

Documentation and digital files in support of:

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

PART D¹: Compilation of Aleutian–Alaska focal mechanisms from Stauder and colleagues

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Attribution: If you use these digital files, please cite *Tape and Lomax* (2022).

Overview

This pdf includes Figures D1–D7, showing Aleutian–Alaska focal mechanisms published in four papers by William Stauder (1922–2002) and colleagues. To give some context for the significance of these papers, the obituary by *Mitchell and Udias* (2003) included this:

When the plate tectonics theory began to emerge in the mid-1960’s Stauder turned his attention to focal mechanisms of earthquakes in island arc regions. He wrote two papers in 1968, one dealing with the Rat Island earthquake sequence of 1965² and the other with earthquakes beneath the Aleutian Trench³. In these papers he was one of the first⁴ to use the now common representation of the focal mechanism diagrams (beach balls). Both studies showed that focal mechanisms varied with depth and location and that they were all consistent with movement of a plate beneath an island arc.

The main purpose of this work is to provide Stauder’s four-paper catalog in a text file format that is easy to use by modern standards. At the time of his publications, there was no standard format for presenting focal mechanism data; this is partially reflected by the fact that Stauder himself uses different approaches in his papers.

The events in *Stauder* (1968b) include 7 new events and also some events from previous lists; these repeated events were excluded in our compilation of 73 focal mechanisms. Here is a summary of the 73 events:

BOUNDS FOR SET OF 73 EVENTS (*display_eq_summary.m*):

| | MIN | MAX |
|---------------|------------|------------|
| Origin time : | 1950-03-27 | 1966-08-07 |
| Longitude : | -179.70 | 180.00 |
| Latitude : | 50.10 | 62.70 |
| Depth (km) : | 5.00 | 142.00 |
| Magnitude : | 5.00 | 7.30 |

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

²*Stauder* (1968a)

³*Stauder* (1968b)

⁴An earlier paper displaying beachball focal mechanisms was *Stauder and Bollinger* (1966).

Description of files

- `TL2022_ZD_stauder.pdf`. This file.
- `stauder_mech.txt`. Text catalog of the 73 focal mechanisms of Stauder.
- `stauder.zip`. A zipped set of text files that includes:
 - data tables published in Stauder’s papers.
 - text files of Stauder’s events in `psmeca` format, needed for plotting beachballs in GMT (*Wessel and Smith, 1991*).
 - `read_mech_stauder.m` and `run_mech_stauder.m`. Two Matlab files showing how the entries in the published tables were converted to standard values for representing focal mechanisms.

References

- Mitchell, B. J., and A. Udias, William V. Stauder, S.J. 1922–2002, *J. Seis.*, 7, 545, doi:10.1023/B:JOSE.0000005727.52443.5d, 2003.
- Stauder, W., Mechanism of the Rat Island earthquake sequence of February 4, 1965, with relation to island arcs and sea-floor spreading, *J. Geophys. Res.*, 73(12), 3847–3858, 1968a.
- Stauder, W., Tensional character of earthquake foci beneath the Aleutian trench with relation to sea-floor spreading, *J. Geophys. Res.*, 73(24), 7693–7701, 1968b.
- Stauder, W., and G. A. Bollinger, The focal mechanism of the Alaska earthquake of March 28, 1964, and of its aftershock sequence, *J. Geophys. Res.*, 71(22), 5283–5295, 1966.
- Stauder, W., and A. Udias, *S*-wave studies of earthquakes of the north Pacific, Part II: Aleutian Islands, *Bull. Seismol. Soc. Am.*, 53(1), 59–77, 1963.
- Tape, C., and A. Lomax, Aftershock regions of Aleutian–Alaska megathrust earthquakes, 1938–2021, *J. Geophys. Res. Solid Earth* (in preparation), 2022.
- Wessel, P., and W. H. F. Smith, Free software helps map and display data, *Eos Trans. Am. Geophys. Un.*, 72(41), 441 ff., 1991.

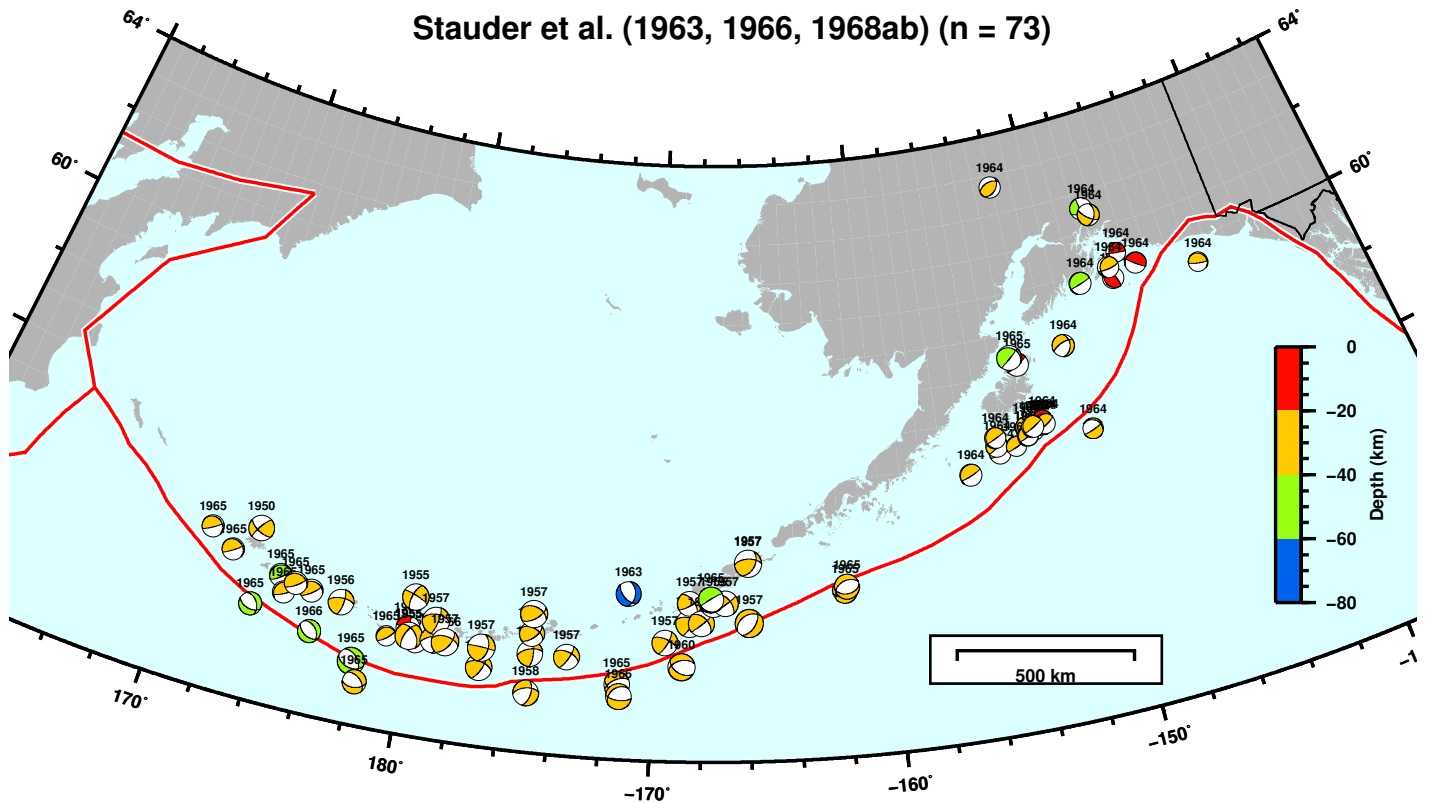


Figure D1: Focal mechanisms ($n = 73$) published in four papers by Stauder and colleagues *Stauder and Udias* (1963); *Stauder and Bollinger* (1966); *Stauder* (1968a,b). 46 of these events were among the 538 events analyzed in *Tape and Lomax* (2022).

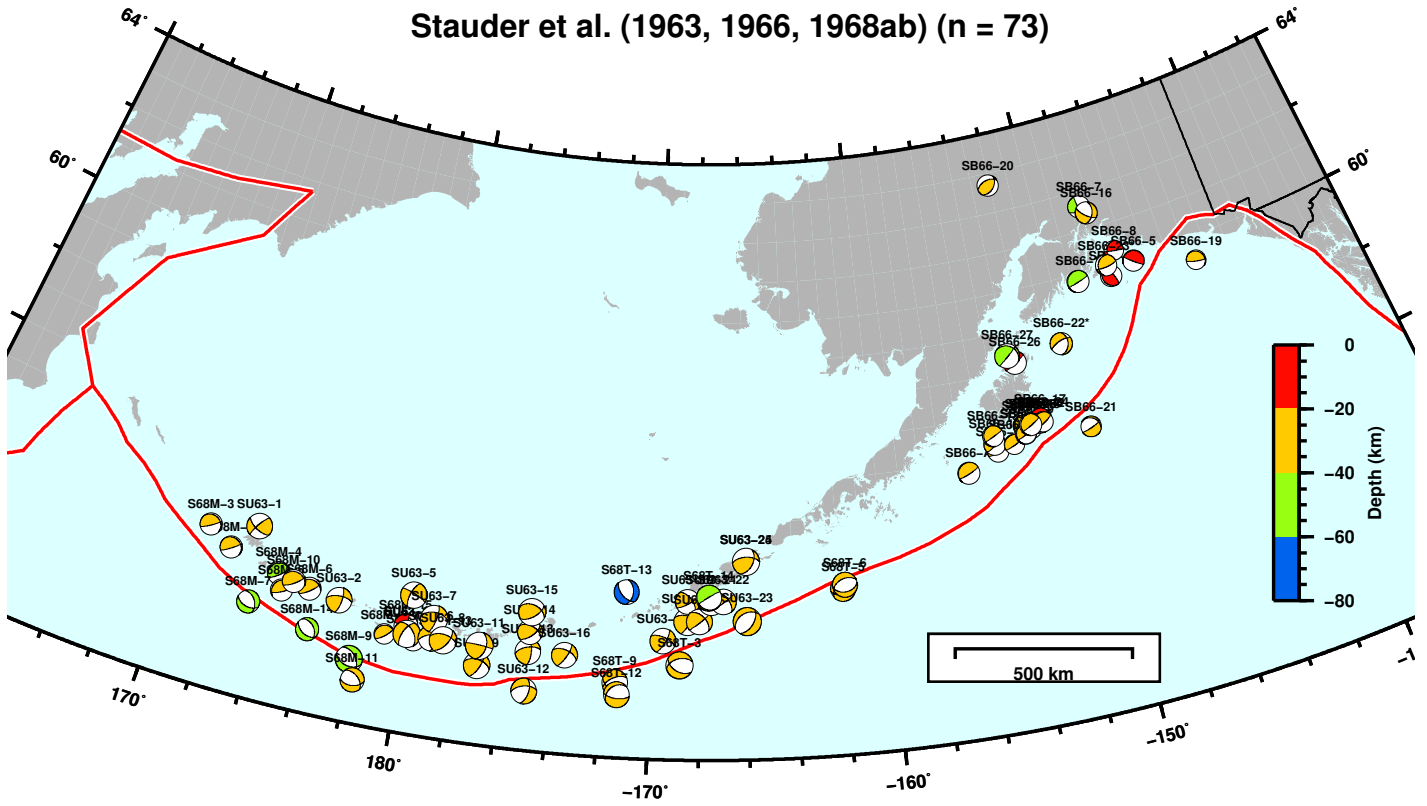


Figure D2: Same as Figure D1, but with text labels corresponding to the event IDs within the four published studies. A label representing the study (SU63, SB66, S68M, S68T) has been added as a prefix for each event ID.

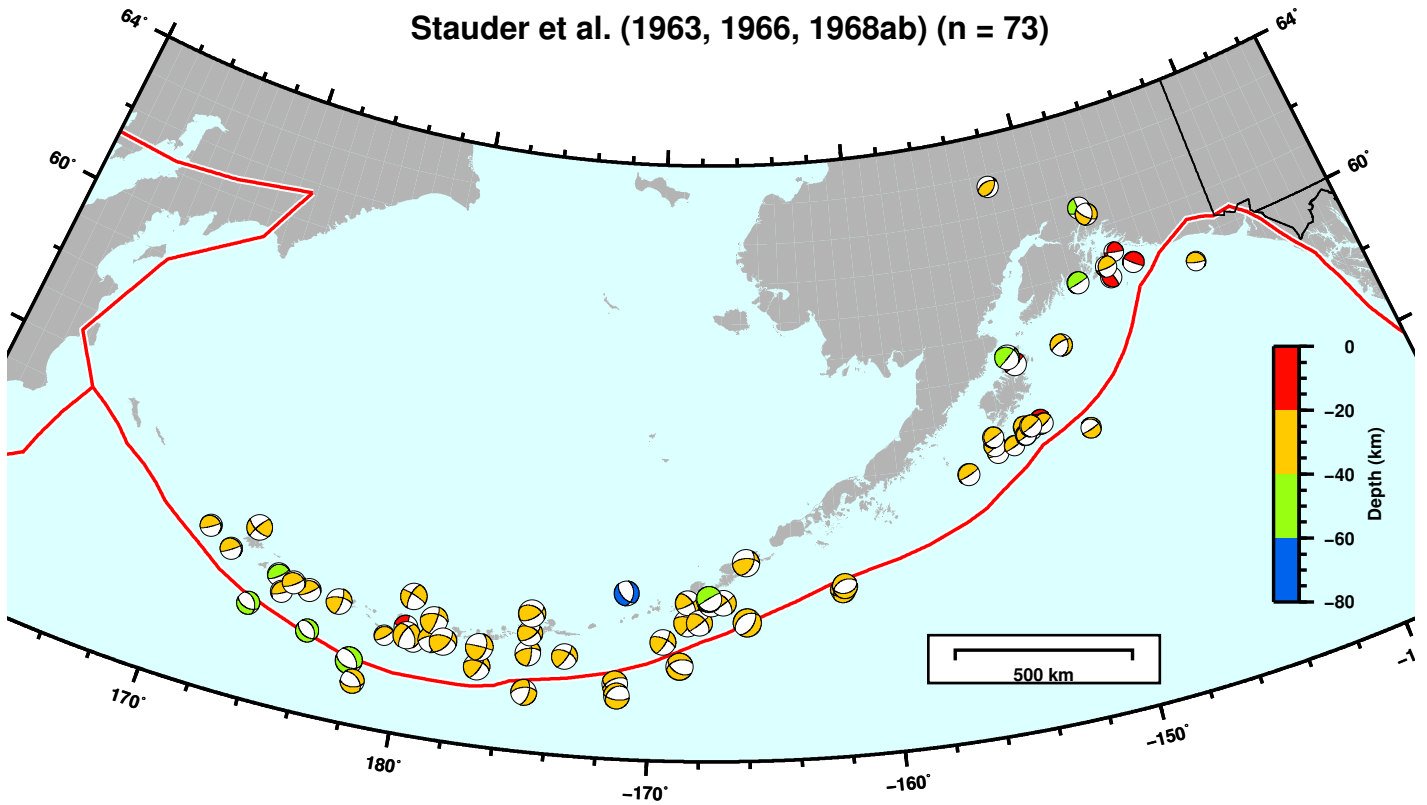


Figure D3: Same as Figure D1, but without text labels.

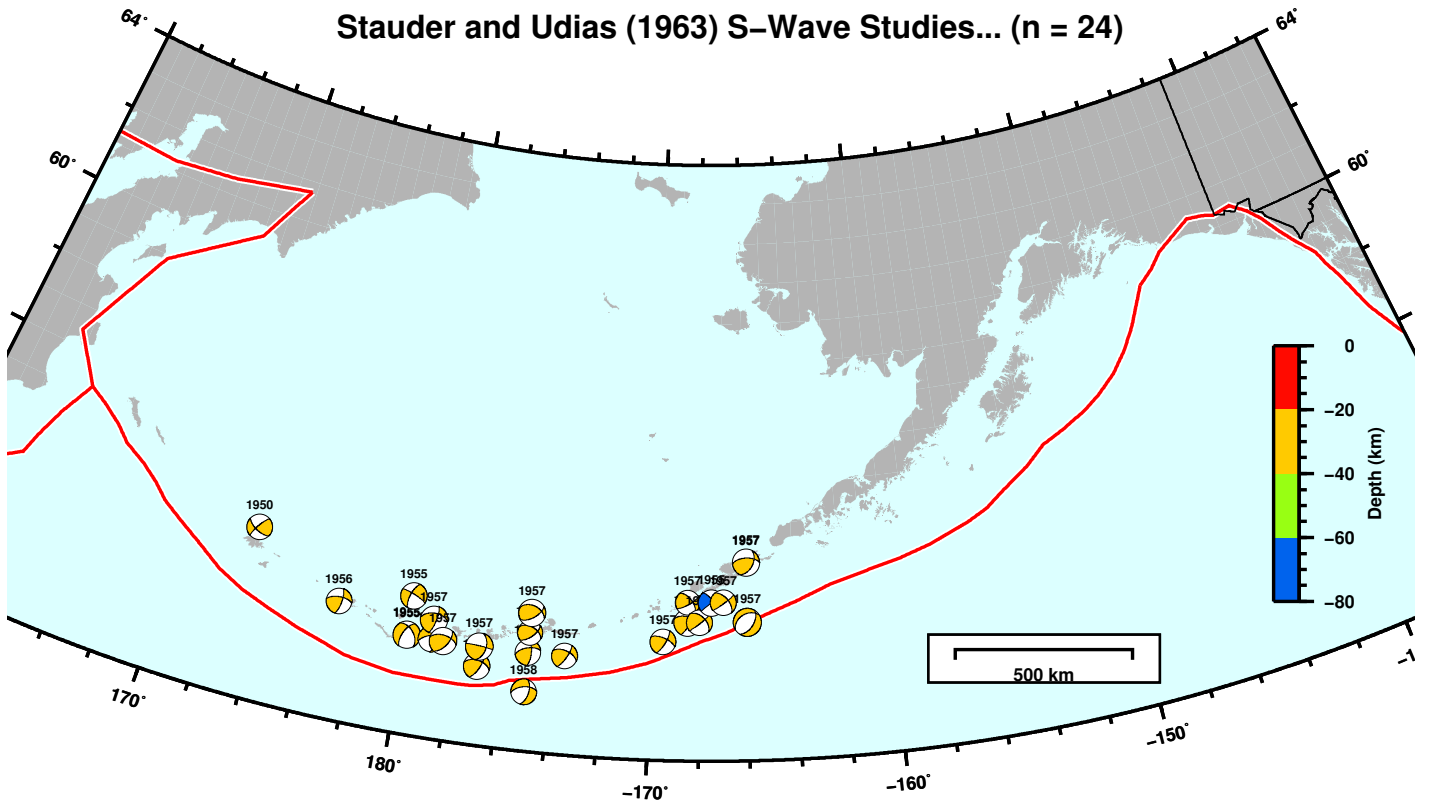
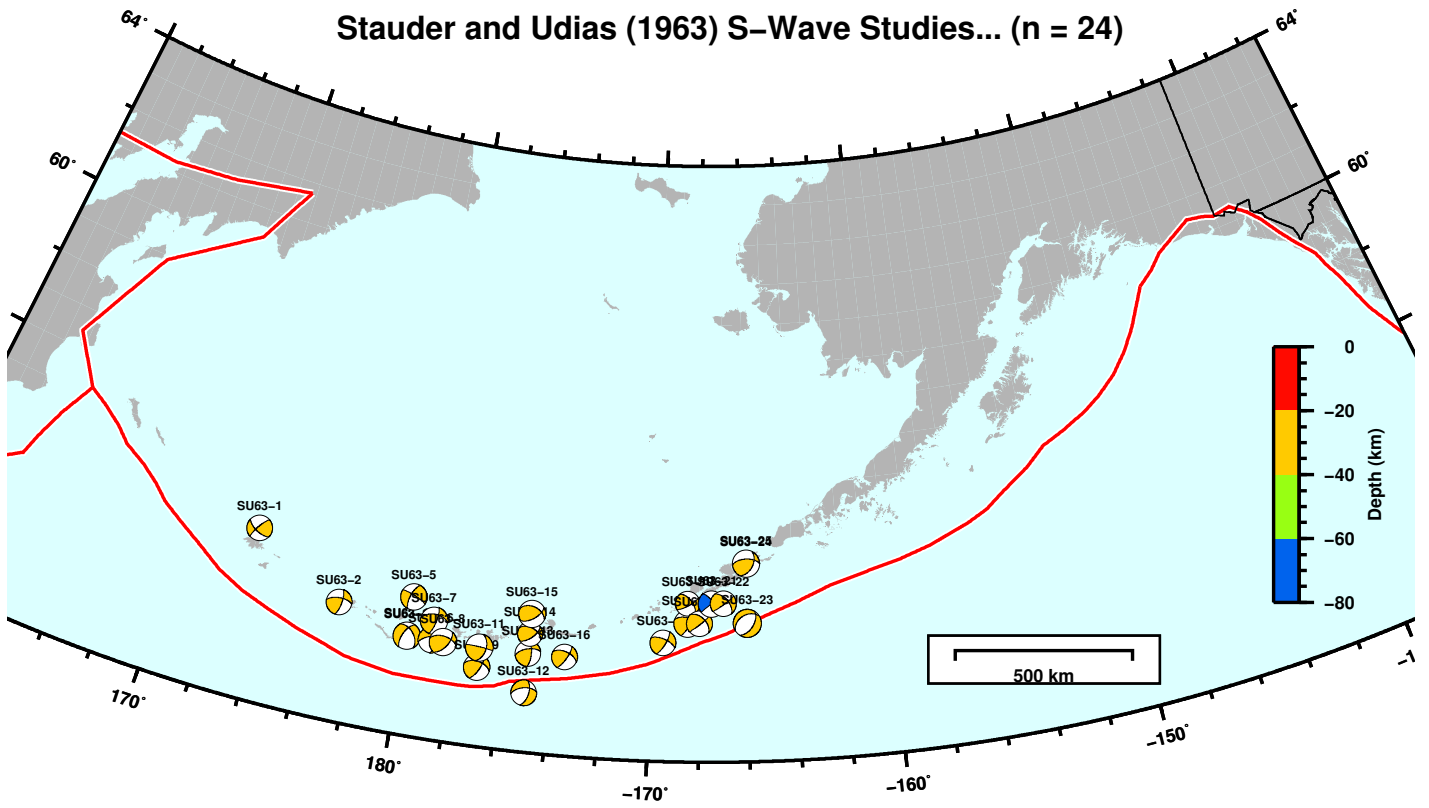


Figure D4: Focal mechanisms of events in *Stauder and Udias* (1963), derived from their Table 3. The text labels in the top figure correspond to the event IDs in the *Stauder and Udias* (1963); the text labels in the bottom figure are the year of the event. No beachballs are plotted in *Stauder and Udias* (1963).

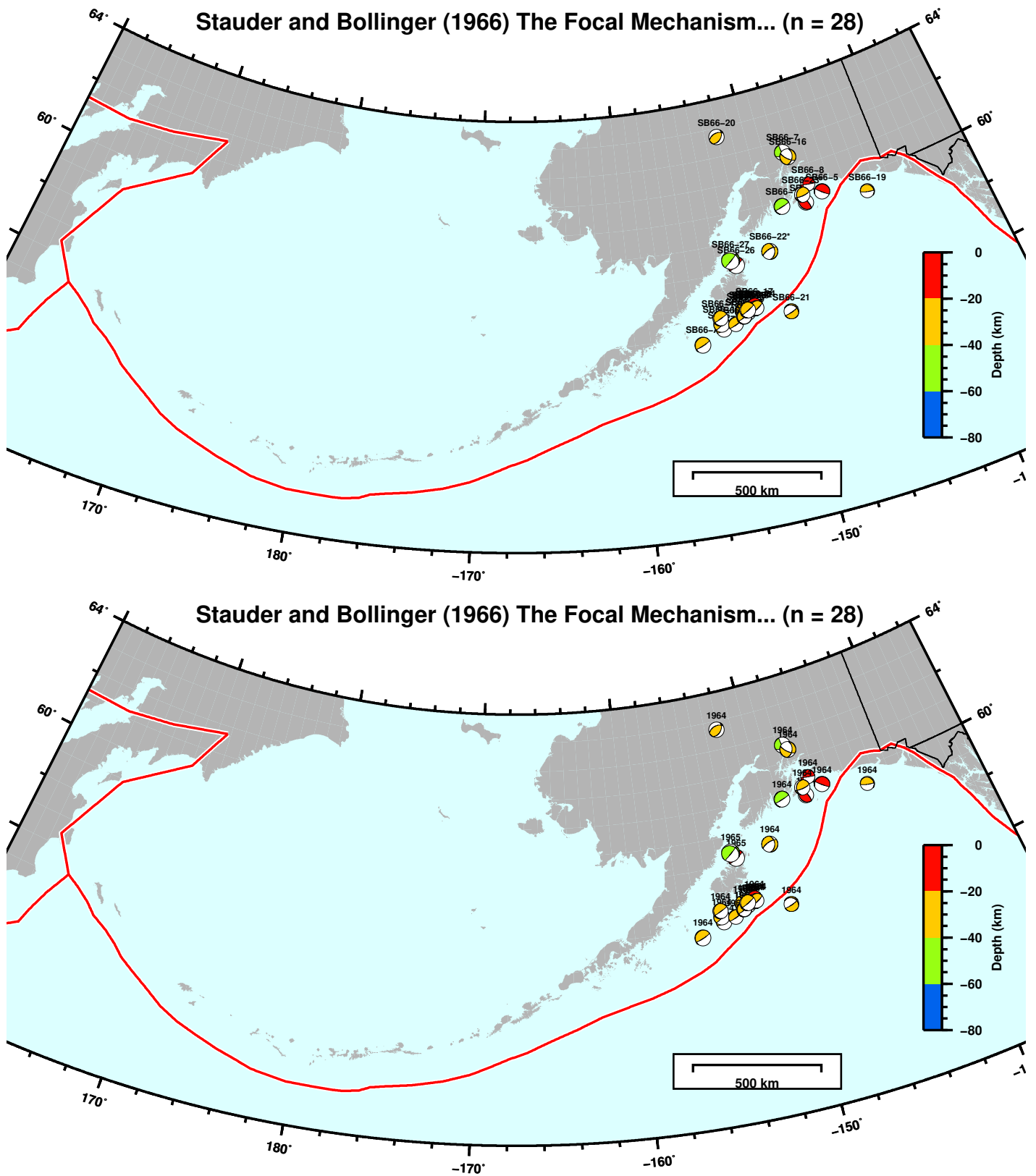


Figure D5: Focal mechanisms of events in *Stauder and Bollinger* (1966), derived from their Table 1. The text labels in the top figure correspond to the event IDs in the *Stauder and Bollinger* (1966); the text labels in the bottom figure are the year of the event. These beachballs should match those plotted in Figures 4 and 5 of *Stauder and Bollinger* (1966); however, note that their beachball coloring convention is reversed from what is now used.

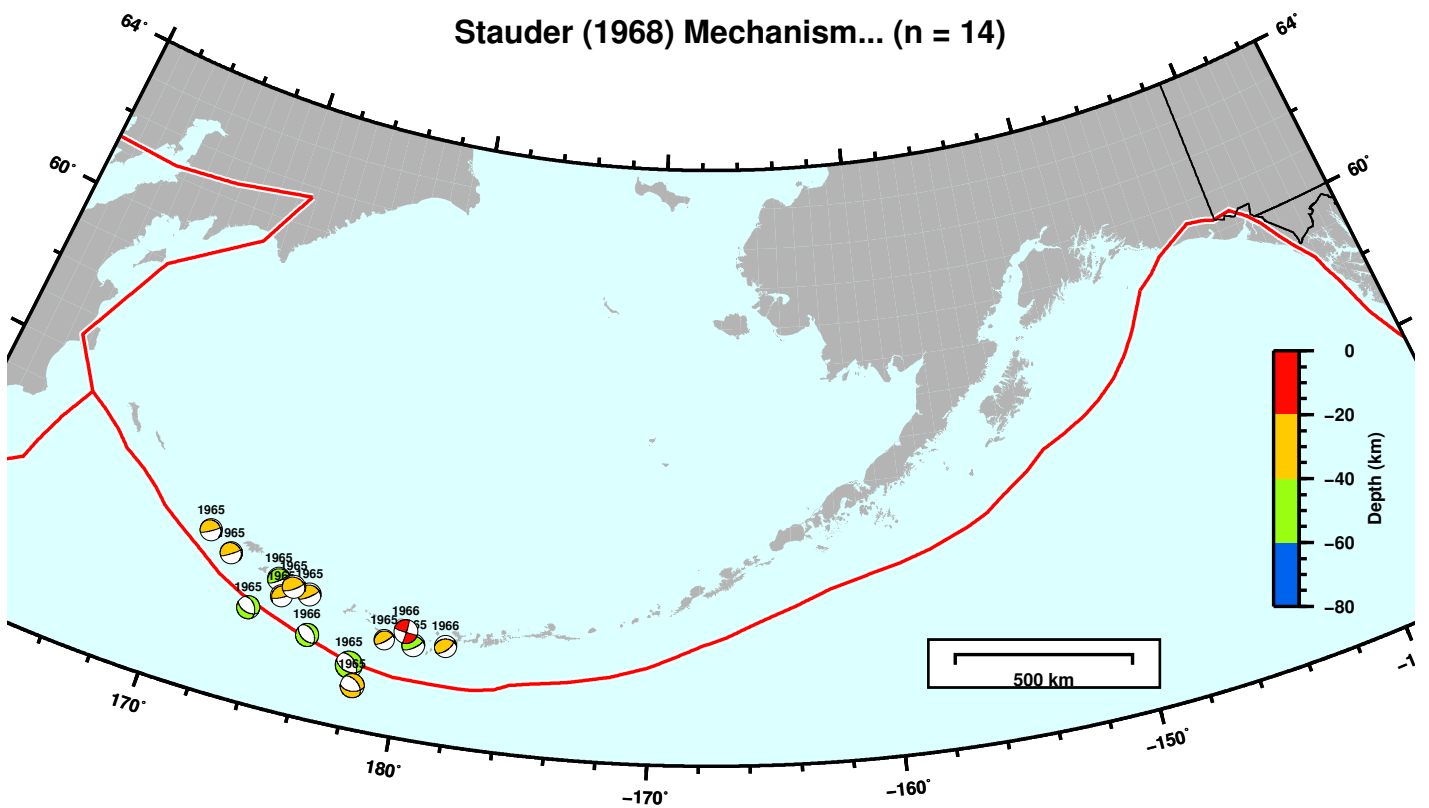
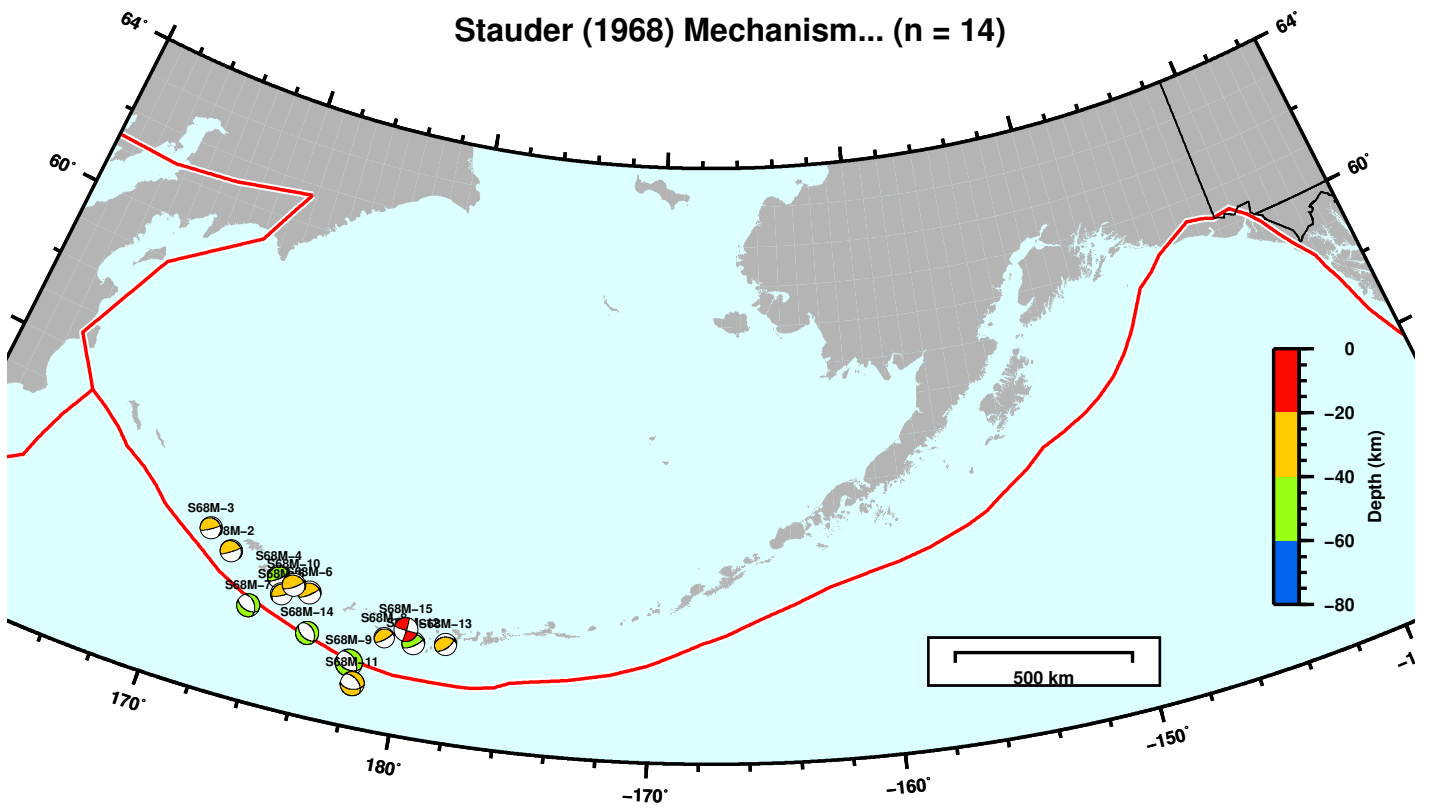


Figure D6: Focal mechanisms of events in *Stauder* (1968a), derived from their Table 2. The text labels in the top figure correspond to the event IDs in the *Stauder* (1968a); the text labels in the bottom figure are the year of the event. These beachballs should match those plotted in Figure 3 of *Stauder* (1968a); however, note that their beachball coloring convention is reversed from what is now used.

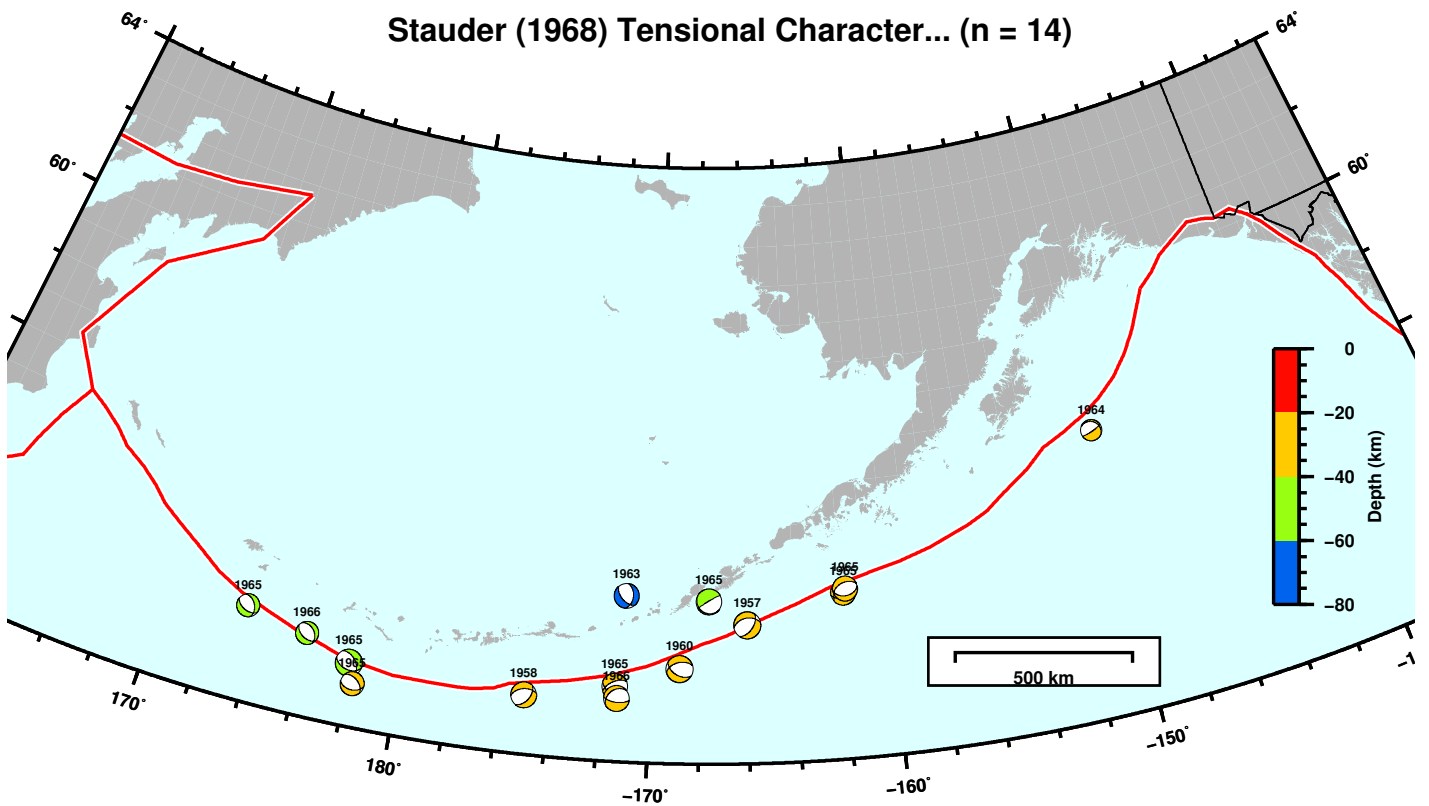
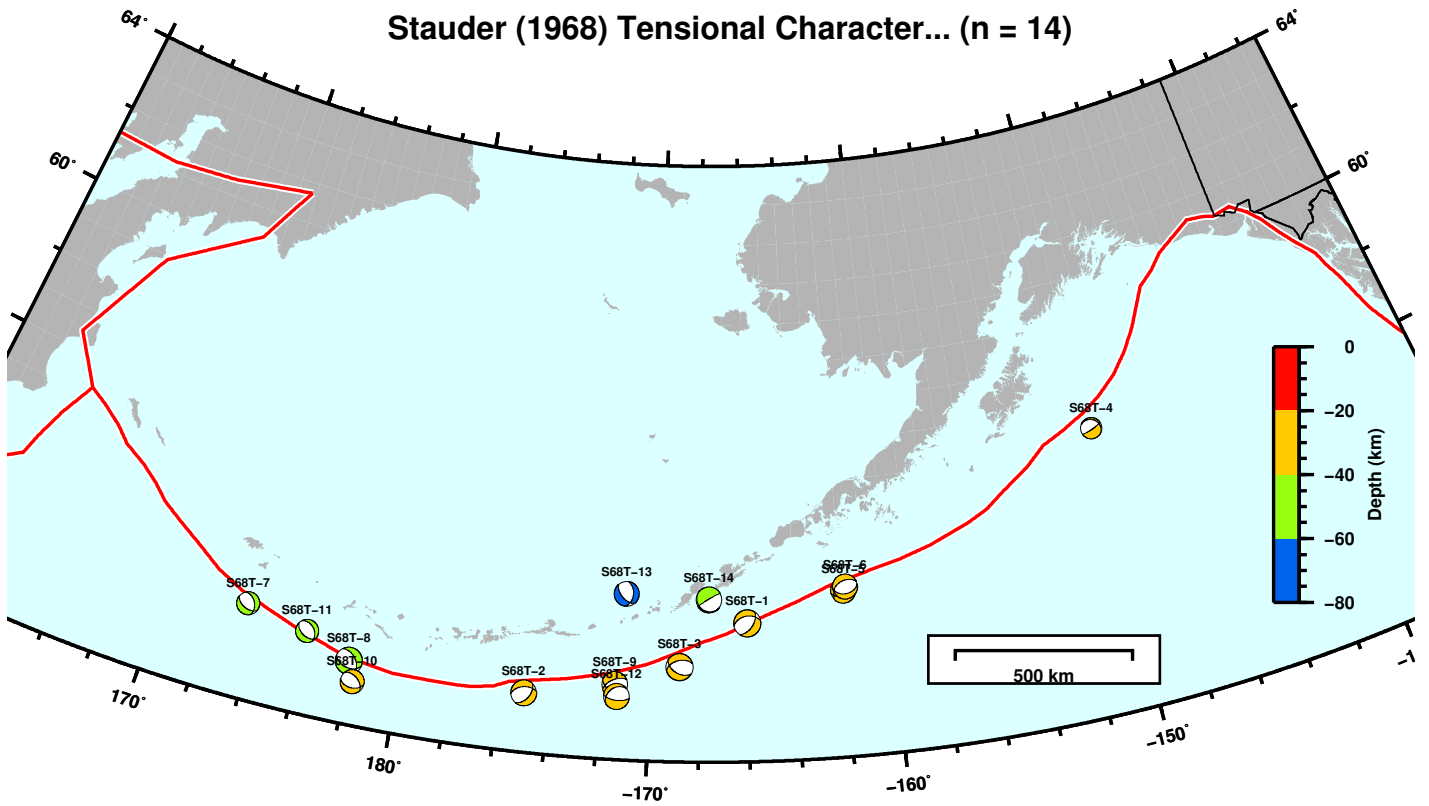


Figure D7: Focal mechanisms of events in *Stauder* (1968b), derived from their Table 1. The text labels in the top figure correspond to the event IDs in the *Stauder* (1968b); the text labels in the bottom figure are the year of the event. These beachballs should match those plotted in Figures 2 and 3 of *Stauder* (1968b); however, note that their beachball coloring convention is reversed from what is now used.