Figure ES I ; Perrin et al.

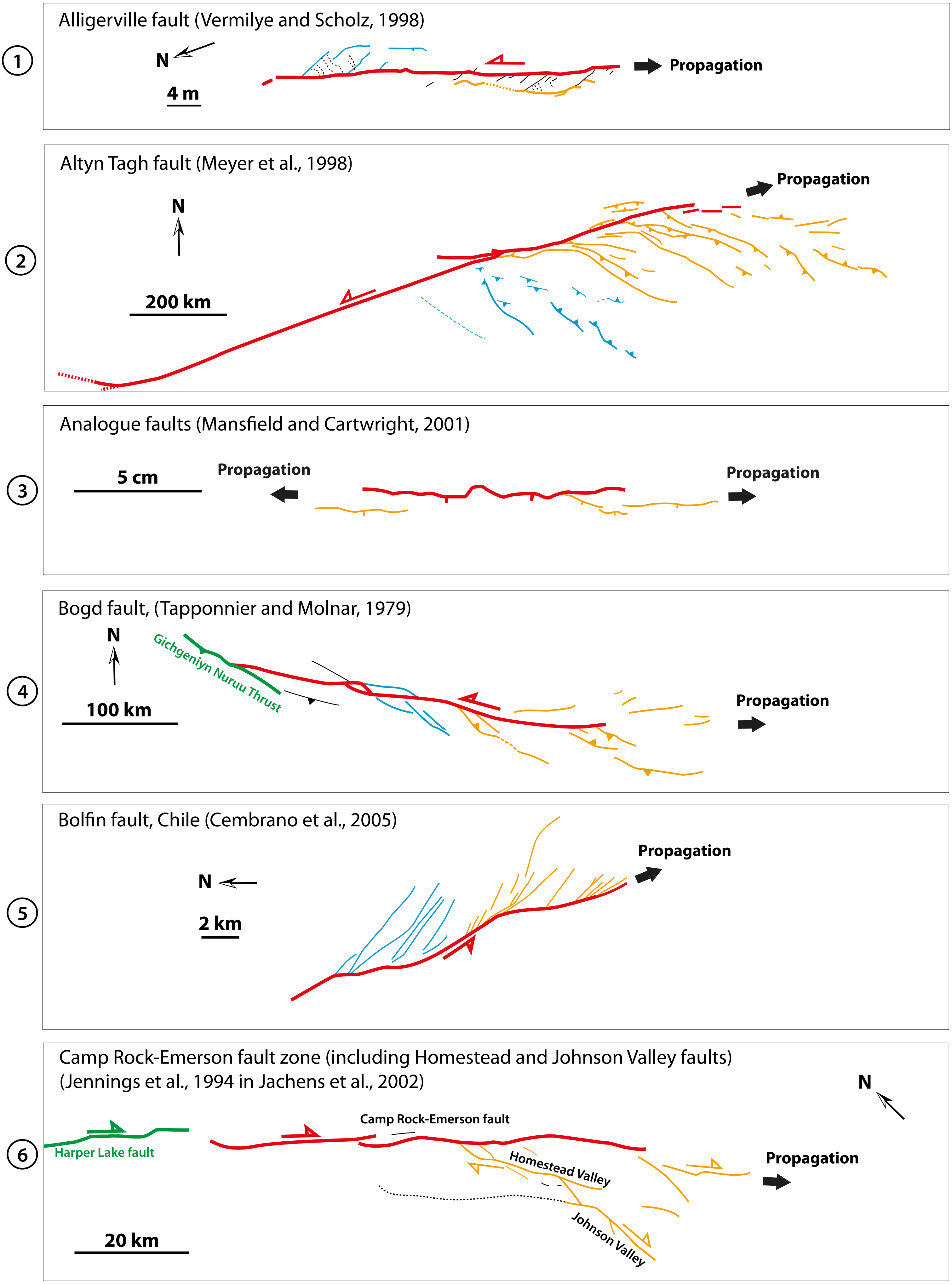
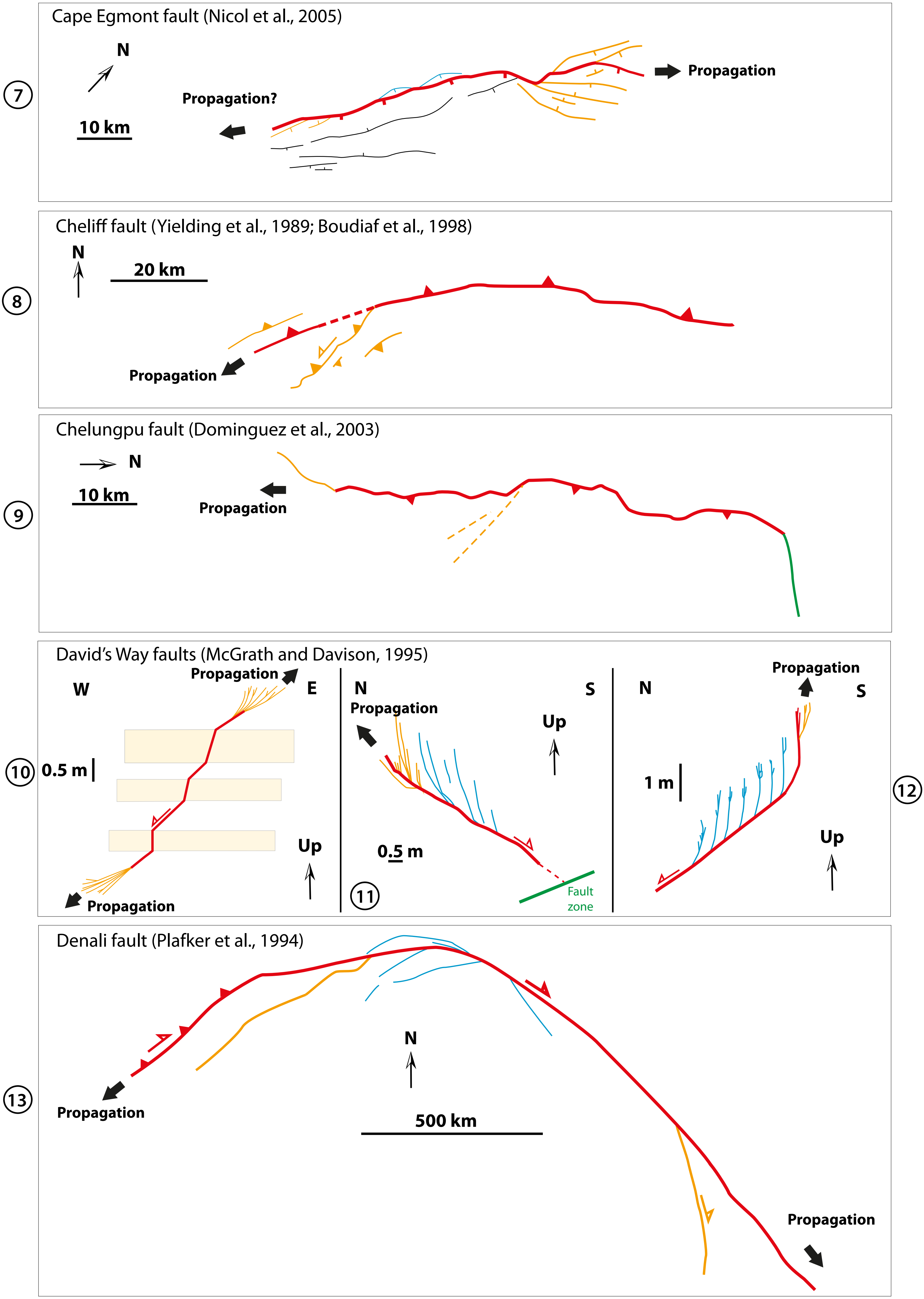


Figure ES I ; Perrin et al. (continued)



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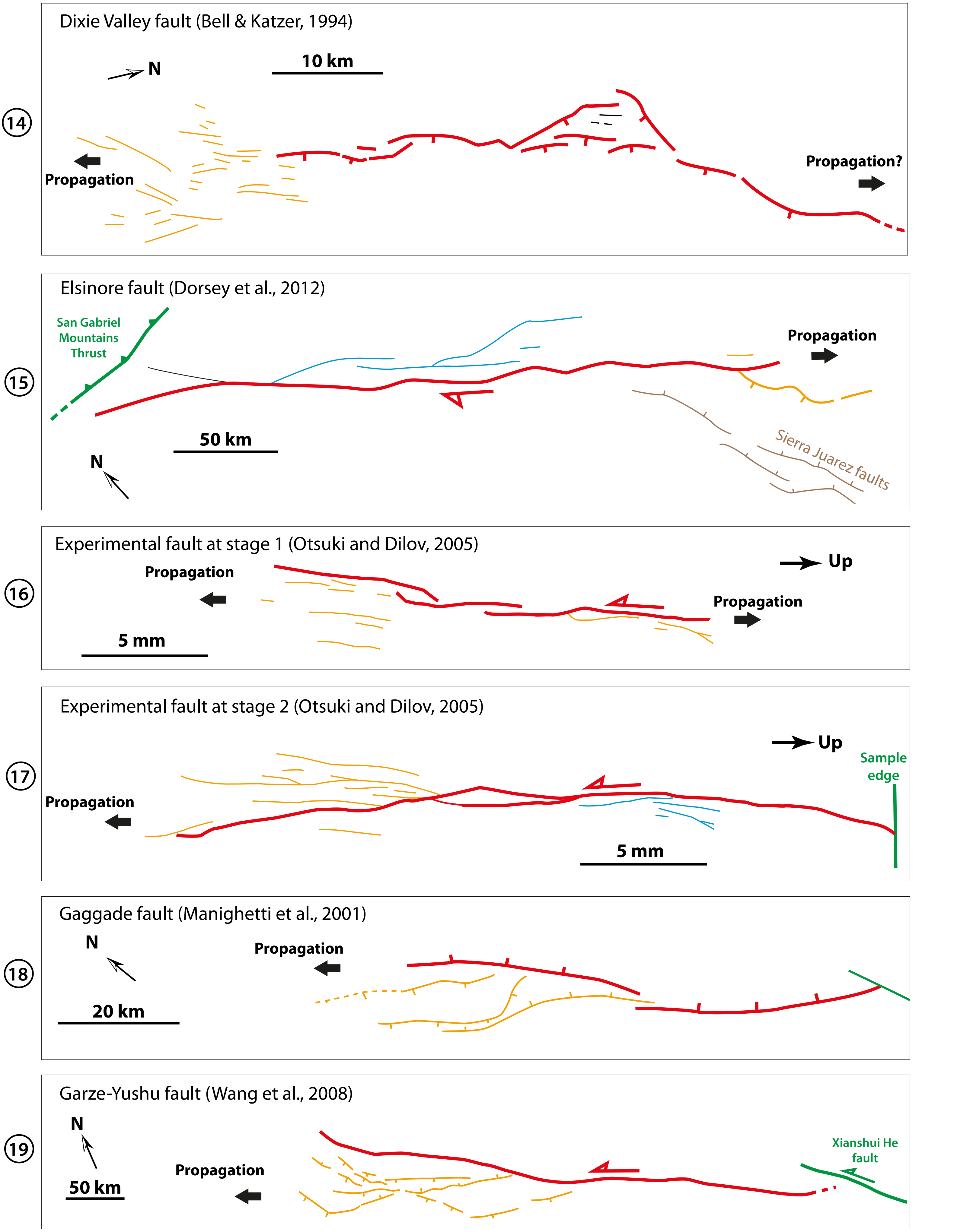

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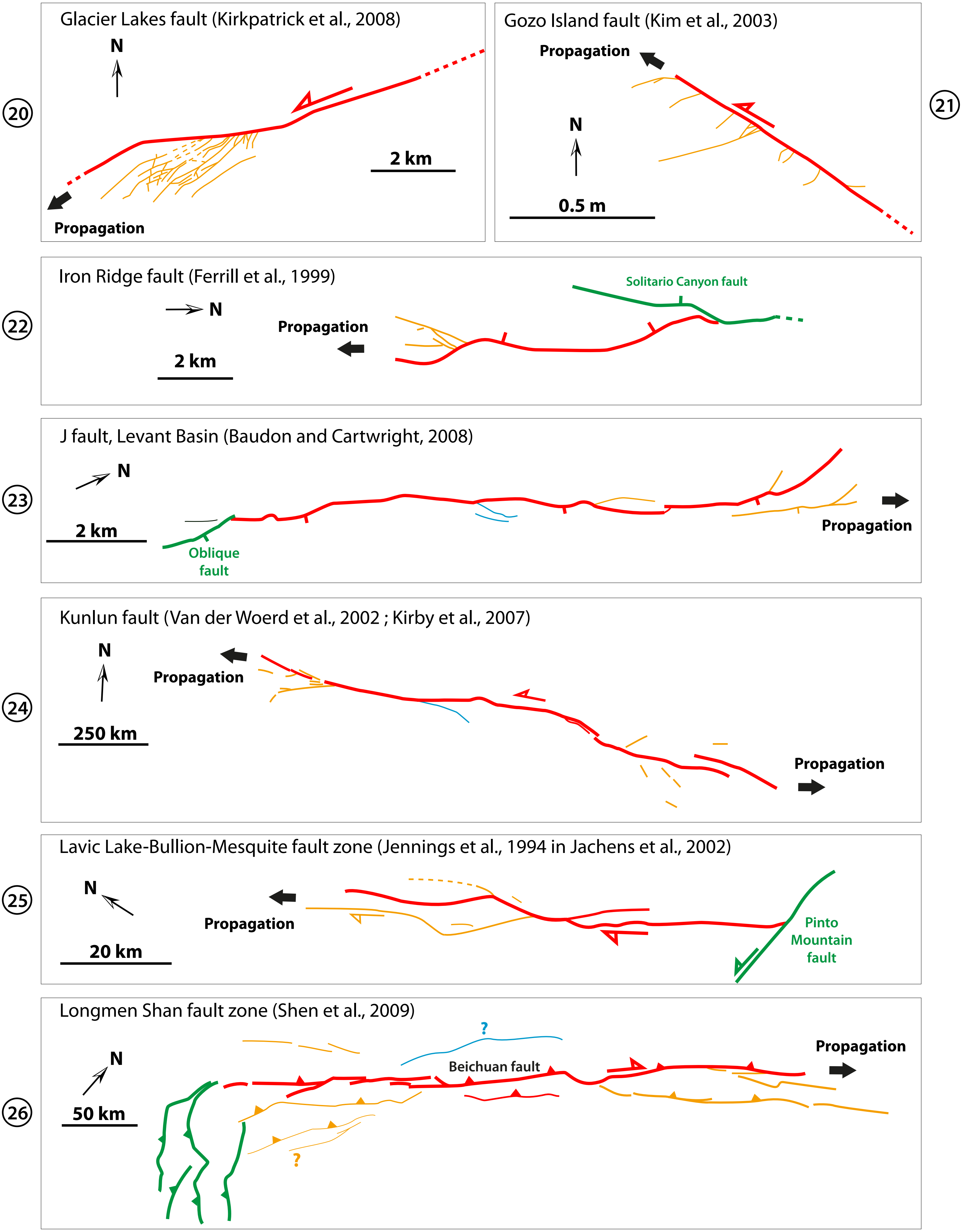

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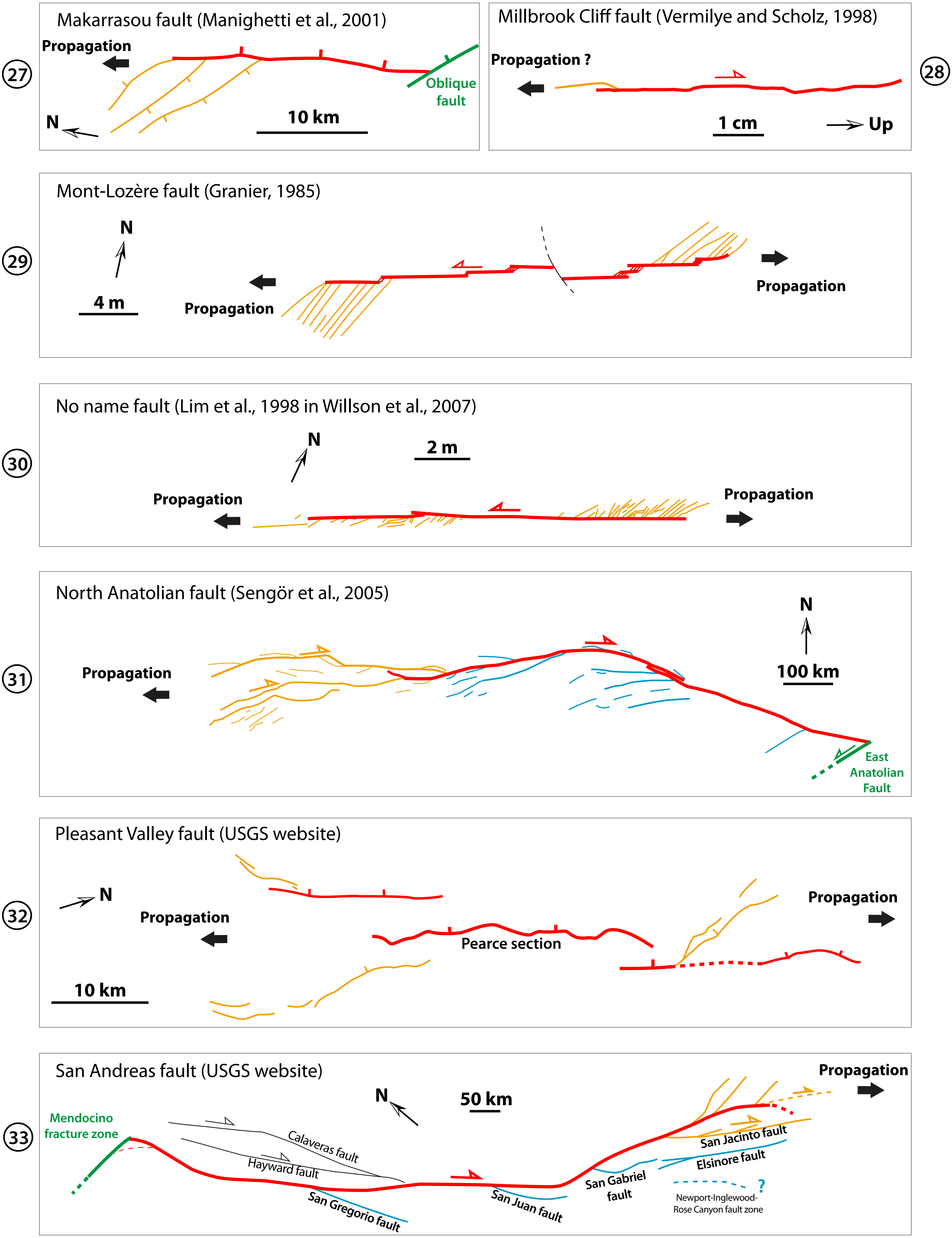

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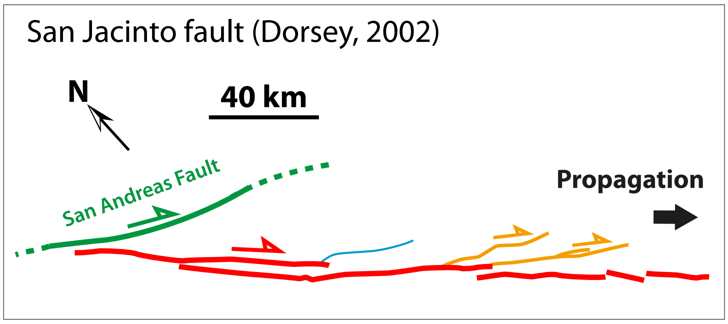

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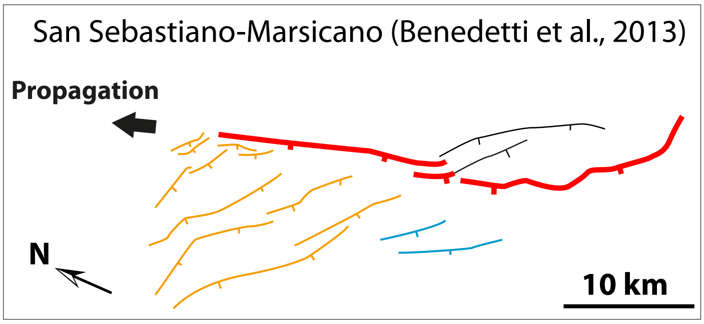

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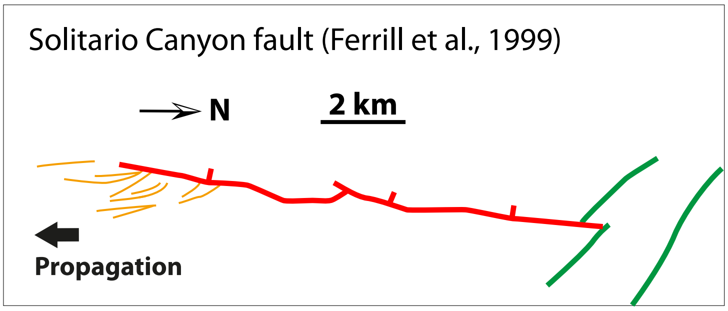

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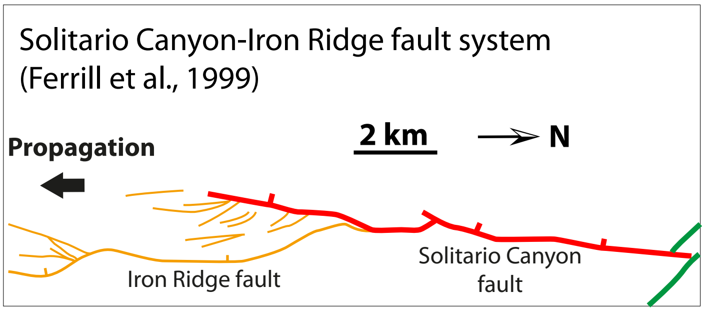

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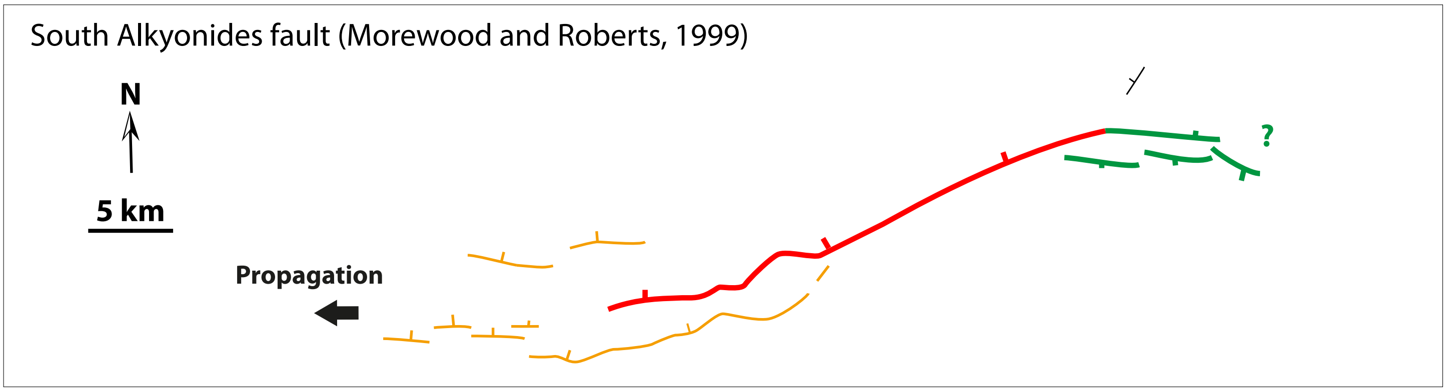

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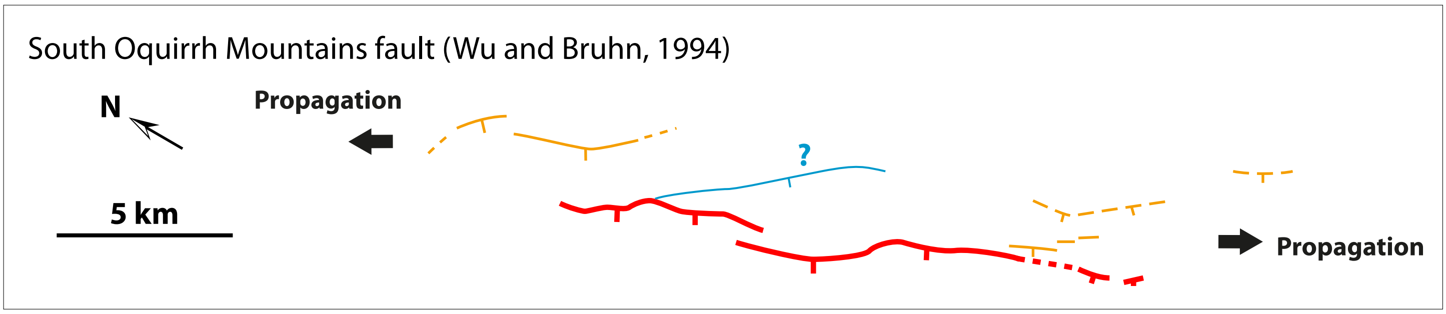

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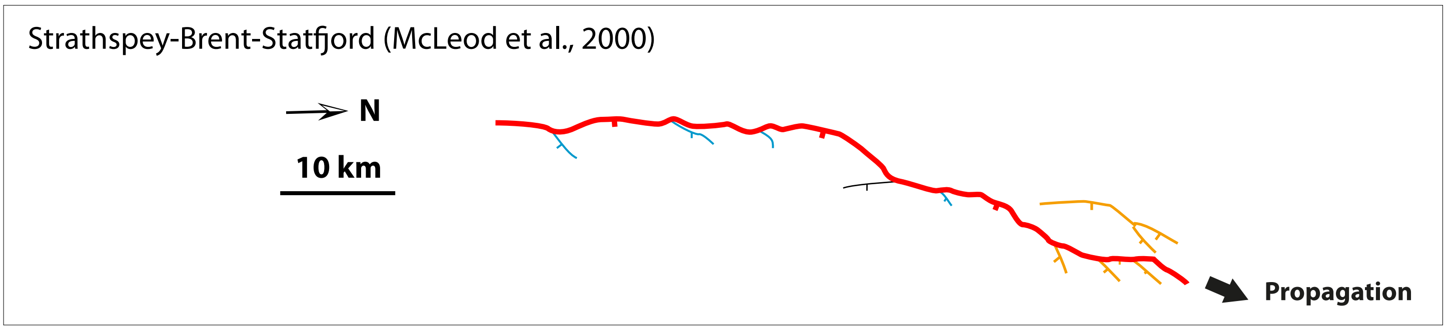

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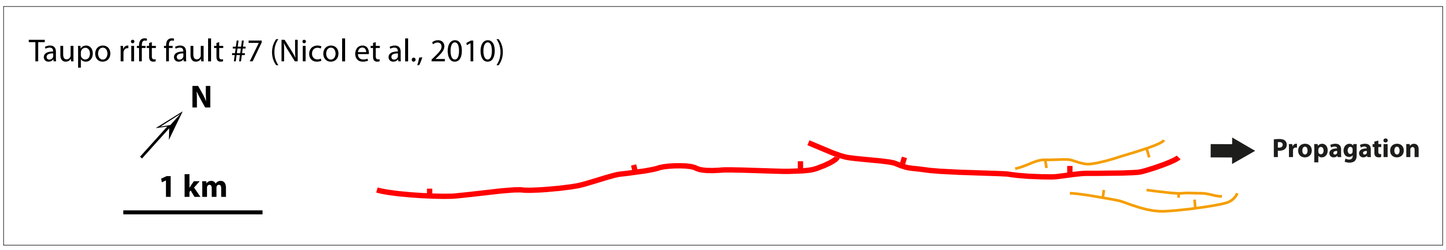

Figure ES I ; Perrin et al. (continued)

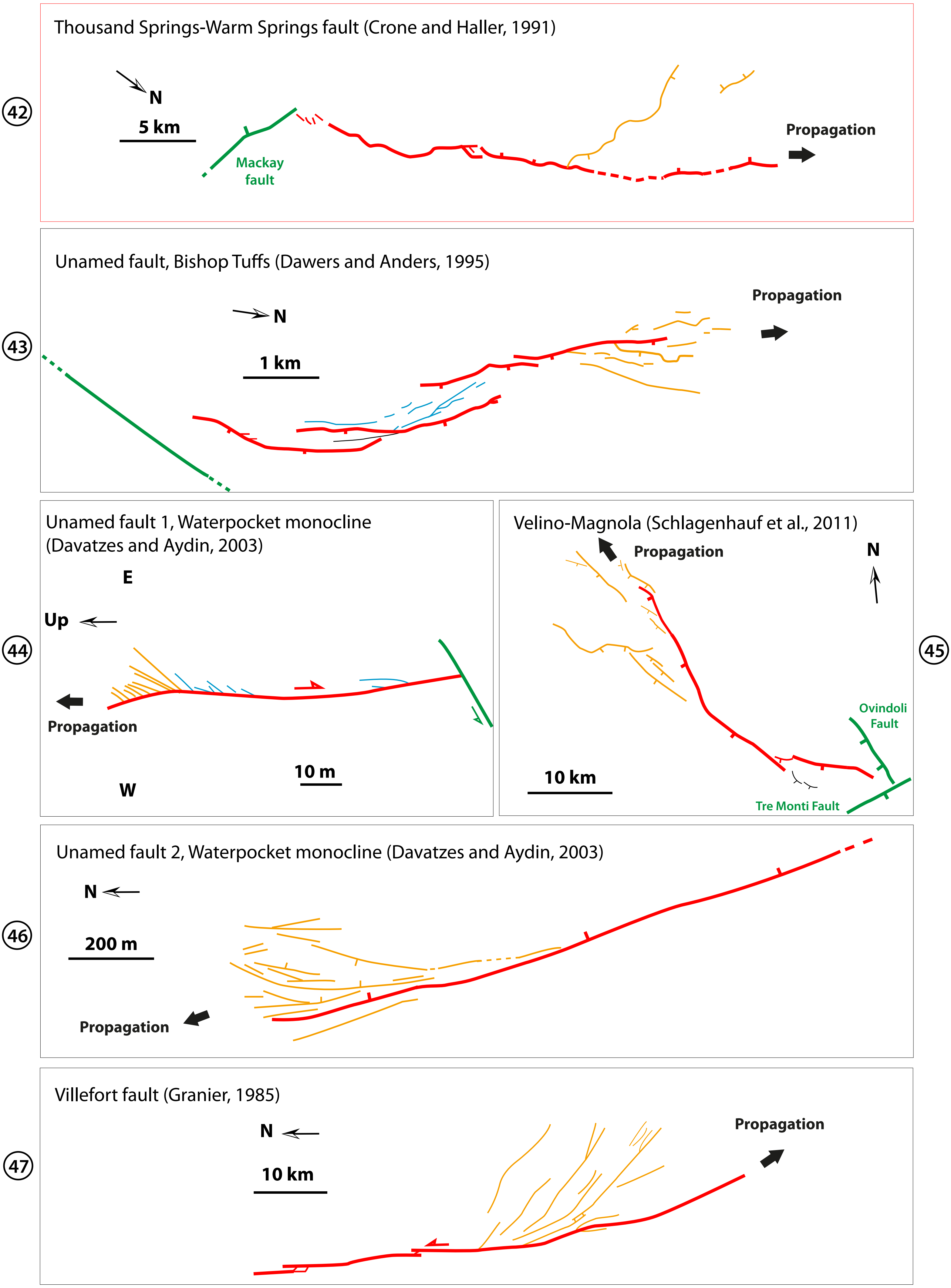

Figure ES I: All 47 fault maps analyzed in present study. The maps are redrawn from their original versions (references in Tables 1 and 2, where faults are numbered in a similar way) to discriminate the parent (in red) and the tip splay faults (in orange). The original maps are not modified except removing a few details of very small scales in rare cases, and adding information on nearby faults or features in a few cases. In blue are splay faults that likely formed in earlier stages of fault growth. In black are other secondary faults of unclear origin. In green are nearby faults or features. The direction of long-term propagation of the parent faults, as described in Table 1, is indicated with a black arrow. In graph 2, the western part of the Altyn Tagh fault is not shown. In graph 6, the NW part of the Johnson Valley fault is represented as a dotted line for it seems that only the southern part of the Johnson Valley fault behaves as an active splay of the Camp Rock-Emerson fault. In graph 15, the Sierra Juarez faults are related to the opening of the Gulf of California. Yet they seem to be reactived as tip splays of the Elsinore fault. In graph 33, we do not interpret the Calaveras and the Hayward faults as original splays of the San Andreas fault for they are much younger (a few Myrs) than the San Andreas fault. They might suggest that, in the last few Myrs, the northern section of the San Andreas fault (north of the creeping zone) has been attempting to expand, propagate and/or migrate northward, through the development of the Hayward and the Calaveras faults.

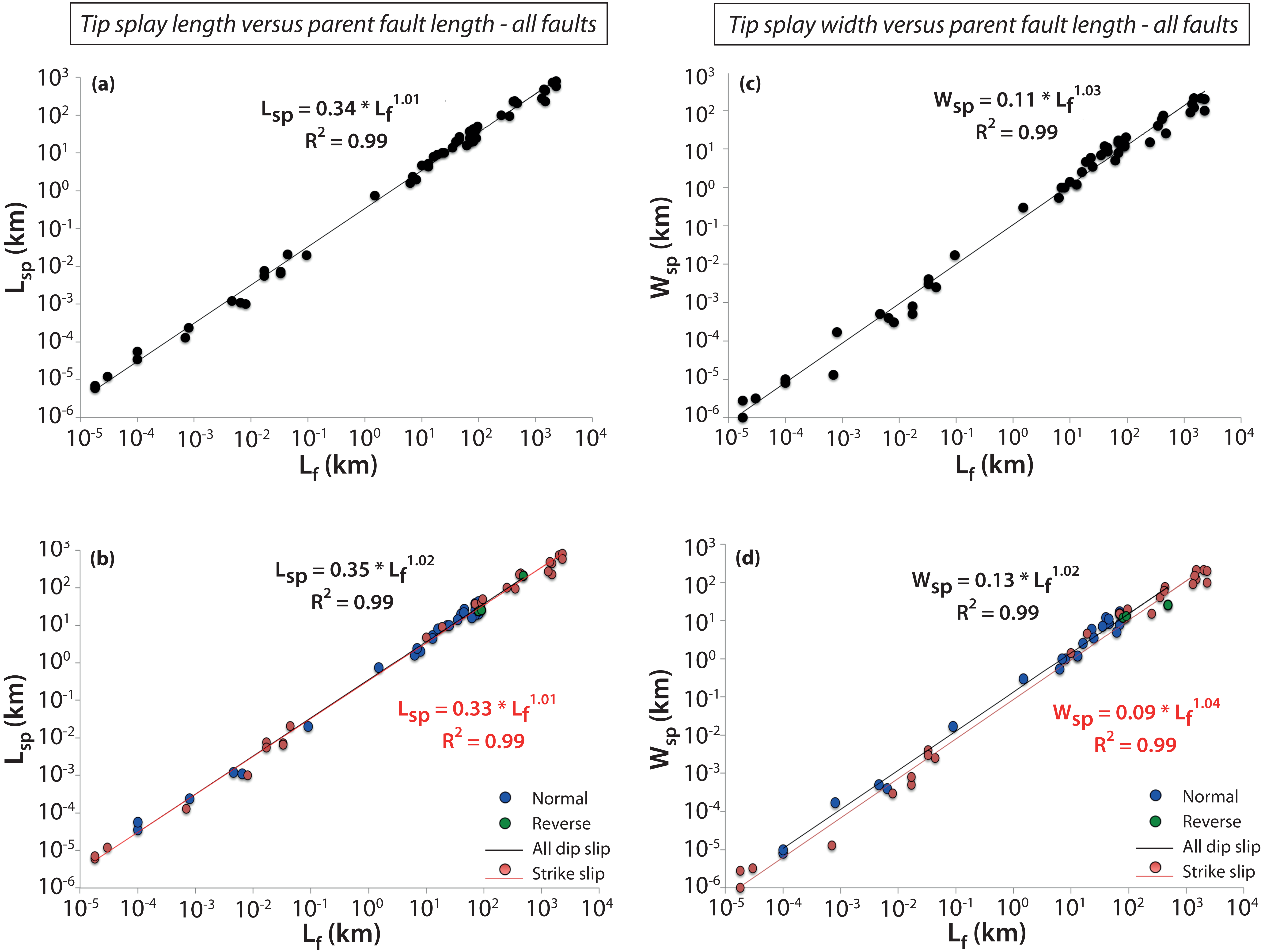

Figure ESII, Perrin et al.

Figure ESII : Scaling relations between parent fault length and tip splay length and width. The figure is similar to Fig. 3 and 4, but the regressions are here shown as power law functions. Lf is parent fault length, Lsp and Wsp are length and width of tip splay networks, respectively. (a) and (c) for entire fault population. (b) and (d) for entire fault population discriminated from fault slip mode (colored symbols). The black and red lines are best fitting power law regressions for dip slip and strike slip fault data, respectively, whose equations are indicated on the graphs. See Fig. ESIIIa-b for specific analysis of normal fault data.

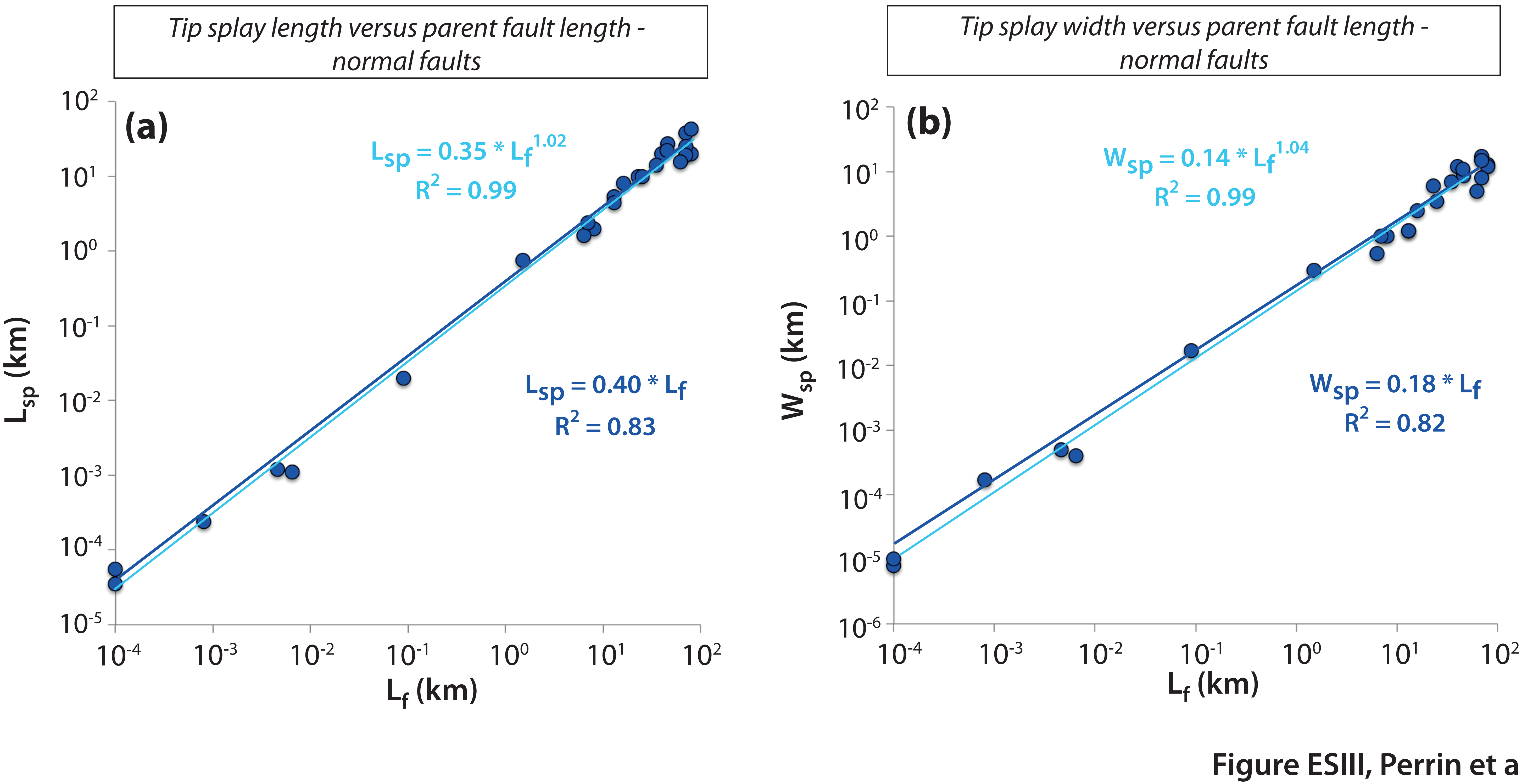

Figure ESIII: Scaling relations between parent fault length and tip splay length and width for normal faults only. (a) Length and (b) width of tip splay networks as a function of parent fault length. Light and dark blue lines show best fitting power law and linear regressions, respectively.

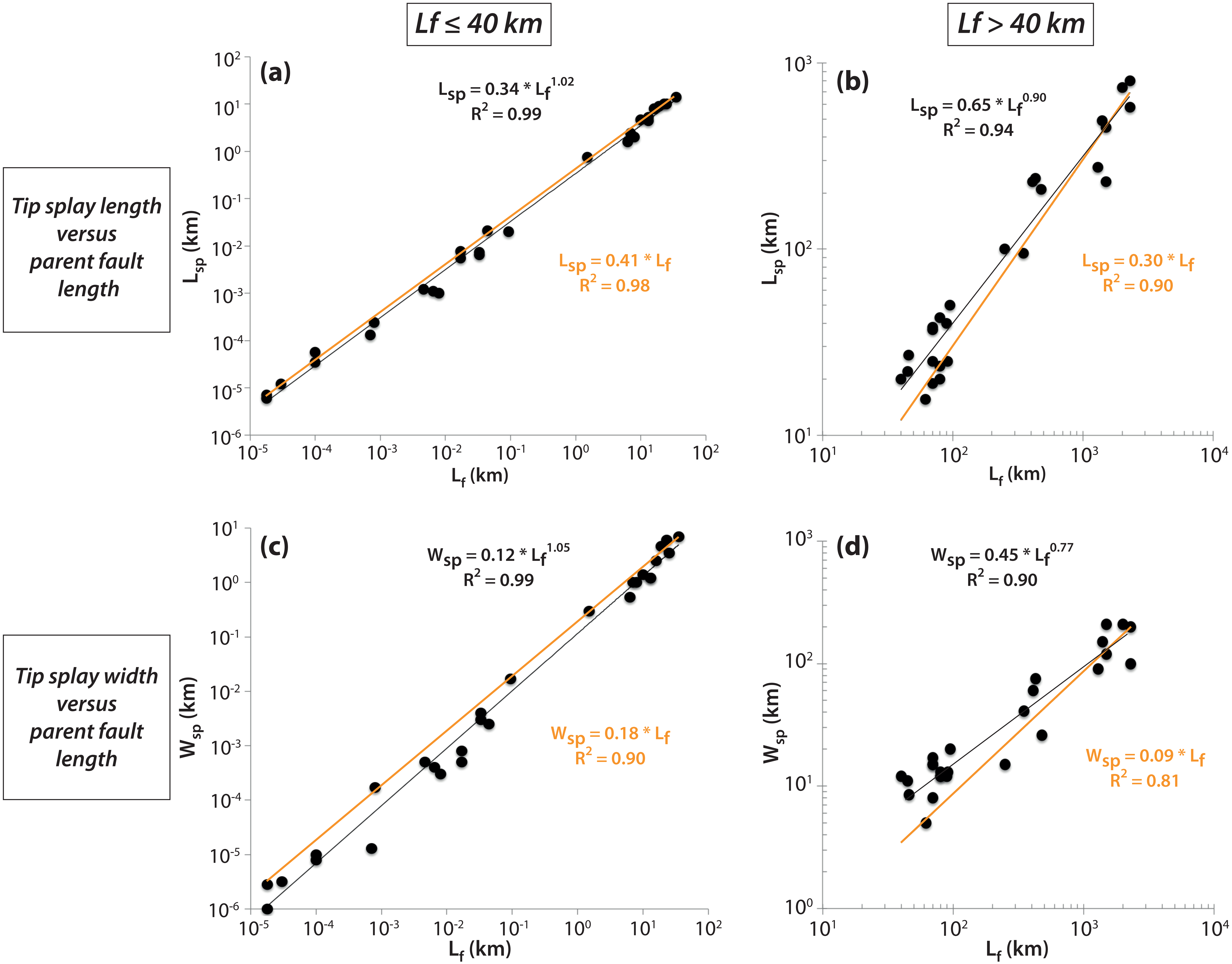

Figure ESIV, Perrin et al.

Figure ESIV: Scaling relations between parent fault length and tip splay length and width, for parent faults shorter (a and c) and longer (b and d) than twice an average seismogenic thickness. The graphs are done as before, and both linear and power law best fitting regressions are shown.

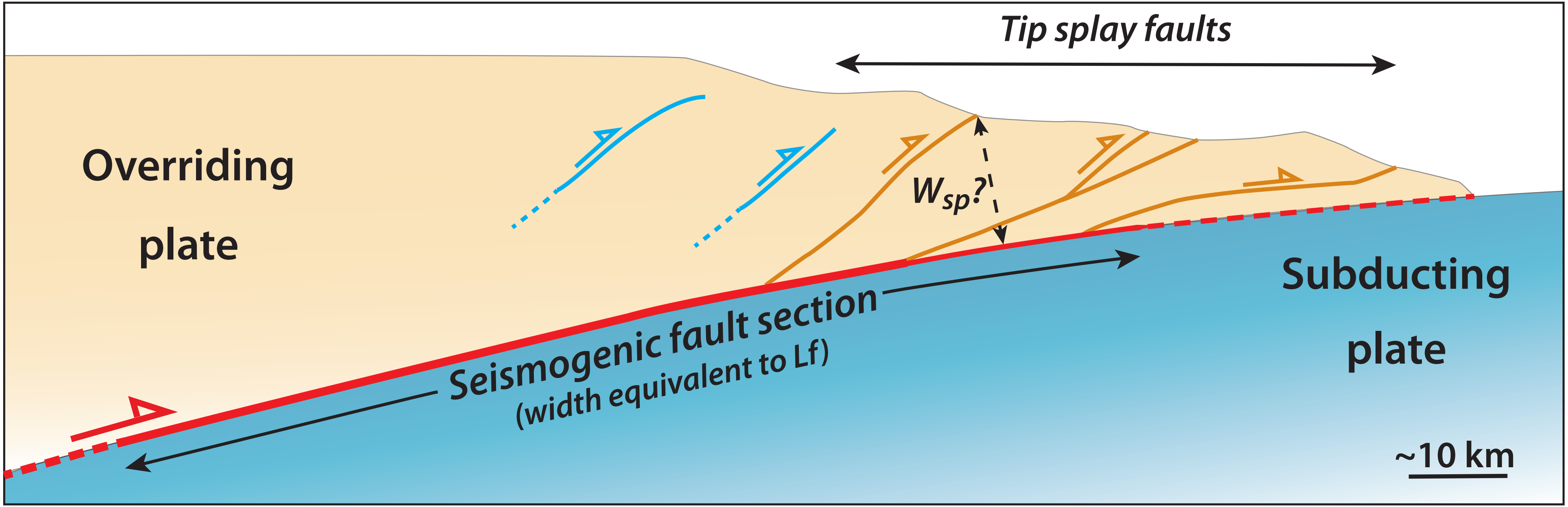

Figure ESV, Perrin et al.

Figure ES V: Sketch of a subduction fault in cross-section. Splay faults are commonly observed to branch off the plate interface and to cut through the accretionary wedge. We suggest that these splays might be tip splays developed at the upper tip of the seismogenic fault section (note that coseismic slip profiles along rupture width also have a generic triangular shape, generally tapering upward, e.g., Manighetti et al., 2005). The length and width of the tip splay networks might scale with the width of the seismogenic section, in similar proportions as those observed in present study for continental faults (graph not at scale).