

Kinematics of lithospheric plate boundaries

**(excerpts from chapter 13 of the
draft kinematics primer)**

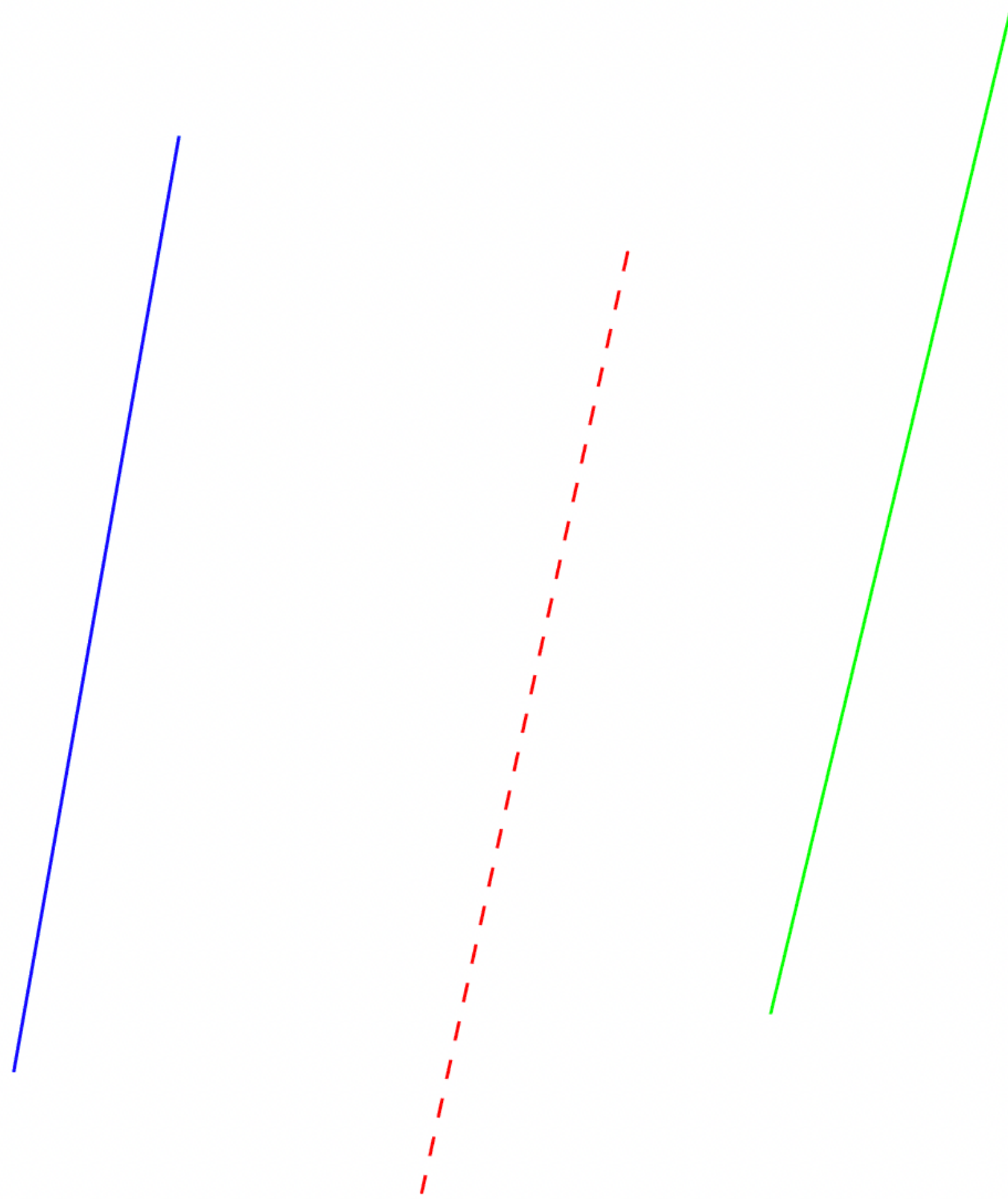


Figure 13-1. Simple model rift axes after 0.5 Myr of model displacement. The blue line is the displaced initial rift on the Pacific plate, the green line is the displaced rift line on the Cocos plate, and the position of the rift at model time = 0 is the red dashed line. All are shown in the polar reference frame.

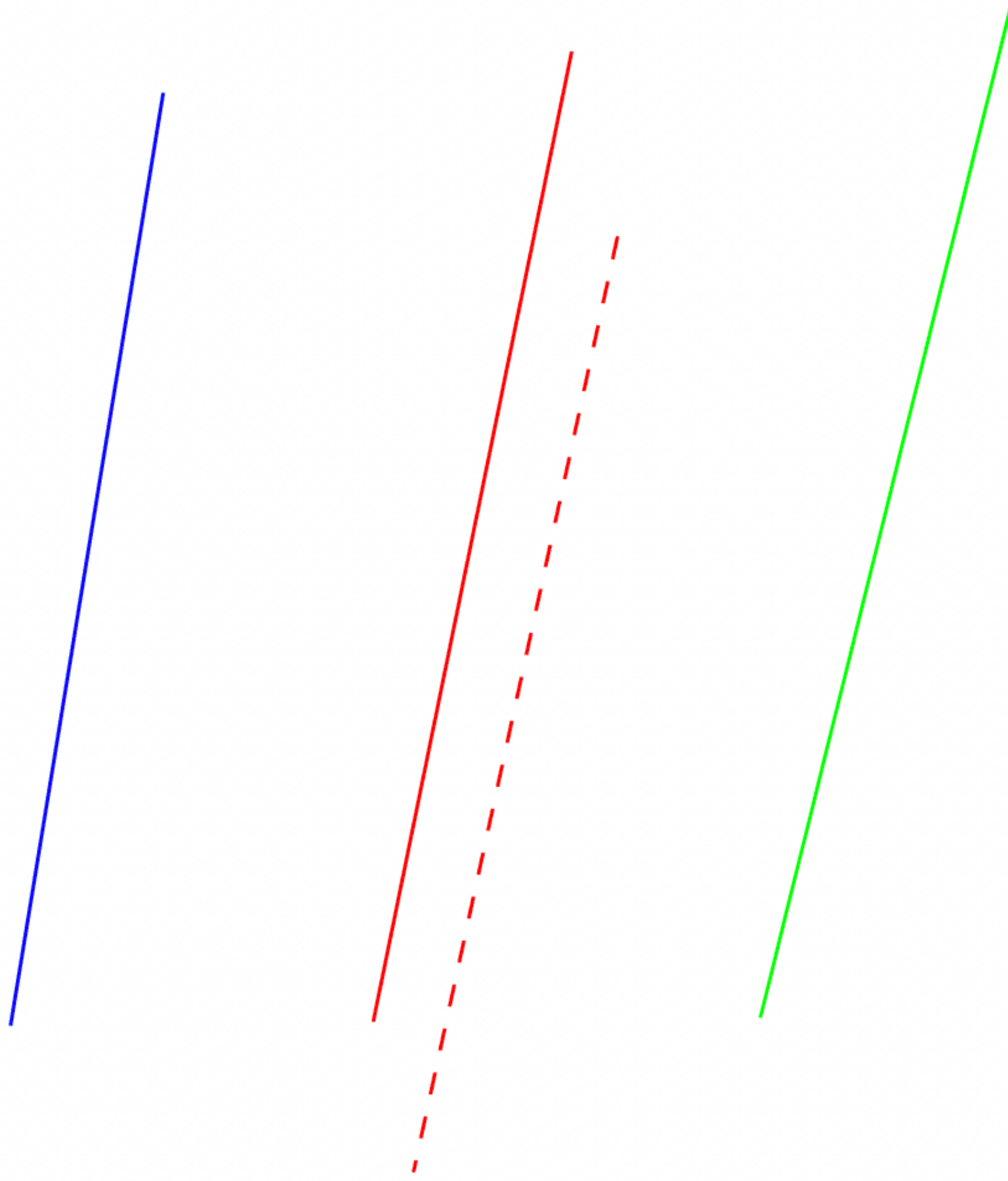


Figure 13-2. Simple model rift axes as in Figure 13-1, but with the rift axis at model time 0.5 Myr added (solid red line). Shown in the polar reference frame.

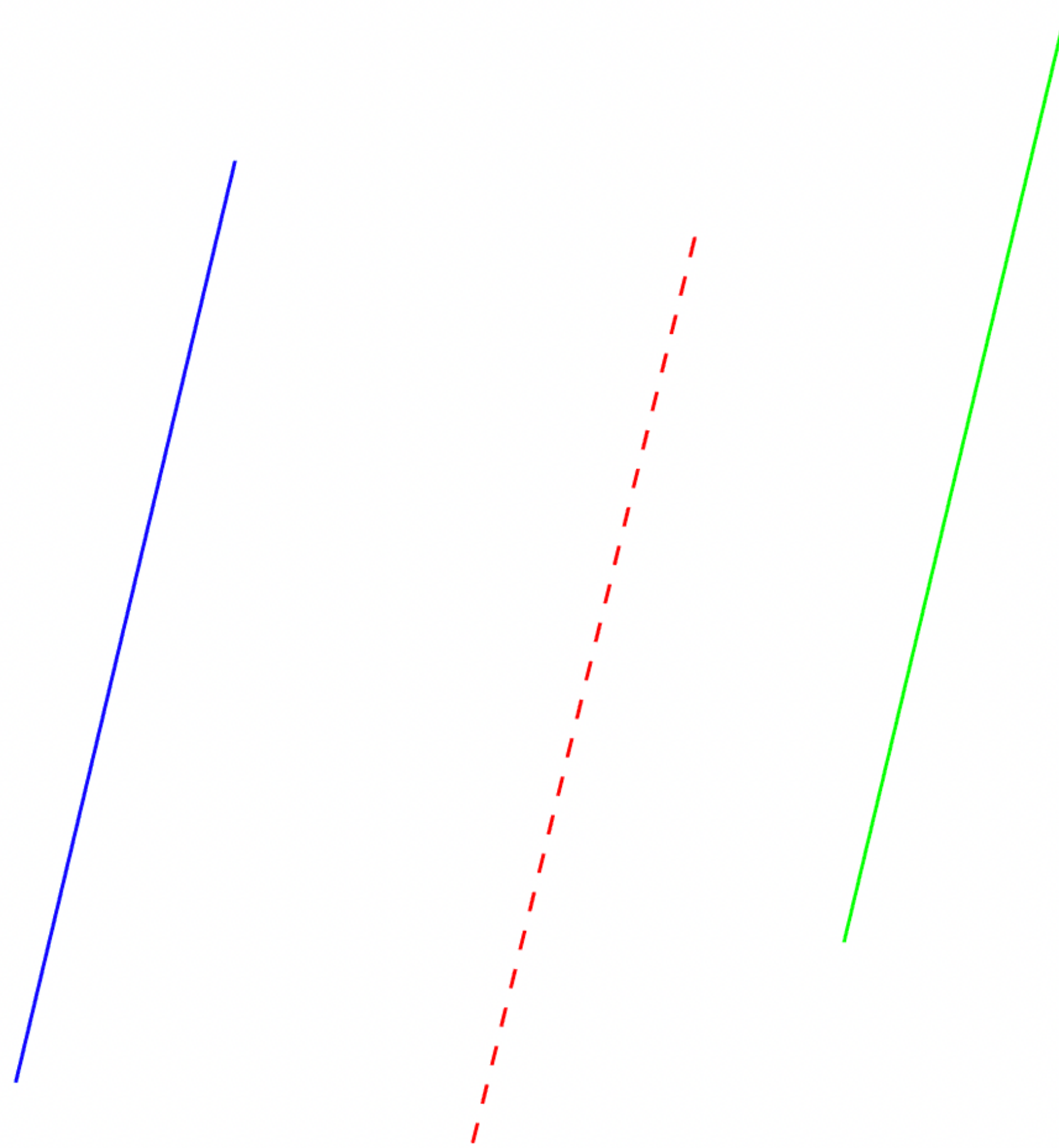


Figure 13-3. Simple model rift axes after 0.5 Myr of model displacement. The blue line is the displaced initial rift on the Pacific plate, the green line is the displaced rift line on the Cocos plate, and the position of the rift at model time = 0 is the red dashed line. All are shown relative to the Pacific plate.

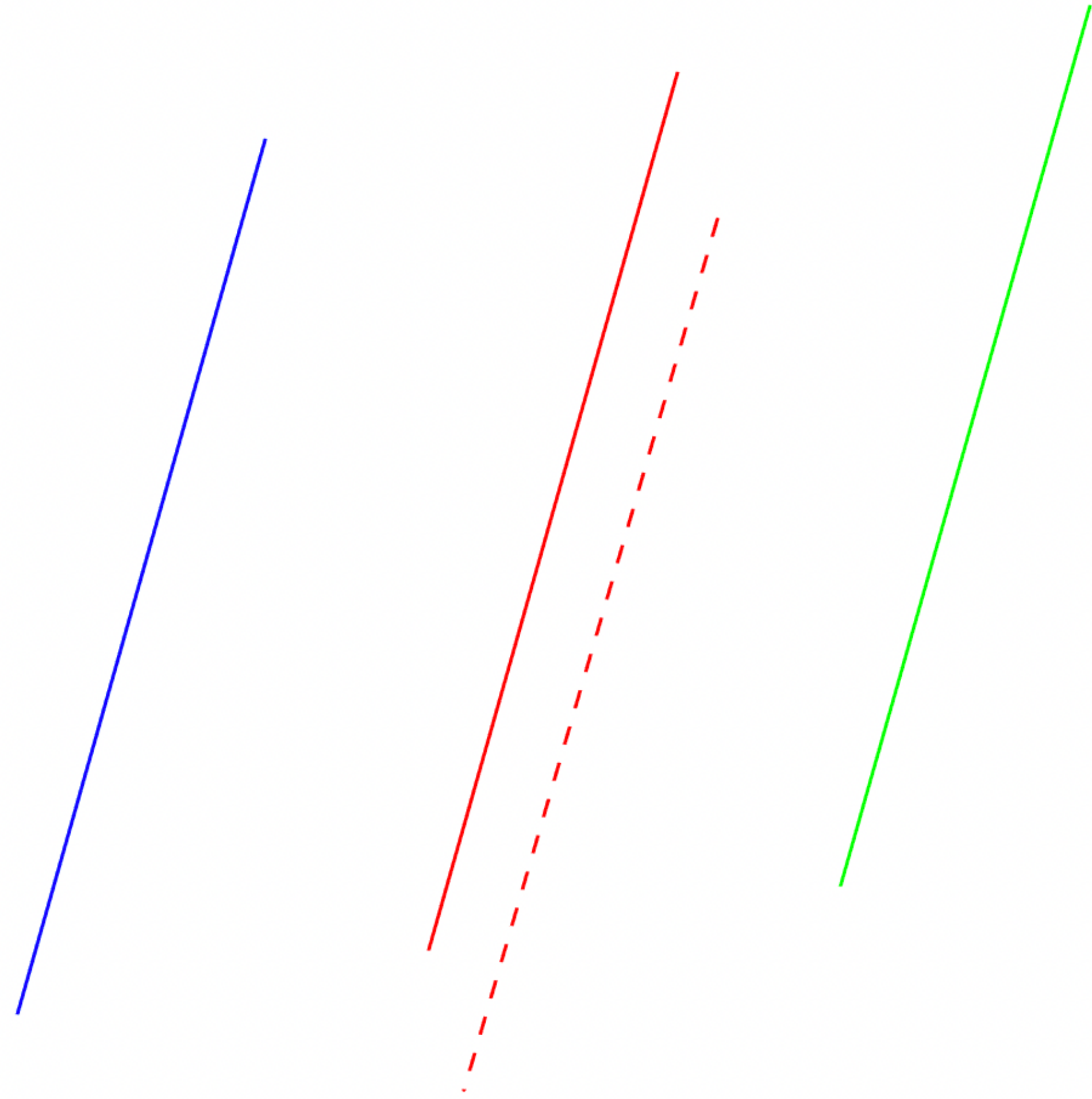


Figure 13-4. Simple model rift axes as in Figure 13-3, but with the rift axis at model time 0.5 Myr added (solid red line). Shown in a reference frame fixed to the Pacific plate.

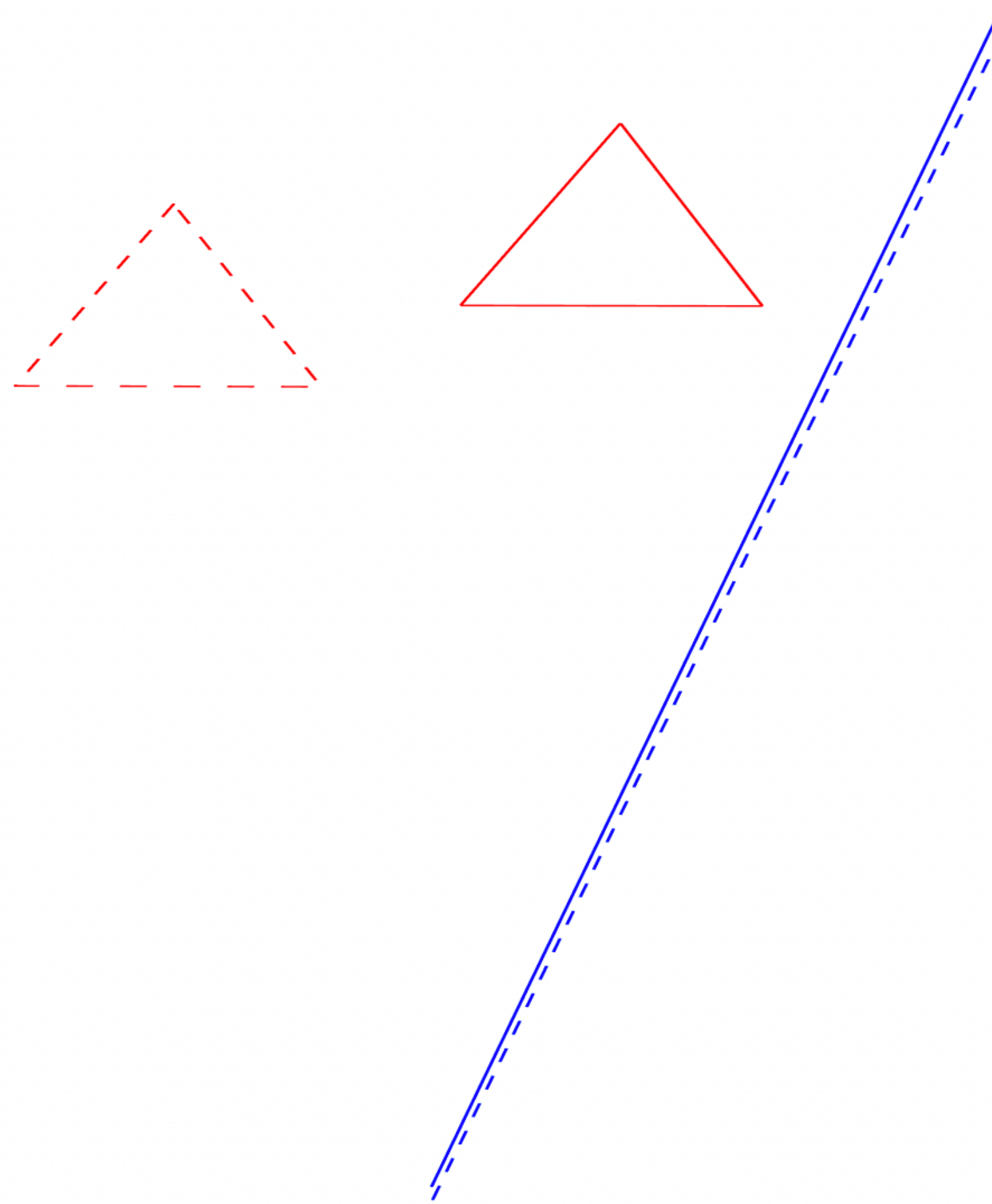


Figure 13-5. Initial position of an arbitrary triangle on the Nazca plate (dashed red triangle) and the leading edge of the South American plate (dashed blue line), and subsequent positions (solid lines) after 1 Myr of displacement viewed in the polar reference frame. The base of the dashed triangle is along latitude 27.5 S, and is approximately 50 km long.

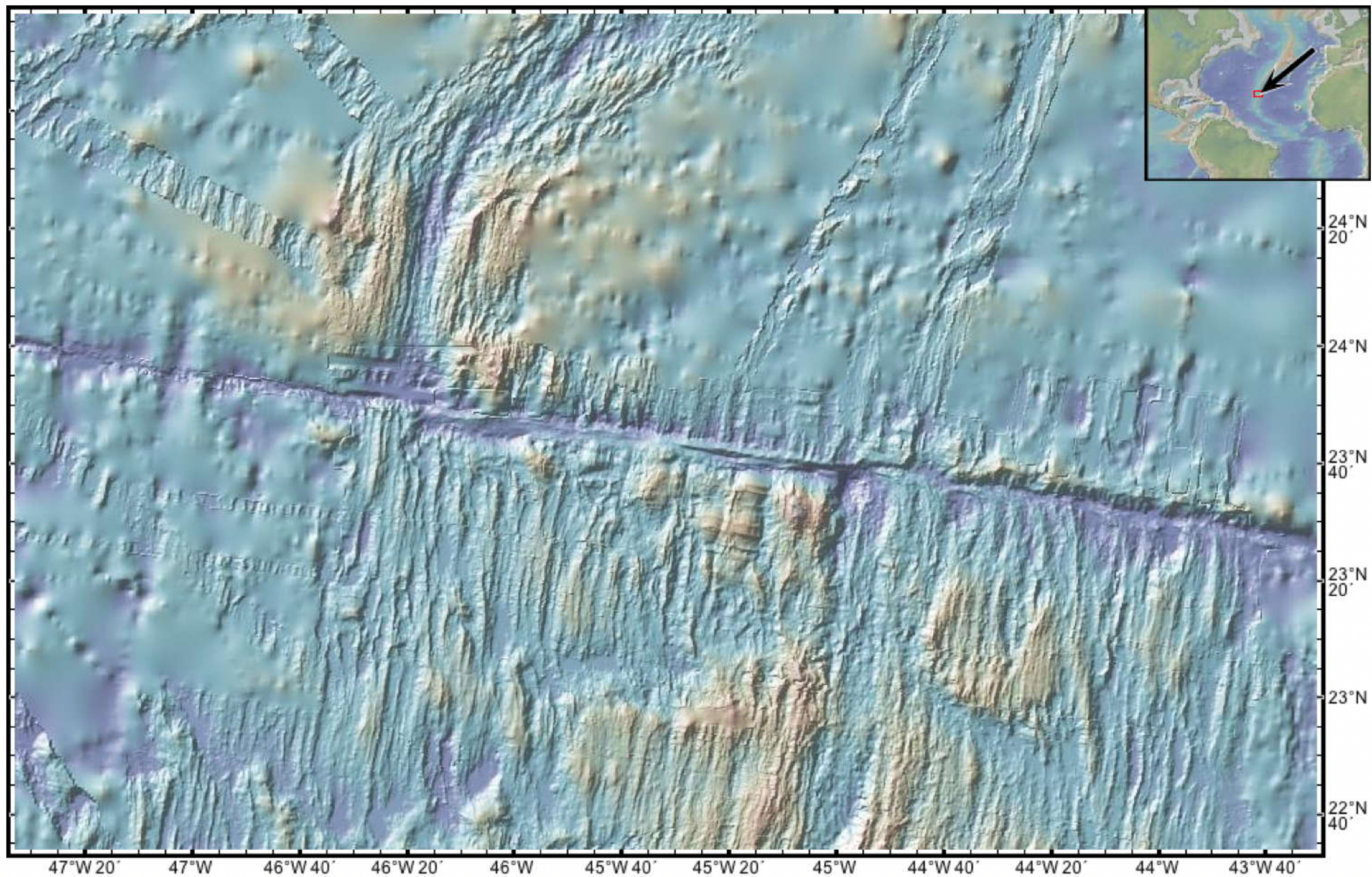


Figure 13-6. Bathymetric hillshade map in the area of the Kane fault (between longitudes $\sim 45^\circ\text{W}$ and $\sim 46^\circ 20'\text{W}$) in the North Atlantic Ocean Basin (see inset map) derived from multibeam seismic surveys and satellite data. The North American plate is to the west (left) and the Nubian plate is to the east (right). From GeoMapAp.

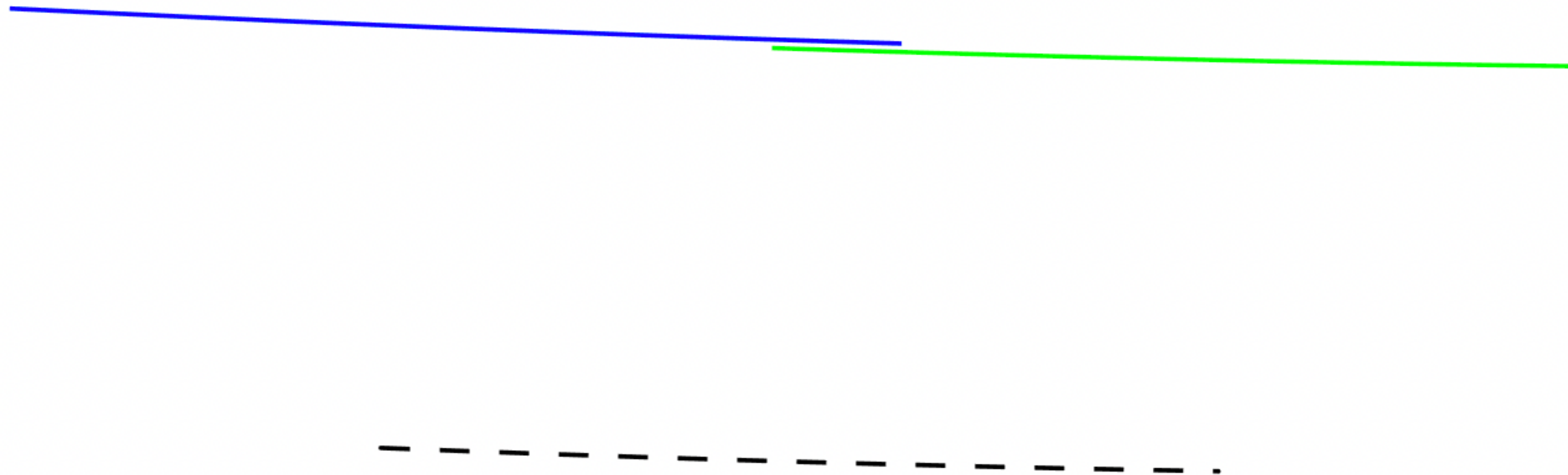


Figure 13-7. North American (blue) and Nubian (green) sides of the synthetic Kane fault after displacement of 85% of the fault's total length, as observed in the polar reference frame. The dashed line is the initial position of the synthetic Kane fault before displacement.

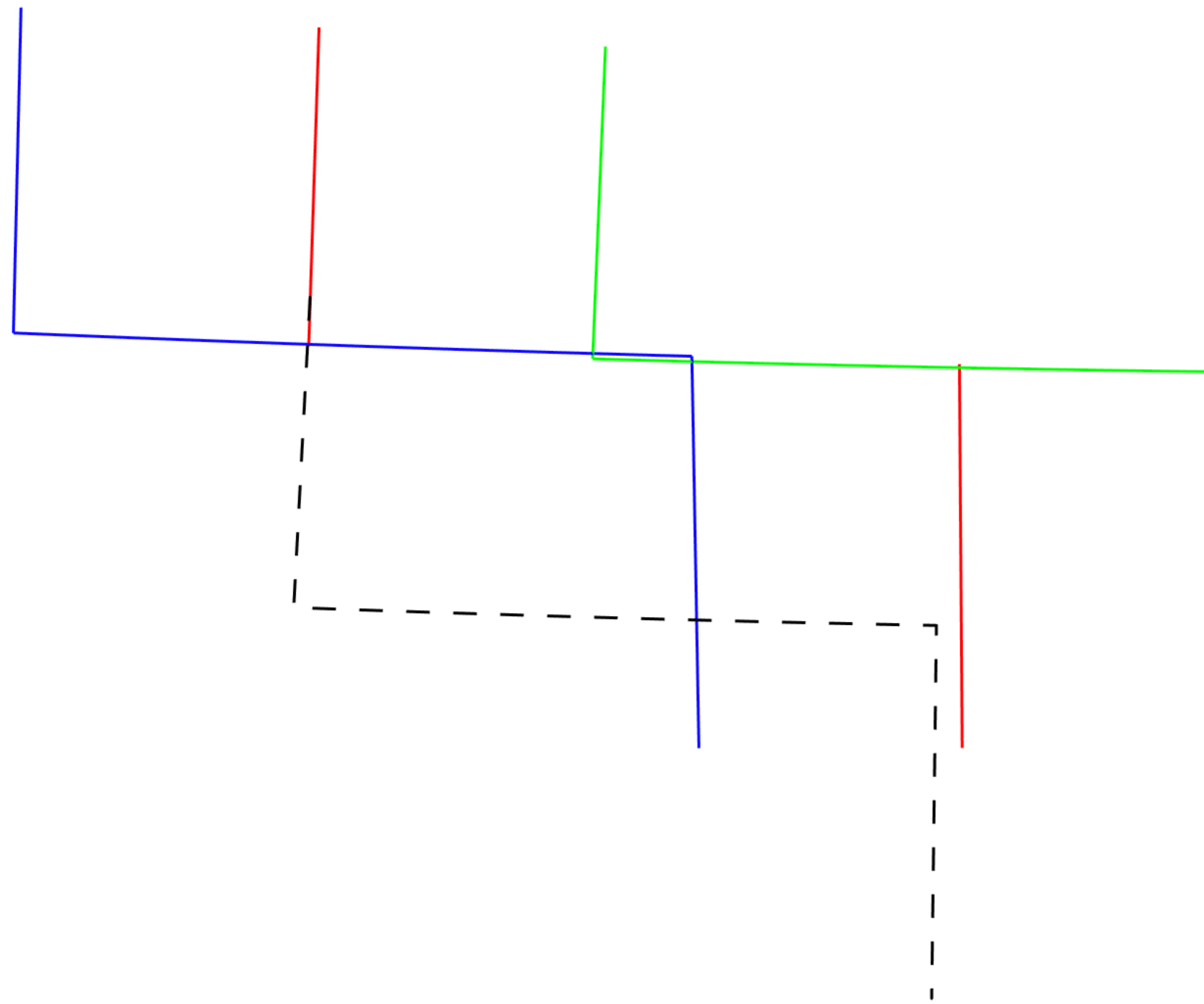


Figure 13-8. North American (blue) and Nubian (green) sides of the synthetic Kane fault and adjoining ridges after displacement of 85% of the fault's total length, as observed in the polar reference frame. The red lines are the locations of the ridge axes at the end of the modeled displacement. The dashed line is the initial position of the ridge-transform-ridge system before displacement.

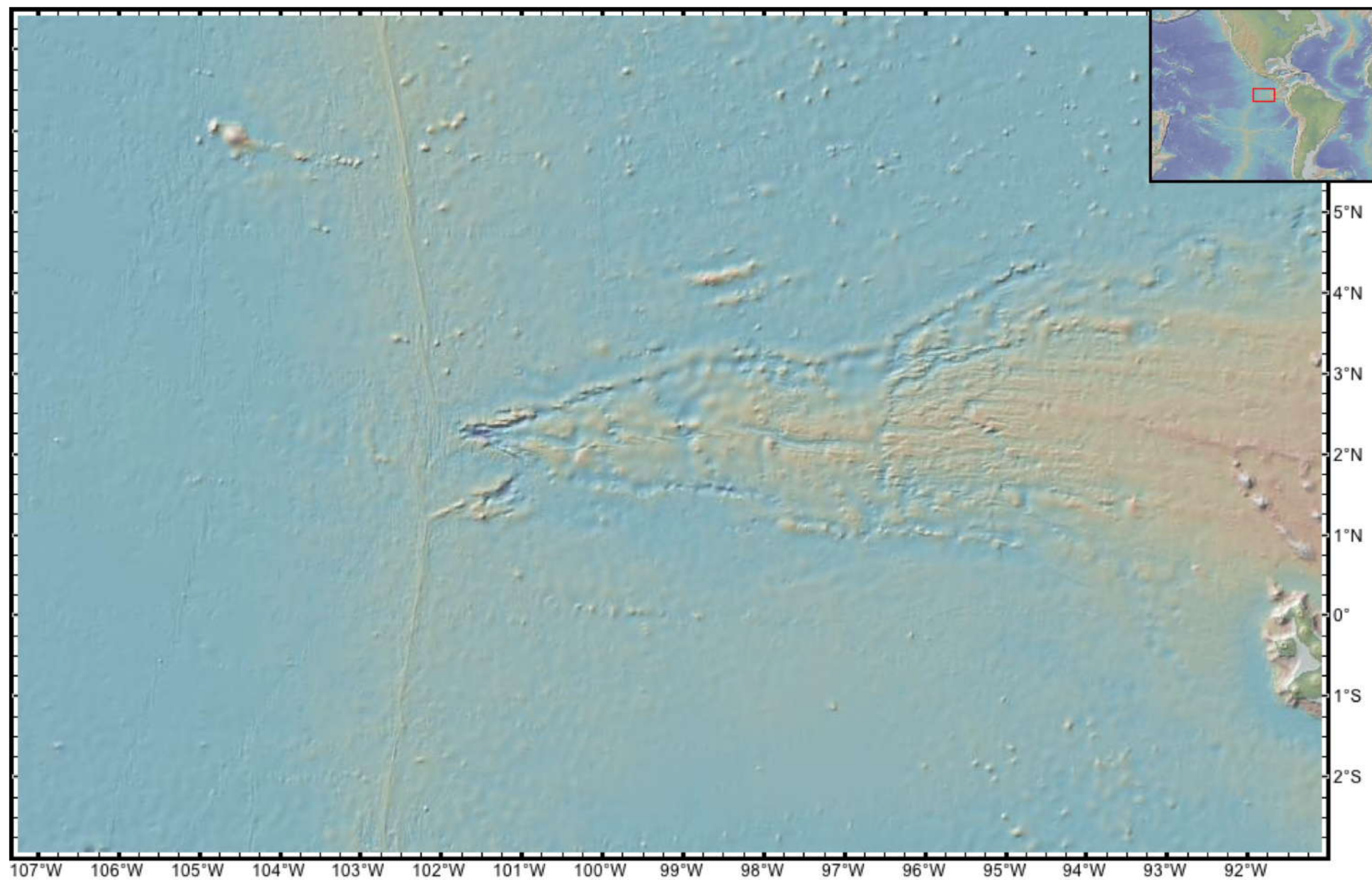


Figure 13-9. Bathymetric hillshade map in the area of the Galapagos triple junction in the east-central Pacific Ocean Basin (see inset map) derived from multibeam seismic surveys and satellite data. The Pacific plate is to the west (left), the Cocos plate is to the northeast (upper right) and the Nazca plate is to the southeast (lower right). From GeoMapAp.

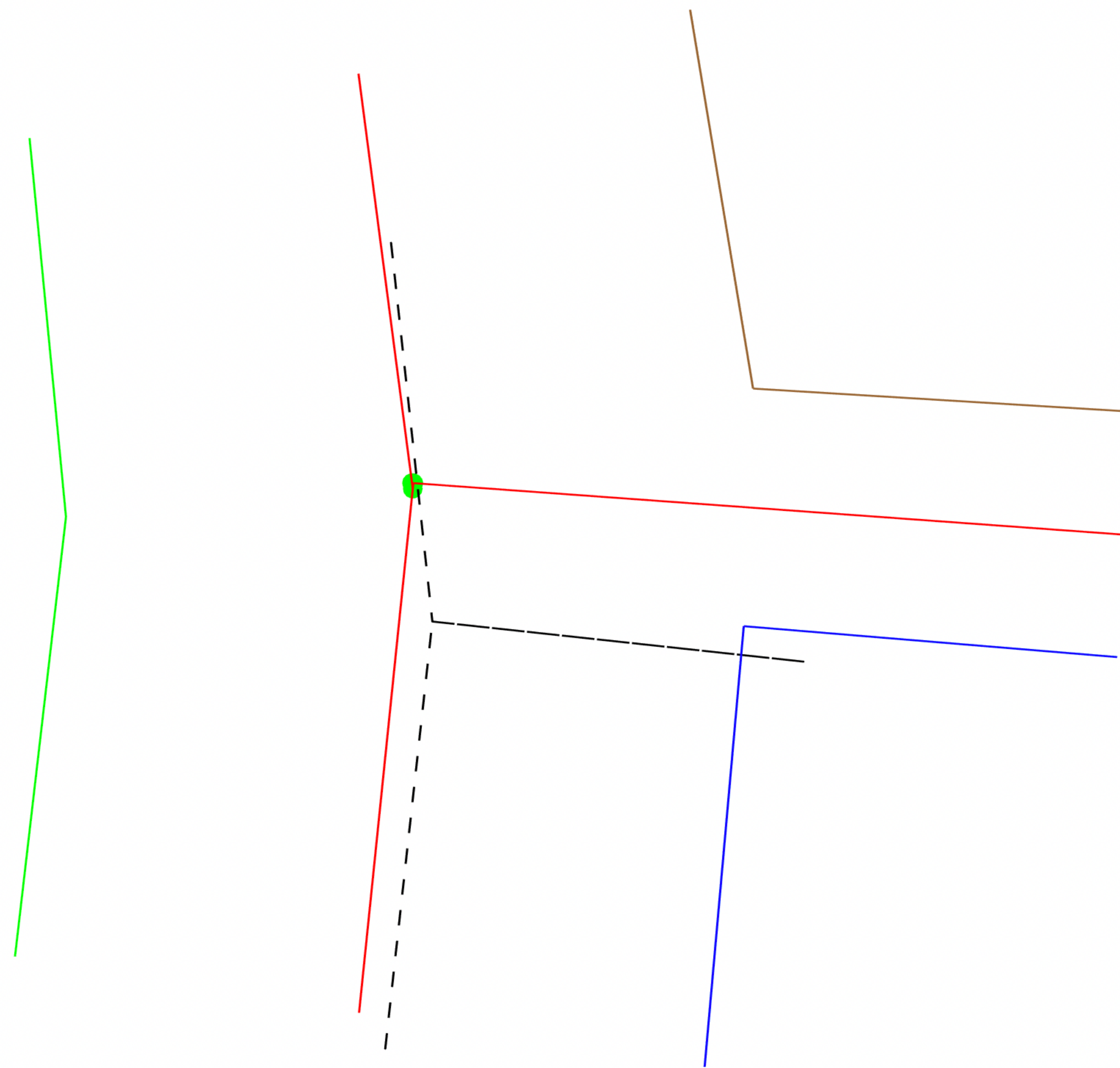


Figure 13-10. Synthetic ridge-ridge-ridge triple junction between the Pacific (green), Cocos (brown) and Nazca (blue) plates after model displacement of 3 million years. The initial position of the triple junction is indicated by the dashed lines. Green dots indicate the apices of the 2-segment polylines that represent the final position of the boundary for each plate. Depicted in the polar reference frame.

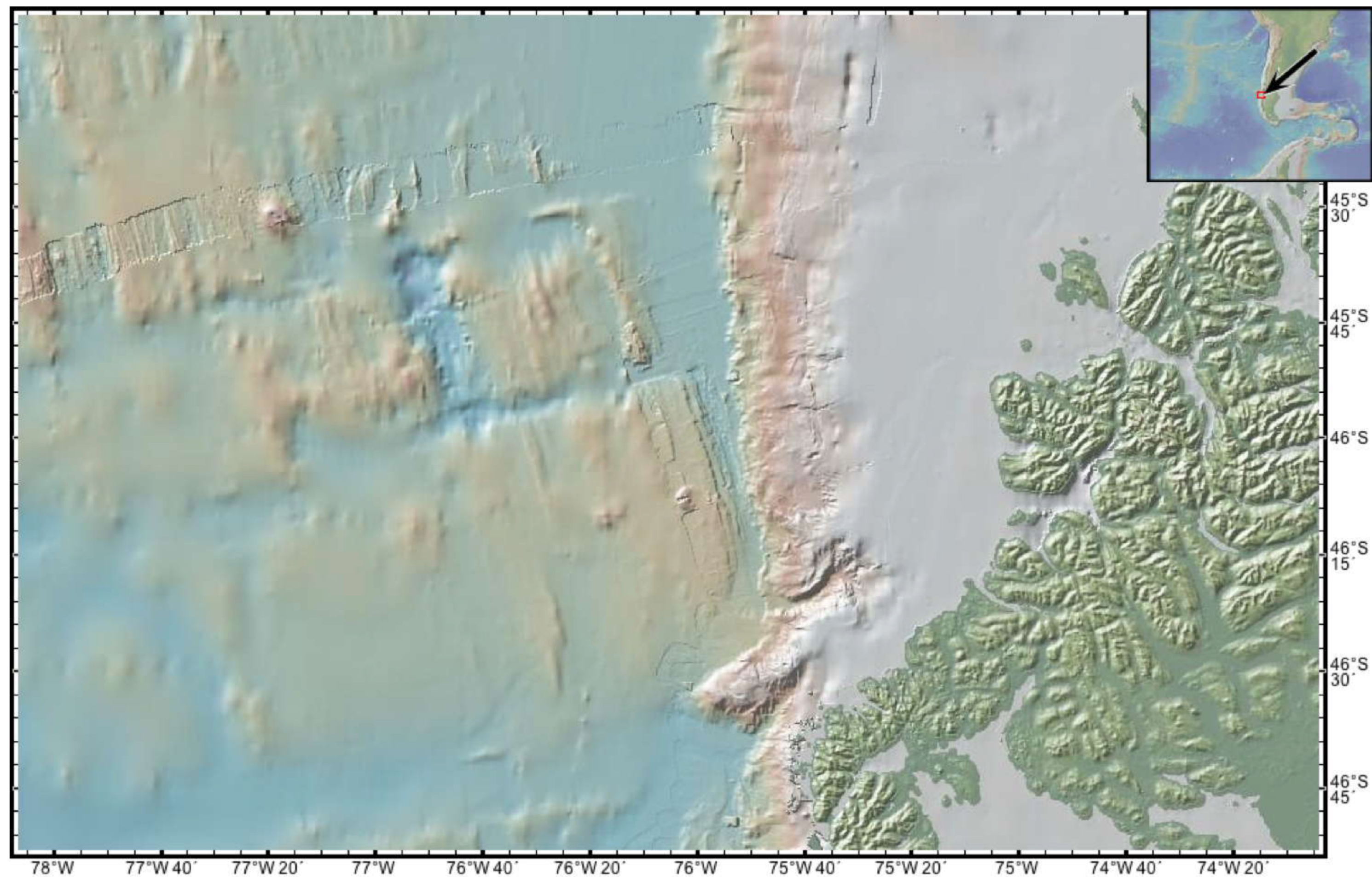


Figure 13-11. Bathymetric hillshade map in the area of the Nazca-Antarctica-South America triple junction in the southeast Pacific Ocean Basin (see inset map) derived from multibeam seismic surveys and satellite data. The Antarctic plate is to the southwest (lower left), the Nazca plate is to the northwest (upper left) and the South American plate is to the east (right), with part of the Taitao Peninsula shown in green. The trench is located between longitudes $\sim 75^{\circ}50'W$ and $75^{\circ}55'W$. From GeoMapAp.

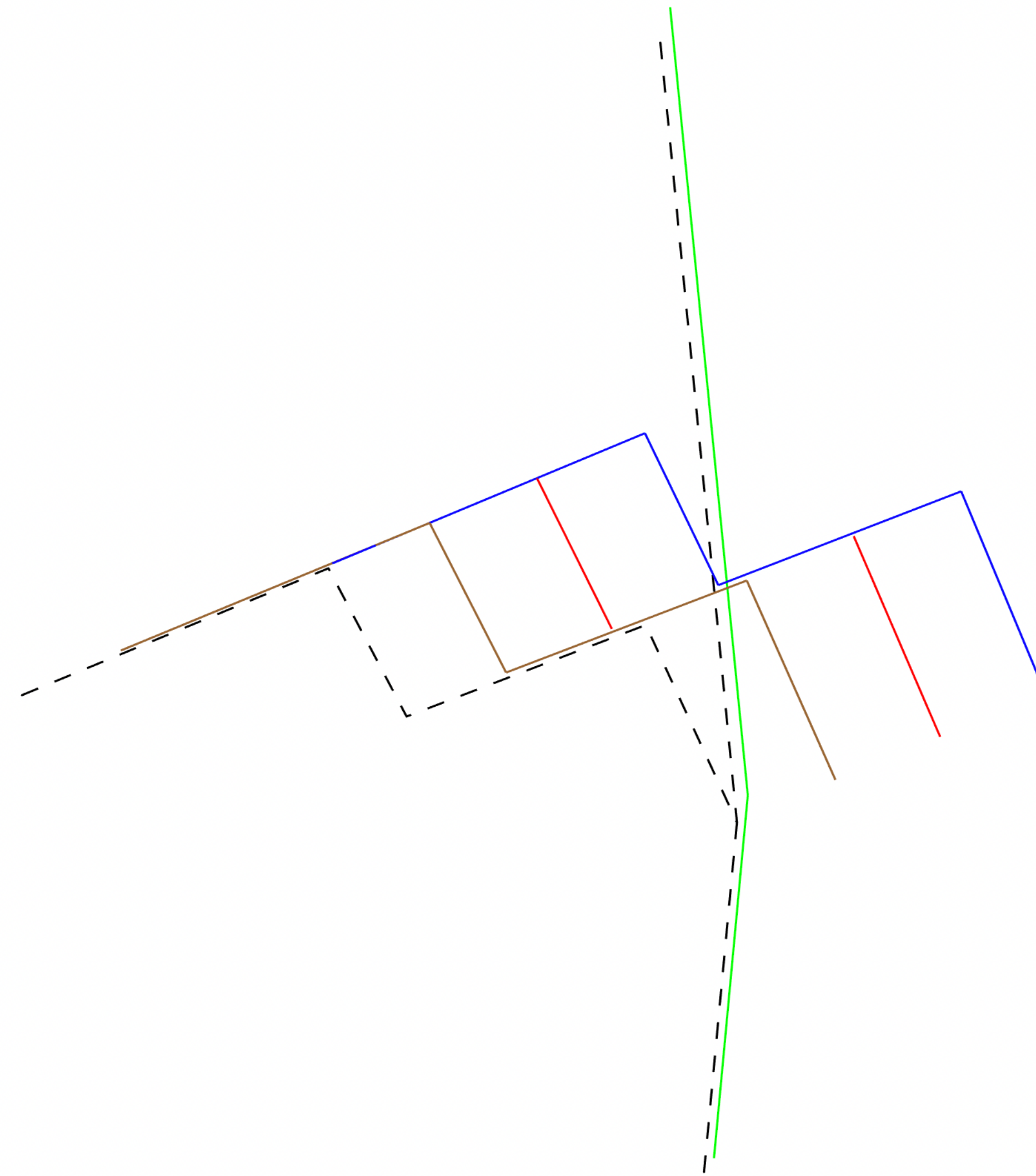


Figure 13-12. Evolution of the triple junction between the Antarctic (brown polyline), Nazca (blue) and South American (green) plates over a model time of 1 million years, as seen in the polar reference frame. Red lines are the ridge axes at 1 Myr, and the dashed lines mark the initial position of the triple junction.