

INVESTIGATING ISOHALINES: ATLANTIC OCEAN SALINITY CROSS SECTION

INTRODUCTION:

Where are the saltiest regions in the sea? Which areas have the least amount of dissolved salt? How does the study of salinity distribution give evidence of general ocean circulation patterns and dynamic ocean processes? In this investigation you will map the distribution of salinity across the globe. The attached cross section map of the Atlantic Ocean shows the salinity boundary lines, known as isohalines, from the surface down to 5000 m. The cross section map shows the Atlantic from 65° North of the Equator to 75° South.

PROCEDURES

1- Using a set of colored pencils, pens or water colors, create a “key” or a legend by choosing a different color for each salinity value shown on your map of the isohalines. [Suggestion: use dark blue or purple colors for high salinities and lighter blue or green colors for low salinities].

2- Using your color key, fill-in the regions of the ocean that correspond to the different salinity values.

ANALYSIS OF DATA

A. Give the approximate latitudes and depths for the regions with the highest salinity. What physical or chemical reason can explain this distribution pattern?

B. Where are the regions that have the lowest salinity? What physical or chemical property accounts for this distribution fact?

C. At what depth range do most of the salinity changes occur? Formulate a hypothesis to explain this.

D. What depth range shows the most uniformity or stability with respect to salinity? Formulate a hypothesis to explain this.

E. Label “AABW” on your cross section map to indicate the Antarctic Bottom Water mass. This is the water mass with a salinity of 34.8 o/oo that extends down and northward from Antarctica. Antarctica is shown as the dark land area from 65° to 75° South. What physical property causes this water mass to underlie the entire southern hemisphere? Explain.

F. Label “AAIW” on your cross section map to indicate the Antarctic Intermediate Water mass. This water mass has a salinity of 34.6 o/oo and extends as a tongue across the equator to 15° N, where it lies at a depth of 500 to 1000 meters.

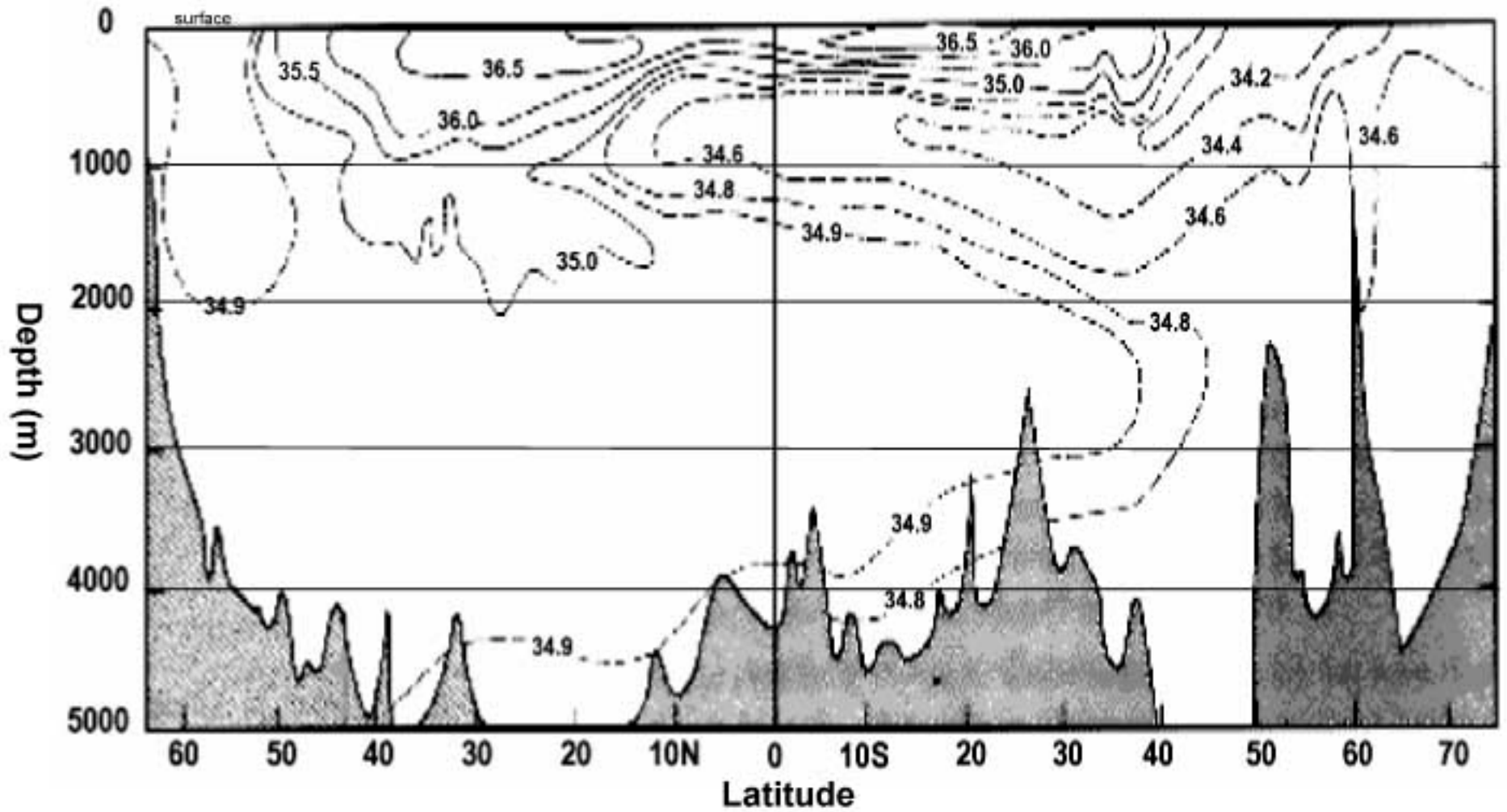
G. Label “NADW” on your cross section map to indicate the North Atlantic Deep Water mass. This water mass occupies the largest amount of volume in the entire Atlantic Ocean. It has a salinity signature of 34.9 o/oo. What physical property causes this water mass to cover so much of the deep ocean?

H. Which water mass has the greatest density, AABW or NADW? Explain.

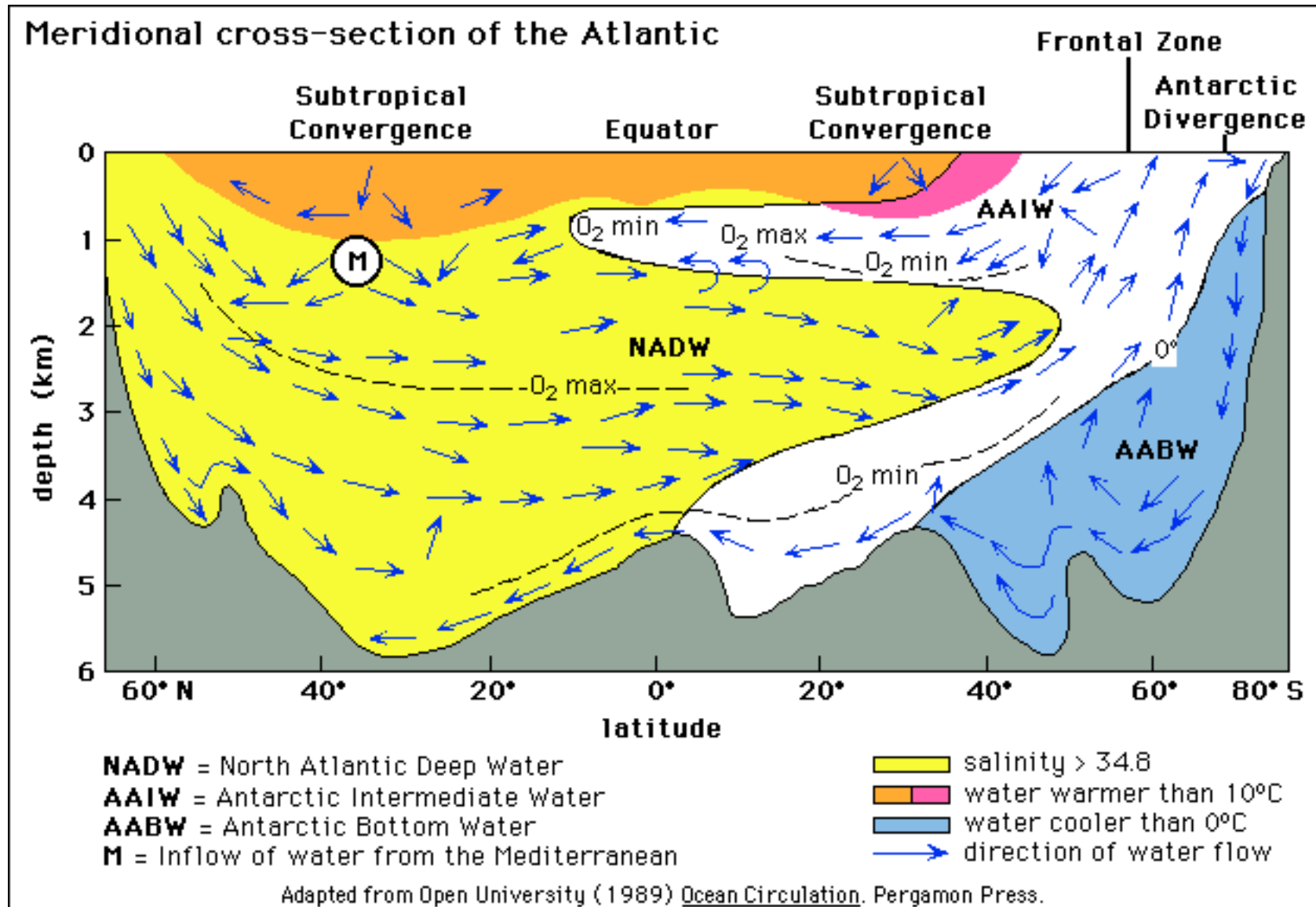
I. Use arrows to indicate the direction of flow for AABW and NADW.

Name _____ Period _____

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