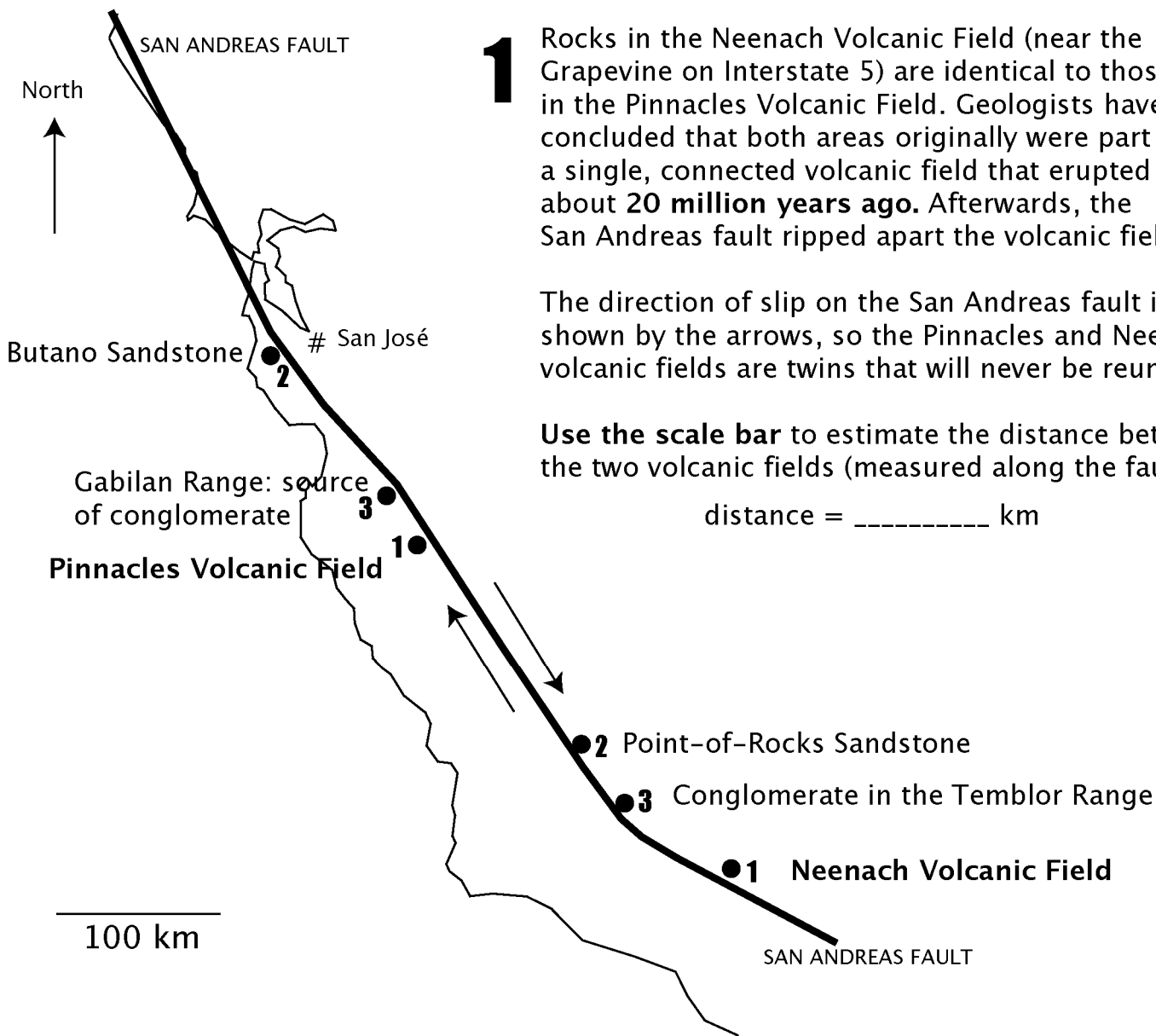


This map shows three pairs of geological features that have been offset by slip on the San Andreas fault.



1 Rocks in the Neenach Volcanic Field (near the Grapevine on Interstate 5) are identical to those in the Pinnacles Volcanic Field. Geologists have concluded that both areas originally were part of a single, connected volcanic field that erupted about **20 million years ago**. Afterwards, the San Andreas fault ripped apart the volcanic field.

The direction of slip on the San Andreas fault is shown by the arrows, so the Pinnacles and Neenach volcanic fields are twins that will never be reunited.

Use the scale bar to estimate the distance between the two volcanic fields (measured along the fault).
 distance = _____ km

2 The Butano Sandstone (near Santa Cruz) and the Point-of-Rocks Sandstone also have been ripped apart by the San Andreas fault. Originally, they were part of an underwater sand that was deposited about **50 million years ago**.
 Estimate the distance between the sandstones: _____ km

3 In the Gabilan Range just north of the Pinnacles, a distinctive rock crops out in the mountains. In the Temblor Range far southeast of here, large chunks of this rock are found in conglomerate (a sedimentary rock) that formed about **10 million years ago**.
 Estimate the distance between the conglomerate and its source: _____ km

Fill in this table AFTER a group discussion of the distances.

	Offset distance (in kilometers)	Age (in millions of yrs)	Average slip rate (in km/m.y.)
Pinnacles and Neenach			
Butano and Point-of-Rocks			
Conglomerate and source			

Questions to ponder

The units "kilometers per million year" (km/m.y.) is hard to visualize, given the much shorter life span of humans. What was the slip rate for the Pinnacles–Neenach offset in millimeters/year? 1 millimeter is about the width of the tip of your pencil.

What happened along the San Andreas between 50 m.y. and 20 m.y. ago?

How has the average rate of offset on the San Andreas fault changed over time?