In comparison to the San Andreas margin, the Parkfield segment (Fig. 3c, 3b), implying substantial aseismic slip below the aftershock zone.

We inverted the coseismic changes in the GPS vectors of the 13 lines measured before and after the 1966 earthquake to determine the 1966 seismic moment, using the same inversion procedure described above. Because the geodetic measurements do not uniquely constrain the depth of seismic slip, we assume in the following analysis that coseismic or postseismic slip occurred at all depths below the transition depth and allow this parameter to vary from 14 to 22 km. The GPS surveys reveal that aseismic slip beneath the 1966 aftershock zone is small to nonexistent and that the main shock started the locked zone. The locked zone extends some 30 km above the transition depth and coincides quite closely with the surface trace of the 1966 earthquake fault plane (24). The 1966 seismic moment calculated from the geodetic data ranges from $1.55 \times 10^{25}$ dyn cm if we assume no slip below 14 km, to $9.1 \times 10^{25}$ dyn cm, if we assume no slip below 22 km. These rates exceed the seismic moment of $2.1 \times 10^{25}$ dyn cm calculated from surface waves (25). Because surveys were not conducted until several weeks or months after the earthquake, the geodetically determined seismic moment includes an unknown amount of aseismic slip. The comparison with similar earthquakes in California suggests that postseismic slip can account for a factor of 2 increase in seismic moment (26). The remaining discrepancy between the surface wave and geodetic moment may be an artifact of the smoothing in the inversion, which tends to introduce substantial slip at depth where the network has low resolution. An alternative inversion procedure that tends to minimize the slip deficit yields a moment of $3.2 \times 10^{25}$ dyn cm, which we take to be a lower bound on the 1966 moment.

We used these results to calculate the time required for a moment deficit equal to the 1966 seismic moment to accumulate. This would be equivalent to the recurrence time according to the time-predictable earthquake recurrence model (28). We considered two limiting models, model 1 with a transition depth at 14 km and model 2 with a transition depth at 22 km (29). In each model, the slip deficit relative to the corresponding deep-slip rate was used to calculate the moment deficit rate. We then compared calculated rate, 

![](image)

**Figure 3.** Interseismic slip rate pattern for a transition depth of 22 km and a deep-slip rate of 33 mm yr$^{-1}$. Colors indicate slip rate in millimeters per year: (a) Smooth model. (b) Same as (a) but with an additional degree of freedom in the inversion. (c) Same as (a) but with two additional degrees of freedom. The longitudinal cross section of 1966 mainshocks (circles) and mainshock (star) projection onto the model fault plane (24) outlines the rupture surface of the 1966 Parkfield earthquake.