

FOLDING AND FAULTING

The earth's crust is not as rigid and stable as one may think. An earthquake or volcanic eruption demonstrates just how fragile it really is.

Geologists believe that there are two zones below the crust: the mantle and the core (see Fig. 1 below). The extremely hot core produces convection currents in the hot mantle that cause the rock of the mantle to shift like slow-moving plastic. This creates stress on the earth's crust, causing it to crack. This movement produces folding and faulting in the rocks of the earth's crust.

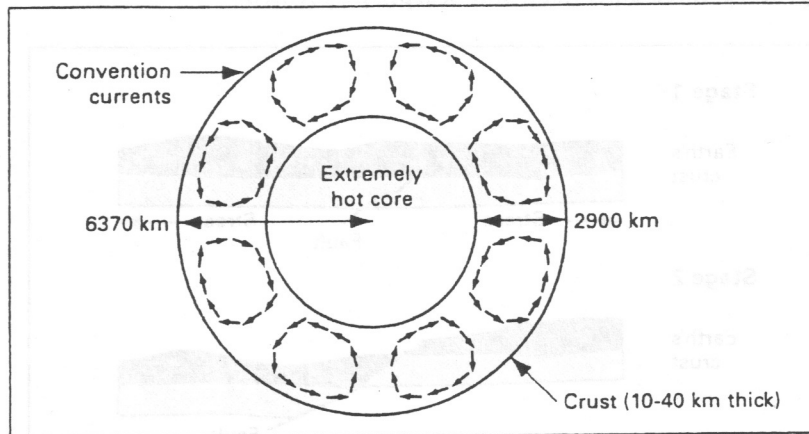


Fig. 1

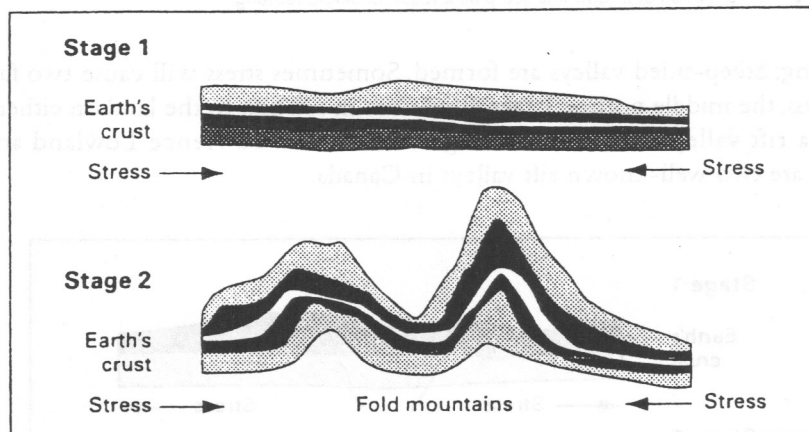


Fig. 2 How fold mountains are formed.

FOLDING

Folding can occur in any kind of rock. Over a long period of time and under conditions of high temperatures and pressure, rock layers slowly bend rather than break. The result may be fold mountains as shown in Fig. 2 above. Two examples are the Rockies and the Appalachians.

QUESTIONS

TAGE 1

1. In which direction is pressure being exerted?
Where does the pressure come from?

STAGE 2

2. What happens to the earth's crust as a result of this pressure?

FAULTING

Faults are fractures (cracks) in bedrock along which movement has taken place. They are produced in the earth's crust by the stress that convection currents create in the mantle. If the rock is brittle or the forces cause the rock to move faster than it can bend, it will fracture. This fracturing is usually accompanied by some movement.

Faulting, like folding, can occur in any type of rock and takes a long time to produce major landforms. There are numerous examples of faults in the Shield of southern Ontario. In the Ottawa Valley-Georgian Bay region faulting is evident, although most of the easily identified faults are in the eastern and northern parts of this region. Two types of faults that are common in Canada are described below. Examine the following diagrams and answer the questions.

A: Single faulting: Steep-sided cliffs (fault-line scarps) are formed

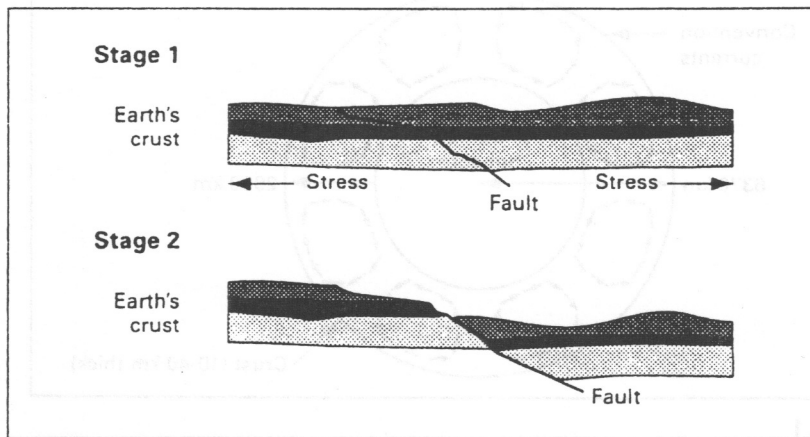


Fig. 3 The formation of a fault-line scarp as a result of single faulting.

B: Double faulting: Steep-sided valleys are formed. Sometimes stress will cause two faults to develop. Under continued stress, the middle portion drops downward in relation to the land on either side of the two faults. The result is a rift valley, also known as a graben. The St. Lawrence Lowland and the Ottawa-Bonnechere Graben are two well-known rift valleys in Canada.

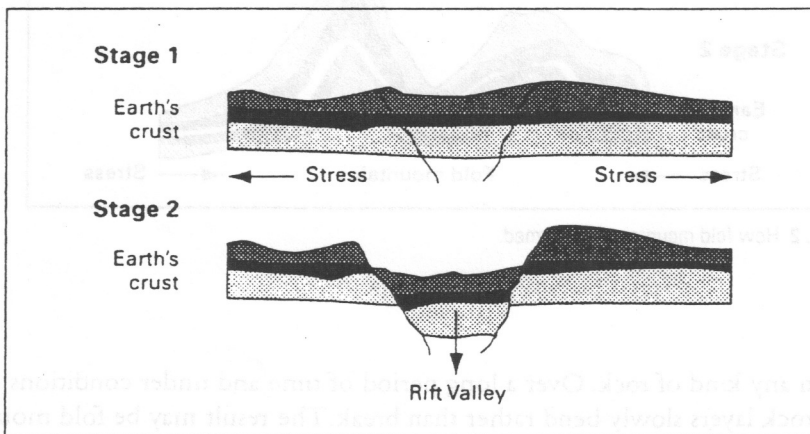


Fig. 4 The formation of a rift valley as a result of double faulting.

QUESTIONS

3. How are faults formed?
4. Examine Stages 1 and 2 in Fig. 3 and Fig. 4. What has happened?
5. Imagine that you are a geologist examining the rocks in the diagram. How could you prove that faulting has occurred?
6. Using your own words, explain how a rift valley is formed.