LANGMUIR CIRCULATION - FOAMY STREAKS ON THE WATER

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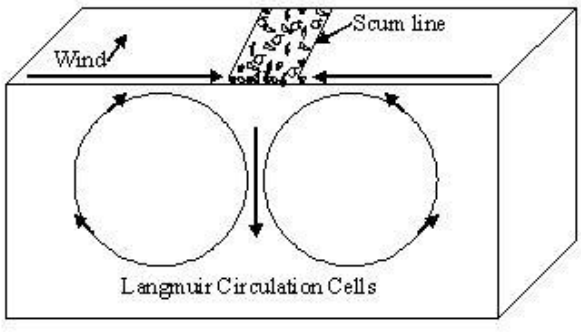
Have you ever wondered what those foamy streaks of scum on the Harbor are? Have you ever wondered why the bubbles seem to align themselves in streaks and not just cover the surface on windy days?

Those streaks or scum lines are due to a rather complex water movement phenomenon called Langmuir Circulation. When a specific blend of wind speed and wave movement occurs, we experience Langmuir Circulation.

Langmuir Circulation was discovered back in 1938 by scientist Irving Langmuir during a cross-Atlantic voyage. Langmuir noticed the sargassum (floating seaweed) forming linear patterns on the waters surface during his journey. Upon returning home, Langmuir conducted experiments in Lake George, New York, in order to explain the sargassum formations.



What Langmuir discovered was that as wind blows across the surface of the water, convection cells begin to take shape as the shearing forces of the wind push the surface water. The surface water is pushed in a perpendicular fashion to create a circulation pattern below the water. These cells begin to rotate as "tubes" of water for the length of the bay waters just below the surface and pointed in the direction of the wind. The tubes rotate in opposite directions to the concurrent tube next to it.

In simplest terms, when wind pushes a unit of water from point A to point B, more water rushes to fill point A. This causes an upwelling to occur. At point B, where there is more water than before, a downwelling occurs. This upwelling and downwelling effect, which happen over and over again, creates the spiraling tubes mentioned above.

While we can only see the surface, the evidence of this phenomena occurring lies in the

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two concurrent, counter-circulating tubes that clear the surface on the up-welling and concentrate floating bubbles on the down-welling. Because the two adjoining cells or tubes are rotating in opposite directions, what we see is the accumulation of bubbles, foam, and debris on the waters surface.

Next time you're out on the water and you see the telltale scum line, look around for another. The distance between the two scum line streaks is equal to two tubes. If you position your boat on top of a scum line, the water beneath you will be moving down and downwind. As your boat drifts between two scum lines, the water beneath you will be moving up and downwind.

Langmuir Circulation can be observed on any body of water including oceans, seas, lakes, estuaries, and rivers. This phenomenon can form very quickly and last from several minutes to several hours. So, have you seen those foamy streaks on the water lately?

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