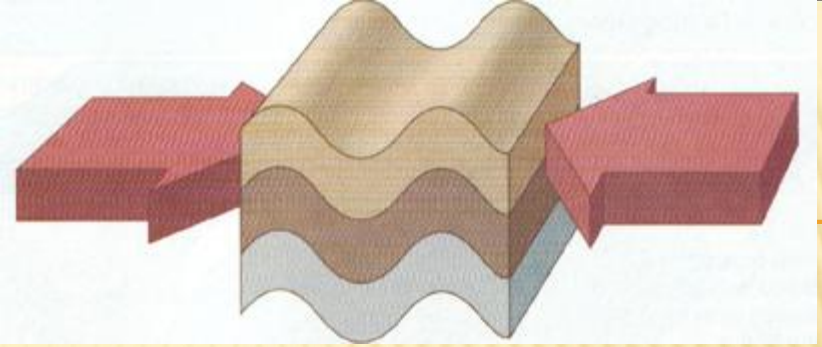
DEFORMATION OF THE EARTH'S CRUST

- The shape of the earth's crust is always changing.
- Deformation is the bending, tilting, and breaking of the earth's crust.
- Deformation occurs because of *STRESS*.
- Plate movement causes stress.

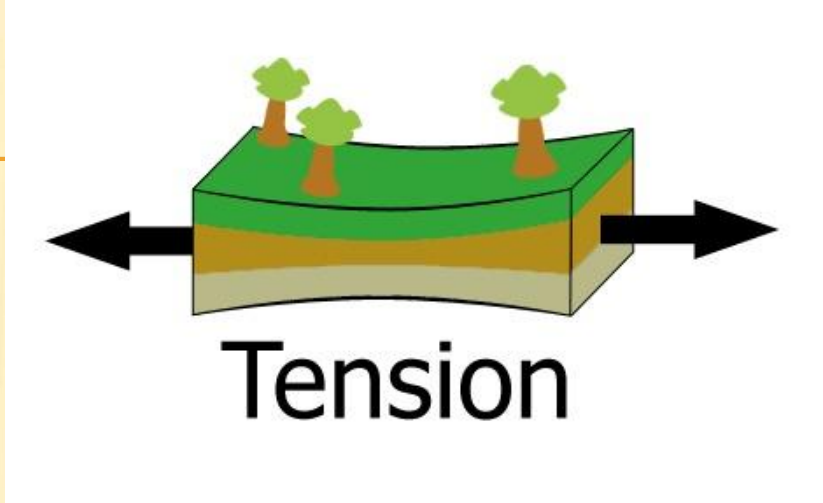
- Stress is caused by the pressure that builds up in the crust because of plate movement.
- The crust is exposed to three main types of stress.

1. COMPRESSION



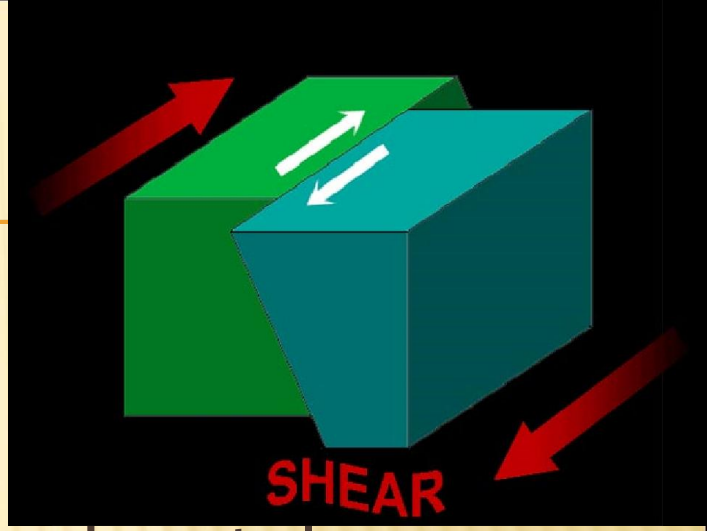
- Rocks are squeezed together.
- Rocks are pushed higher into the air (C-C), deeper into the crust (O-O) or a combination of both (C-O).
- Occurs at convergent boundaries.

2. TENSION



- Rocks are pulled apart.
- As a result, rocks become thinner.
- Occurs at divergent boundaries.

3. SHEARING

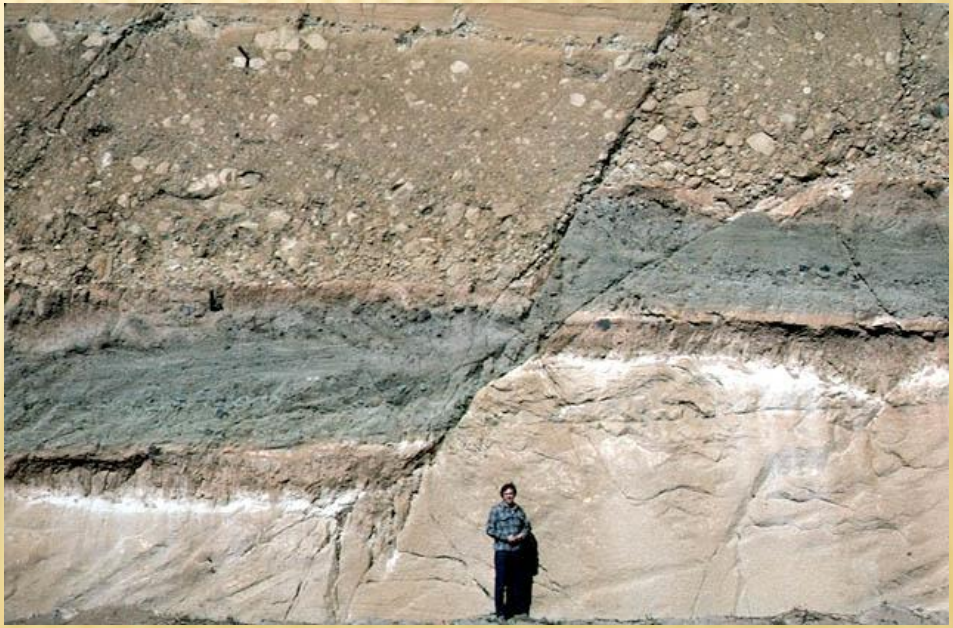


- Rocks are pushed in opposite horizontal directions
- This causes rocks to twist, bend or break apart.
- Occurs at transform boundaries.

- When enough stress is applied, the shape of a rock can change permanently.

ROCKS CAN RESPOND TO STRESS IN 3 WAYS:

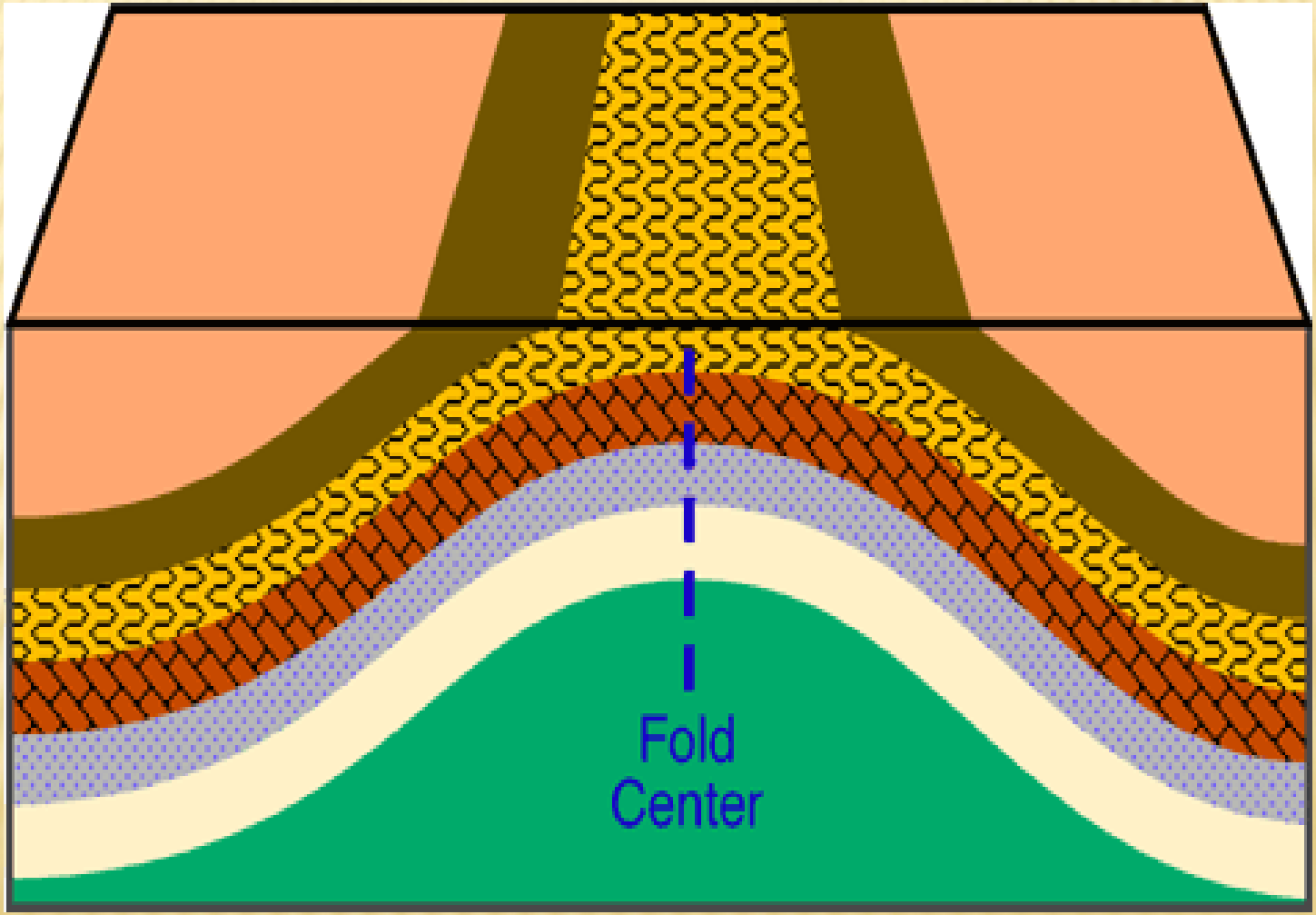
- They either:
  - Fold
  - Fracture
  - Fault



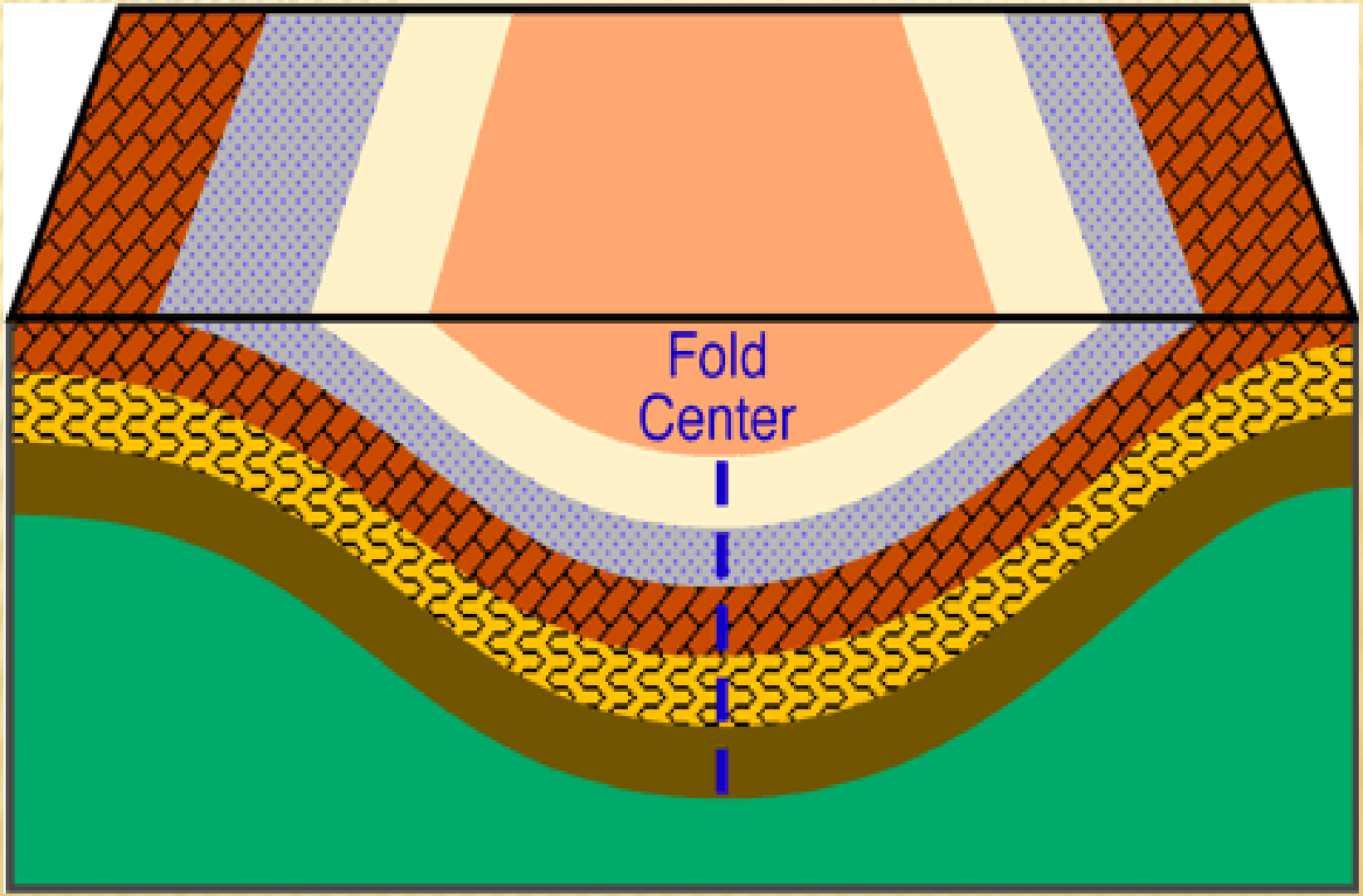
FOLDING

- The permanent bending of a rock exposed to extreme stress.
- The rock is permanently deformed, but it does not break.
- Caused by compression stress at convergent boundaries.
- 2 types of folds:
  - Anticline
  - Syncline

ANTICLINE: A FOLD IN THE ROCK THAT BENDS UPWARD.



SYNCLINE: A FOLD IN THE ROCK THAT BENDS DOWNWARD.

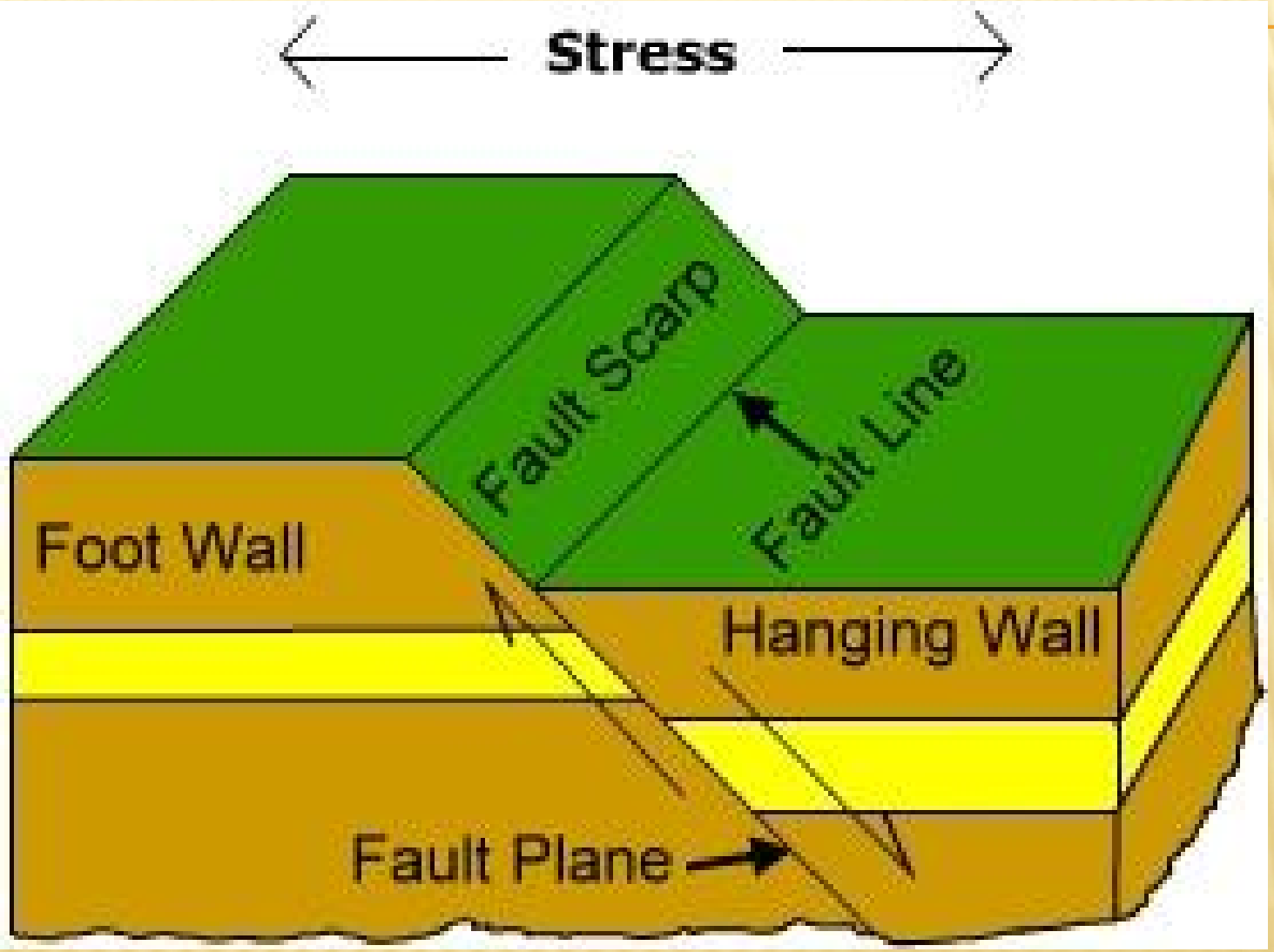


FRACTURE: THE ROCK BREAKS, BUT THE ROCK ON EITHER SIDE OF THE BREAK DOES NOT MOVE.

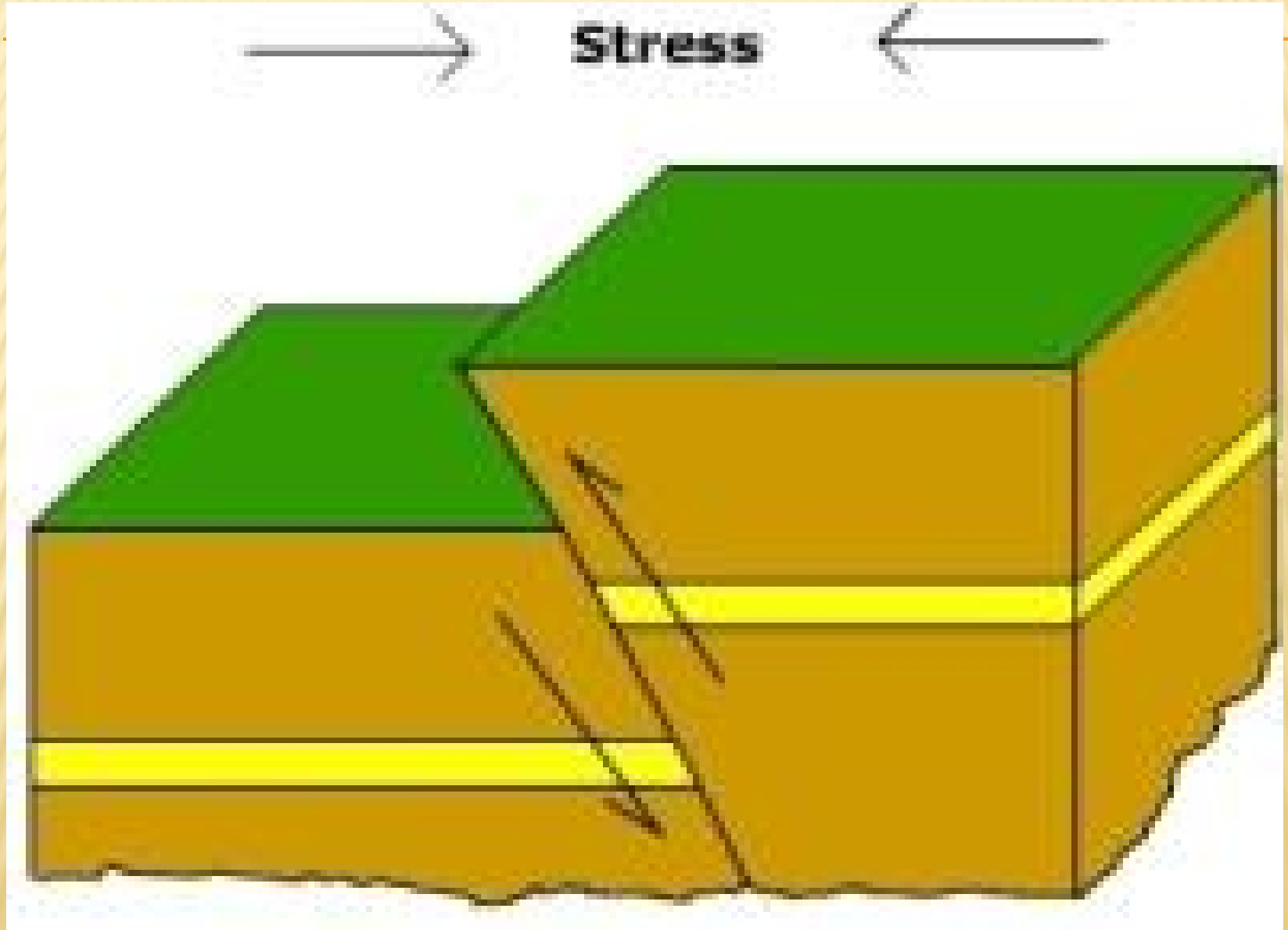
FAULT: ROCK BREAKS AND THE ROCK ON EITHER SIDE OF THE BREAK DOES MOVE!

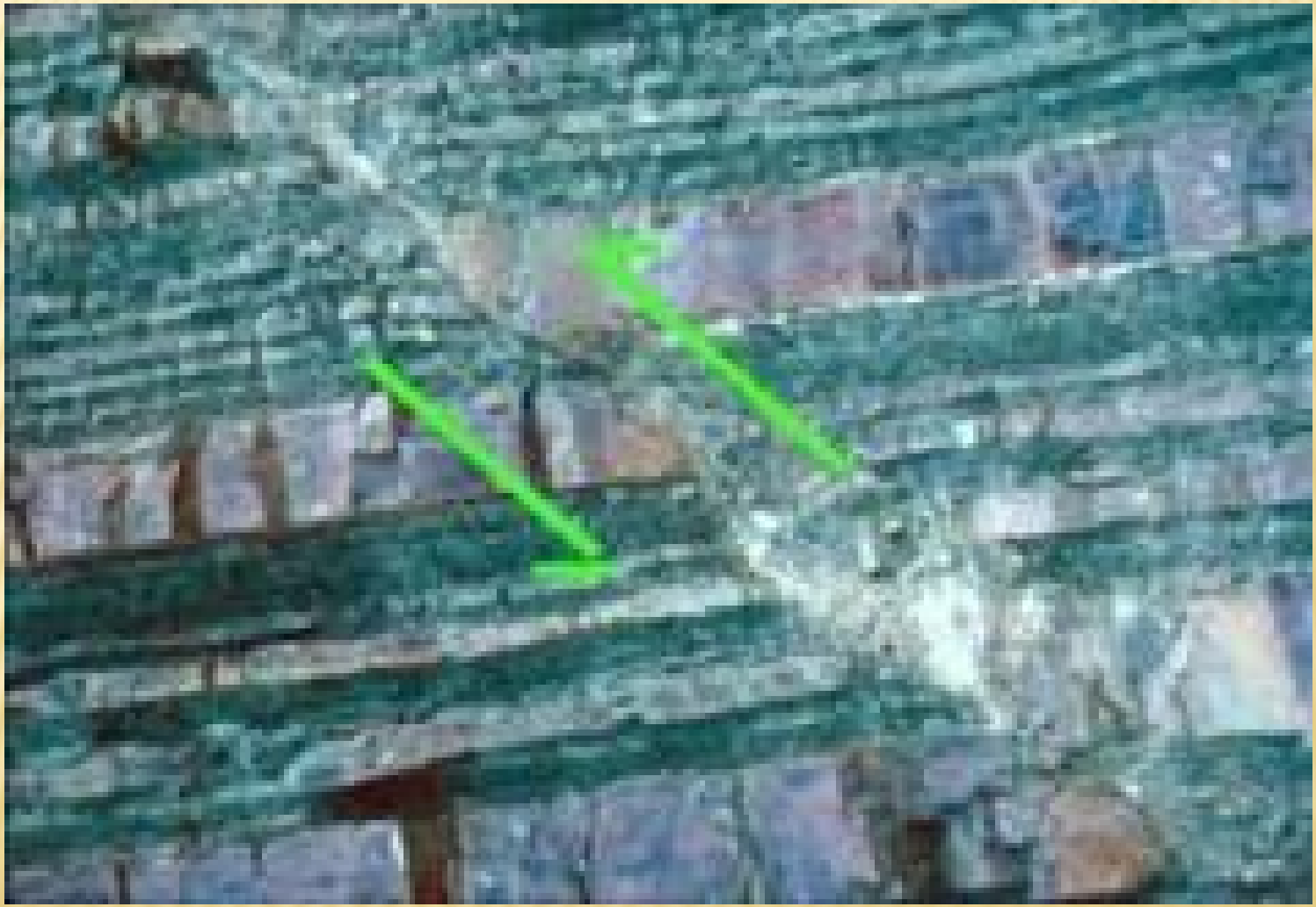
3 TYPES OF FAULTS

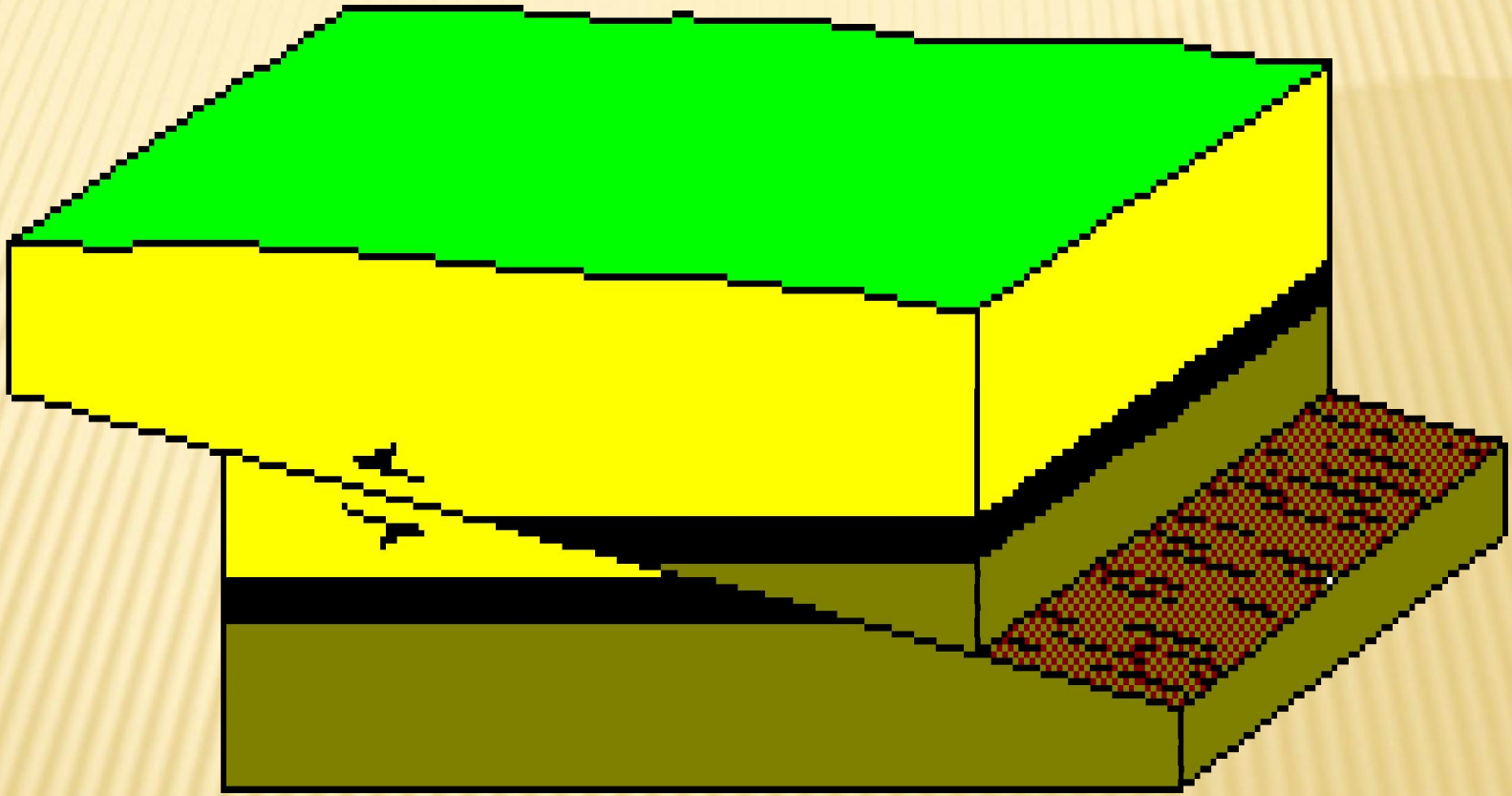
- 1. Normal: when one side of the fault plane drops down
- Rock above the normal fault line is called the hanging wall and the rock below the normal fault line is called the foot wall.
- Occurs along divergent boundaries because of tension stress.


Stress
Fault Scarp
Fault Line
Foot Wall
Hanging Wall
Fault Plane

- 2. Reverse/thrust fault: when one side of the fault plane moves up (hanging wall up; footwall down).
- Opposite of a normal fault.
- Occurs along convergent boundaries because of compression stress.

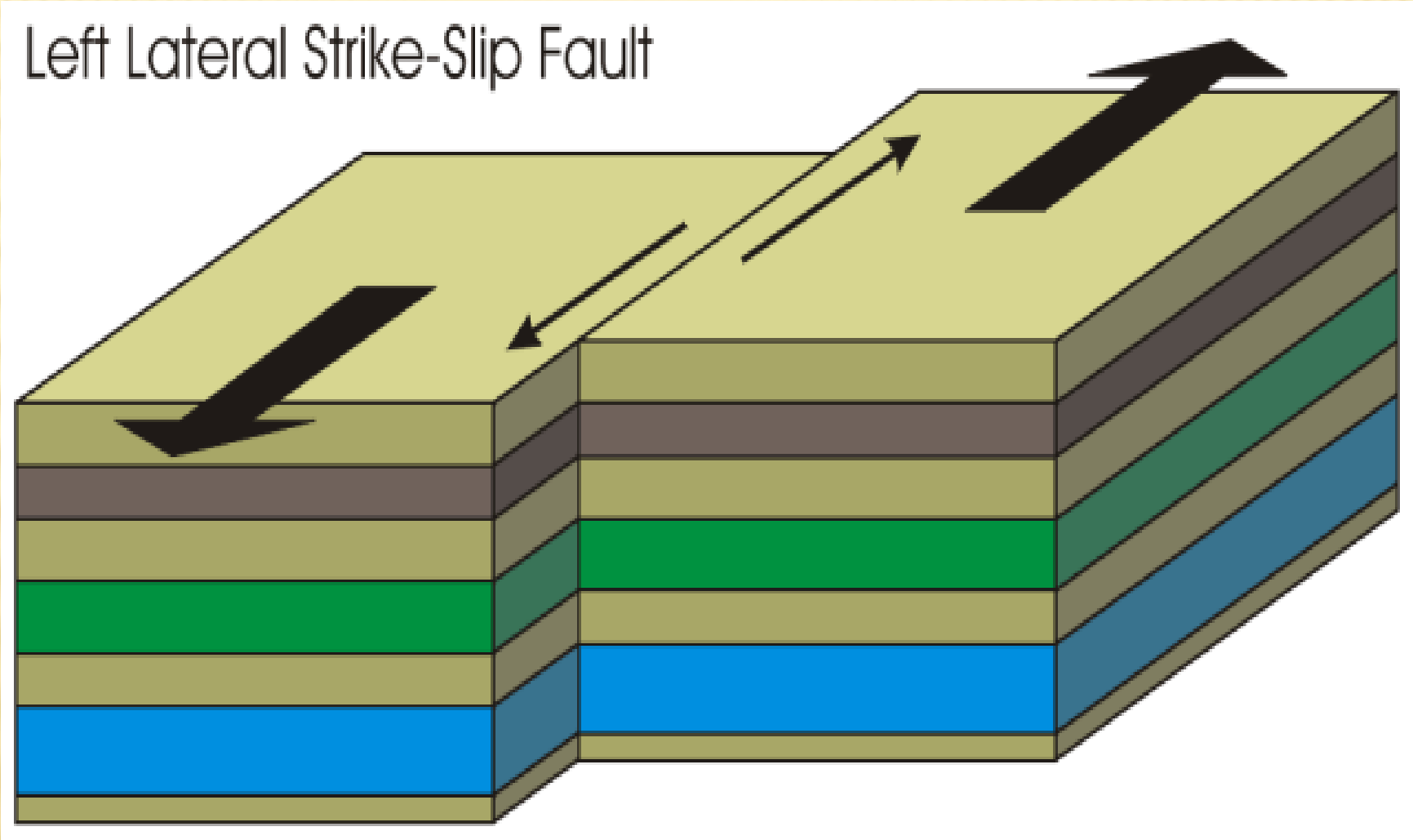

Stress

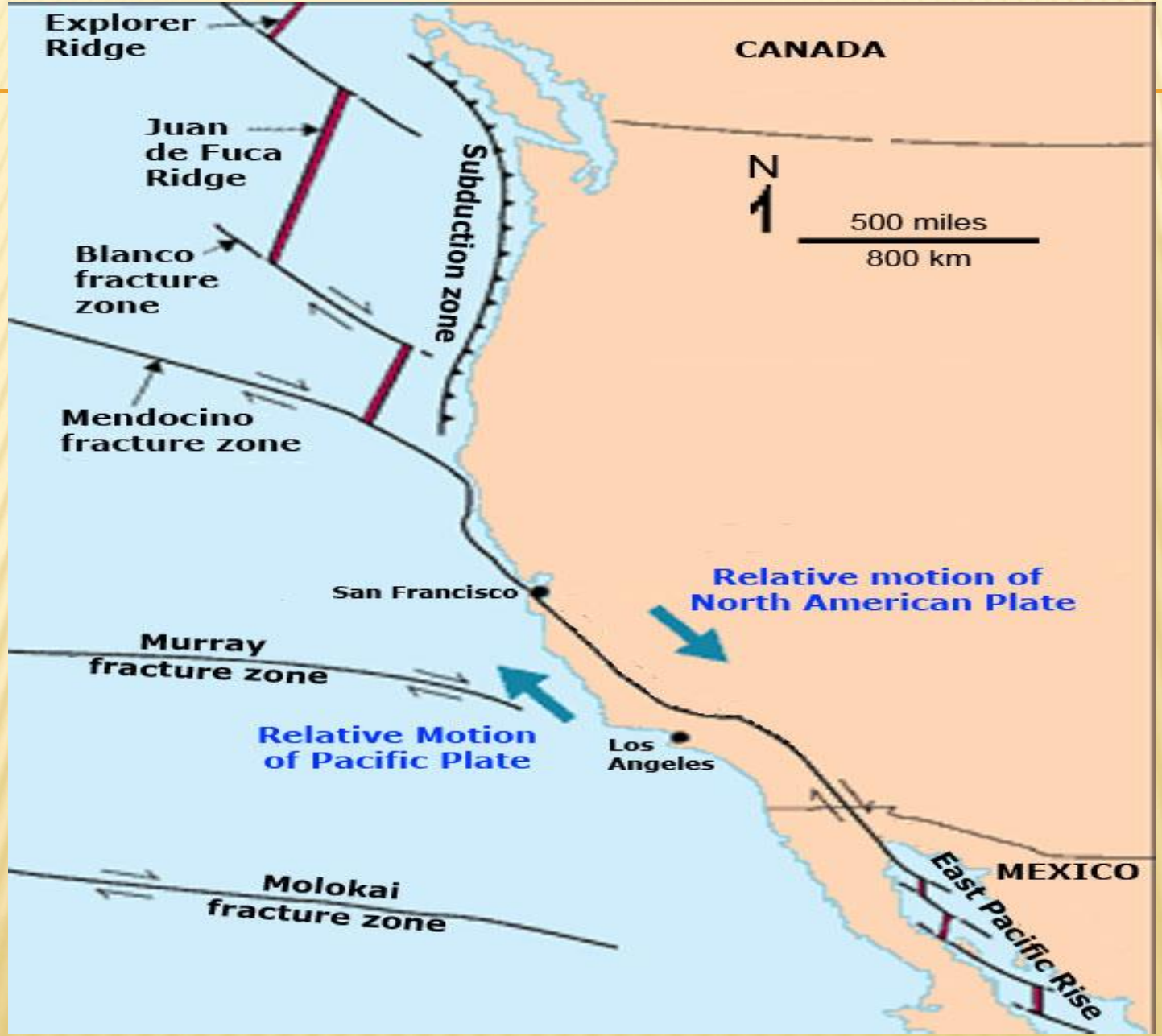




THRUST FAULT

- 3. Strike-Slip Fault: rock on either side of the fault plane slide horizontally.
- Occurs along transform fault because of shearing stress.
- Ex. San Andreas fault.


Left Lateral Strike-Slip Fault


Explorer Ridge
Juan de Fuca Ridge
Blanco fracture zone
Mendocino fracture zone
Subduction zone
CANADA
N
500 miles
800 km
San Francisco
Relative motion of North American Plate
Murray fracture zone
Relative Motion of Pacific Plate
Los Angeles
MEXICO
East Pacific Rise
Molokai fracture zone