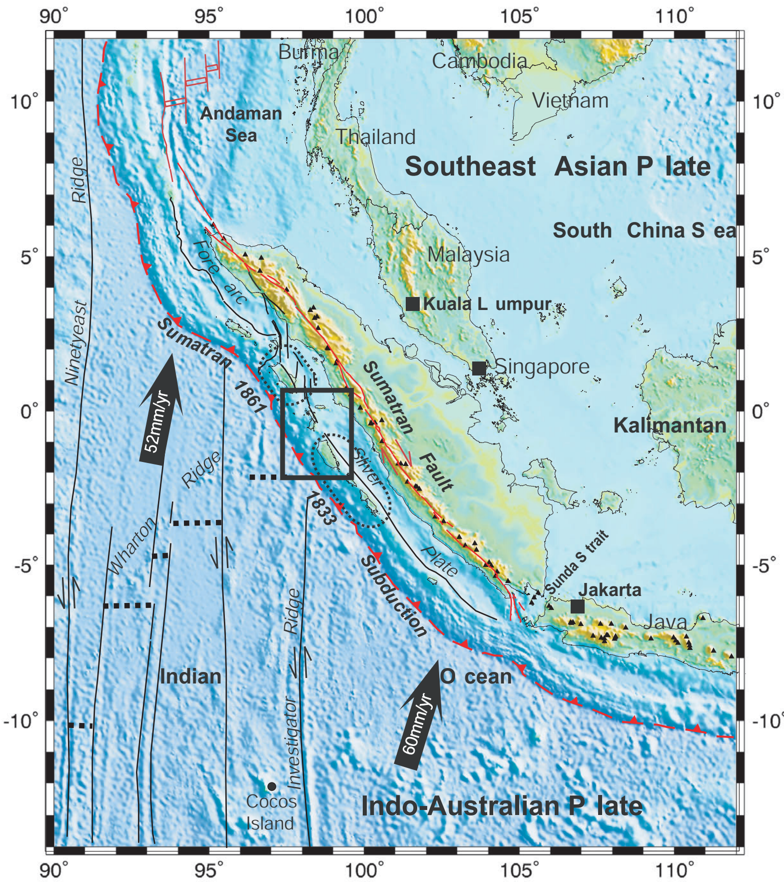

Figure 5.1a Map of the principal tectonic elements of the Sumatran plate boundary, and on ETOPO2 shaded relief base map. Oblique subduction of the Indian and Australia plates beneath Sumatra is accommodated principally by slip on the Sumatran subduction and the dextral Sumatran fault. Volcanoes are triangles. Dotted-black line ellipsoids are estimated source ruptures of the 1833 and 1861 giant earthquake. A square is an index location for Fig.5.1b. Adapted from Chapter 2.

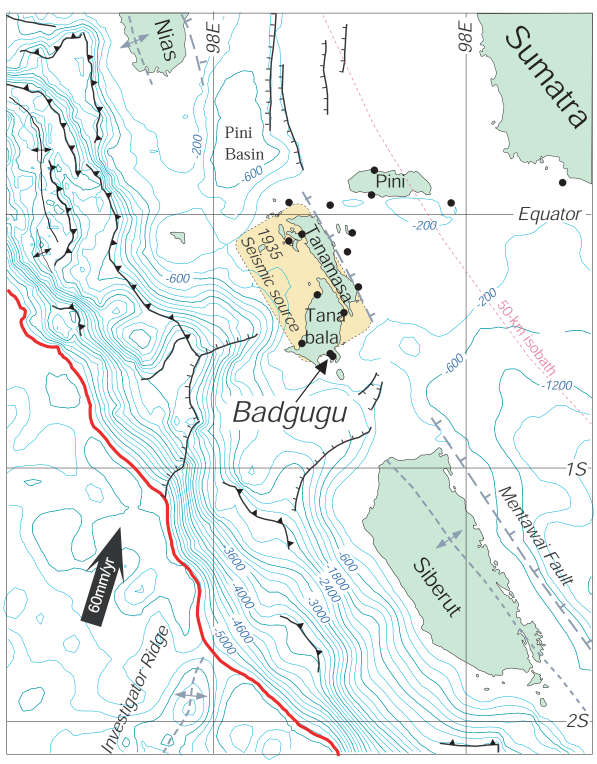

Figure 5.1b Index map and the regional geological structures. Badgugu site is located at the southern edge of the 1935 seismic source determined from the analysis of the teleseismic data from *Rivera et al.*[2002].

view to south

(a)

view to west

(b)

Figure 5.2b Photographs of the two fossil microatolls that constitute the majority of the Badgugu record, taken as we were cutting the larger head in mid-2000. Both photos were taken during low tide, when the flat upper surfaces of the heads were well above water. (a) Head #14, with slot showing the location of slab sample Bdg99A1. View is toward the South and the open bay. About 150 m in distance is the outer edge of the intertidal platformNote the shallowness of the lagoon, other fossil heads in the middle ground, and the rubble rampart in the background. (b) Head #15, while cutting of slab sample Bdg00A1 is in progress. The beach and houses of Badgugu village are about 100 m to the west.

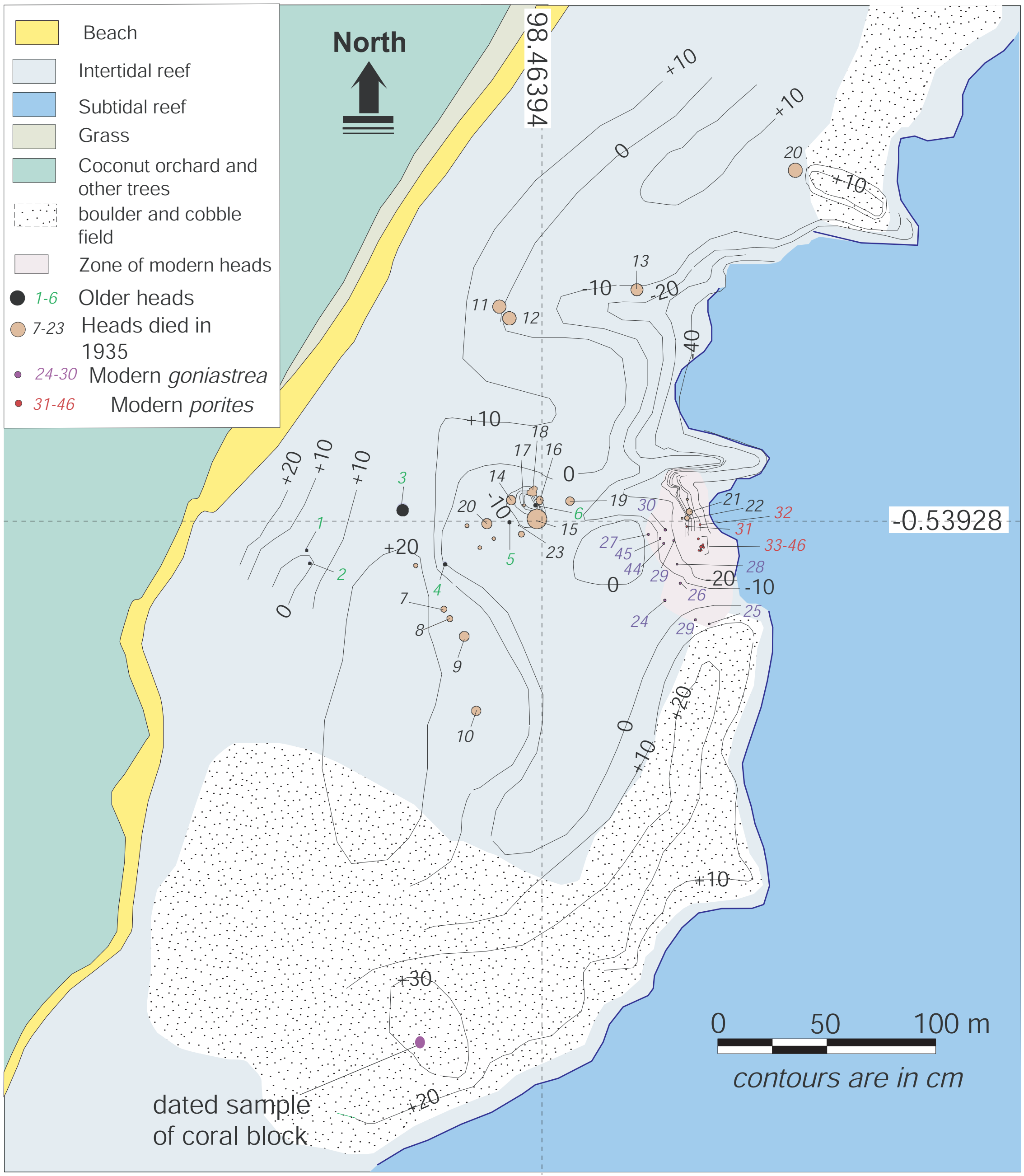

Figure 5.3 West Badgugu site map shows the wide and shallow intertidal reef platform, with its lagoon and outer rubble rampart. The large breach in the rampart allows circulation of seawater between the bay and the lagoon. The lagoon is a graveyard of fossil microatolls, most of which died from emergence of about 80 cm in 1935.

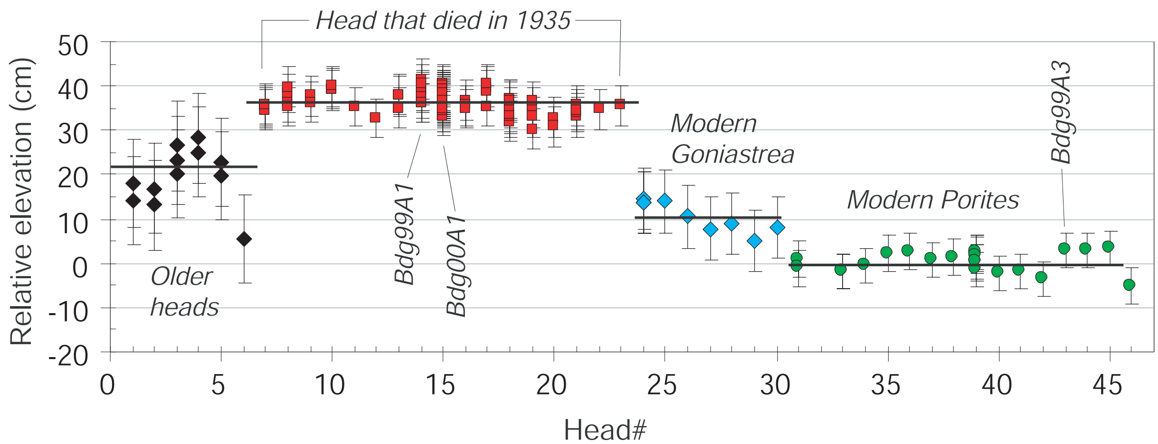

Figure 5.4. Relative elevations of perimeter crests of 46 microatolls. The datum is the average HLS of modern *Porites* heads. Modern *Goniastrea* heads are about 10 cm higher. The *Porites* heads that died in 1935 are about 35 cm higher than their modern equivalents. Little is known about the older population of microatolls.

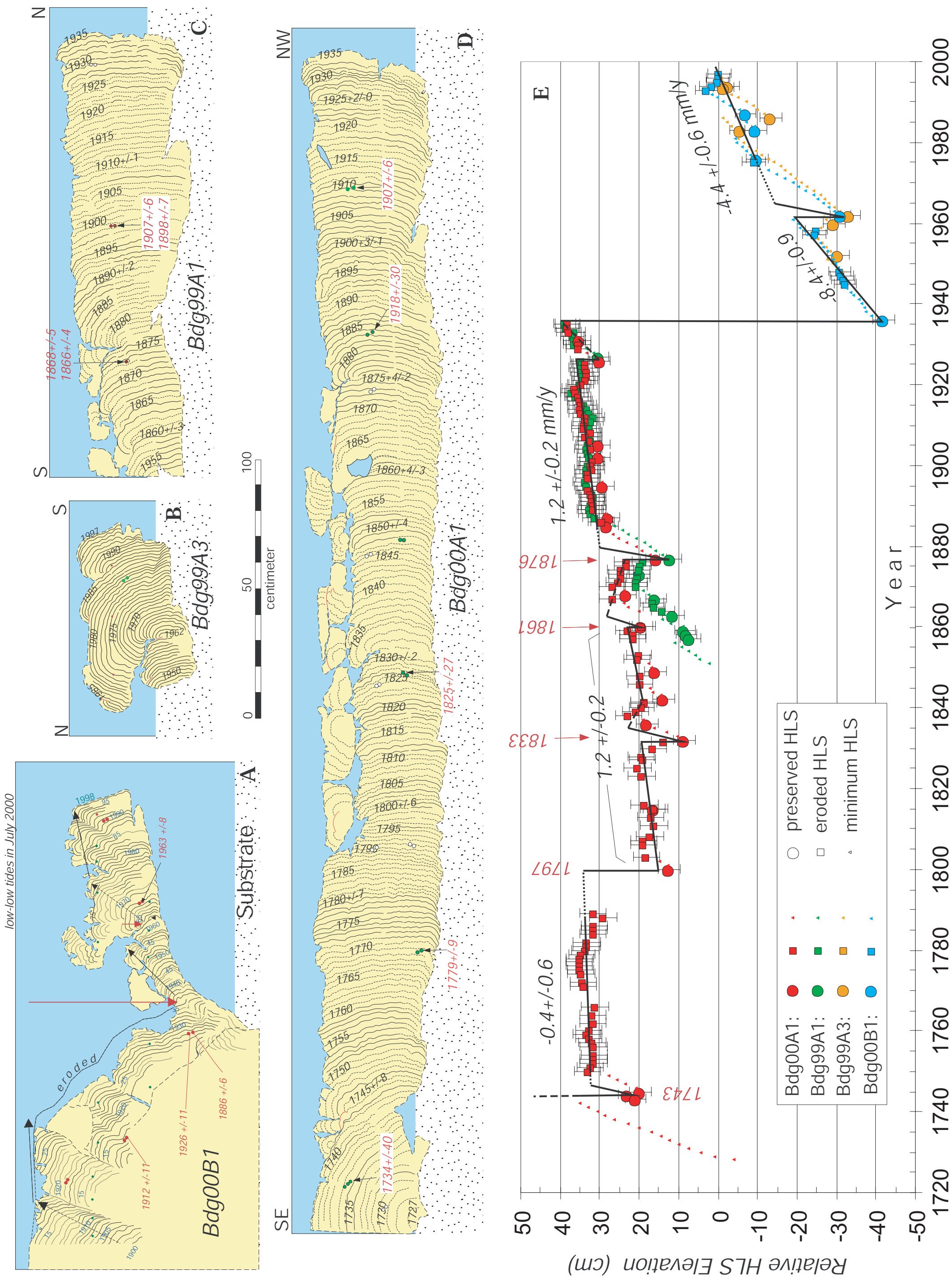

Figure 5.5 Four slabs from the west and east Badgugu sites. A. Slab of fossil microatoll from east Badgugu site. B. Slab of the modern head near the outer edge of the intertidal flat in the west Badgugu site C. Slab of the smaller "pancake-shaped" fossil microatoll in the west Badgugu. D. Slab of the larger fossil microatoll. E. The composite HLS history from the four slabs. The record is dominated by the 80 cm emergence in 1935. A very slow submergence operated for two centuries prior to 1935, interrupted by significant disturbances in about 1743, 1797, 1833, 1861, 1876, and 1962. A fast submergence rate followed the 1935 event. The rate decelerated after the 1962 event but higher still than that of before 1935.

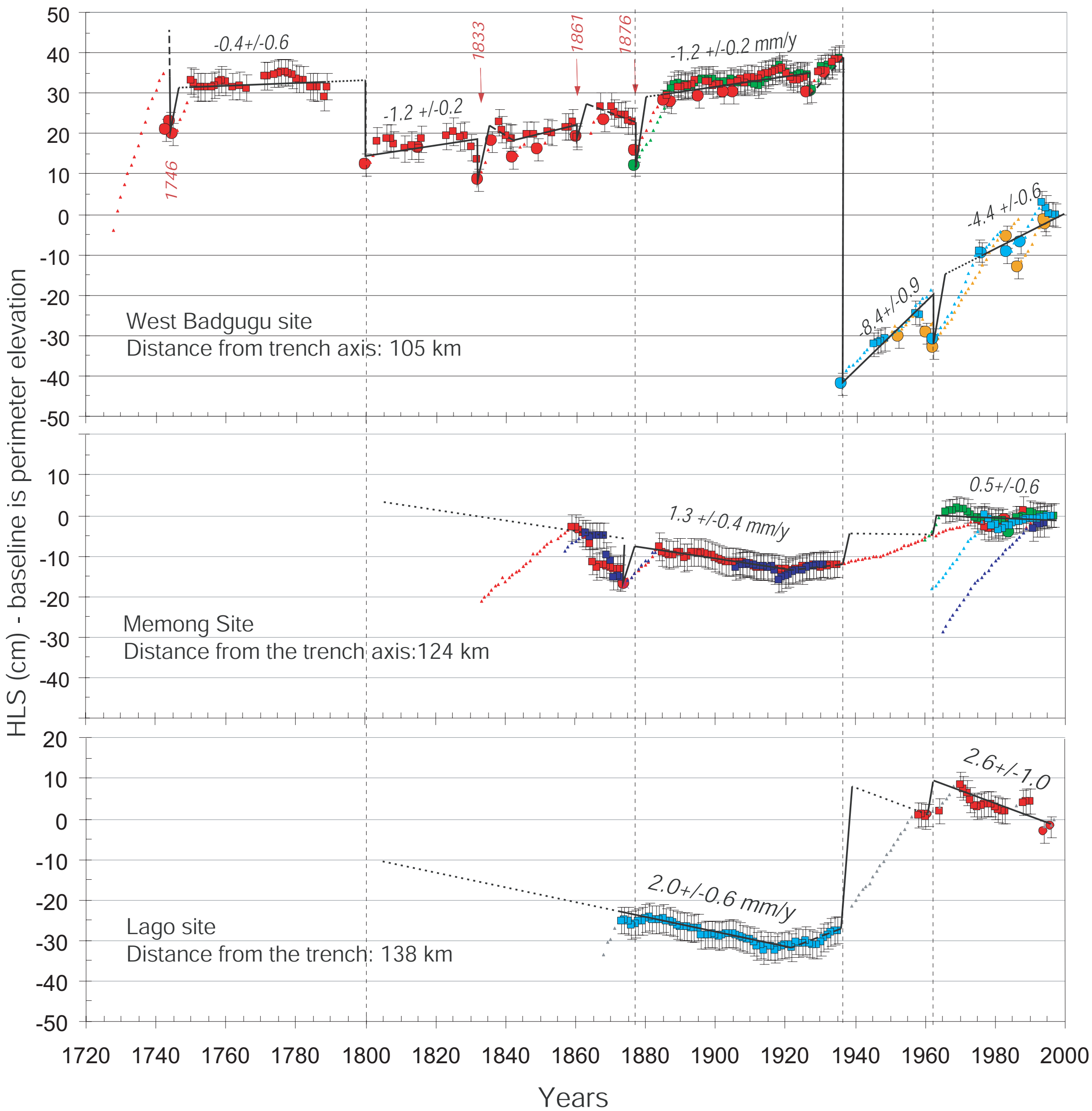

Figure 5.6 The HLS histories depicted from three longest coral slabs from the sites around the equator (i.e., Badgugu, Memong, and Lago). The records suggest that the physical behavior of the subduction before 1935 appears to have unchanged since 1800.

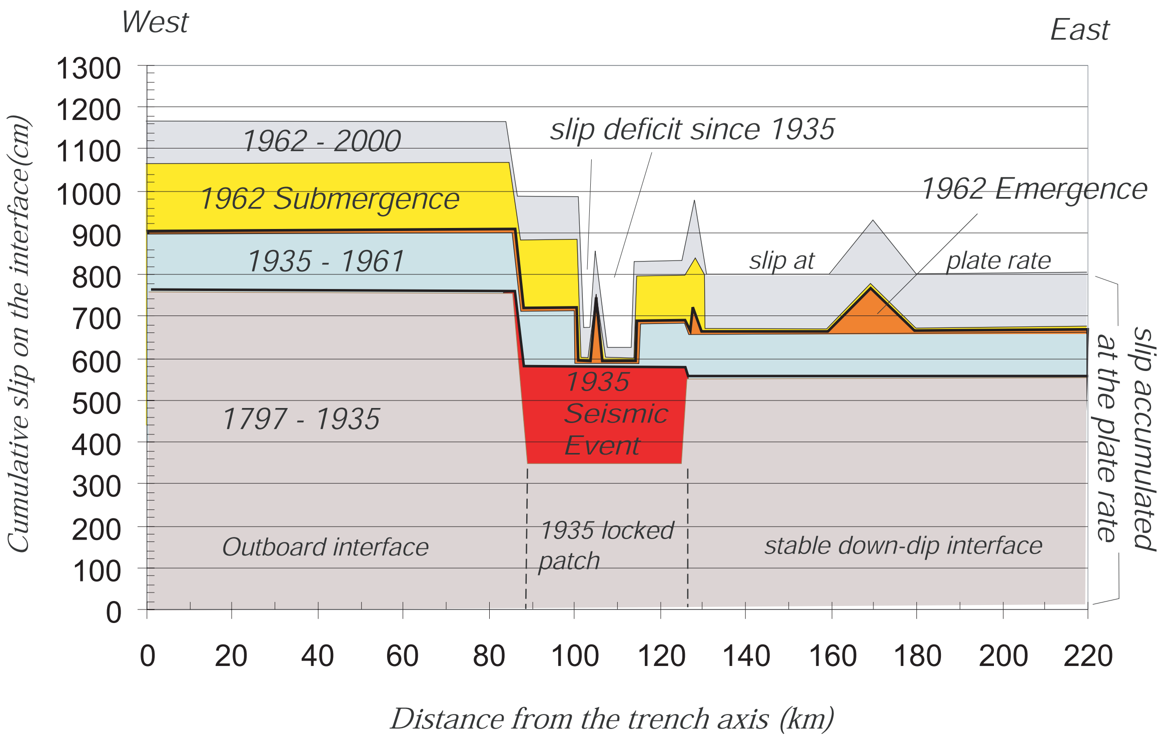

Figure 5.7 A graphic presentation of a complex history of seismic and aseismic slip on the subduction interface for the last 200 years, based on the modeling in Chapter 4, Fig. 4.28. The steady-state subduction on the downdip interface that slips continuously at plate rate (4 cm/yr) is represented by the graph on the right (east) side. The slip history on the shallow portion of the interface (closer than 130 km to the trench axis) is dominated by quasi-stable sliding. Within this portion, the red and yellow patches represent the strain releases during the 1935 and the 1962 events. The strain accumulations (slip deficits) are shown by the other patches with cooler colors. Note that, Slip deficit sin 1797 on the patch, 88 to 127 km from the trench, equal to the predicted slip event in 1935. The slips on the updip section (0–90 km) are entirely aseismic, but include that of the 1962 slow-slip event.