

Like the mountains, this part of the California coastline also runs east–west (see Chapter 15). A person standing at the ocean's edge to watch the waves in Santa Barbara or Ventura is actually facing south. Eight islands and numerous smaller rocks are found off the southern California coast. The four northern islands, called the Channel Islands, form a chain at the southern boundary of the Santa Barbara Channel, whereas the four southern islands are a more scattered group lying southwest of Los Angeles and Long Beach (Endpaper 3). Five of the islands—San Miguel, Santa Rosa, Santa Cruz, Anacapa, and Santa Barbara—make up Channel Islands National Park, established in 1980. Santa Catalina Island is more developed and a very popular summer resort, and San Clemente Island is a military reservation. Numerous smaller sea stacks are scattered throughout the islands. The area offshore is referred to as the Southern California Borderland, and like the Los Angeles basin, it has a geologic history closely tied to that of the Transverse Ranges Province.

Today, compression is the geologic process creating the distinctive features of the Transverse Ranges Province. Because of the Big Bend in the San Andreas fault, the Pacific and North American Plates converge in this region (Fig. 16-5; see Chapter 14).

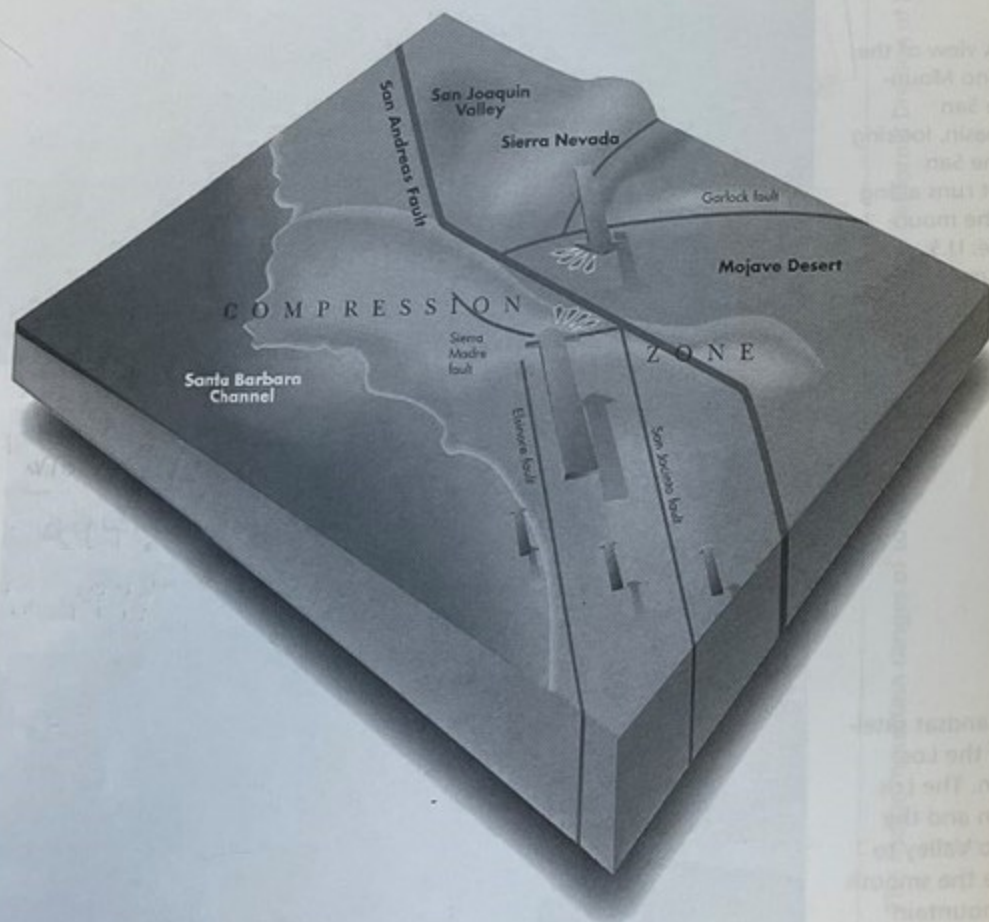


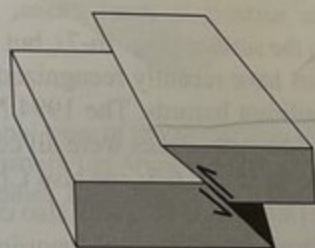
Fig. 16-5 The Big Bend in the San Andreas fault causes compression in the Transverse Ranges Province. (Source: Southern California Earthquake Center, *Reviewing the Basics, The Master Fault*: <http://www.scecdc.scec.org/eqabc.html>.)

As a result, the entire region is being squeezed together, with the maximum compression oriented in a north-south direction. The mountains, the basins, and many of the faults crossing the province are all expressions of this squeezing. Most trend east-west, perpendicular to the direction of maximum compression. As the crust is compressed, it is being squeezed and thickened. This process is expressed at the surface, where some areas are being uplifted to form mountains, as others are being pushed down to form basins.

The Transverse Ranges are one of the Earth's most rapidly uplifting areas. The steep, rugged mountains along the Big Bend are some of the evidence of rapid uplift. The stepped marine terraces near Ventura and Palos Verdes (see Chapter 15) provide further proof of rapid uplift. The terraces are rising by as much as 5 to 10 millimeters per year. Dramatic uplift takes place during earthquakes. During the 1994 Northridge earthquake, the Santa Susana Mountains rose 70 centimeters, and during the 1971 San Fernando earthquake, the same mountains rose about 2 meters.

1994 Northridge
70 cm uplift
1971 San Fernando
2 meters uplift
REVERSE FAULTS AND FOLDS

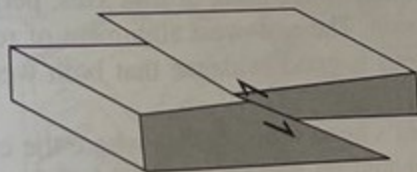
Not surprisingly, many of the faults in the Transverse Ranges Province are the type produced by compressional forces. When blocks of rocks are compressed, they buckle together, with one block sliding over the other (Fig. 16-6; see also Fig. 1-15B). Both vertical movement and shortening of the crust occur across the resultant fault, known as a **reverse fault**. If a reverse fault is only slightly inclined, it is called a **thrust**



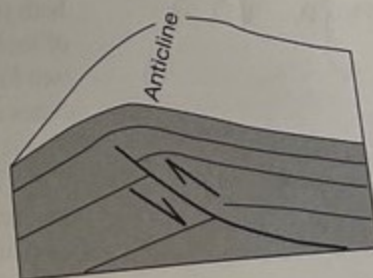
Reverse



Oblique-slip reverse
(component of strike-slip
and reverse slip)



Thrust
(low-angle reverse)



Buried reverse fault

Fig. 16-6 Block diagrams of reverse and thrust faults. (Source: Adapted from Keller, E., and Pinter, N. 1996. *Active Tectonics*. Upper Saddle River, NJ: Prentice Hall.)