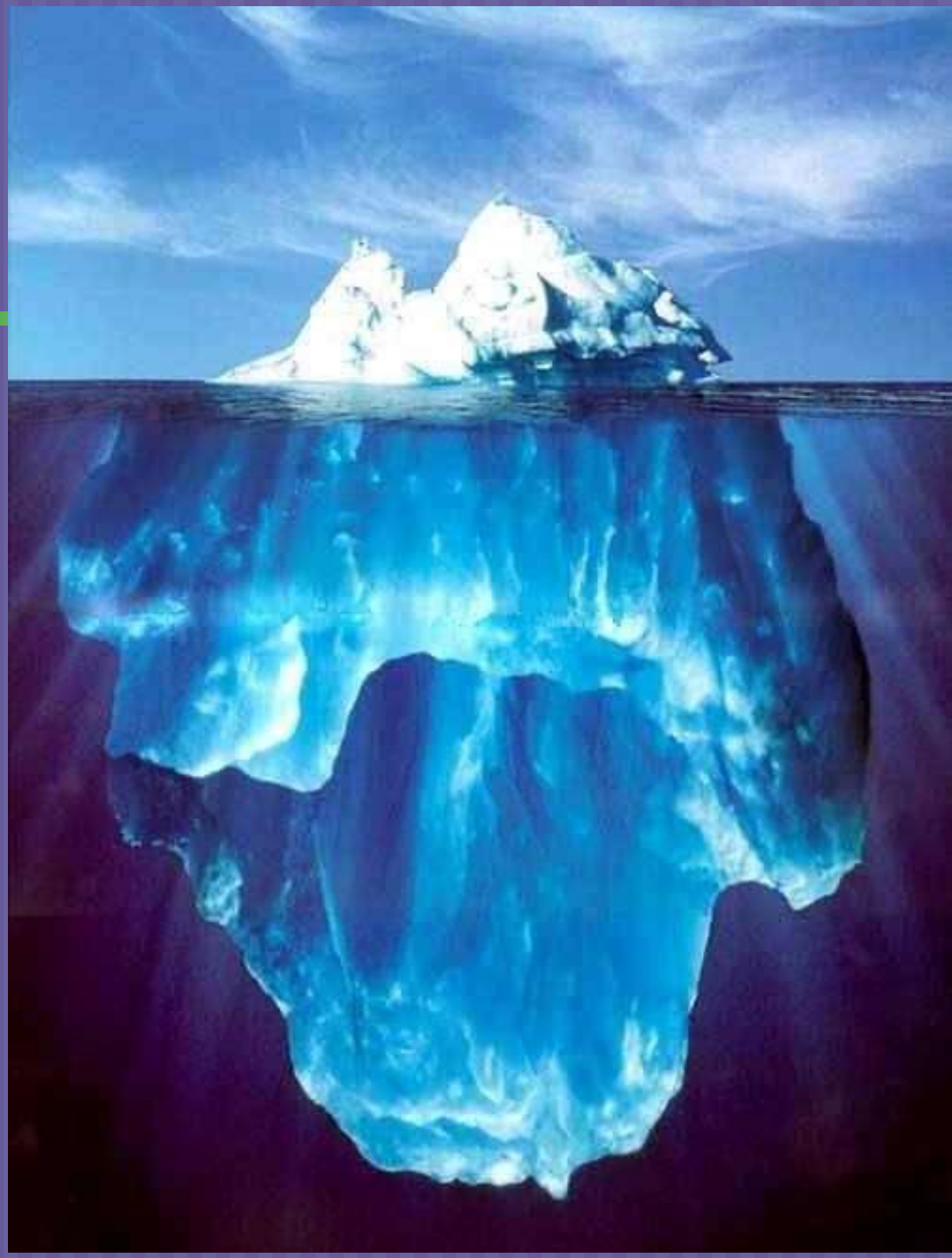
# ISOSTASY

Removal of material from the top will induce uplift at the surface. Removal of material from the bottom will produce subsidence. Thus, in the case of tectonic extension, isostasy will produce an effect that is opposite to thermal uplift.



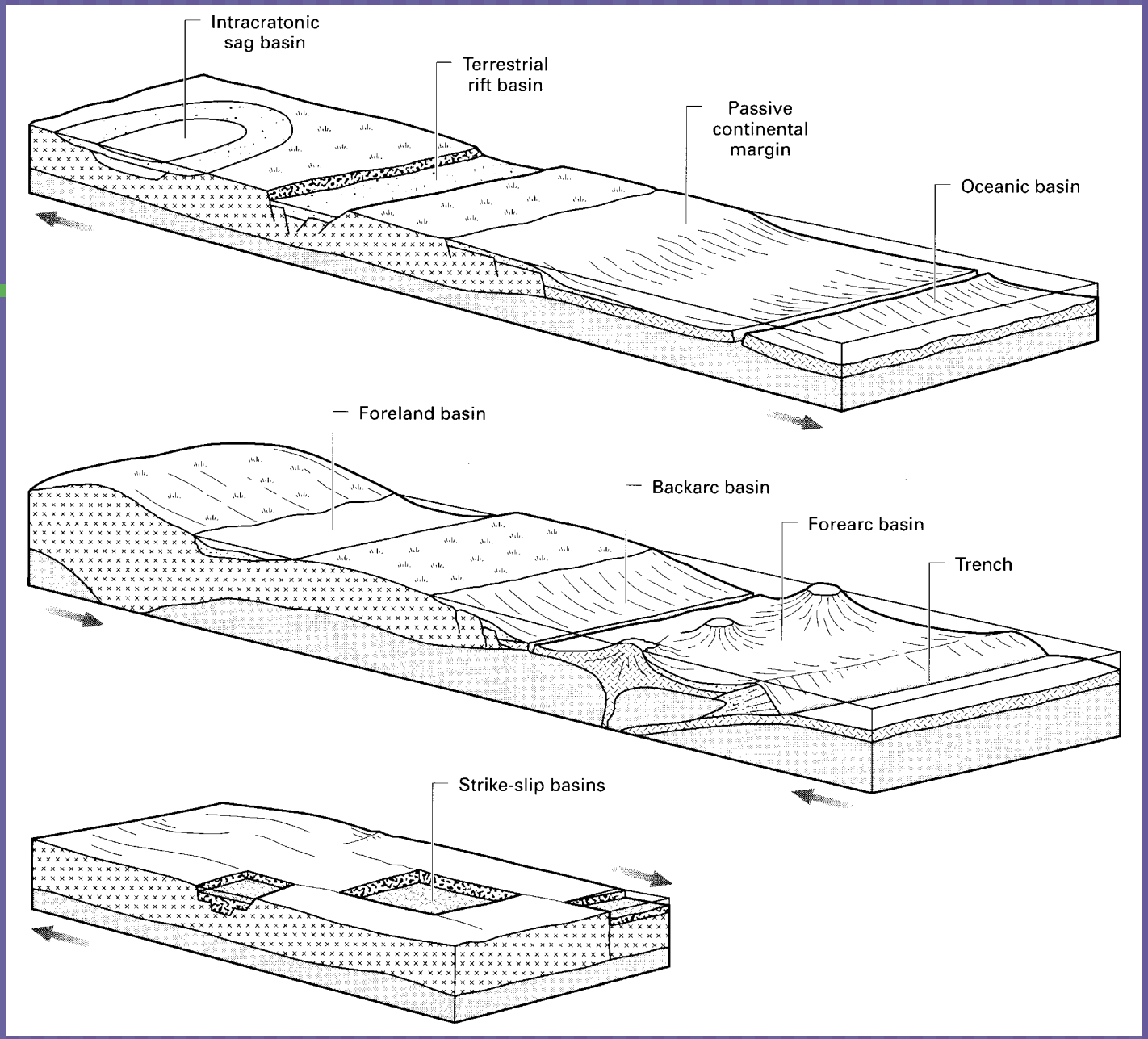
# TECTONIC BASINS

**Sedimentary Basin = area of thick sediment accumulation**

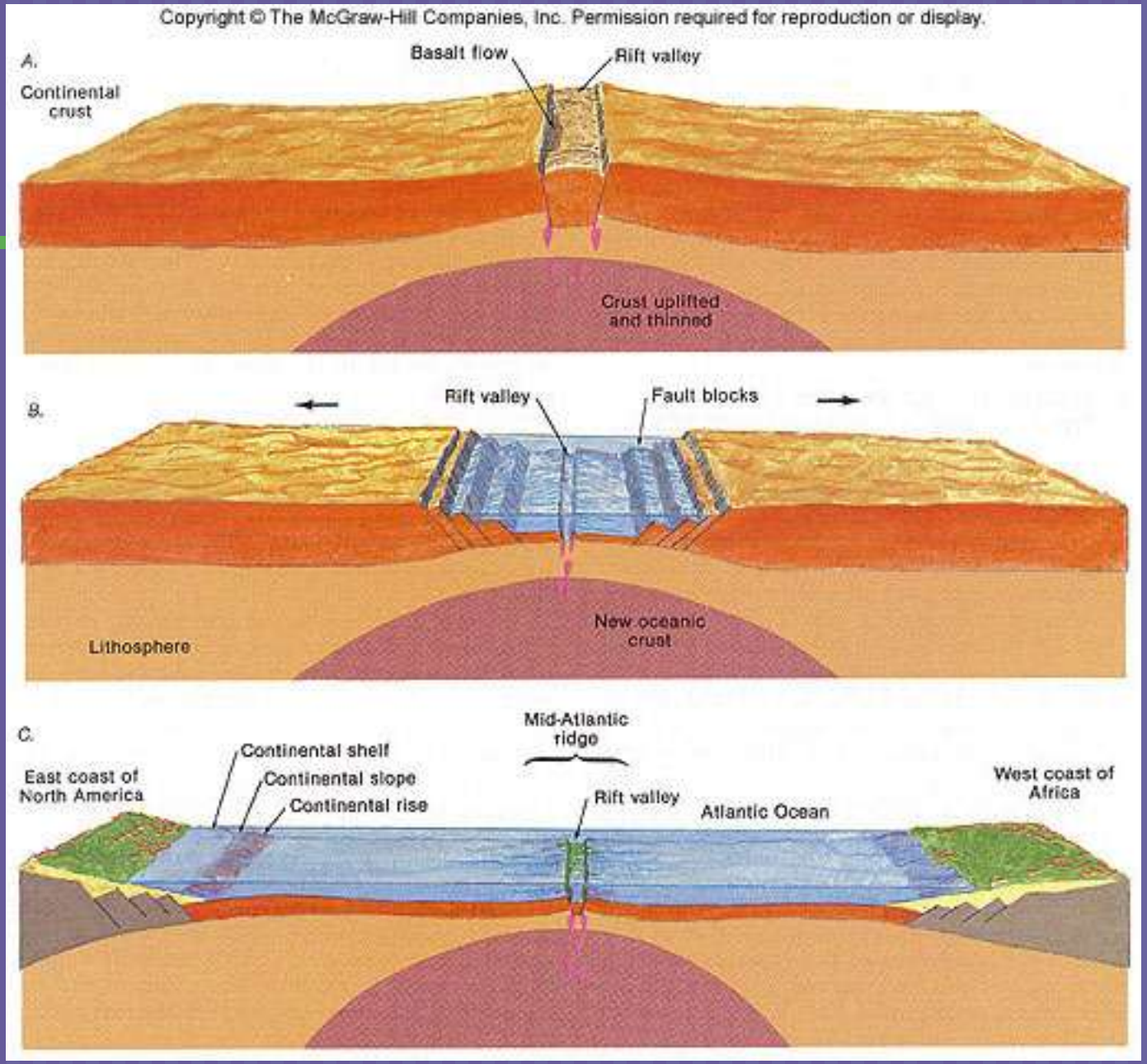
***To accumulate seds, must either raise sea level or cause underlying lithosphere to subside***

# SUBSIDENCE MECHANISMS

- Subsidence related to cooling
  - Passive continental margin
- Subsidence related to crustal thinning (isostasy)
- Subduction subsidence (trench)
- Loading
  - Glaciers
  - Sediments
  - Thrust loading
- Local basin formation in transcurrent settings

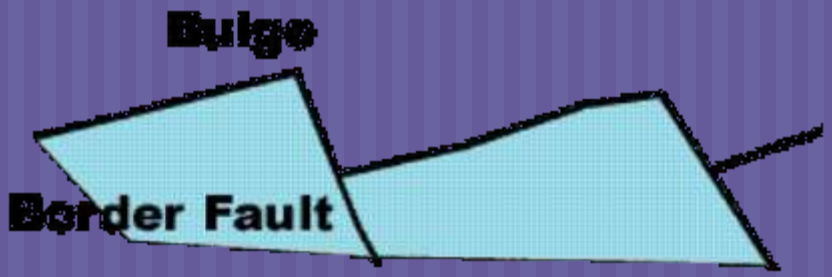


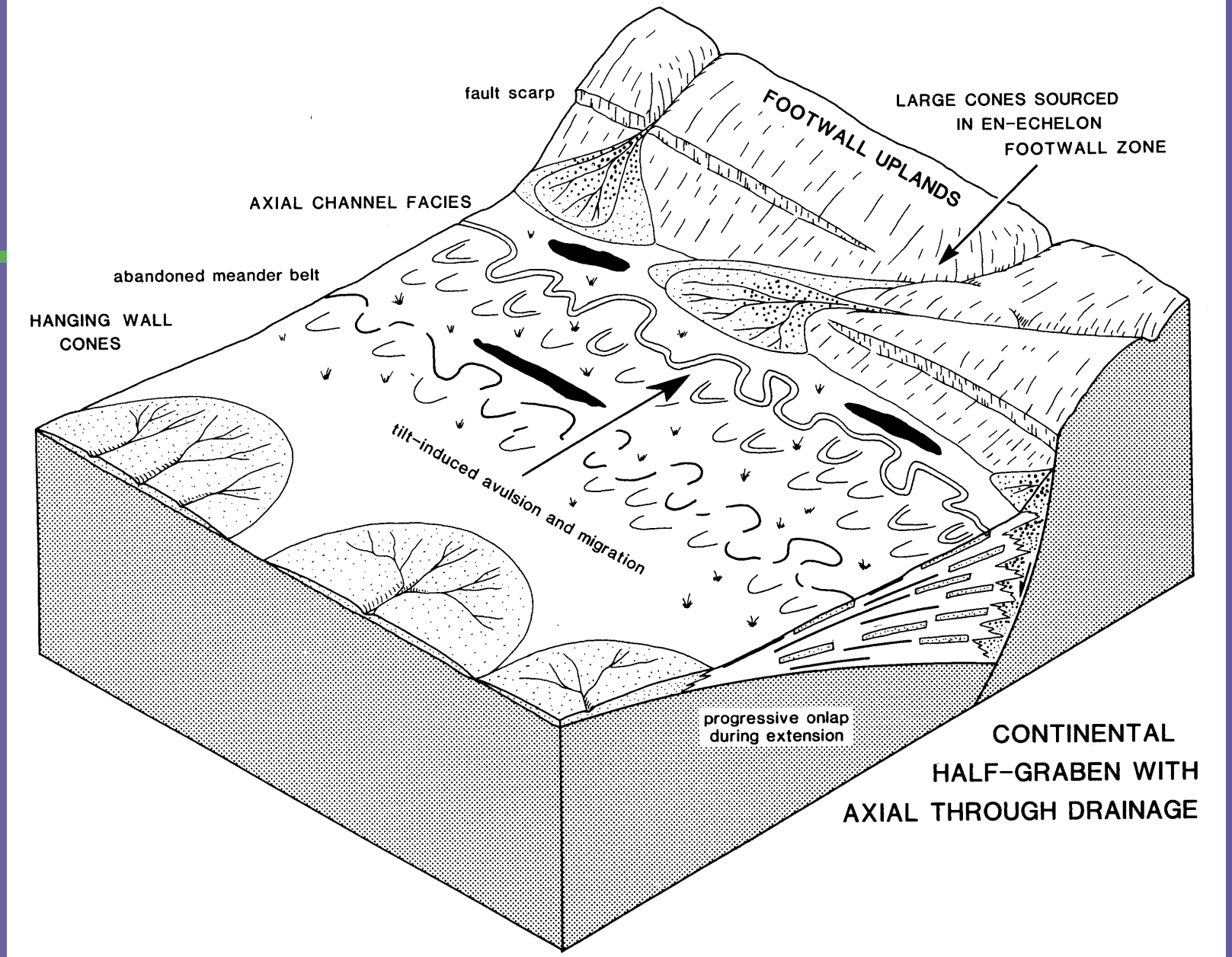

Basin types can be distinguished by structural and sedimentary patterns

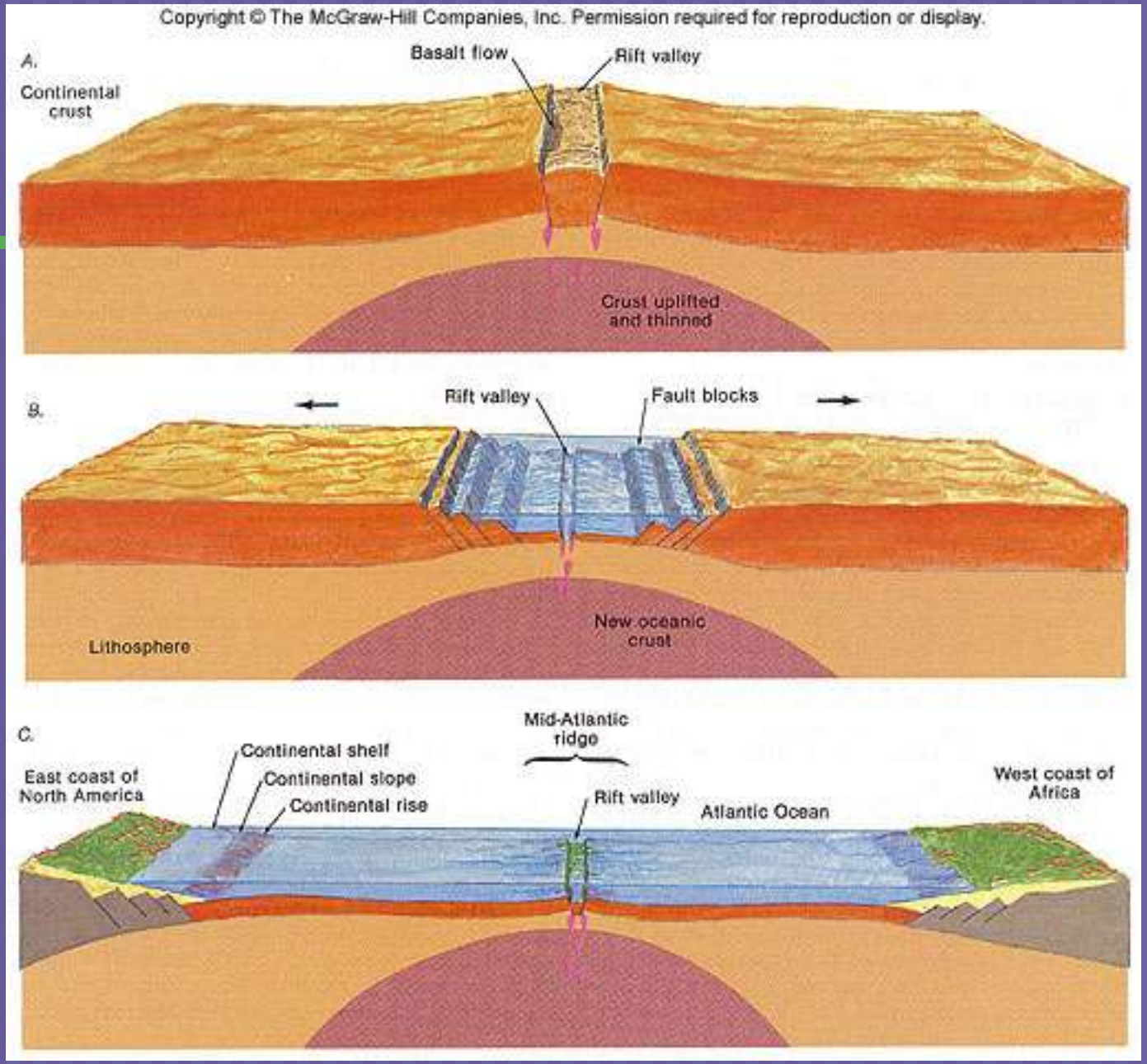


# DIVERGENT SETTING- RIFT

- Crustal thinning produces depocenters
- Half-graben geometry results in asymmetric patterns of deposition
- Sediments are typically immature, intercalated with volcanic rocks
- Distribution of sediment types over time records tectonic activity
- Older sedimentary layers have higher dips than younger layers




fault scarp
FOOTWALL UPLANDS
LARGE CONES SOURCED
IN EN-ECHELON
FOOTWALL ZONE
AXIAL CHANNEL FACIES
abandoned meander belt
HANGING WALL
CONES
tilt-induced avulsion and migration
progressive onlap
during extension
CONTINENTAL
HALF-GRABEN WITH
AXIAL THROUGH DRAINAGE



# Continental margin sedimentation

- Siliciclastic systems
  - Regionally extensive, tabular units
  - Moderately mature sands - quartz dominant - grade to fine-grained pelagic seds
  - Generally well developed bedding
- Carbonate systems
  - Confined to low latitude, warm clear seas with little terriginous input
  - Patterns affected by organisms, such as those that form reefs, not just sedimentation processes

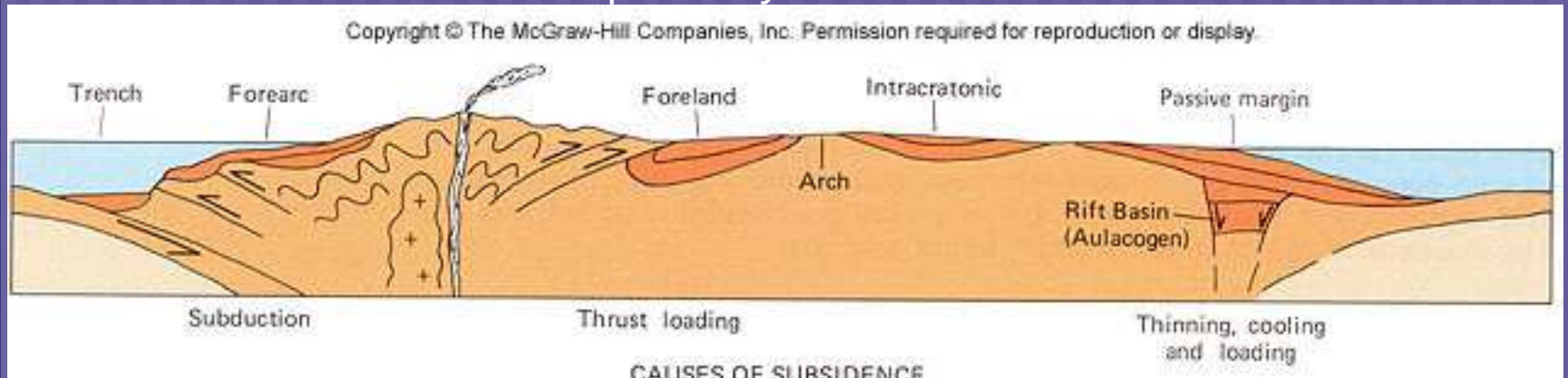
# Ocean basins

- Dominated by pelagic deposition (biogenic material and clays) in the central parts and turbidites along the margins

# CONVERGENT SETTINGS

Elongate trends of thick sedimentary sequences associated with subduction zones

- Trench: Trench basins can be very deep, and the sedimentary fill depends primarily on whether they are intra-oceanic or proximal to a continent. Accretionary prism includes material carried to trench on downgoing slab; wedge-shaped, faulted and folded
- Trench-slope: (intra-slope basins)
  - Hemipelagic sediments, turbidites, slumps
- Forearc Basin: shoals upward, turbidites to delta and non-marine, shows unroofing sequence (input from progressively deeper rocks)
- Input of both immature sediments shed from eroding arc and volcanic materials increases with proximity to continent



QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

# Basic structural and sedimentological elements of an accretionary prism

# An exhumed example from SW Japan

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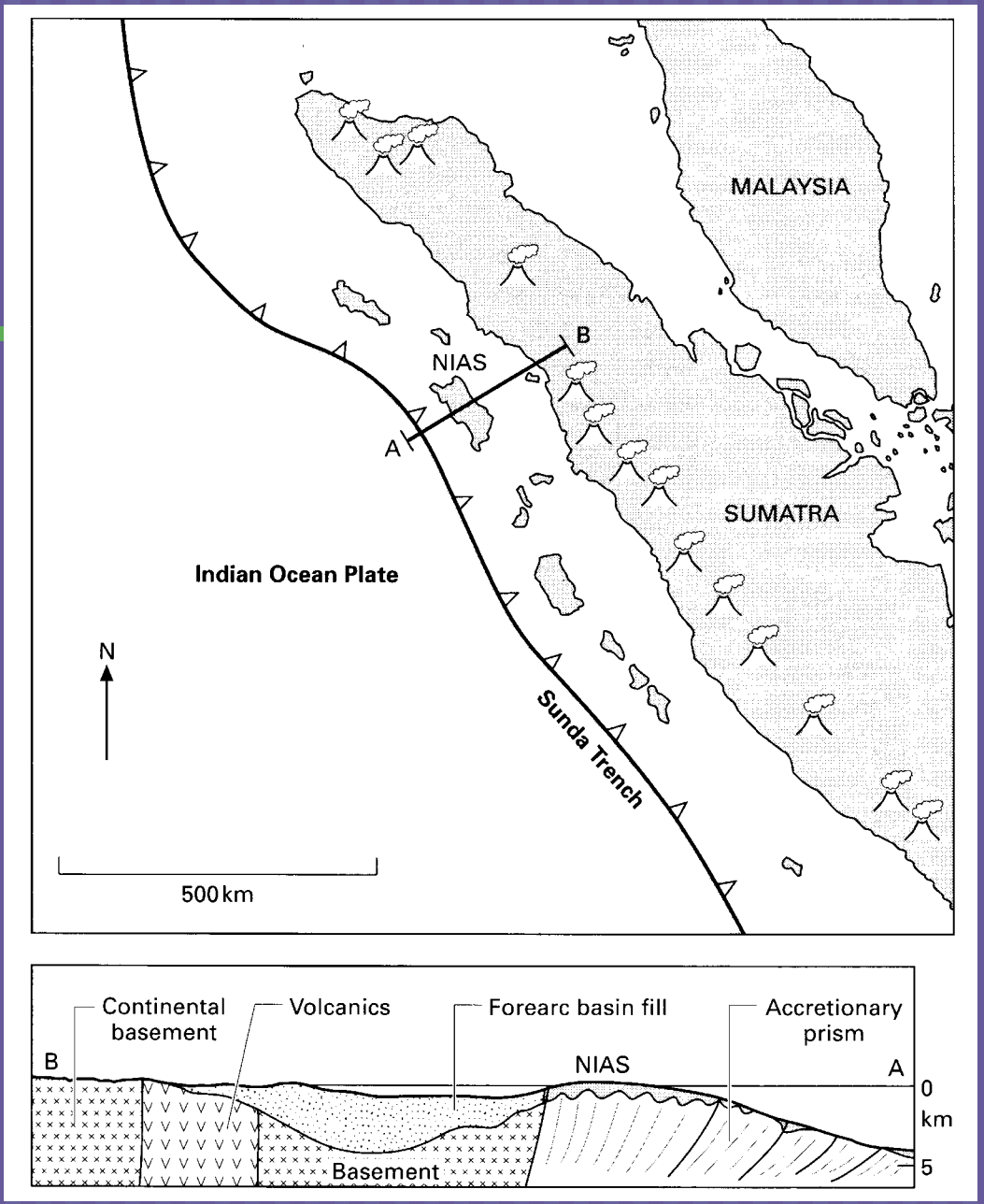
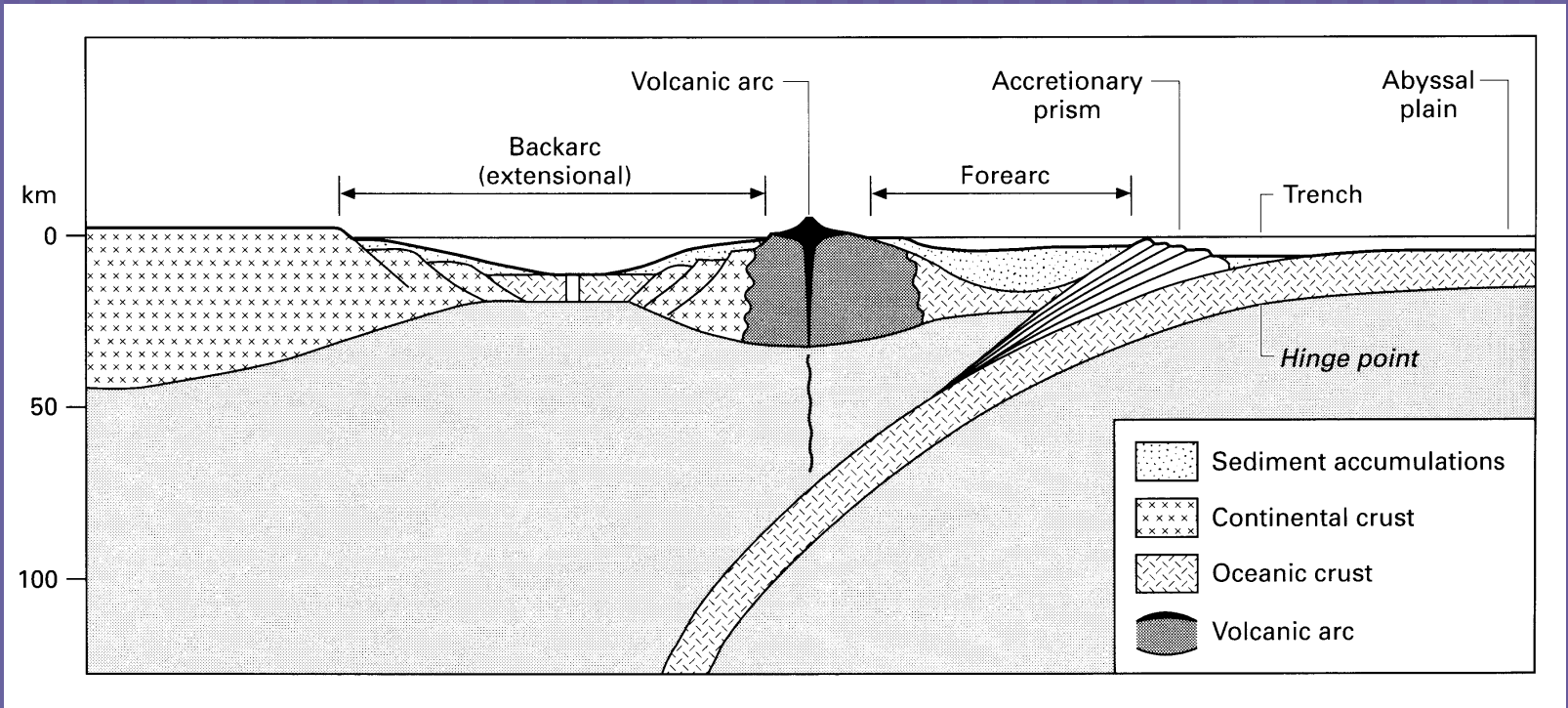
TIFF (Uncompressed) decompressor
are needed to see this picture.


MALAYSIA
B
NIAS
A
SUMATRA
Indian Ocean Plate
N
Sunda Trench
500 km
Continental basement
Volcanics
Forearc basin fill
Accretionary prism
B
NIAS
A
0
km
5
Basement


QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

# CONVERGENT SETTINGS

- Backarc Basin: extensional, occurs where plates moving in same direction, at different rates



# CONVERGENT SETTINGS

- Foreland Basin: elongate regions of potential sediment accumulation that form on continental crust between contractional orogenic (fold and thrust) belt and craton (produced by thrust loading)
- Arch or bulge separates foreland from cratonic basin

# CONVERGENT SETTINGS

- Thrust belt typically propagates into foreland basin, moving depocenter in the direction of thrust motion
- Piggyback Basin: basins that are on the hanging wall of a thrust fault and move with the hanging wall.
- Sediments evolve from fine-grained turbidites to shallow water continental seds over time