

Documentation and digital files in support of:

“Aftershock regions of Aleutian–Alaska megathrust earthquakes, 1938–2021”

PART C¹: Text file of the relocated earthquake catalog of *Sykes* (1971)

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Overview

Sykes (1971) includes a catalog of 249 relocated earthquakes, including 26 mainshocks and their aftershocks. There are 249 events in Table 1 of *Sykes* (1971). Here we provide a text file of Sykes’s catalog, along with a text label linking each event with a mainshock.

Here is a summary of the Sykes catalog:

BOUNDS FOR SET OF 249 EVENTS (`display_eq_summary.m`):

	MIN	MAX
Origin time :	1923-05-04	1970-06-24
Longitude :	167.69	229.00
Latitude :	49.90	65.99
Depth (km) :	0.00	79.00
Magnitude :	6.00	8.70

¹Part A is published in a separate Zenodo collection. Parts B, C, and D are published together in this Zenodo collection.

Description of file

The main text file is `sykes1971_table1.txt`, which is Table 1 of *Sykes* (1971). It looks like this:

```
1923-05-04 16:26:39.3 55.55 -156.75 0 2.6 49 CB 7.1 e01
1925-08-19 12:07:27.3 55.24 167.69 0 2.4 54 CA 7.2 e02
1925-09-05 16:30:17.5 54.68 170.63 0 2.2 18 CC - e02
1926-10-13 06:02:20.1 51.35 -179.64 0 2.1 54 CA - -
1926-10-13 14:17:46.4 51.54 179.91 0 2.3 38 CB - -
1926-10-13 19:08:10.3 51.63 -175.65 0 2.2 70 CA 7.1 e03
1926-10-14 02:11:12.4 52.33 -175.26 0 2.1 12 CC - e03
: : : : : : : : : : : : : :
```

The columns are:

1. origin time date (yyyy-mm-dd)
2. origin time time (HH:MM:SS.SSS)
3. latitude
4. longitude
5. depth, km (“In most of the computations, the depth . . . was fixed at the surface.”)
6. standard error in arrival time residuals, seconds
7. number of P recordings used
8. two-letter quality assessment for depth (first letter) and epicenter (second letter); “C denotes poorest precision; A, best”
9. Mainshock event index. This label does not appear in the published table. It is assigned here in this report (see next section), in order to better understand which events were used in making the aftershock regions (e.g., Figure C2).

Association of events with aftershock regions

The 26 mainshocks are labeled in Figure C1. For each of the 249 events, I looked at the epicenter and origin time relative to the 26 mainshocks. If the event was close in space and time to a mainshock, I assigned the mainshock event ID (e01, e02, . . .) in the final column of the text file.

The following list shows the number of events (including the mainshock) associated with each of the 26 mainshocks:

```
1 (1923-05-04 M 7.1) : 1 events (0.00)
2 (1925-08-19 M 7.2) : 2 events (0.01)
3 (1926-10-13 M 7.1) : 2 events (0.01)
4 (1927-10-24 M 7.1) : 1 events (0.00)
5 (1929-03-07 M 8.6) : 3 events (0.01)
6 (1929-07-07 M 7.3) : 6 events (0.02)
```

7 (1938-11-10 M 8.7) : 16 events (0.06)
 8 (1940-04-16 M 7.2) : 10 events (0.04)
 9 (1940-08-22 M 7.1) : 1 events (0.00)
 10 (1946-01-12 M 7.2) : 1 events (0.00)
 11 (1946-04-01 M 7.4) : 21 events (0.08)
 12 (1948-05-14 M 7.5) : 3 events (0.01)
 13 (1949-08-22 M 8.1) : 1 events (0.00)
 14 (1951-02-13 M 7.1) : 1 events (0.00)
 15 (1953-01-05 M NaN) : 3 events (0.01)
 16 (1957-01-02 M 7.0) : 12 events (0.05)
 17 (1957-03-09 M 8.2) : 137 events (0.55)
 18 (1957-04-10 M 7.1) : 2 events (0.01)
 19 (1958-07-10 M 7.9) : 1 events (0.00)
 20 (1960-11-13 M 7.0) : 7 events (0.03)
 21 (1964-02-06 M 7.1) : 5 events (0.02)
 22 (1964-03-28 M 8.5) : 1 events (0.00)
 23 (1965-02-04 M 7.9) : 1 events (0.00)
 24 (1965-03-30 M 7.5) : 1 events (0.00)
 25 (1965-07-02 M 7.1) : 1 events (0.00)
 26 (1970-06-24 M 7.0) : 1 events (0.00)
 no clear mainshock : 8 events (0.03)

The number in parentheses shows the fraction of the 249 events comprised by the subset of events. From this, we see that the majority (55%) of the aftershocks relocated by Sykes are for the 1957 earthquake. Figure C2a shows the relocated aftershocks of the 1957 earthquake, as well as the aftershock region published in *Sykes* (1971).

There are 8 events that are not clearly linked with any of the 26 mainshocks in Figure C1. These are as follows:

1	4	otime	1926-10-13	06:02:20.100	lon	-179.64	lat	51.35	dep	0.00	km	M	NaN
2	5	otime	1926-10-13	14:17:46.400	lon	179.91	lat	51.54	dep	0.00	km	M	NaN
3	12	otime	1929-05-20	04:52:56.300	lon	-175.52	lat	52.17	dep	0.00	km	M	NaN
4	19	otime	1929-12-17	10:58:36.900	lon	171.46	lat	53.67	dep	0.00	km	M	7.600
5	20	otime	1929-12-17	12:12:00.500	lon	173.47	lat	52.01	dep	0.00	km	M	NaN
6	21	otime	1930-02-02	14:55:55.400	lon	179.75	lat	51.17	dep	0.00	km	M	NaN
7	49	otime	1943-11-03	14:32:17.500	lon	-150.84	lat	61.90	dep	0.00	km	M	7.300
8	231	otime	1958-04-07	15:30:40.300	lon	-156.55	lat	65.99	dep	0.00	km	M	7.300

References

- Sykes, L. R., Aftershock zones of great earthquakes, seismicity gaps, and earthquake prediction for Alaska and the Aleutians, *J. Geophys. Res.*, 76(32), 8021–8041, 1971.
- Tape, C., and A. Lomax, Aftershock regions of Aleutian–Alaska megathrust earthquakes, 1938–2021, *J. Geophys. Res. Solid Earth* (in preparation), 2022.

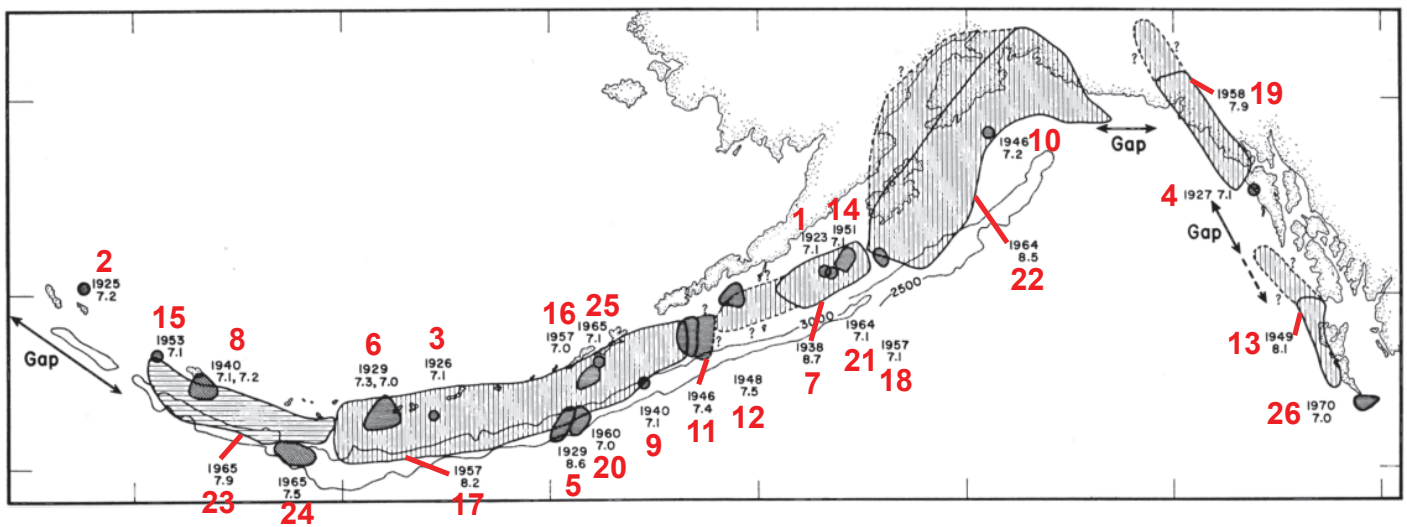


Figure C1: Annotated version of Figure 4 of *Sykes* (1971), showing the indices of the 26 earthquakes labeled in the original figure. The mainshocks and aftershocks of these 26 earthquakes make up the 249 events in Table 1 of *Sykes* (1971). The largest events from west to east are: 1965 (7.9), 1957 (8.2), 1946 (7.4), 1938 (8.7), 1964 (8.5), 1958 (7.9), and 1949 (8.1).

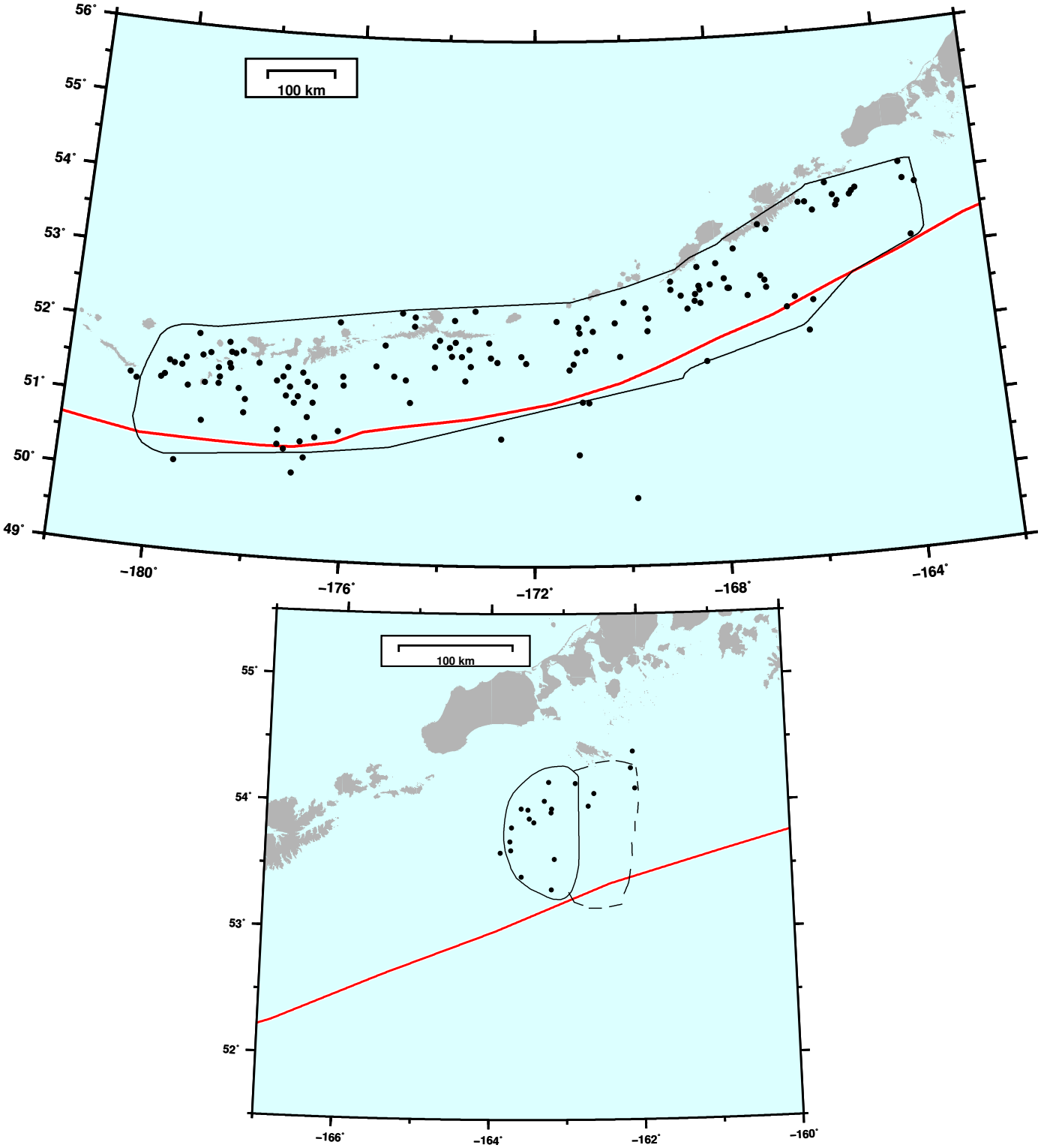


Figure C2: Two subsets of aftershock epicenters from Table 1 of *Sykes* (1971). The top is for the 1957-03-09 M_w 8.6 earthquake; the bottom is for the 1946-04-01 M_w 8.6 earthquake. The aftershock regions shown are digitized from the publication of *Sykes* (1971).