

Supplementary information for “GPS-derived interseismic fault locking along the Jalisco-Colima segment of the Mexico subduction zone”

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The supplementary materials in this document include:

- A description of the separate files provided with this document (Section S1).
- Supplementary Figures S1 to S8, which are referenced in the main document (Section S2).

The additional files include two files with the locking distribution from our preferred model:

- tm15.nod
- tm15_flt_atr.gmt

S1 DESCRIPTION OF ADDITIONAL FILES

The contents of the files with our preferred locking solution (based on velocities corrected for the postseismic viscoelastic effects estimated with a mantle Maxwell time of 15 years) are organized as follows:

***.nod file:** Contains the locking information at the nodes. The contents of each column are:

1. Fault name
2. Fault number
3. Node X-index
4. Node Z-index
5. Hanging wall block name
6. Foot wall block name
7. Node Longitude
8. Node Latitude
9. Node depth (km)
10. Node phi (locking coefficient)

11. Node phi 1-sigma uncertainty
12. Fault East slip rate (mm/yr)
13. Fault North slip rate (mm/yr)
14. Fault East slip rate 1-sigma uncertainty (mm/yr)
15. Fault North slip rate 1-sigma uncertainty (mm/yr)
16. Fault slip rate NE correlation
17. East component of slip deficit rate (mm/yr)
18. North component of slip deficit rate (mm/yr)
19. Azimuth of slip at node
20. Along strike distance of node (from first node) in km
21. Across strike (horizontal) distance of node from surface node up-dip from it, in km
22. Downdip distance of node from surface node up-dip from it, in km
23. Not used
24. Not used
25. Moment (rate) associated with this node in N m.

***atr.gmt file:** Contains the information of the interseismic slip distribution (locking and slip rate deficit) at the faults discretized in fault patches (the segments joining two neighboring nodes are subdivided into five sub-segments, so that each quadrilateral generated by adjacent nodes along-strike and down-dip is subdivided into 25 constant-locking patches). The files include fault attributes and quadrilaterals that can be used to make color plots of locking or slip rate deficit distributions. Every header line starts with > -Z for columns 1 and 2. The rest of the columns are:

3. Fault number
4. Slip rate deficit (mm/yr)
5. Locking fraction (ϕ)
6. Locking fraction 1-sigma uncertainty
7. Strike-slip plate rate
8. Dip-slip plate rate
9. Fault opening plate rate

10. Rake angle on sub-segment
11. Sub-segment centroid longitude
12. Sub-segment centroid latitude
13. Sub-segment centroid depth (km)
14. Node X-index
15. Node Z-index
16. Sub-segment X-index
17. Sub-segment Z-index
18. Fault sub-segment area (km²)
19. Fault sub-segment moment (N-m)
20. Fault sub-segment moment sigma (N-m)
21. East component of slip rate on fault (mm/yr)
22. North component of slip rate on fault (mm/yr)

The header line is followed by the four coordinates of the trapezoid that defines the fault patch:

Lon1 Lat1 Depth1
Lon2 Lat2 Depth2
Lon3 Lat3 Depth3
Lon4 Lat4 Depth4

To plot a colored locking distribution on a map you can use the gmt script line:

```
awk '{ if ($1 == ">") print $1,$2,$5; else print $1,$2 }' filename.gmt | psxy  
-Cpalette.cpt -R...
```

To plot a colored slip rate deficit distribution on a map you can use the gmt script line:

```
awk '{ if ($1 == ">") print $1,$2,$4; else print $1,$2 }' filename.gmt | psxy  
-Cpalette.cpt -R...
```

S2 SUPPLEMENTARY FIGURES

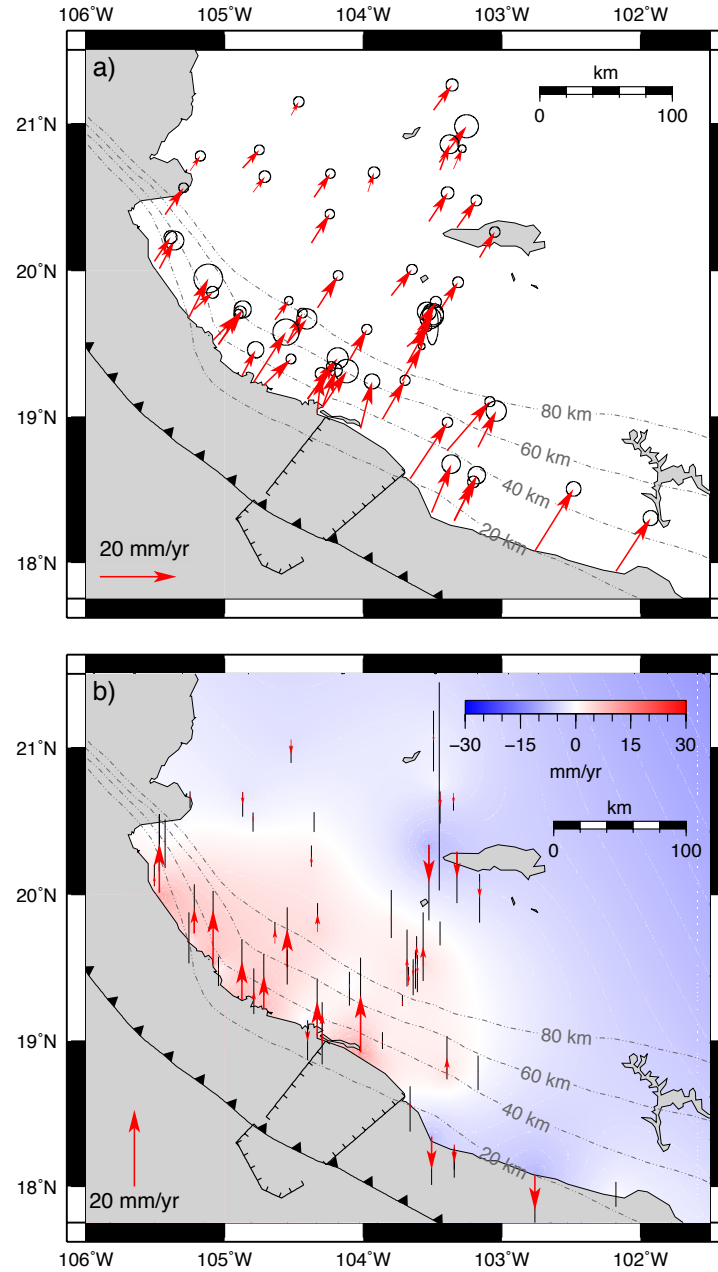


Figure S1. Best fitting GPS site velocities from the time-dependent inversion of GPS position time series that were corrected for viscoelastic effects of the 1995 Colima–Jalisco and 2003 Tecomán earthquakes using $\tau_m = 2.5$ years. a) Horizontal velocities relative to a fixed North America plate frame of reference. Ellipses represent 2D, 1- σ uncertainties. b) Vertical velocities. Thin black lines represent 1- σ uncertainties. Color shows the interpolated surface vertical velocities over the region.

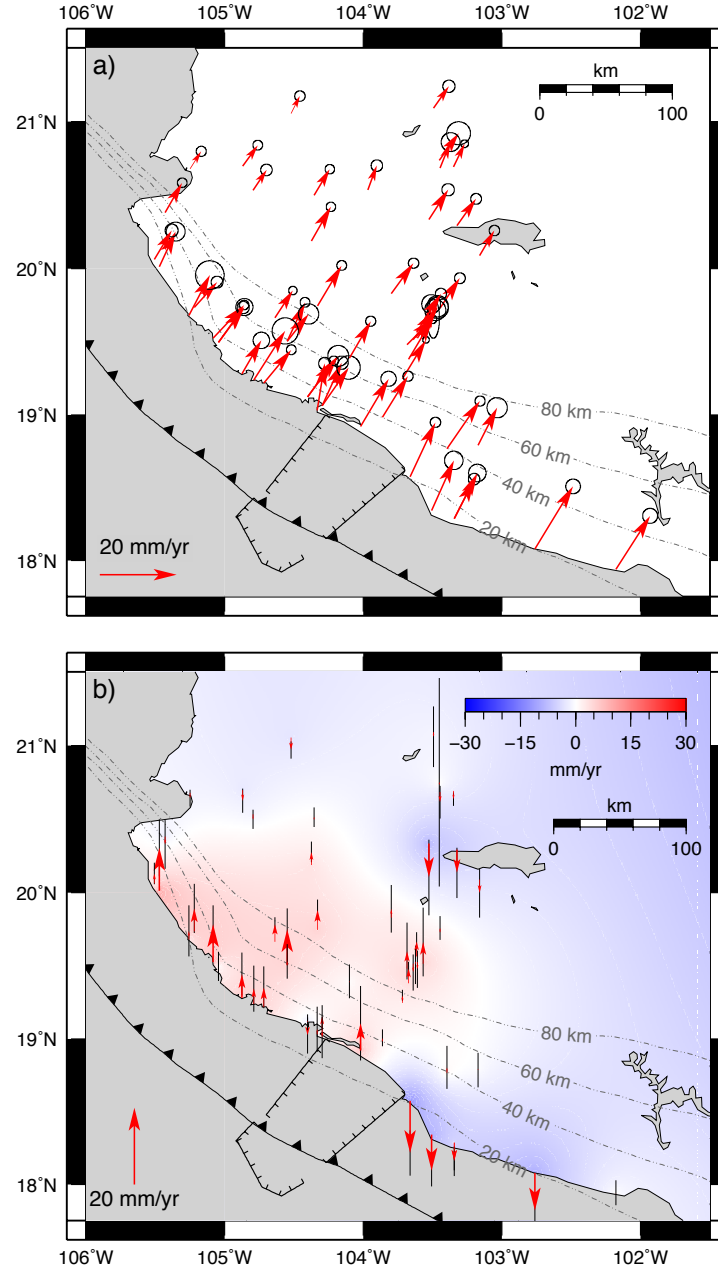


Figure S2. Best fitting GPS site velocities from the time-dependent inversion of GPS position time series that were corrected for viscoelastic effects of the 1995 Colima-Jalisco and 2003 Tecomán earthquakes using $\tau_m = 4$ years. a) Horizontal velocities relative to a fixed North America plate frame of reference. Ellipses represent 2D, 1- σ uncertainties. b) Vertical velocities. Thin black lines represent 1- σ uncertainties. Color shows the interpolated surface vertical velocities over the region.

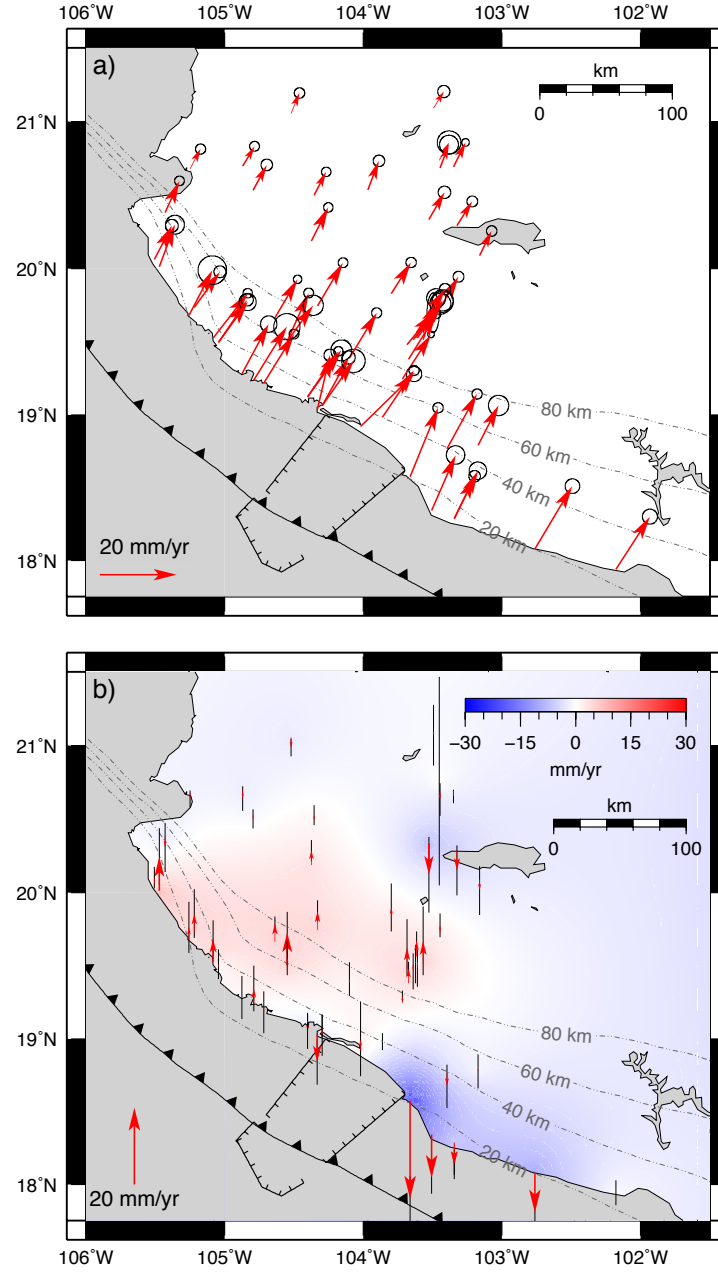


Figure S3. Best fitting GPS site velocities from the time-dependent inversion of GPS position time series that were corrected for viscoelastic effects of the 1995 Colima-Jalisco and 2003 Tecomán earthquakes using $\tau_m = 8$ years. a) Horizontal velocities relative to a fixed North America plate frame of reference. Ellipses represent 2D, 1- σ uncertainties. b) Vertical velocities. Thin black lines represent 1- σ uncertainties. Color shows the interpolated surface vertical velocities over the region.

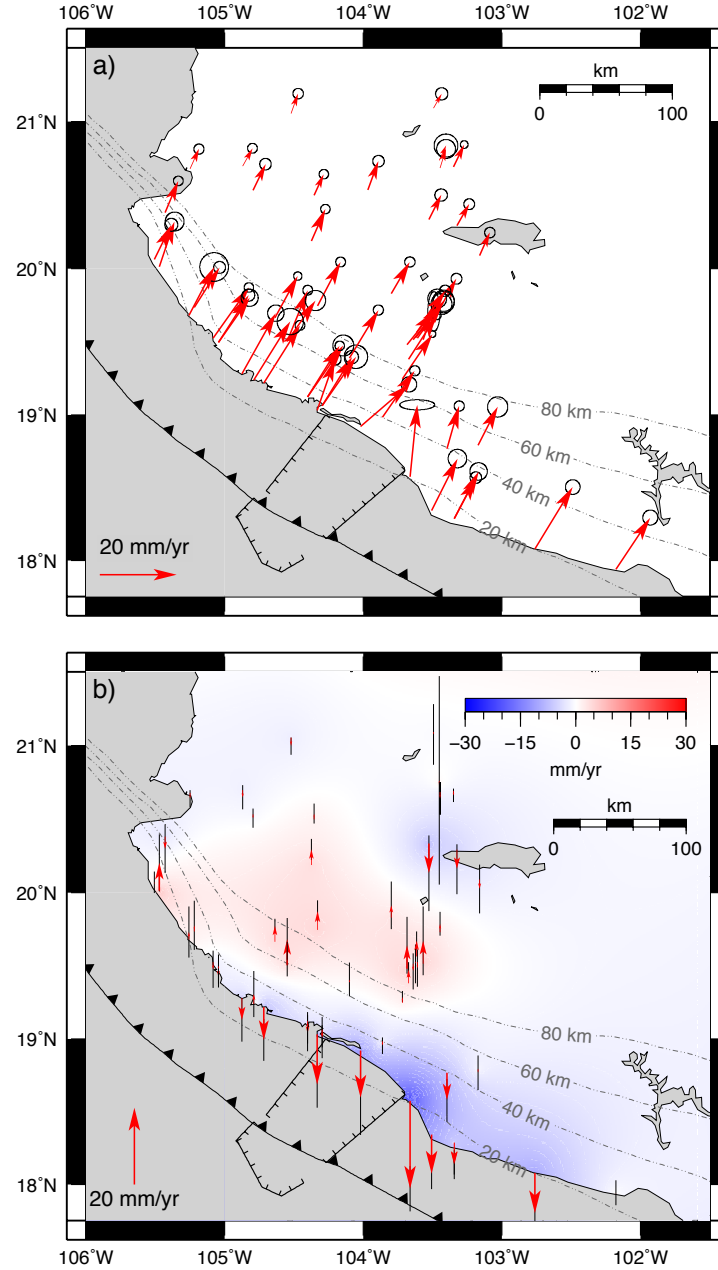


Figure S4. Best fitting GPS site velocities from the time-dependent inversion of GPS position time series that were corrected for viscoelastic effects of the 1995 Colima-Jalisco and 2003 Tecomán earthquakes using $\tau_m = 15$ years. a) Horizontal velocities relative to a fixed North America plate frame of reference. Ellipses represent 2D, 1- σ uncertainties. b) Vertical velocities. Thin black lines represent 1- σ uncertainties. Color shows the interpolated surface vertical velocities over the region.

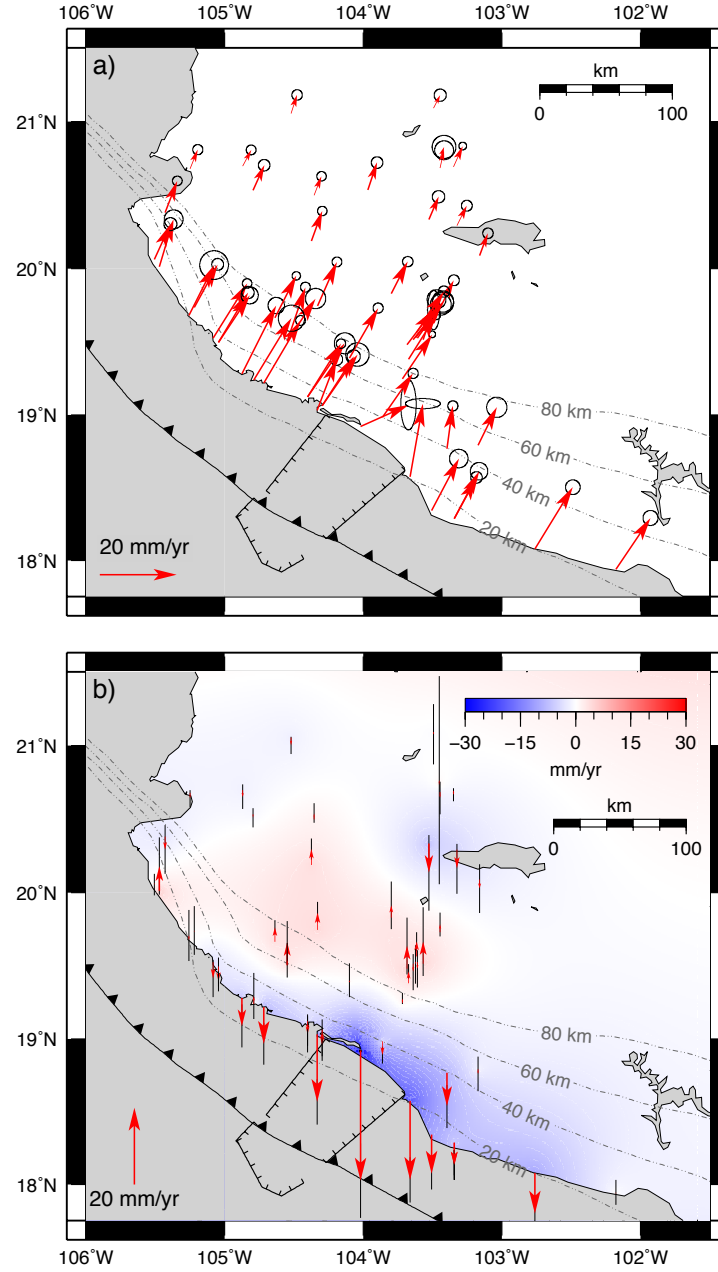


Figure S5. Best fitting GPS site velocities from the time-dependent inversion of GPS position time series that were corrected for viscoelastic effects of the 1995 Colima–Jalisco and 2003 Tecomán earthquakes using $\tau_m = 25$ years. a) Horizontal velocities relative to a fixed North America plate frame of reference. Ellipses represent 2D, 1- σ uncertainties. b) Vertical velocities. Thin black lines represent 1- σ uncertainties. Color shows the interpolated surface vertical velocities over the region.

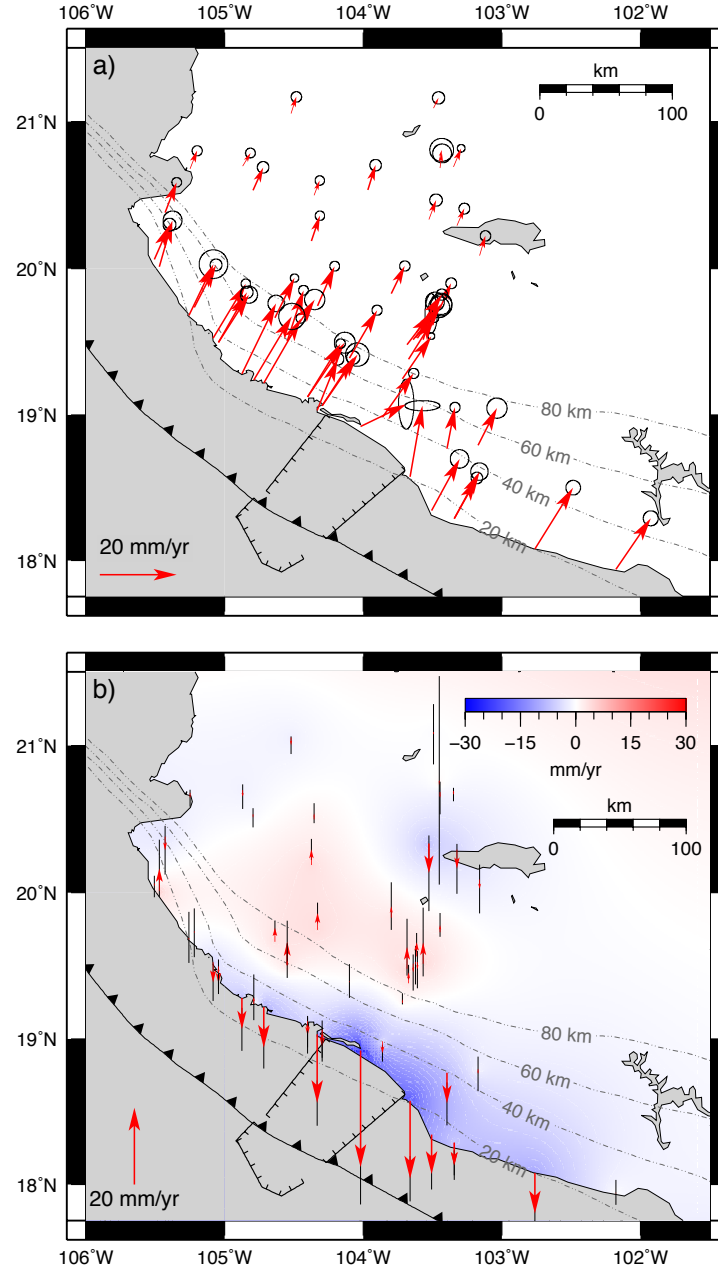


Figure S6. Best fitting GPS site velocities from the time-dependent inversion of GPS position time series that were corrected for viscoelastic effects of the 1995 Colima-Jalisco and 2003 Tecomán earthquakes using $\tau_m = 40$ years. a) Horizontal velocities relative to a fixed North America plate frame of reference. Ellipses represent 2D, 1- σ uncertainties. b) Vertical velocities. Thin black lines represent 1- σ uncertainties. Color shows the interpolated surface vertical velocities over the region.

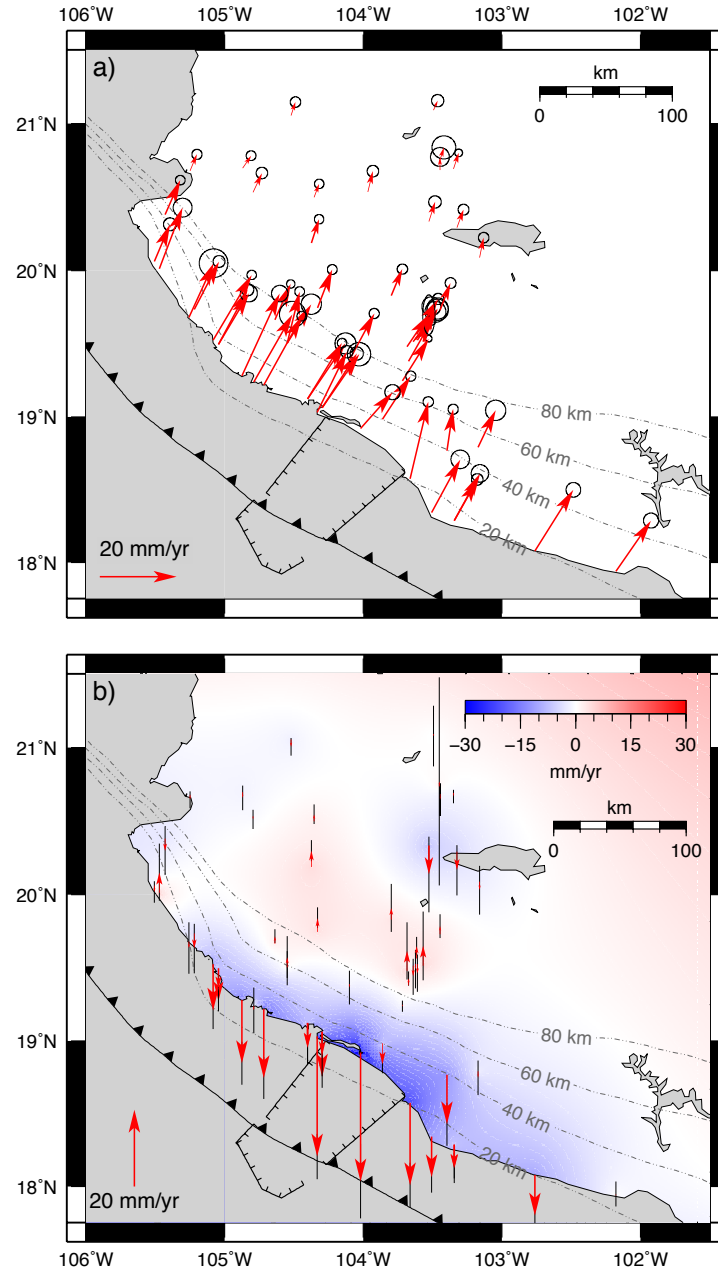


Figure S7. Best fitting GPS site velocities from the time-dependent inversion of GPS position time series with no viscoelastic effects corrections. a) Horizontal velocities relative to a fixed North America plate frame of reference. Ellipses represent 2-D, 1- σ uncertainties. b) Vertical velocities. Thin black lines represent 1- σ uncertainties. Color shows the interpolated surface vertical velocities over the region.

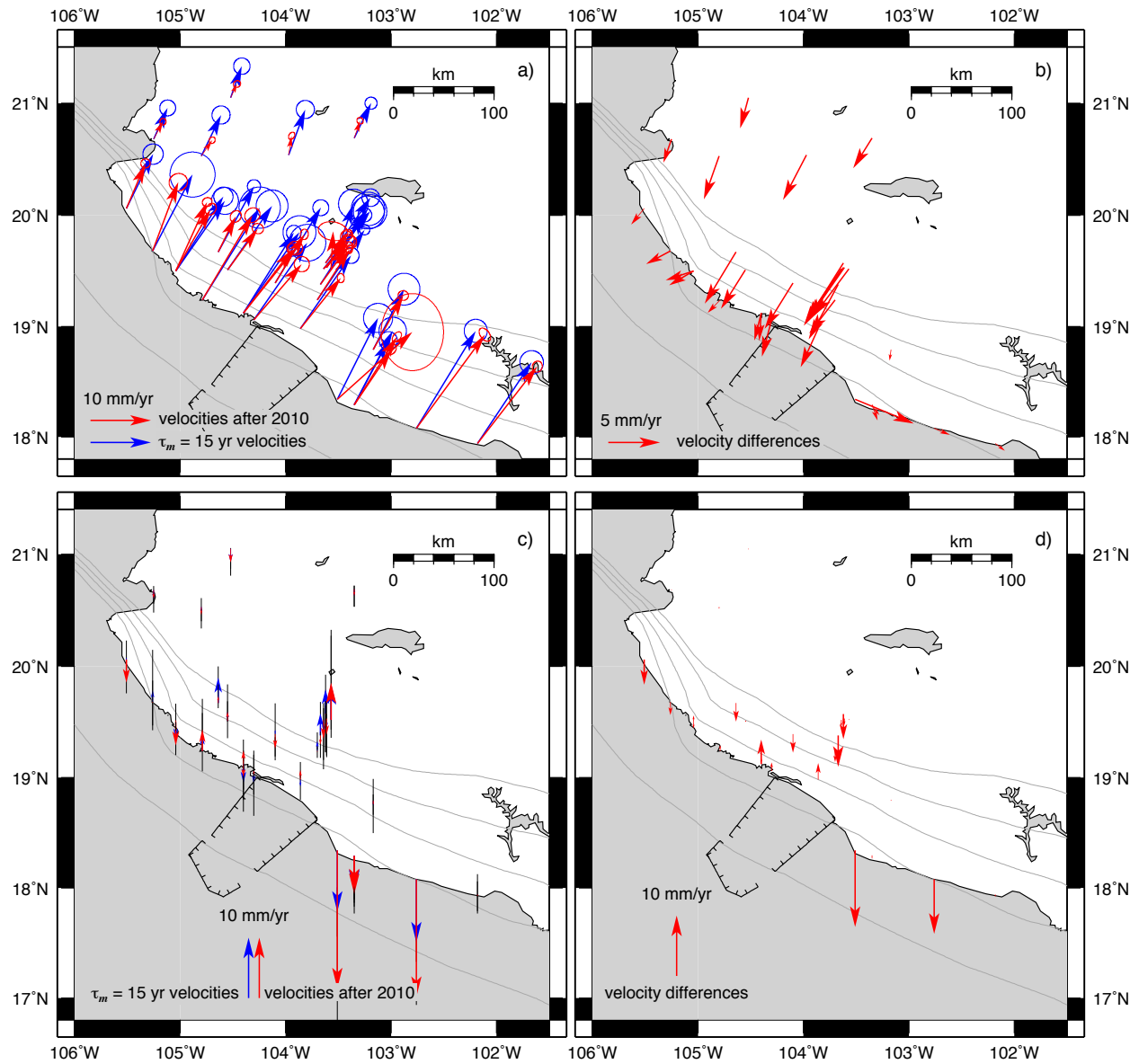


Figure S8. Panels a) and c) show a comparison between the best fitting GPS site velocities from the time-dependent inversion of GPS position time series that were corrected for viscoelastic effects of the 1995 Colima–Jalisco and 2003 Tecomán earthquakes using $\tau_m = 15$ years (blue arrows), and the velocities estimated as the best-fitting 3D slopes for each station with measurements after 2010 from the original daily station positions, corrected only for the steady movement of the North America plate (red arrows). Ellipses in a) represent 2D, 1- σ uncertainties of the horizontal velocities. Thin black lines in c) represent 1- σ uncertainties of the vertical velocities. Panels b) and d) show the difference of these velocities (horizontal and vertical, respectively) at each GPS site.