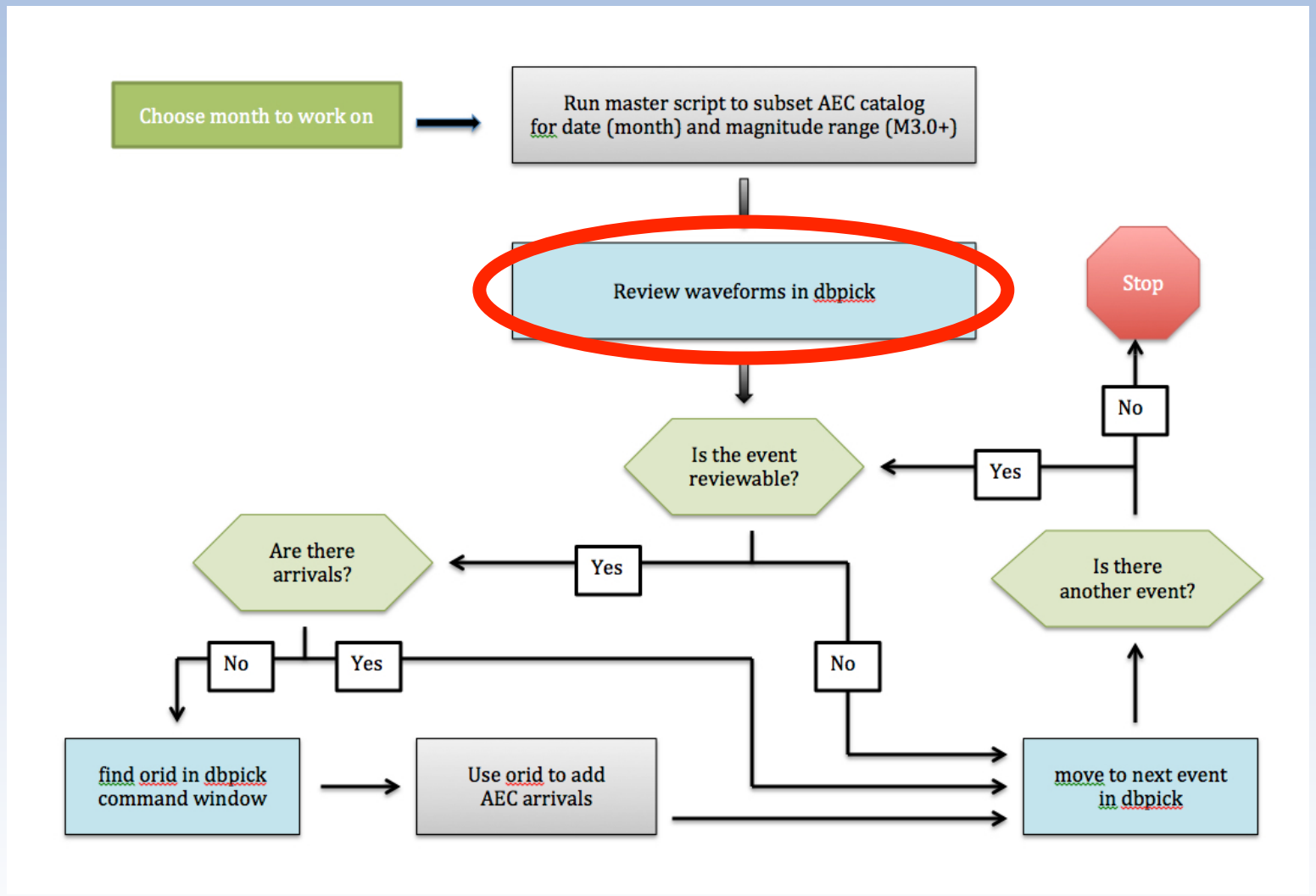
Beginning June 2015, we are associating all Alaska events greater M3.0 (that are visible within the TA footprint) into the TA catalog as part of a post-realtime process.

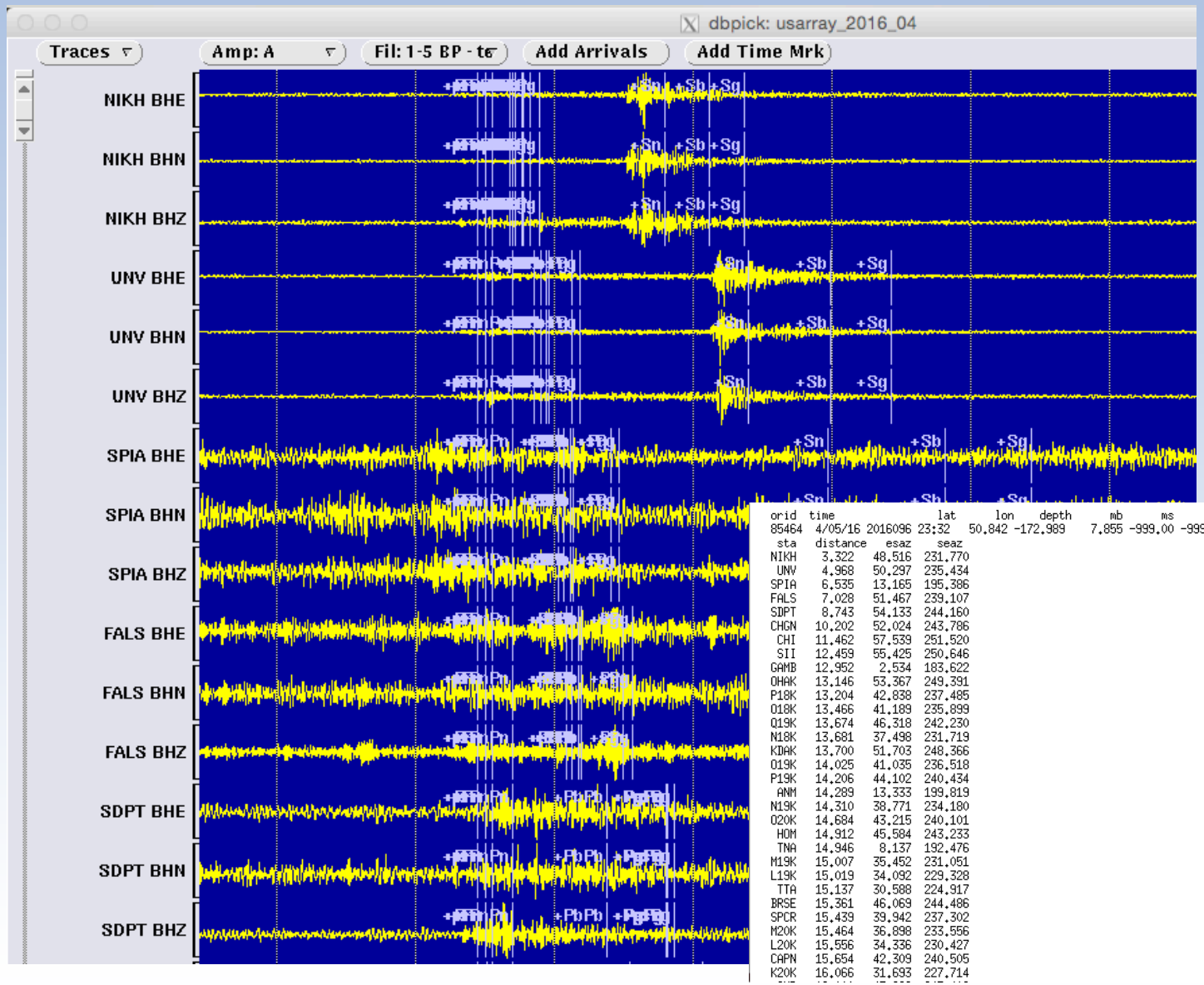
Very little "duplication of efforts" occurs – we are able to add Alaska analyst arrivals and event locations to the TA catalog with minimal effort.

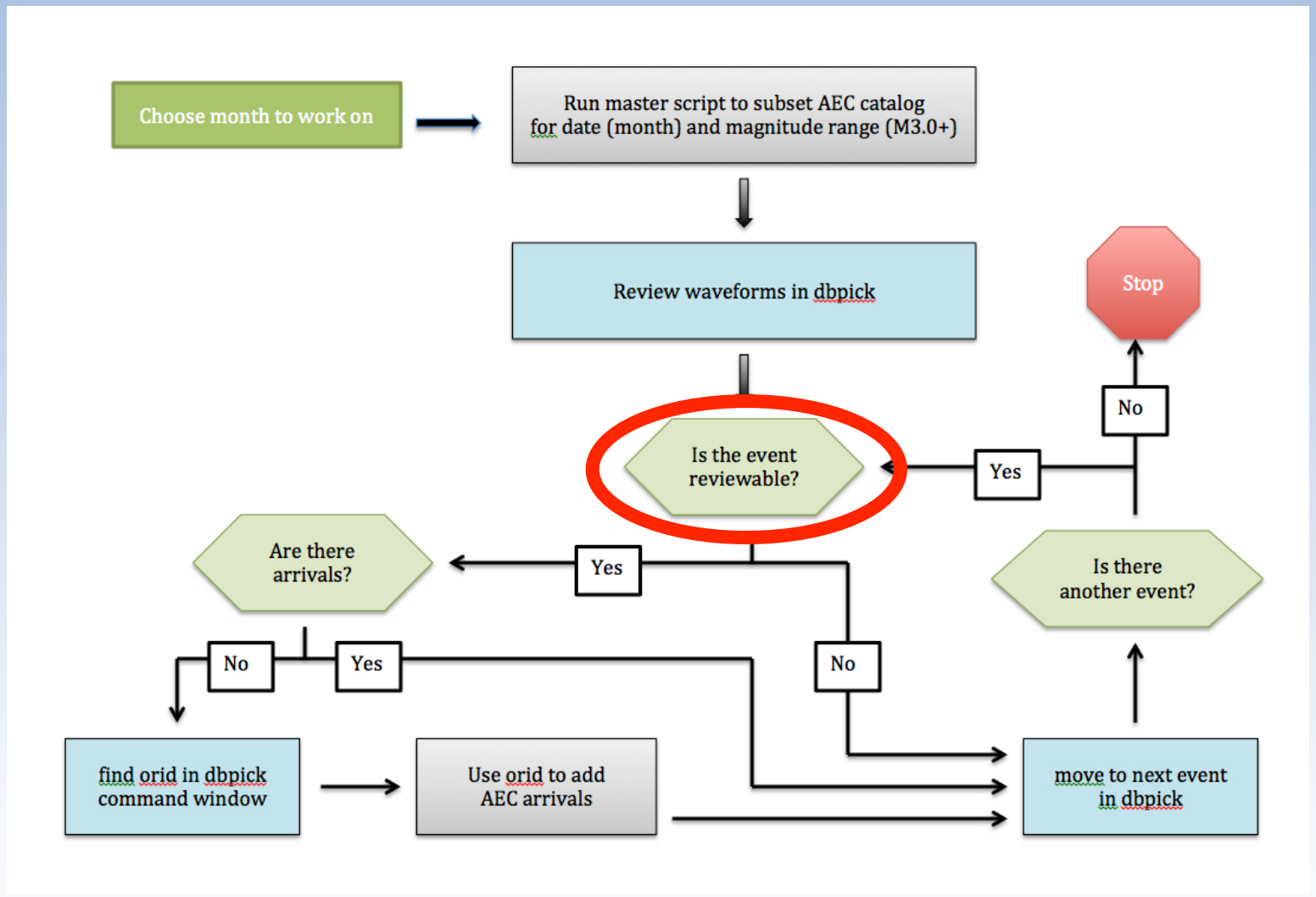

Choose month to work on
Run master script to subset AEC catalog for date (month) and magnitude range (M3.0+)
Review waveforms in dbpick
Stop
No
Is the event reviewable?
Yes
Are there arrivals?
Yes
Is there another event?
No
Yes
No
find orid in dbpick command window
Use orid to add AEC arrivals
move to next event in dbpick

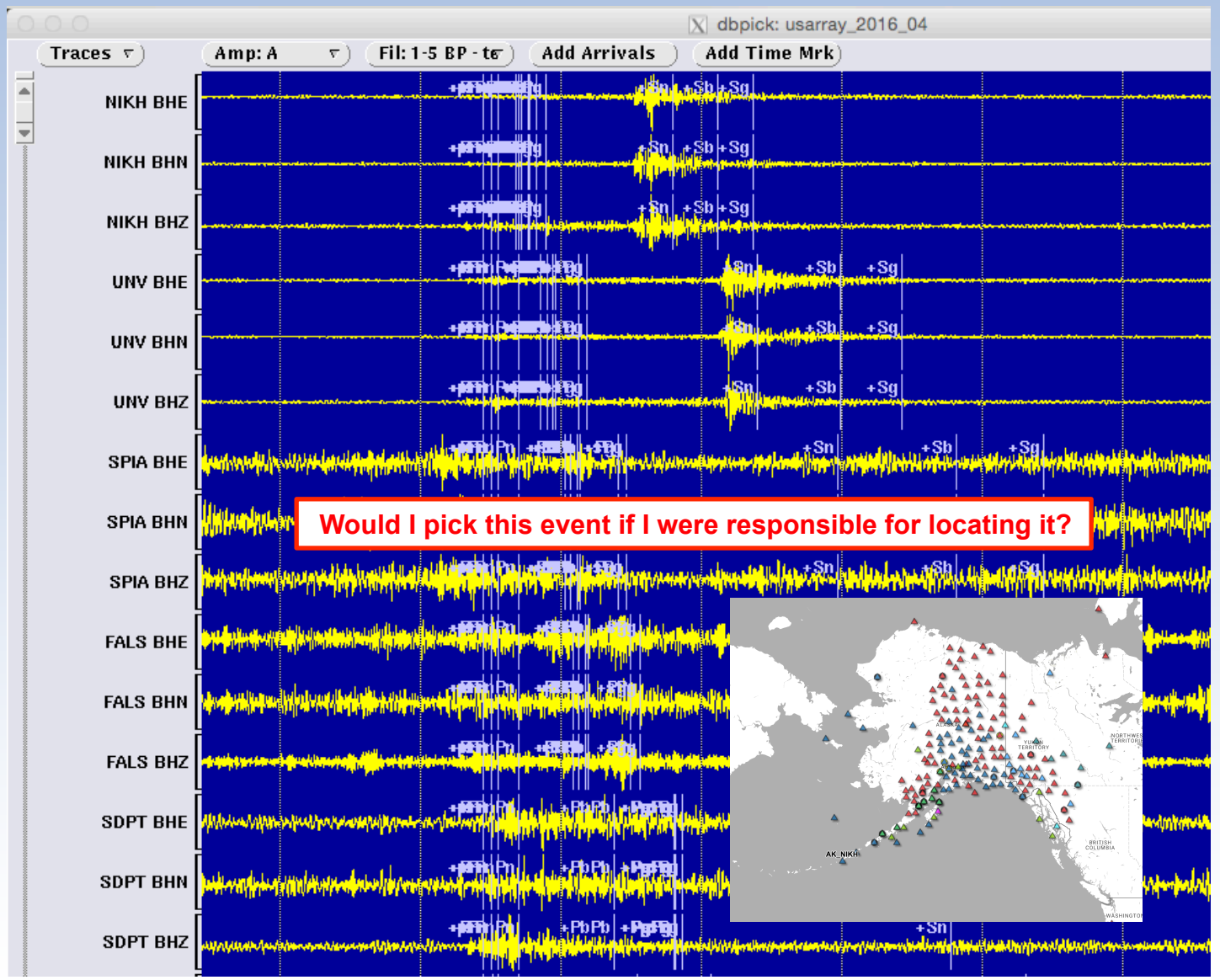

Choose month to work on
Run master script to subset AEC catalog for date (month) and magnitude range (M3.0+)
Review waveforms in dbpick
Is the event reviewable?
Yes
No
Stop
Are there arrivals?
Yes
No
Yes
No
Is there another event?
find orid in dbpick command window
Use orid to add AEC arrivals
move to next event in dbpick

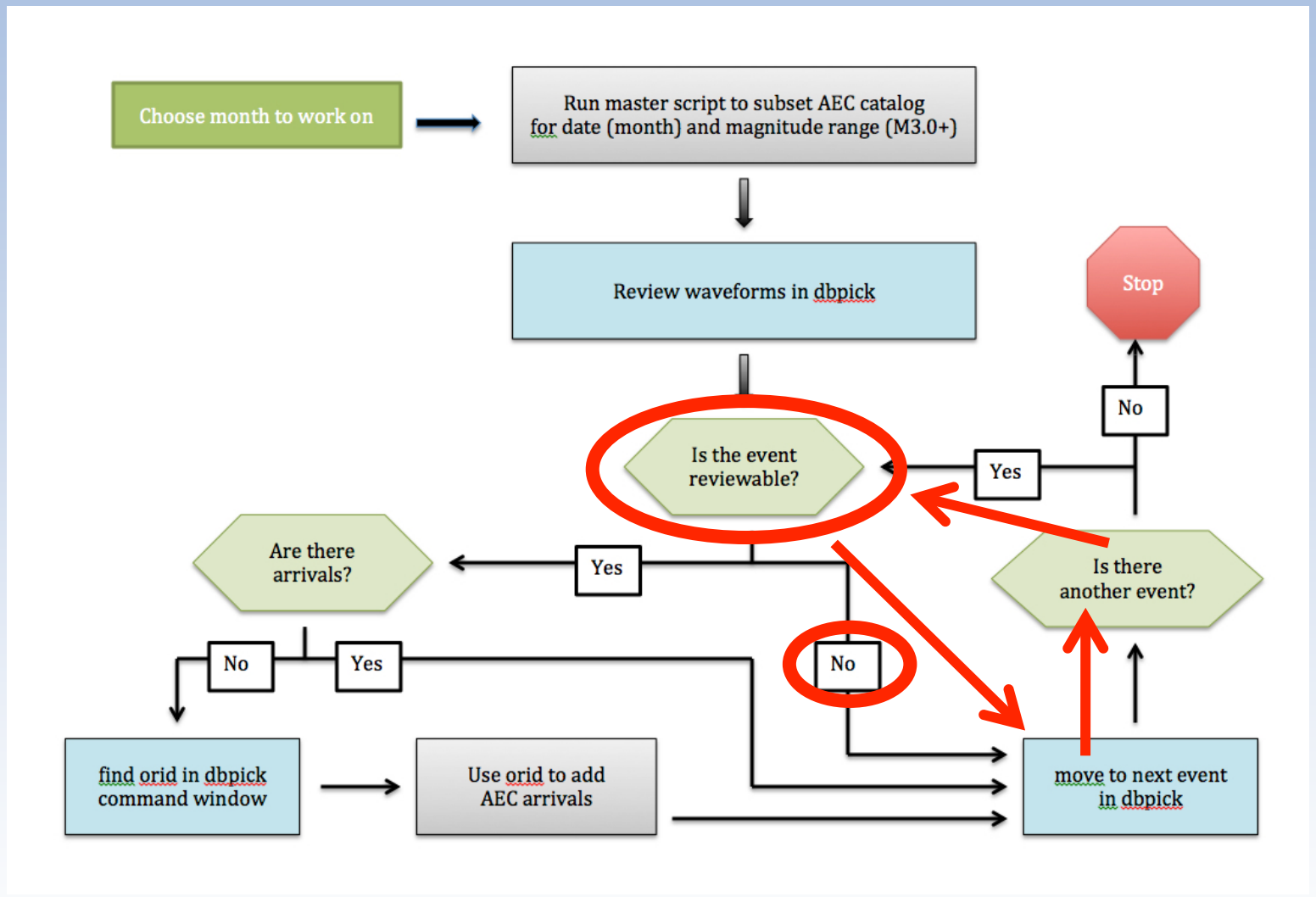

wasatch.dynamic.ucsd.edu{tcox}28% ~/scripts/aec_TApick_review
aec_TApick_review: /Users/tcox/scripts/aec_TApick_review
aec_TApick_review: Requesting input to build database of AEC picks to review
aec_TApick_review: Input database containing AEC arrival, origin, and netmag): /Users/tcox/projects/usarray/catalogs/aeic
aec_TApick_review: Deployment database (/path/to/dbops/db): /Users/tcox/projects/usarray/dbops/usarray
aec_TApick_review: Magnitude cutoff (between -2.0 and 10.0): 3.0
aec_TApick_review: Start date/time : 4/1/2016
aec_TApick_review: End date/time : 4/30/2016
Input
aecdb: /Users/tcox/projects/usarray/catalogs/aeic
deployment: /Users/tcox/projects/usarray/dbops/usarray
Number of origin records before time subset: 96006
Number of origin records after time subset: 3152
Number of origin-netmag records before magnitude subset: 3156
Number of origin-netmag records after magnitude subset: 234
Number of records after all table joins: 4608
Cmd is: last_origin_lddate aecfull_2016092_2016121_gt3_0dupes aecfull_2016092_2016121_gt3_0
Output
last_origin_lddate: 0 0 Antelope Release 5.6 Mac OS X 10.9 2013-04-28 <#>
last_origin_lddate: 7881ced274625ea215b7505cdbe15c3e96f36652 <#>
last_origin_lddate: Wed Jul 29 02:28:08 2015 <#>
--> last_origin_lddate aecfull_2016092_2016121_gt3_0dupes aecfull_2016092_2016121_gt3_0 <#>
last_origin_lddate: /opt/antelope/5.6/contrib/bin/last_origin_lddate aecfull_2016092_2016121_gt3_0dupes aecfull_2016092_2016121_gt3_0
last_origin_lddate: starting execution on wasatch.dynamic.ucsd.edu 8/01/2016 (214) 22:23:20.135
last_origin_lddate: 155 events processed 195 original origins
wasatch.dynamic.ucsd.edu{tcox}29%

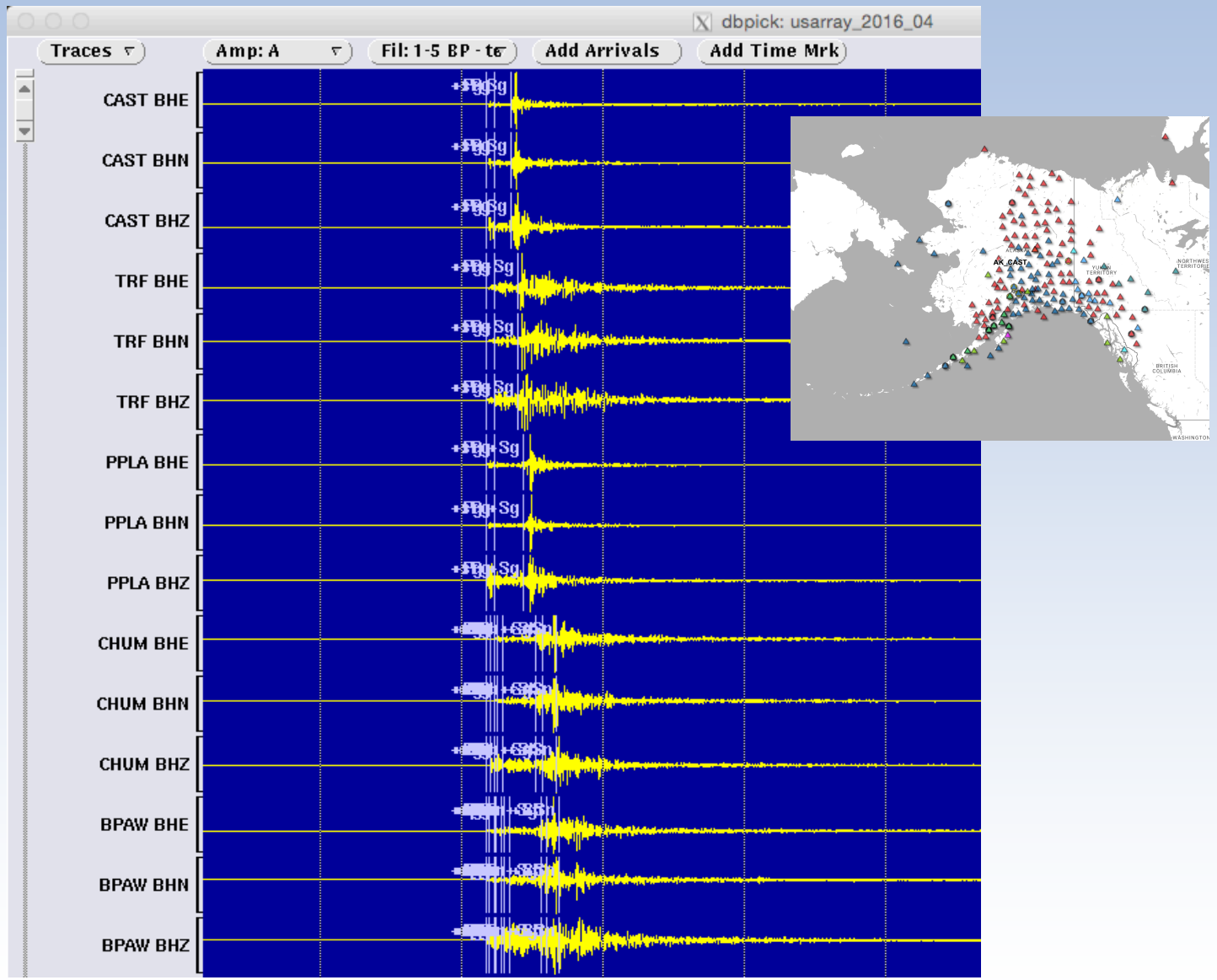

Choose month to work on
Run master script to subset AEC catalog for date (month) and magnitude range (M3.0+)
Review waveforms in dbpick
Stop
No
Is the event reviewable?
Yes
Are there arrivals?
Yes
Is there another event?
No
Yes
No
find orid in dbpick command window
Use orid to add AEC arrivals
move to next event in dbpick

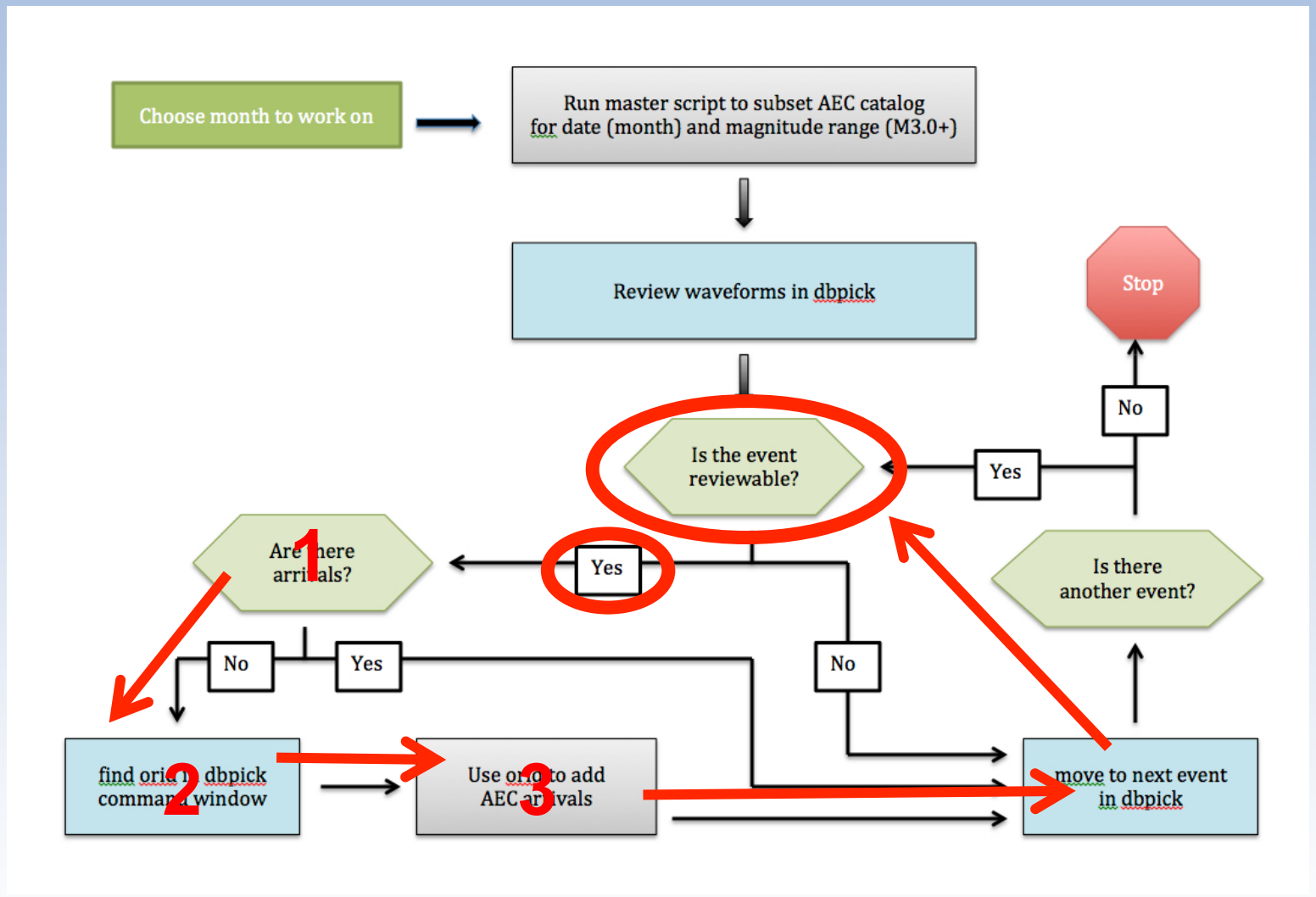

dbpick: usarray_2016_04
Traces
Amp: A
Fil: 1-5 BP - te
Add Arrivals
Add Time Mrk
NIKH BHE
NIKH BHN
NIKH BHZ
UNV BHE
UNV BHN
UNV BHZ
SPIA BHE
SPIA BHN
SPIA BHZ
FALS BHE
FALS BHN
FALS BHZ
SDPT BHE
SDPT BHN
SDPT BHZ
orid time lat lon depth mb ms ml auth
85464 4/05/16 2016096 23:32 50.842 -172.989 7.855 -999.00 -999.00 3.74 AK:natasha
sta distance esaz seaz
NIKH 3.322 48.516 231.770
UNV 4.968 50.297 235.434
SPIA 6.535 13.165 195.386
FALS 7.028 51.467 239.107
SDPT 8.743 54.133 244.160
CHGN 10.202 52.024 243.786
CHI 11.462 57.539 251.520
SII 12.459 55.425 250.646
GAMB 12.952 2.534 183.622
OHAK 13.146 53.367 249.391
P18K 13.204 42.838 237.485
O18K 13.466 41.189 235.899
Q19K 13.674 46.318 242.230
N18K 13.681 37.498 231.719
KDAK 13.700 51.703 248.366
O19K 14.025 41.035 236.518
P19K 14.206 44.102 240.434
ANM 14.289 13.333 199.819
N19K 14.310 38.771 234.180
O20K 14.684 43.215 240.101
HOM 14.912 45.584 243.233
TNA 14.946 8.137 192.476
M19K 15.007 35.452 231.051
L19K 15.019 34.092 229.328
TTA 15.137 30.588 224.917
BRSE 15.361 46.069 244.486
SPCR 15.439 39.942 237.302
M20K 15.464 36.898 233.556
L20K 15.556 34.336 230.427
CAPN 15.654 42.309 240.505
K20K 16.066 31.693 227.714

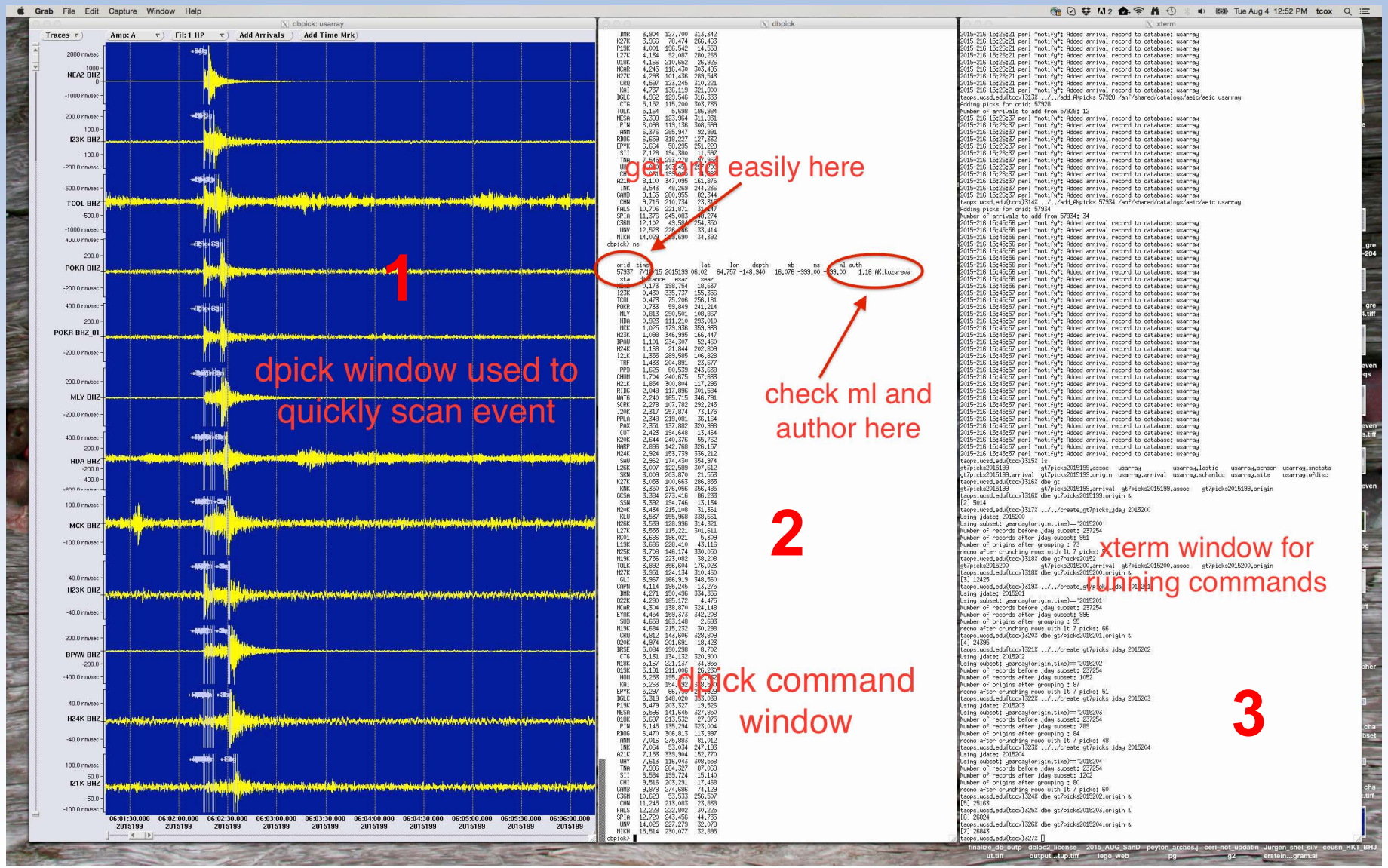

Choose month to work on
Run master script to subset AEC catalog for date (month) and magnitude range (M3.0+)
Review waveforms in dbpick
Is the event reviewable?
Yes
No
Stop
Are there arrivals?
Yes
No
Yes
No
Is there another event?
find orid in dbpick command window
Use orid to add AEC arrivals
move to next event in dbpick


dbpick: usarray_2016_04
Traces
Amp: A
Fil: 1-5 BP - te
Add Arrivals
Add Time Mrk
NIKH BHE
NIKH BHN
NIKH BHZ
UNV BHE
UNV BHN
UNV BHZ
SPIA BHE
SPIA BHN
SPIA BHZ
FALS BHE
FALS BHN
FALS BHZ
SDPT BHE
SDPT BHN
SDPT BHZ
Would I pick this event if I were responsible for locating it?

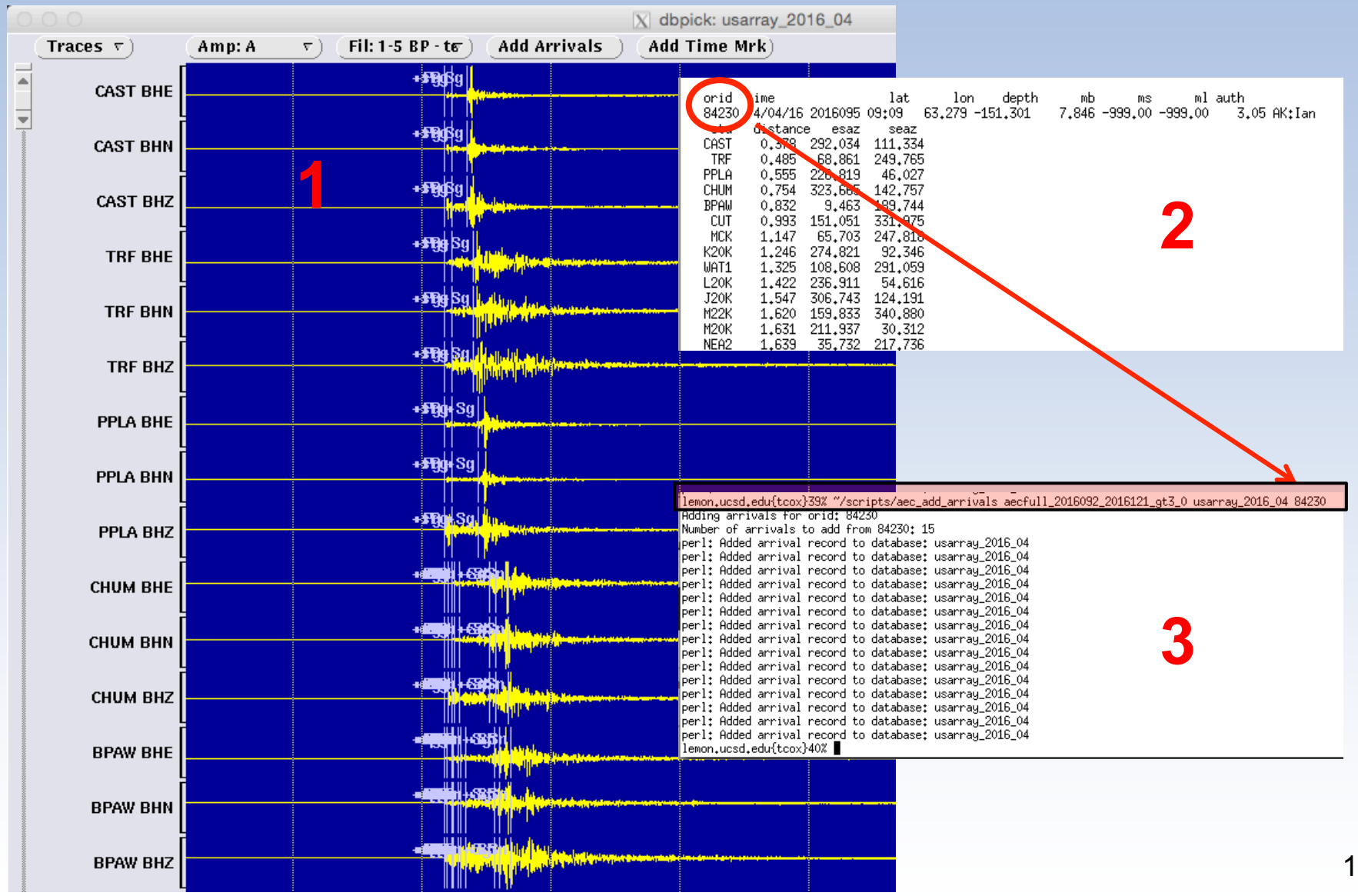

Choose month to work on
Run master script to subset AEC catalog for date (month) and magnitude range (M3.0+)
Review waveforms in dbpick
Stop
No
Is the event reviewable?
Yes
Are there arrivals?
Yes
Is there another event?
No
Yes
No
find orid in dbpick command window
Use orid to add AEC arrivals
move to next event in dbpick

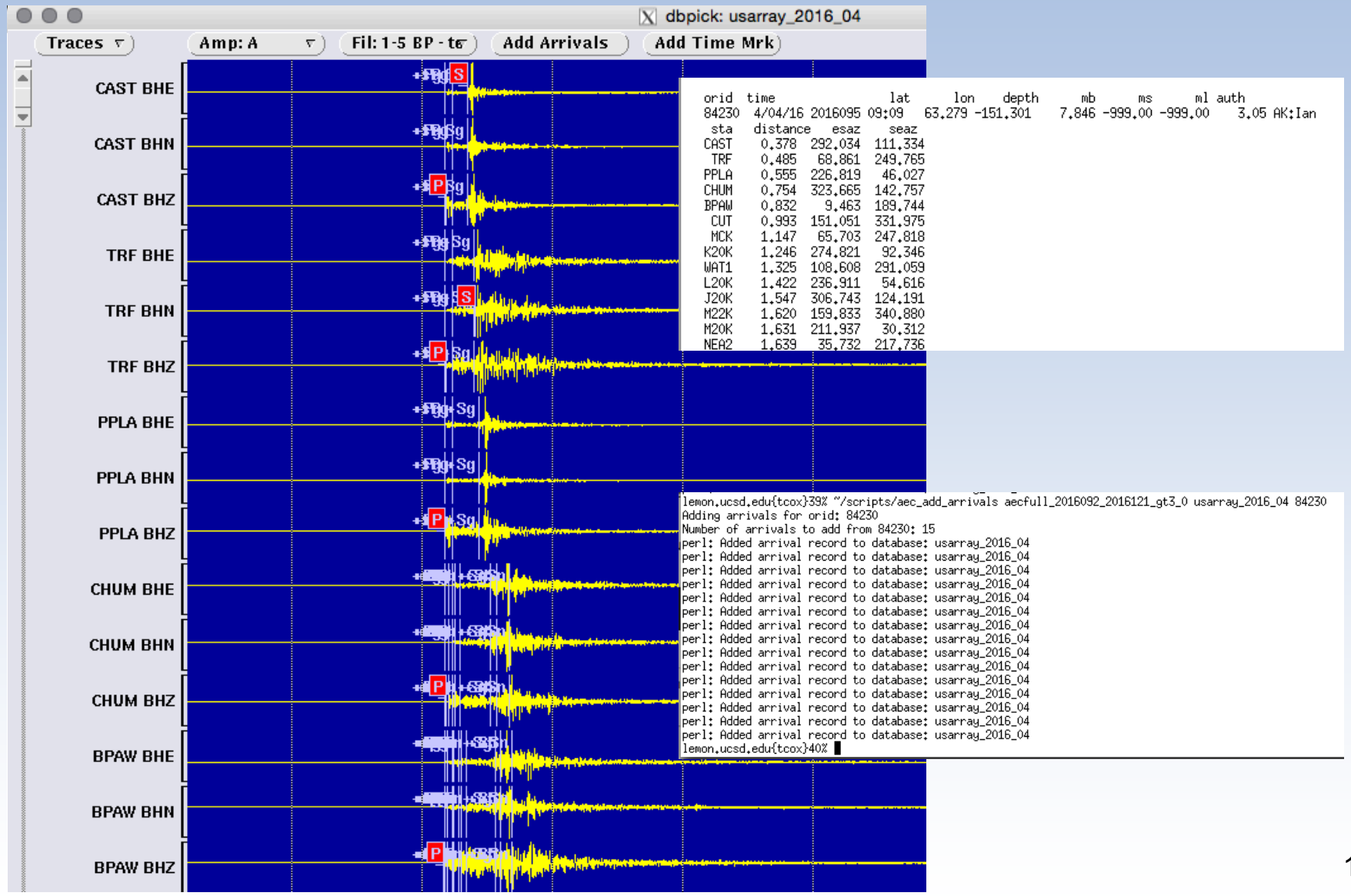

dbpick: usarray_2016_04
Traces
Amp: A
Fil: 1-5 BP - te
Add Arrivals
Add Time Mrk
CAST BHE
CAST BHN
CAST BHZ
TRF BHE
TRF BHN
TRF BHZ
PPLA BHE
PPLA BHN
PPLA BHZ
CHUM BHE
CHUM BHN
CHUM BHZ
BPAW BHE
BPAW BHN
BPAW BHZ
AK_CAST


Choose month to work on
Run master script to subset AEC catalog for date (month) and magnitude range (M3.0+)
Review waveforms in dbpick
Stop
No
Is the event reviewable?
Yes
Are there arrivals?
Yes
Is there another event?
No
Yes
No
1
2
3
find origin in dbpick command window
Use origin to add AEC arrivals
move to next event in dbpick



dpick window used to quickly scan event
1
dpick easily here
check ml and author here
2
dpick command window
xterm window for running commands
3


dbpick: usarray_2016_04
Traces
Amp: A
Fil: 1-5 BP - tc
Add Arrivals
Add Time Mrk
CAST BHE
CAST BHN
CAST BHZ
TRF BHE
TRF BHN
TRF BHZ
PPLA BHE
PPLA BHN
PPLA BHZ
CHUM BHE
CHUM BHN
CHUM BHZ
BPAW BHE
BPAW BHN
BPAW BHZ
1
orid time lat lon depth mb ms ml auth
84230 4/04/16 2016095 09:09 63.279 -151.301 7.846 -999.00 -999.00 3.05 AK:Ian
sta distance esaz seaz
CAST 0.378 292.034 111.334
TRF 0.485 68.861 249.765
PPLA 0.555 226.819 46.027
CHUM 0.754 323.685 142.757
BPAW 0.832 9.463 189.744
CUT 0.993 151.051 331.975
MCK 1.147 65.703 247.816
K20K 1.246 274.821 92.346
WAT1 1.325 108.608 291.059
L20K 1.422 236.911 54.616
J20K 1.547 306.743 124.191
M22K 1.620 159.833 340.880
M20K 1.631 211.937 30.312
NEA2 1.639 35.732 217.736
2
lemon.ucsd.edu{tcox}39% ~/scripts/aec_add_arrivals aecfull_2016092_2016121_gt3_0 usarray_2016_04 84230
Adding arrivals for orid: 84230
Number of arrivals to add from 84230: 15
perl: Added arrival record to database: usarray_2016_04
lemon.ucsd.edu{tcox}40%
3


dbpick: usarray_2016_04
Traces
Amp: A
Fil: 1-5 BP - te
Add Arrivals
Add Time Mrk
CAST BHE
CAST BHN
CAST BHZ
TRF BHE
TRF BHN
TRF BHZ
PPLA BHE
PPLA BHN
PPLA BHZ
CHUM BHE
CHUM BHN
CHUM BHZ
BPAW BHE
BPAW BHN
BPAW BHZ
orid time lat lon depth mb ms ml auth
84230 4/04/16 2016095 09:09 63.279 -151.301 7.846 -999.00 -999.00 3.05 AK:Ian
sta distance esaz seaz
CAST 0.378 292.034 111.334
TRF 0.485 68.861 249.765
PPLA 0.555 226.819 46.027
CHUM 0.754 323.665 142.757
BPAW 0.832 9.463 189.744
CUT 0.993 151.051 331.975
MCK 1.147 65.703 247.818
K20K 1.246 274.821 92.346
WAT1 1.325 108.608 291.059
L20K 1.422 236.911 54.616
J20K 1.547 306.743 124.191
M22K 1.620 159.833 340.880
M20K 1.631 211.937 30.312
NEA2 1.639 35.732 217.736
lemon.ucsd.edu{tcox}39% ~/scripts/aec_add_arrivals aecfull_2016092_2016121_gt3_0 usarray_2016_04 84230
Adding arrivals for orid: 84230
Number of arrivals to add from 84230: 15
perl: Added arrival record to database: usarray_2016_04
perl: Added arrival record to database: usarray_2016_04
perl: Added arrival record to database: usarray_2016_04
perl: Added arrival record to database: usarray_2016_04
perl: Added arrival record to database: usarray_2016_04
perl: Added arrival record to database: usarray_2016_04
perl: Added arrival record to database: usarray_2016_04
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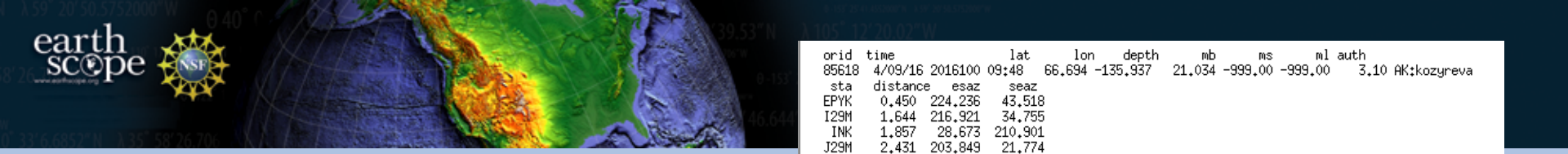
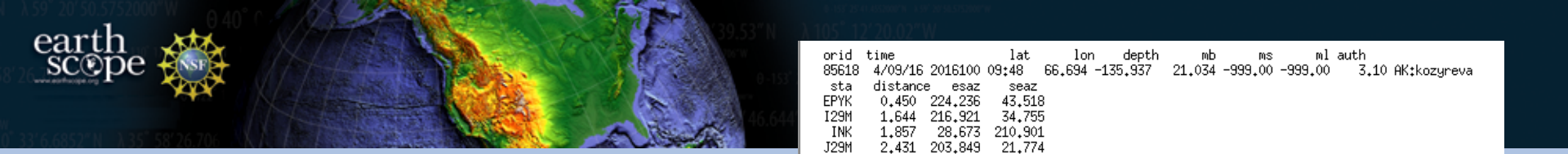
perl: Added arrival record to database: usarray_2016_04
perl: Added arrival record to database: usarray_2016_04
perl: Added arrival record to database: usarray_2016_04
perl: Added arrival record to database: usarray_2016_04
lemon.ucsd.edu{tcox}40%



orid	time		lat	lon	depth	mb	ms	ml	auth
85618	4/09/16	2016100 09:48	66.694	-135.937	21.034	-999.00	-999.00	3.10	AK:kozyreva

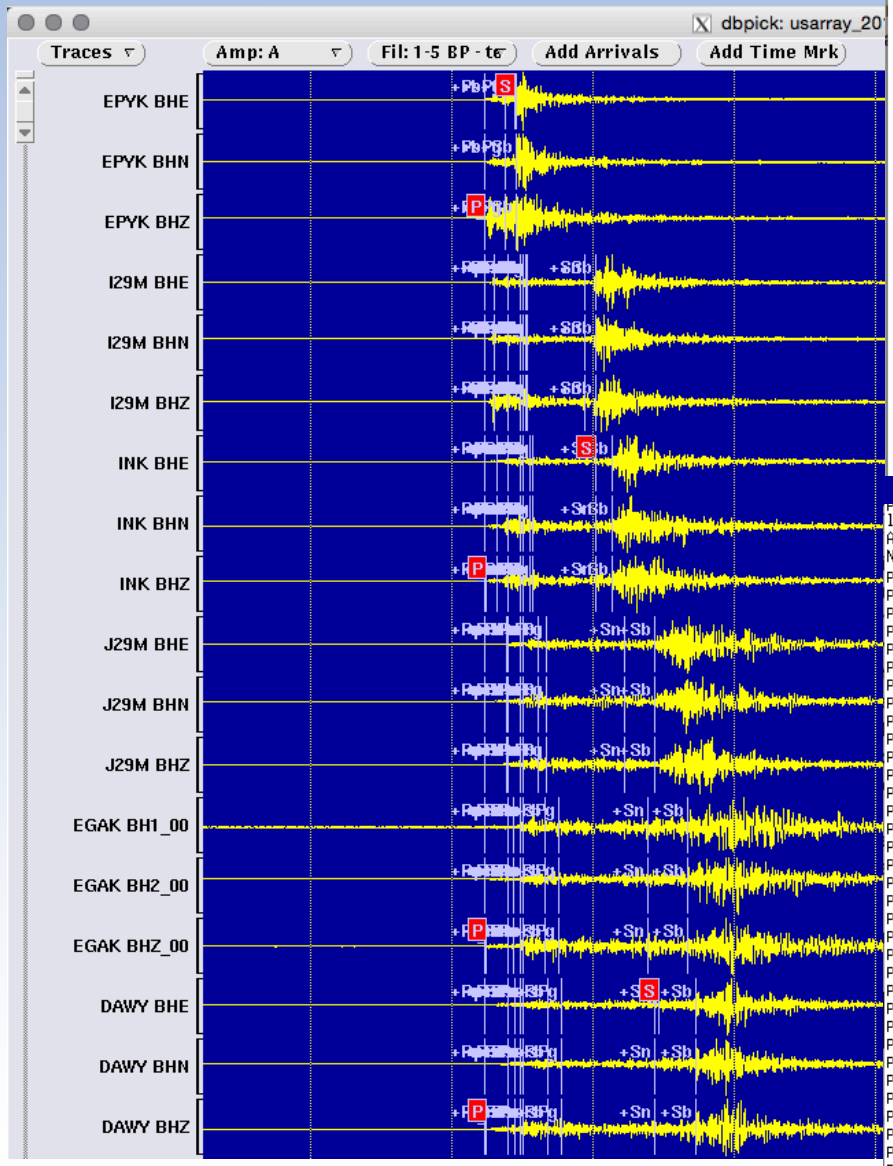
sta	distance	esaz	seaz
EPYK	0.450	224.236	43.518
I29M	1.644	216.921	34.755
INK	1.857	28.673	210.901
J29M	2.431	203.849	21.774
EGAK	2.876	230.628	45.866
DAWY	2.996	210.278	27.137
MAYO	3.098	179.632	359.673
K27K	3.692	226.663	41.081
J26L	3.835	238.680	51.731
M30M	4.134	185.481	4.707
SCRK	4.317	234.747	47.424
J25K	4.404	246.201	57.602
L27K	4.406	217.244	31.907
MMPY	4.537	151.719	335.947
M31M	4.541	170.854	352.250
FARO	4.601	164.791	347.128
RIDG	4.755	235.762	47.667
BVCY	4.771	208.547	24.097
L26K	4.828	224.037	37.323
H24K	4.874	265.395	74.457
POKR	4.943	256.737	66.235
M27K	5.028	213.223	27.855
HDA	5.089	248.458	58.427
C36M	5.161	53.731	244.743
N31M	5.208	179.173	359.315
COLA	5.209	255.095	64.212
TCOL	5.209	255.095	64.211
M26K	5.250	218.481	32.101
YUK3	5.294	203.841	19.764
YUK4	5.380	193.424	11.075

```
lemon.ucsd.edu{tcox}50% ~/scripts/aec_add_arrivals aecfull_2016092_2016121_gt3_0 usarray_2016_04 85618
Adding arrivals for orid: 85618
Number of arrivals to add from 85618: 35
perl: Added arrival record to database: usarray_2016_04
perl: Added arrival record to database: usarray_2016_04
perl: Added arrival record to database: usarray_2016_04
```



orid	time	lat	lon	depth	mb	ms	ml	auth
85618	4/09/16 2016100 09:48	66.694	-135.937	21.034	-999.00	-999.00	3.10	AK:kozyreva

sta	distance	esaz	seaz
EPYK	0.450	224.236	43.518
I29M	1.644	216.921	34.755
INK	1.857	28.673	210.901
J29M	2.431	203.849	21.774
EGAK	2.876	230.628	45.866
DAWY	2.996	210.278	27.137
MAYO	3.098	179.632	359.673
K27K	3.692	226.663	41.081
J26L	3.835	238.680	51.731
M30M	4.134	185.481	4.707
SCRK	4.317	234.747	47.424
J25K	4.404	246.201	57.602
L27K	4.406	217.244	31.907
MMPY	4.537	151.719	335.947
M31M	4.541	170.854	352.250
FARO	4.601	164.791	347.128
RIDG	4.755	235.762	47.667
BVCY	4.771	208.547	24.097
L26K	4.828	224.037	37.323
H24K	4.874	265.395	74.457
POKR	4.943	256.737	66.235
M27K	5.028	213.223	27.855
HDA	5.089	248.458	58.427
C36M	5.161	53.731	244.743
N31M	5.208	179.173	359.315
COLA	5.209	255.095	64.212
TCOL	5.209	255.095	64.211
M26K	5.250	218.481	32.101
YUK3	5.294	203.841	19.764
YUK4	5.380	193.424	11.075




```
lemon.ucsd.edu{tcox}50% ~/scripts/aec_add_arrivals aecfull_2016092_2016121_gt3_0 usarray_2016_04 85618
Adding arrivals for orid: 85618
Number of arrivals to add from 85618: 35
perl: Added arrival record to database: usarray_2016_04
perl: Added arrival record to database: usarray_2016_04
perl: Added arrival record to database: usarray_2016_04
perl: Added arrival record to database: usarray_2016_04
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perl: Added arrival record to database: usarray_2016_04
perl: Added arrival record to database: usarray_2016_04
perl: Added arrival record to database: usarray_2016_04
lemon.ucsd.edu{tcox}51%
```

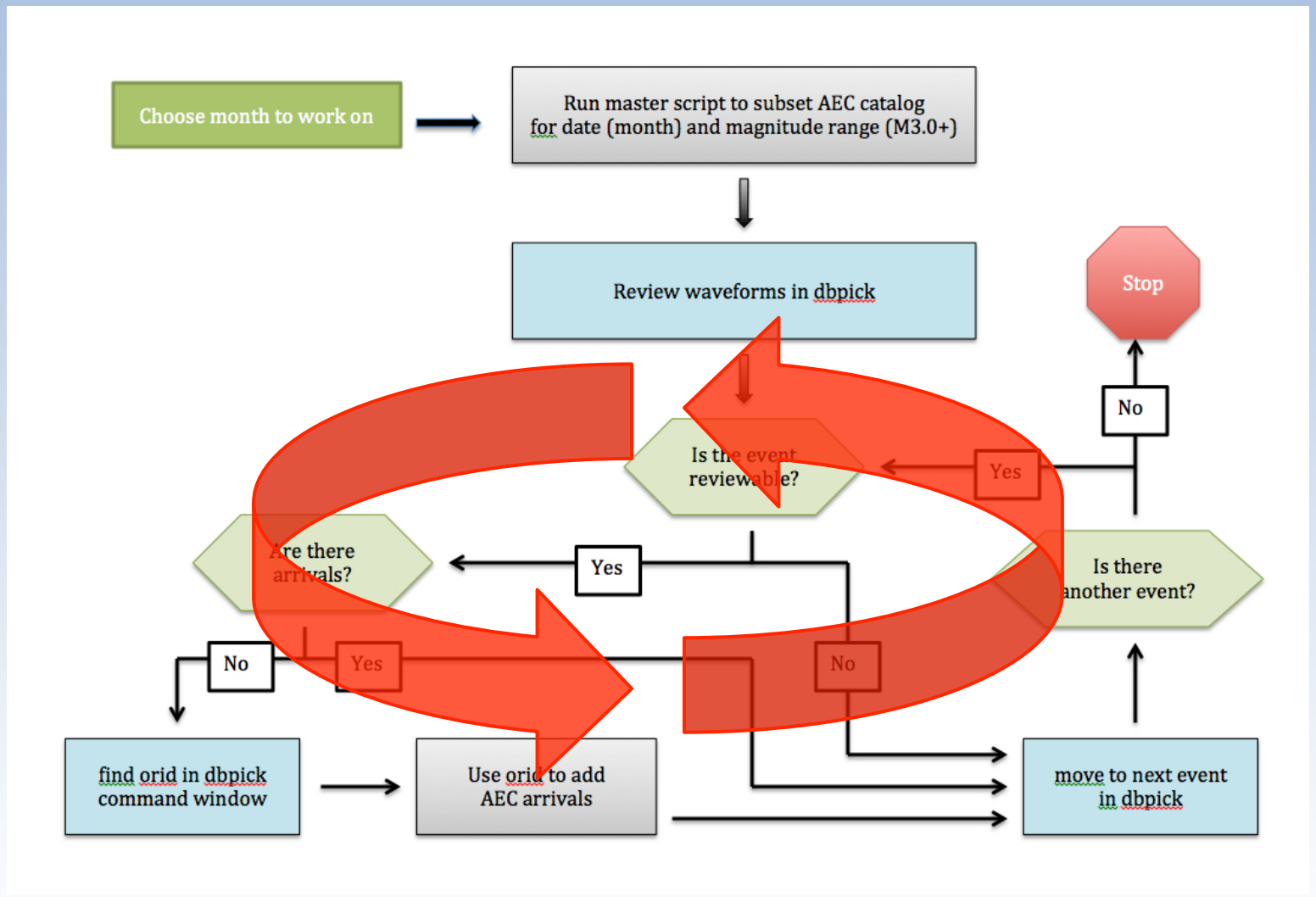

Next event, next event, next event…

Very little "duplication of efforts" occurs – ANF analysts are able to add Alaska analyst arrivals and event locations to the TA catalog with minimal effort.

April 2016 = 94 events, 2538 arrivals (28 events added, 44 already added)
May 2016 = 91 events, 2457 arrivals
June 2016 = 155 events, 4185 arrivals (72 events added)
July 2016 = 98 events, 2646 arrivals

Total processing time to add ~100 events (per month) are done in ~ 30 minutes (subset AEC catalog, review/add arrivals to database with dbpick, associate events with dbloc2).