

## DIVERGENT BOUNDARIES

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### BATHYMETRY OF THE SOUTH ATLANTIC OCEAN 3° S to 40° S

Use the map of the South Atlantic Ocean to consider the geometry of a divergent boundary on a plate scale and to examine the relationship between the divergent boundary and its first-order discontinuities, transform faults.

i) What is the very large scale character of the bathymetry of this MOR? How wide is the MOR? (How do you know where the MOR ends and the abyssal plains begin?) How high does the MOR rise above the abyssal plains? What is the slope of the MOR?

ii) Trace out the location of the divergent plate boundary, active transform boundaries, and inactive transform segments on the 11 x 17" portion of the map that has been duplicated for you. You should do this with as much precision as possible given the information on the map. It won't always be clear where the plate boundary lies exactly. You will have to make interpretations and interpolations.

Explain the principles that guide your choices (indicate where/how you did this right on the map). Try to abstract general principles about the relationship of bathymetry to divergent plate boundary systems from this. (Write them down).

iii) As you do your work, answer the following questions:

Are 2nd and 3rd order discontinuities - between the fracture zones - discernable on this map? Which can you find? Label those that you can find.

What is the smallest-scale feature that would be identifiable on a bathymetric map of this scale? (i.e. How big would, say, a volcano need to be to show up on this map?)

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## MID-ATLANTIC RIDGE SYSTEM - 24° to 31° N COMPILATION MAP

This compilation map shows the detailed bathymetry of the crest of the Mid-Atlantic ridge system from the Atlantis Fracture Zone (transform fault) on the north to just north of the Kane Fracture zone on the south (i.e. only one transform fault is captured in the map area). Study both the compilation map and the smaller scale maps from which it is made.

- i) Study the RIFT SYSTEM that forms the axis of the divergent boundary.  
What is the width of the rift valley? [One degree of latitude is approximately 110 linear kilometers.] What is the depth of the rift valley - the distance from the floor of the valley to the top of its walls?  
Where is the deepest part of this system?  
Is the bathymetry along the rift valley axis (parallel to the plate boundary) consistent? Is it segmented? Can you characterize it? What might differences in bathymetry along the rift correlate to?
- ii) Study the TRANSFORM FAULT at the north end of the map.  
Describe the morphology of this transform boundary, both in its active segment and in the inactive segment to the east and west of the divergent boundaries.  
Can you find the "nodal basins" and the "inside corner highs" as described in your reading?
- iii) Look for 2nd and 3rd order discontinuities south of the transform fault. Can you find a "DEVAL", a "OCS" and/or a "OBZ"?