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Round: 3A

1. Who first scientifically described Langmuir circulation (first and last name), in what year, and in what body of water?

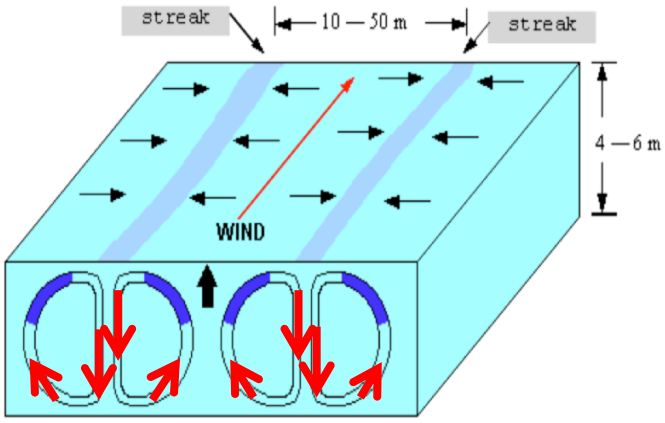
Irving Langmuir (1 pt), 1938(1 pt), Sargasso Sea (1 pt)

2. a. Describe in words the flow pattern in Langmuir circulation cells, and the conditions required to form them.

A cellular circulation set up by winds that blow consistently in one direction (1pt) with velocities above 12 km/h (or 3 m/s or 6 knots) (1 pt). Helical spirals running parallel to wind direction (1pt) are alternately clockwise and counterclockwise (1 pt).

b. Draw and label a diagram on the box below to show the vertical and horizontal circulations, and the causes and effects, of a Langmuir circulation cell in relation to the noted prevailing wind direction.

See diagram for correct labeling (1 pt for the correct labeling of any four (4) of the following; 4 pts total): - Vertical direction - Vertical distance (4-6 m) - Horizontal directions - Streak pattern - Horizontal distance (10-50 m)



3. What is the approximate depth of a Langmuir cell?

4-6 meters (5 meters also acceptable) (1 pt)

4. When observing from a boat or vessel, what are the visible telltale signs that Langmuir circulation is occurring?

Streaks of floating material/debris OR bubbles on the water surface (2 pts)
(Also accept: calm patches where divergence occurs OR wind rows OR rows of alternating surface roughness)

5. How might Langmuir circulation affect the distribution of plankton at the surface?

Organisms that lack strong swimming skills may be trapped in these areas of convergence OR organisms that lack strong swimming skills will be excluded from areas of divergence (2 pts). Hence, distribution may be concentrated to the areas of circulation (2 pts).

6. How might Langmuir circulation contribute to the cleanup of the Deepwater Horizon oil spill?

By organizing the oil into rows on the ocean's surface (1 pt), it could be easier to clean up (1 pt).

Reference: Introductory Oceanography, Ninth Edition, ©2001 page 226
(Introductory Oceanography, Ninth Edition, ©2001 page 533 (definition)) image: http://faculty.gvsu.edu/videticp/langmuir.ht