FOLLOW THE GLIDER

DISCOVER THE OCEAN´S SECRETS WITH UNDERWATER GLIDERS

MEDCLIC
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Obra Social "la Caixa"

SOCIB
Balearic Islands Coastal Observing and Forecasting System

WHAT IS A GLIDER?

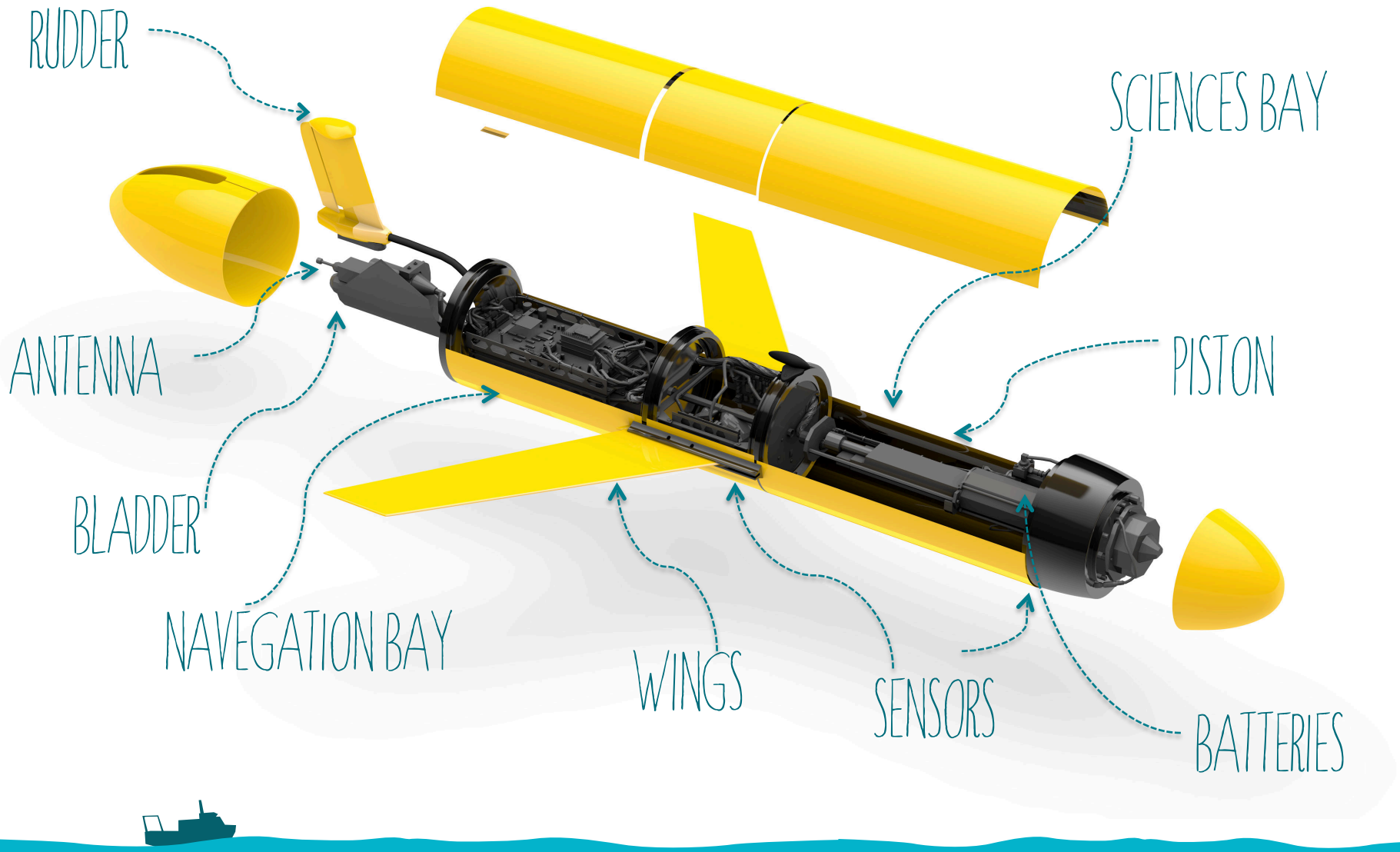
An underwater glider is a small submarine that's autonomous–which means there's nobody inside it, one reason being that nobody could possibly fit in there: it's only about 2 meters long and weights around 50 kilos.
Underwater gliders are used to observe the seas and the oceans. Scientists place them in the water and the gliders collect interesting data about the temperature, the amount of salt and oxygen in the water, and so forth. They do so by using sensors that measure that information and much more (depth, etc.)

Interesting info

1. *They use very little energy because they glide; they don't have any motors or propellors.*
2. *They can dive as deep as 1000 meters.*
3. *They can go as fast as 10-20 centimeters per second in vertical motion, but if the currents help them along, they can go up to 1 kilometer an hour.*
4. *They can send data to the lab through their antennas, and receive data, too.*

Watch the video at: http://followtheglider.socib.es/estudiantes/queesunglider/

This is what a glider looks like on the inside!



PROS AND CONS

There are other ways of getting data about the sea. One of them is organizing an expedition with several scientists, hopping on a boat, and sailing off for a few days, weeks, or even months to take all kinds of measurements. What are the advantages and disadvantages of using underwater gliders instead of other systems like boats?

ADVANTAGES

- They work 24 hours a day, 7 days a week.
- They cover large distances.
- They can go on long-term missions.
- They're autonomous, unmanned systems, so you don't need a large number of people on board, as you would on a boat.
- They can include many different sensors to measure many kinds of data (temperature, salinity, chlorophyll, oxygen... even sounds!)
- They allow us to collect almost real-time data.

DISADVANTAGES

- They move very slowly.
- They can only go down 1000 meters.
- They can't take samples on the spot. They can only collect data!
- Their sensors are still quite low-resolution compared to the ones available on boats.
- Their technology is very recent. They're still in the prototype stage, so things don't always work properly.
-They can run into fishing nets, plastic objects, or collide with the sea floor or boats.

2. HOW IT WORKS

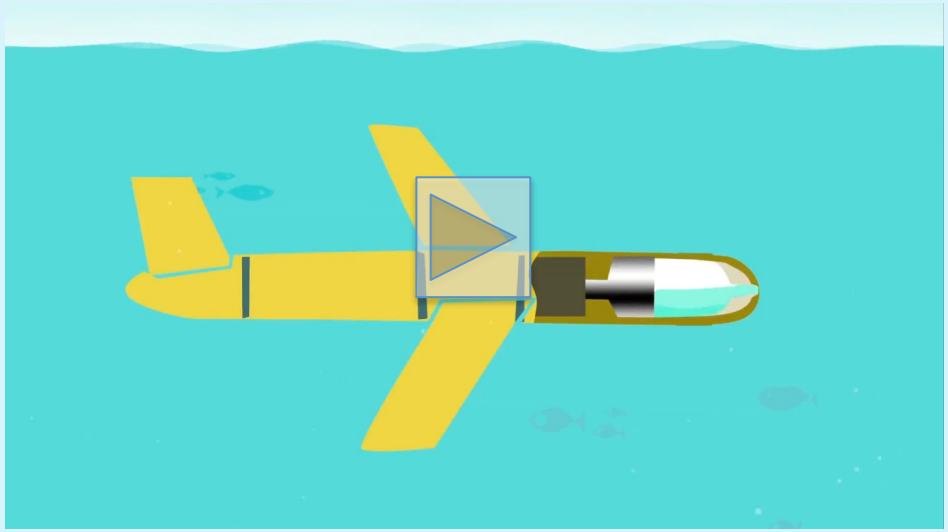
How does it go up and down in the water?

1. An underwater glider has a piston. When it wants to dive down, it fills the piston up and sinks.

2. When it wants to come back up to the surface, it releases the water from the piston.

3. The space that held the water fills up with air, and that makes the glider rise.

4. It's like an inflatable rubber ring: when it's full of air, it floats, and when it isn't, it sinks.



Watch the video at:
http://followtheglider.socib.es/en/estudiantes/howitworks/

A glider's journey, step by step.

1. LAB

The scientist decides on the glider's mission and the engineer, who's also the pilot, inputs the data into its operating system: route, deepest dive, how often it will get in touch with the base, what data it will collect and how often, what information to transmit, etc.

2. LAUNCHING AND NAVIGATING

Once we've put the glider in the water, first it sinks and then it bobs back up. During the entire mission, it keeps on going up and down like this. As it sinks and surfaces, it collects data. A set of alkaline or lithium batteries provide the power it needs to move. It doesn't have propellers or a motor, so it doesn't use up a lot of energy.

Okay, so... how does it move along?

It does so by using its wings. When the glider goes up and down, it glides in the water. If it has to change course, it uses the rudder attached to its tail.

3. DATA TRANSMISSION

The glider comes up to the surface, connects its antenna, and sends the data it has collected via satellite. If necessary, it receives new orders. Its GPS helps it find its way, detects whether the currents have set it off course, and points it in the right direction.

HOW LONG DO THE BATTERIES LAST?

A glider doesn't have a motor, so it uses as little battery power as a cell phone. It gets the power it needs from alkaline or lithium batteries.

WHAT HAPPENS IF IT GOES OFF COURSE?

Ocean currents can set a glider off course. When it realizes what's going on, the glider can correct its "mistake": for example, if it thinks there have been currents heading south, it will head further north to correct that divergence.

Well, that depends on:

- The type of battery: lithium batteries last longer.
- The environment: gliding against the current uses more power.
- The mission: if the glider has to dive down deep, turn on many sensors, or send data many times a day, it uses more power.

END OF MISSION

The mission ends because...

- That was the way it was planned all along.
- Something very serious happens, like a mechanical failure.
- The batteries run out.
- If a storm is coming, we give the glider the order to dive down, avoid the storm, and wait until it passes to continue its mission. But if there's a long stretch of bad weather ahead... we've got to recover the glider right away!

COMING HOME

With any luck, the glider will make it home on its own. But that may use up a lot of battery power, so we have to figure it all out very well in advance, so the glider won't end up stranded. Sometimes it's worth continuing to collect scientific data even if a glider's batteries have run out. In this case, when the power is all used up, we set out to find the glider, wherever it may be. And that isn't always easy!

WE'VE GOT A PROBLEM!

There are many dangers out there while a glider's on a mission:

If any of this happens, we have to suspend the mission and rescue the glider!

DANGERS

- Mechanical or software failures.
- Collisions with boats, fishing nets, and buoys...
- Poor-quality batteries.
- Communications failures because of the glider itself or the satellites.
- Low-density waters that don't allow the glider to get back up to the surface.
- Unwanted fellow travelers, such as mollusks or remoras, that stick onto the glider and stop it from moving on.

3. WHAT IT MEASURES

An underwater glider measures different things in the seawater: some are physical (the amount of salt, the temperature) and others are biochemical (the amount of oxygen or chlorophyll in the water).

Physical parameters: salt and temperature

Do you think the amount of salt in the water is the same everywhere in the sea? And that the temperature is the same, too? Well, it isn't! The water that flows into the Mediterranean from the Atlantic Ocean through the straits of Gibraltar contains less salt. Meanwhile, the water in the eastern Mediterranean is saltier. Why do you think it is? In the eastern Mediterranean, there's more evaporation, and if more water evaporates, the proportion of salt left in the water is higher.

Why would we want to know about the water temperature and salt content?

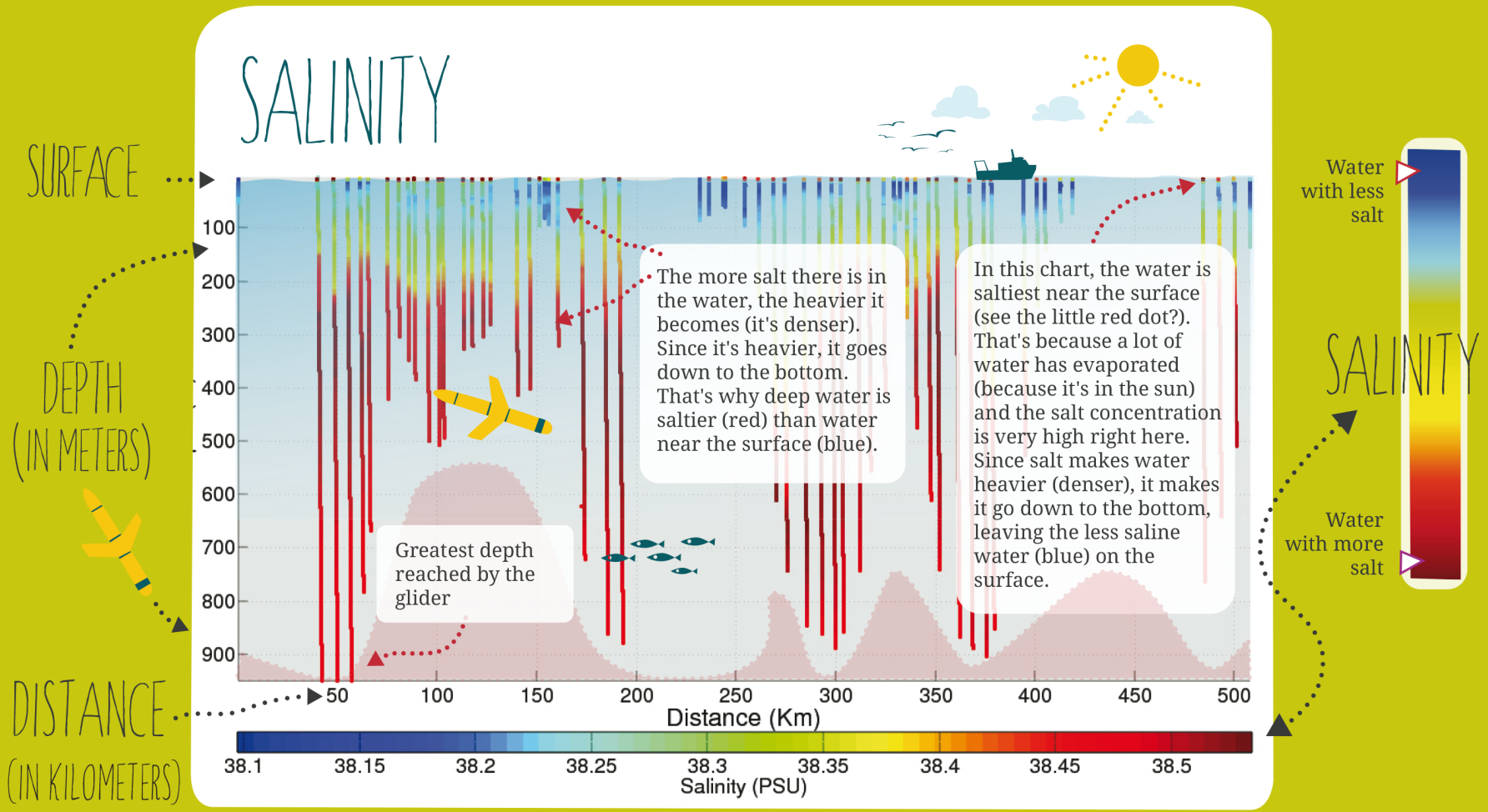
Seawater is not the same on the surface and down deep. On the surface, it's not very dense. Density depends on salt and temperature, among other things. So when we measure its temperature and salinity, we find out about the changes in the water's density. These changes affect marine currents: if we have that information, we can find out more about how currents move. We can also find out more about the weather's influence on the sea.

Biochemical parameters: oxygen and chlorophyll

The oxygen and chlorophyll in seawater are very important for marine ecosystems. Oxygen is what most animals and plants need to survive. And chlorophyll helps us know how much phytoplankton the water contains. Phytoplankton is made up of small organisms (like tiny algae) that photosynthesize and have chlorophyll. So, if there's a lot of chlorophyll in the water, it means there's lots of phytoplankton. Do you think that's important? It sure is, because many marine animals feed on phytoplankton! Phytoplankton also absorb large amounts of CO2; they're like a forest in the sea, the "ocean's lungs."

Why would we want to know about the chlorophyll and oxygen?

How do we read the data we receive from a glider?



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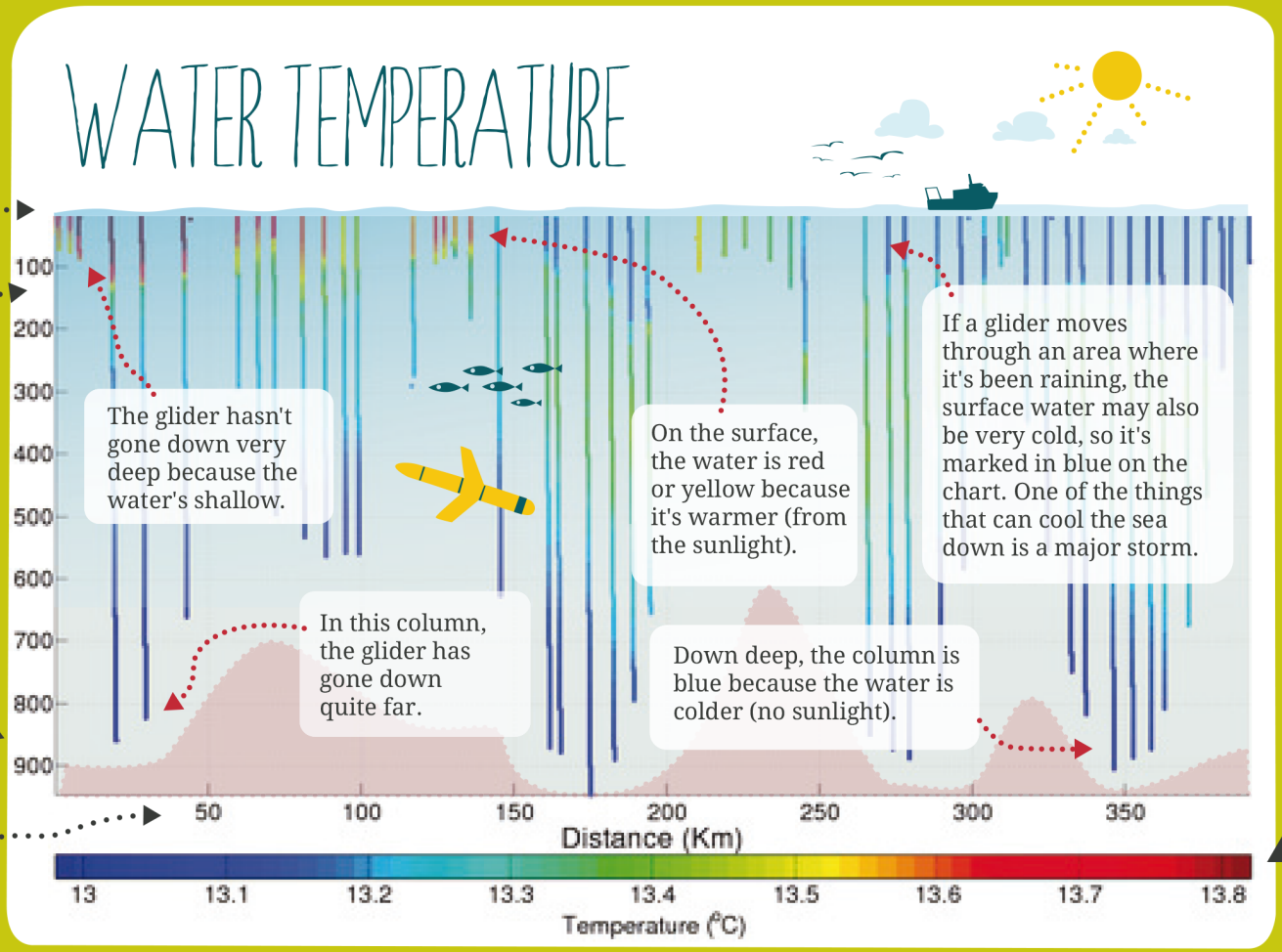

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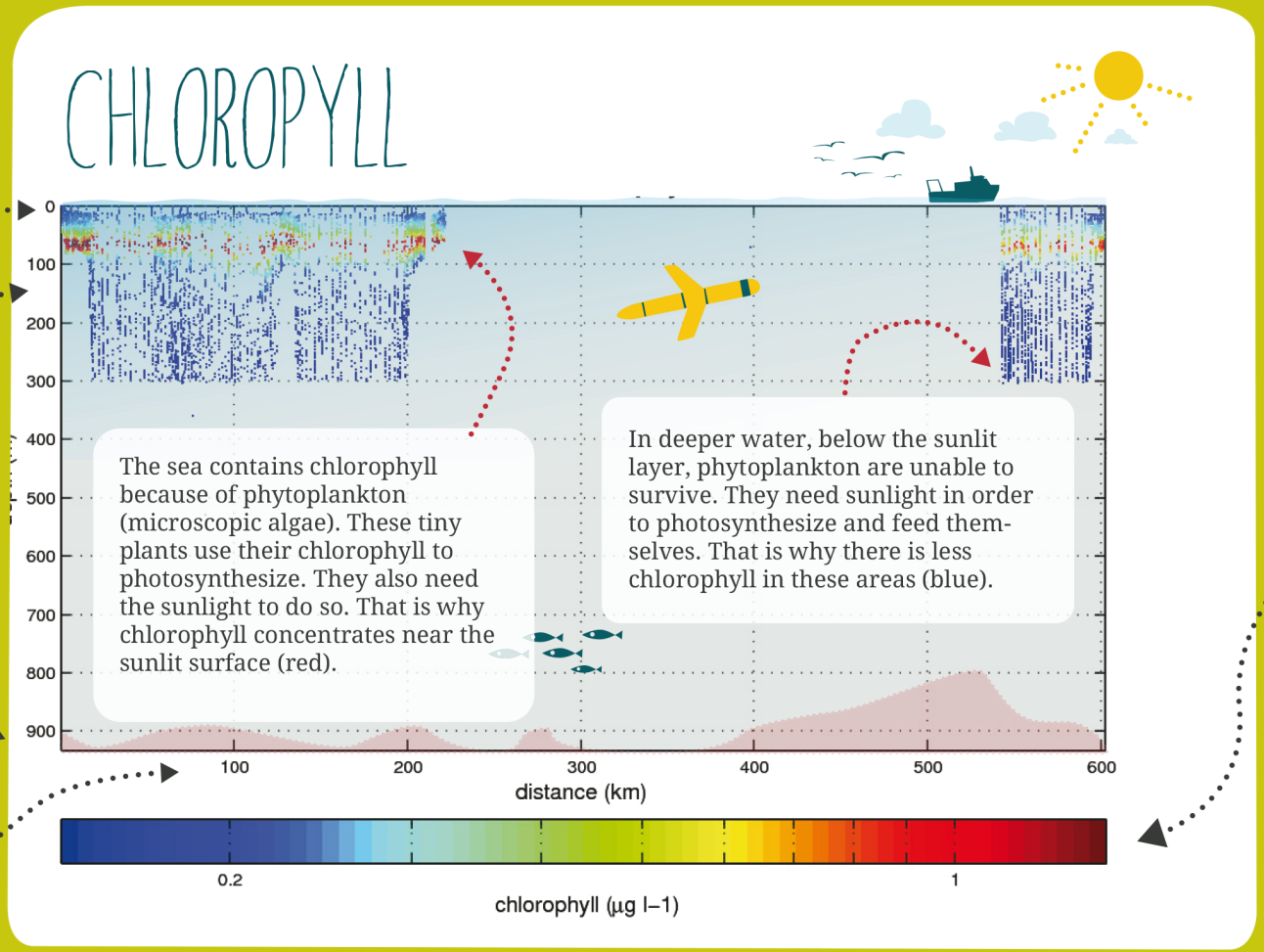

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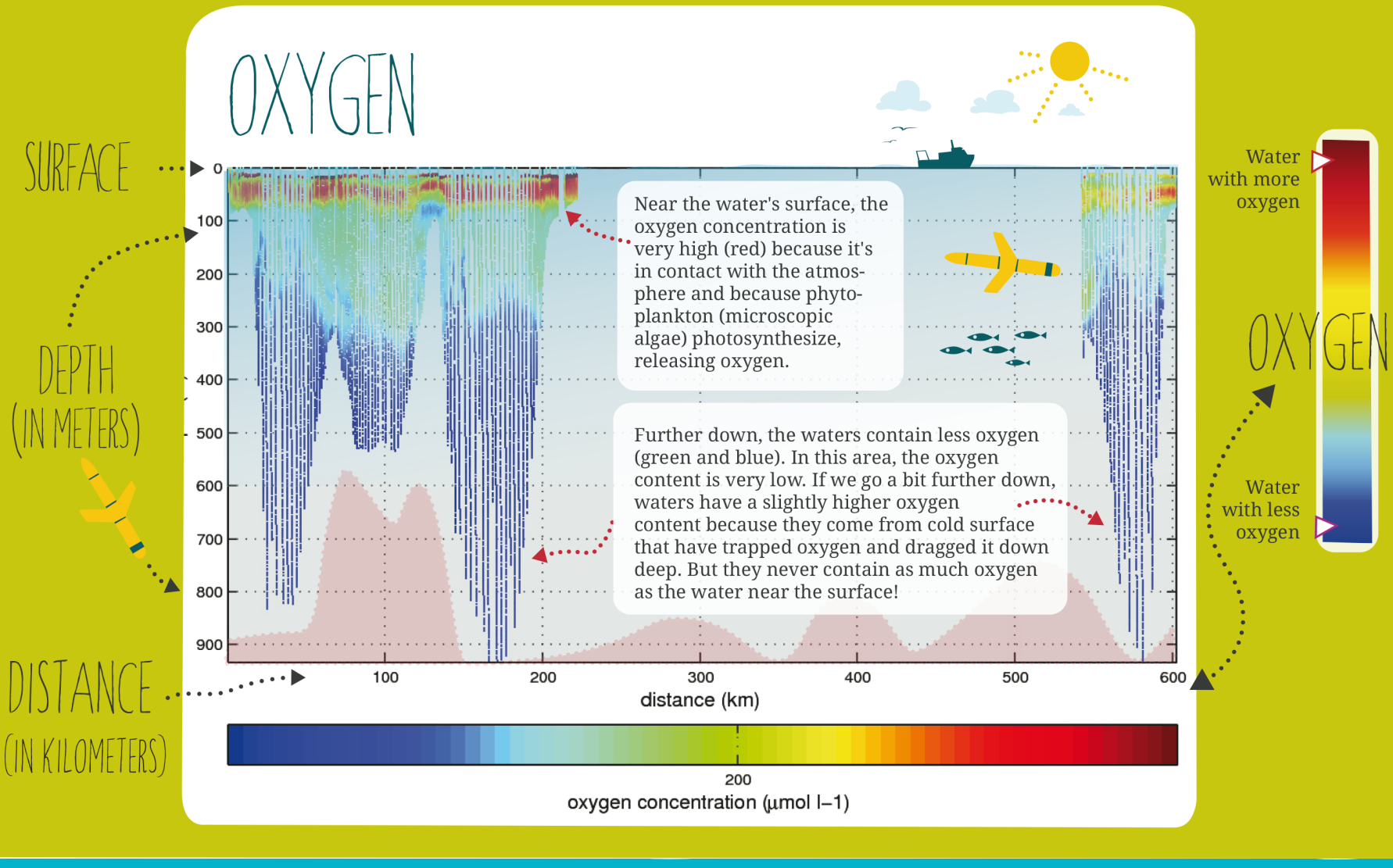


4. WHAT IT´S FOR?

Things are pretty much similar in the sea, and it's important to know how currents and whirlpools work in order to come up with forecasting models.

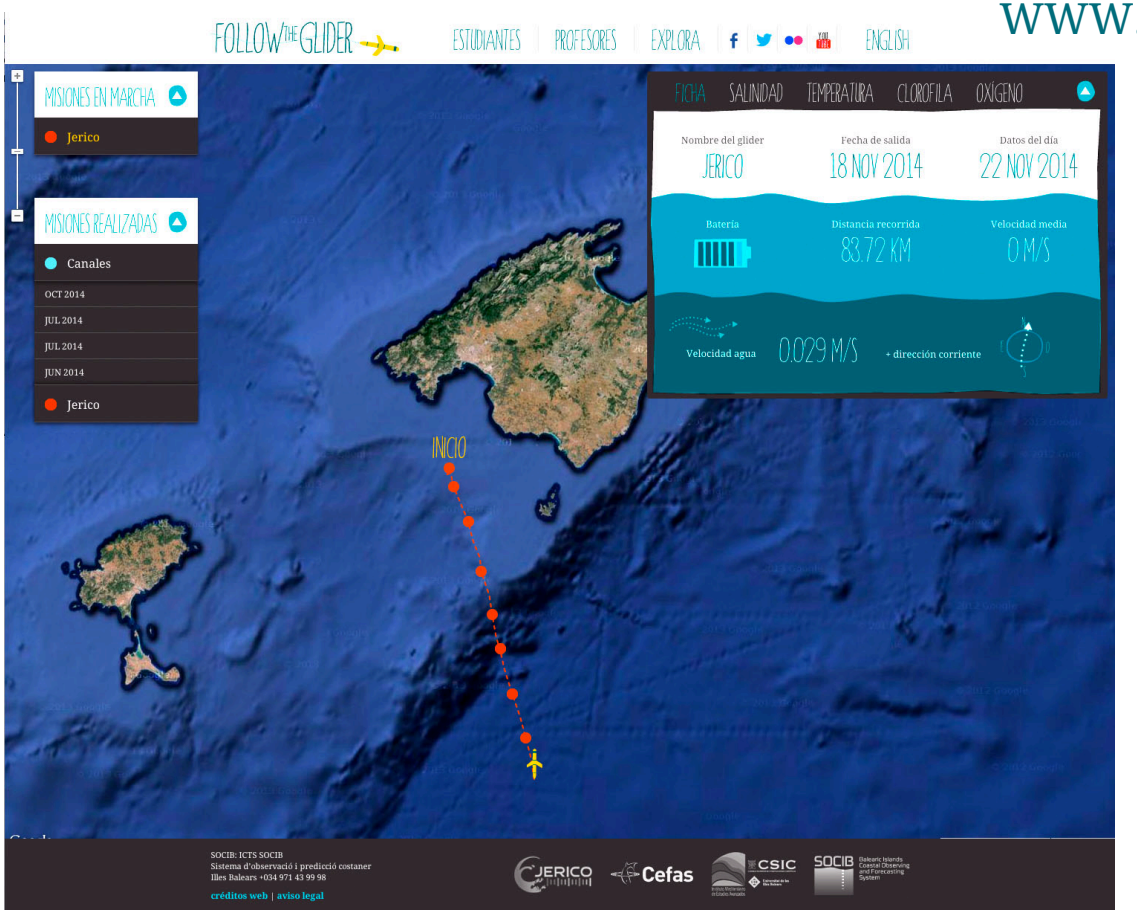
These models enable us to do things such as:

- Know in what direction an **oil spill** is going to move.
- Know how the oceans are reacting to **climate change**.
- Know how **severe winter storms** affect the sea.
- In the future, gliders will have more advanced sensors that will allow us to measure nitrites, nitrates, pH, alkalinity, etc.

5. EXPLORE

WHERE ARE OUR GLIDERS SAILING TODAY?

FOLLOW THEM AT
WWW.FOLLOWTHEGLIDER.COM

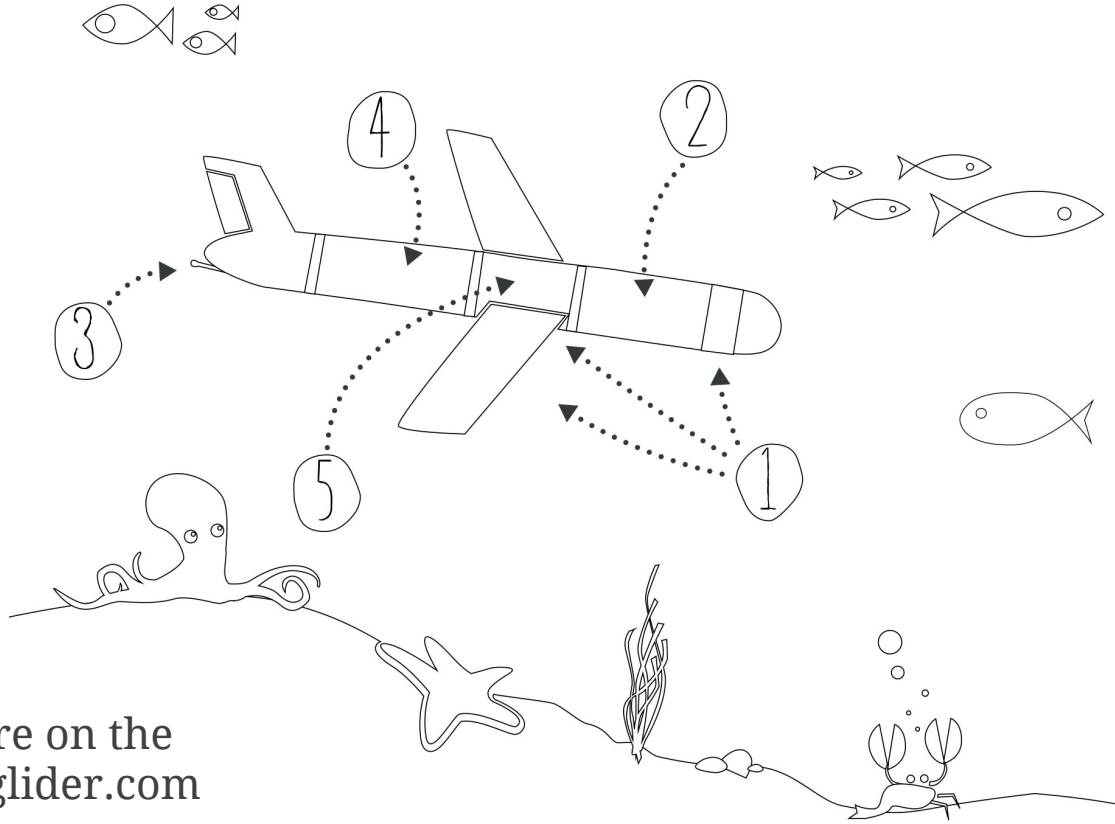


1 ACTIVITY

Discover a glider and follow it

1. Color the glider and label its parts

- ◯ Piston
- ◯ Antenna
- ◯ Navigation bay
- ◯ Scientific bay
- ◯ Sensors



2. Choose one of the gliders that are on the “Explore” map at www.followtheglider.com and follow its course.

2 ACTIVITY

Your mission

You're a glider pilot and have to make a few decisions

1. Do you have to put gasoline in the glider before it leaves?

a. No, you don't. The glider doesn't need any gasoline because it glides and uses batteries.
b. Yes, it needs gasoline so it can go up and down in the sea.

2. The glider has gone off course. What should you do?

a. Just let it keep on going.
b. Send it new data so it can get back on the right course.
c. Go fetch it before it gets lost.

3. The glider is very far from home. It's collecting really interesting data, but it's almost out of battery power. What are your options?

a. Tell it to come home.
b. Save energy: turn off all the sensors that aren't necessary and tell it to come home.
c. Tell it to keep on collecting data and then you'll go out to fetch it.

4. A storm is approaching. What orders should you send to the glider?

a. It's probably not a big deal. Keep on going.
b. Dive down deep and wait until the storm passes.
c. Come home, it's really dangerous!

5. The glider's motor has broken down. What should you do?

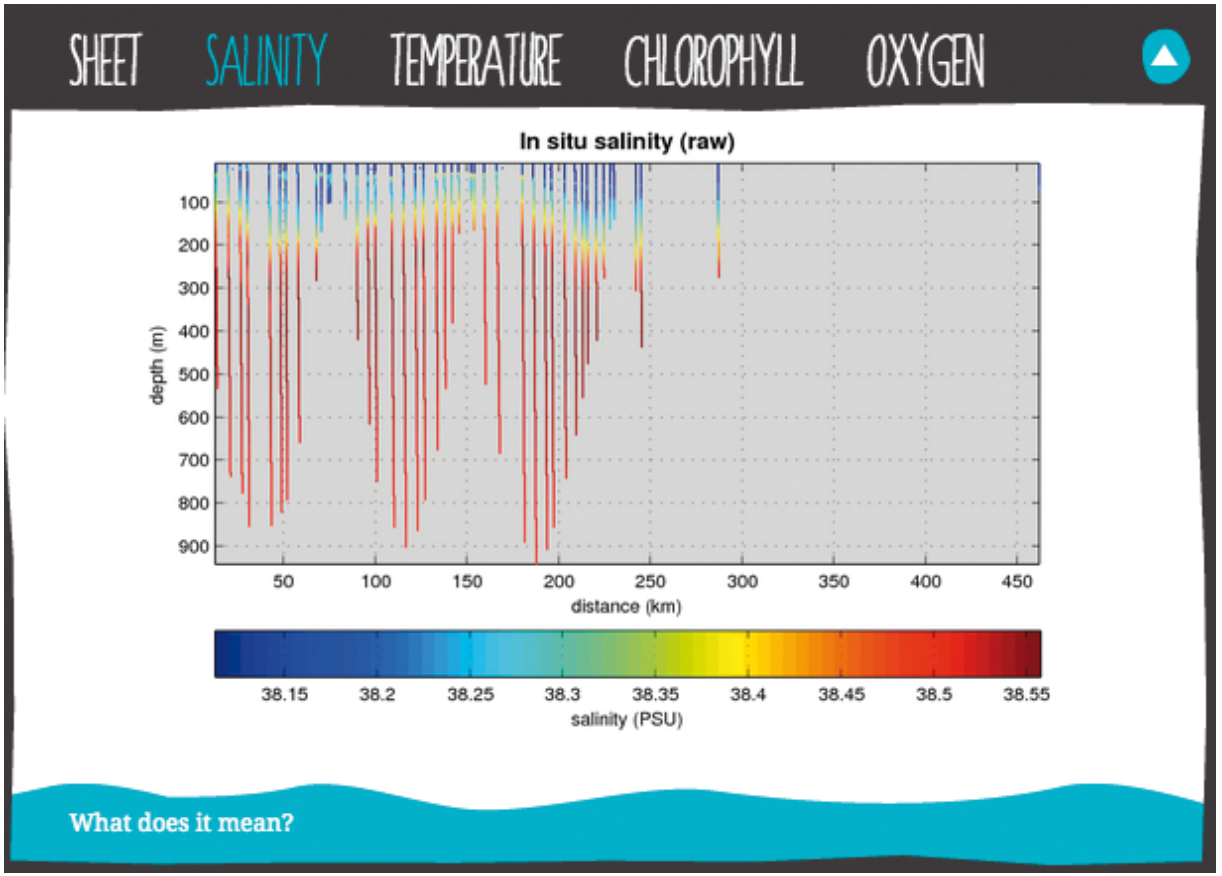
a. Send a mechanic out to repair it.
b. That's impossible. Gliders don't have motors; they glide!

2 ACTIVITY

Your mission

6. The glider has sent you this graph showing the salt in the water. Point out where the following are:

a. The surface water.
b. The bottom of the sea.
c. The saltiest water.
d. The least salty water.



2 ACTIVITY

Your mission

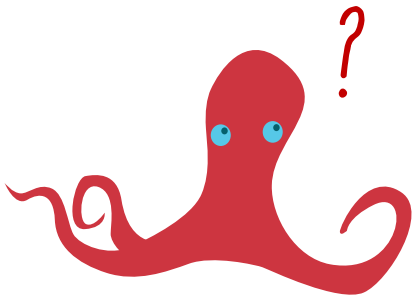
7. The glider is moving along on very warm surface water. Suddenly, it starts raining hard. What do you think will happen?

a. The water on the surface will cool down.
b. The water on the surface will stay just as warm.

8. The sea can be a very dangerous place for a glider. What dangers do you think it can encounter when it's on a mission?

9. What do you think gliders are for?

A few things you should know before you continue with the activities

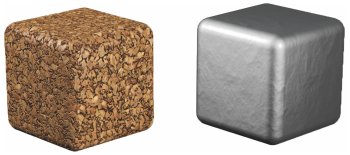


How does a glider move if it doesn't have a motor?

Watch the video at
http://followtheglider.socib.es/en/estudiantes/howitworks/

What is density?

Density refers to how much mass there is in a certain volume. Even if two objects are the same size, if one has more mass than the other, it will be denser. For example, lead is denser than cork.



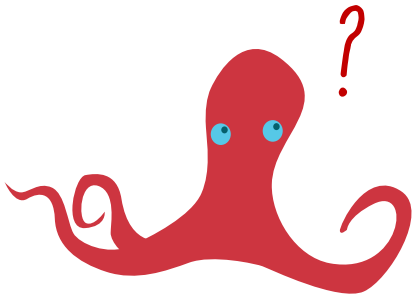
How is density related to buoyancy?

Buoyancy is an object's ability to float in a liquid. One object will float above another one if it is less dense. The density of lead is 11.35g/cm3; it is 0.24g/cm3 for cork, and 1g/cm3 for water. Therefore, cork will float on water, but lead will not.

What is the density of seawater?

The density of seawater varies according to its **salinity** and its **temperature**. Seawater is denser than freshwater; the saltier the water, the denser it is. Temperature also has an effect on density: cold water is denser than warm water. This determines ocean circulations, which is the movement of masses of water within the ocean.

A few things you should know before you continue with the activities



Salinity

Surface salinity depends primarily on evaporation and rainfall. In tropical zones, where evaporation is greater than rainfall, seawater is very salty on the surface. However, in coastal areas near the mouths of rivers, salinity is lower. At the Poles, when the ice melts during the summer season, salinity is also very low.

Temperature

The water temperature depends on the amount of heat absorbed from solar radiation and the amount of heat released from the sea to the atmosphere.

3 ACTIVITY

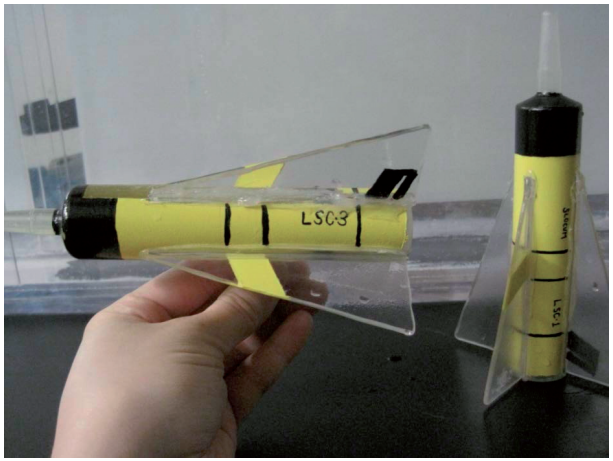
Build a glider

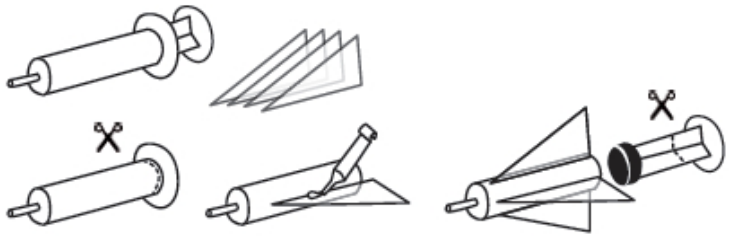
How does a glider move through water without a propeller ?

CONSTRUCTION

1. First, cut the plunger of the syringe so it is about 2.5 cm long.

2. Cut off any of the excess plastic at the back of the syringe. This modified syringe will form the body of the model glider.





3. Next, form the glider wings by cutting 4 Plexiglas triangular shapes that are 10 to 11.5 cm long and 3 cm high. Although real ocean gliders only have two wings, for stability this model needs four wings.

4. Glue the wings to the syringe body at 90º angles at the positions north, south, east, and west. It is important to make sure that the wings are straight lengthwise on the tube, and as close as possible to a right angle on the syringe.

5. Lastly, use yellow and black electrical tape to "paint" the syringe and make it look like a real glider.

3 ACTIVITY

Build a glider

EXPERIMENT

1. Fill the fish tank with fresh water to about ten centimeters from the top.

2. Fill the large measuring cup about halfway with fresh water. Add a handful or two of salt and stir well. The salt should be large-grained and without special additives.

3. Use the syringe to fill one of the gliders you built with the saltwater mixture. Hold it upright and press up on the plunger with your finger to remove any air bubbles.

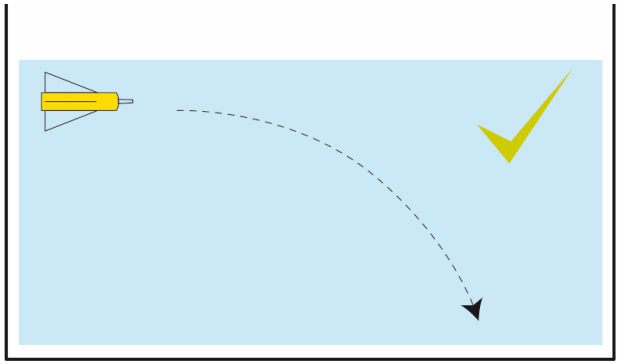
4. Have another one of the gliders you built empty or with a small amount of water inside it.

5. Test fly the gliders by placing them horizontal in the tank (at the surface if it is water filled or near the bottom if empty/air filled) and giving a slight forward push before you release them. The glider should sink nose first, not tail first.

3 ACTIVITY

Build a glider

Sinking should be this:



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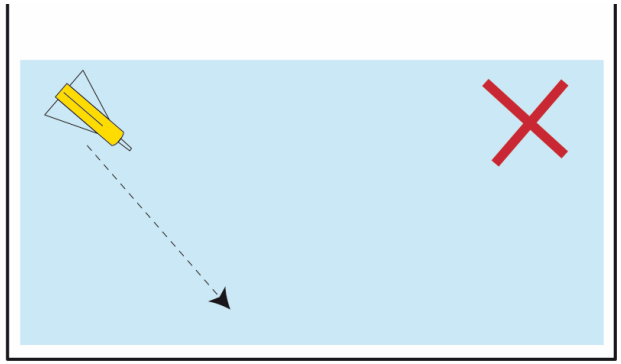
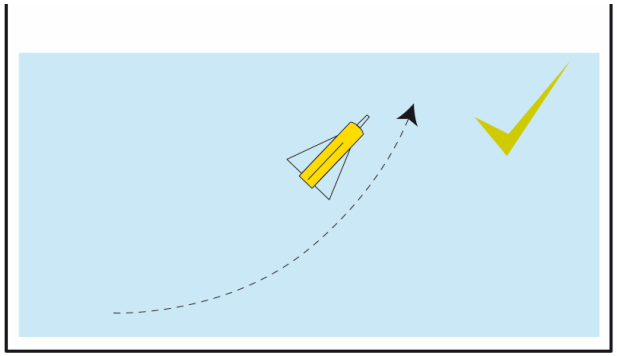


Floating should be this:



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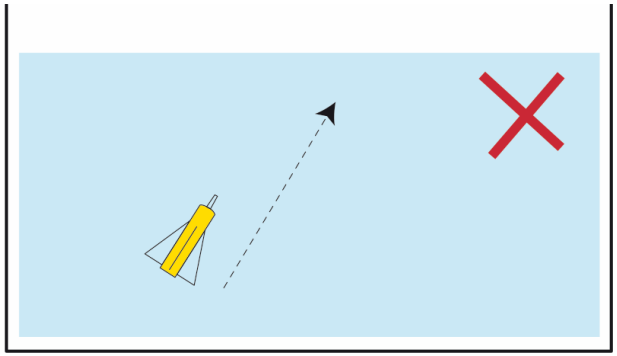


6. Which of the gliders has a higher density?

4 ACTIVITY The amazing story of the floating egg and the colored ice cubes

1 THE EGG THAT FLOATS... OR DOESN'T

EXPERIMENT

1 Fill a large, clear glass with tap water and place a raw egg in it. What happens?

2 Fill another identical glass with tap water and add a fair amount of salt. Stir it in. Place a raw egg in the glass. What happens?

3 Why does one egg float and the other one sink ?

4 Why is saltwater denser than fresh water? Look for the answer online

5 How do you think this affects the glider?

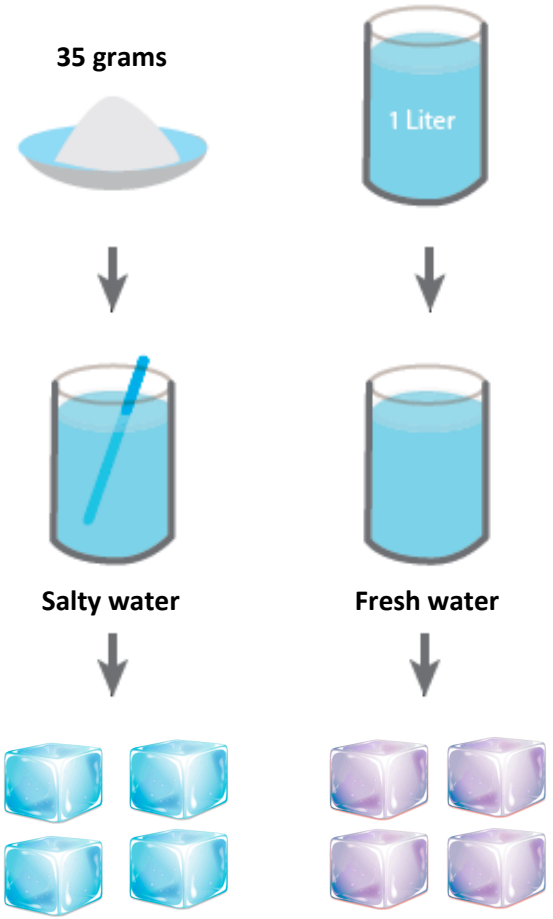
If you have time, you can take the experiment one step further following this video:

http://youtu.be/VAevsIHDnhQ

4 ACTIVITY The amazing story of the floating egg and the colored ice cubes

2 THE COLORED ICE CUBES

Make ice cubes the day before. Into one half of the tray, pour food-colored water. Using a different color, pour very salty water into the other half of the tray (35 grams of salt per one liter of water, which is the average amount of salt in seawater).



EXPERIMENT

1 Fill the fish tank with tap water. Allow the water a minute or two to settle.

2 Gently add one cube of each color into the water. Before you do it, come up with a working hypothesis: what do you think will happen when you add the ice cubes?

3 Describe and explain what happens.

4 What ice cubes sink faster? Which sink slower? Why?

5 ACTIVITY

The water layer trick

How does seawater mix? Is seawater the same everywhere?

Stratification

In the ocean, masses of water form layers according to their densities. This is what we refer to as the water column, whose data the glider collects. In areas of open ocean, the water column usually has three different layers:

1) At the top there is a layer of **warm, less dense water**.
2) Next, there is **a thermocline**: an area where the water cools down and its density quickly increases with depth.
3) Lastly, there is a **deep layer of denser, colder water**, whose density increases with depth.

In the open ocean, the difference in density depends on temperature above all. However, in coastal areas near the mouths of rivers and in polar zones where ice forms or melts, salinity is very important for determining water density and stratification.

5 ACTIVITY

The water layer trick

EXPERIMENT 1

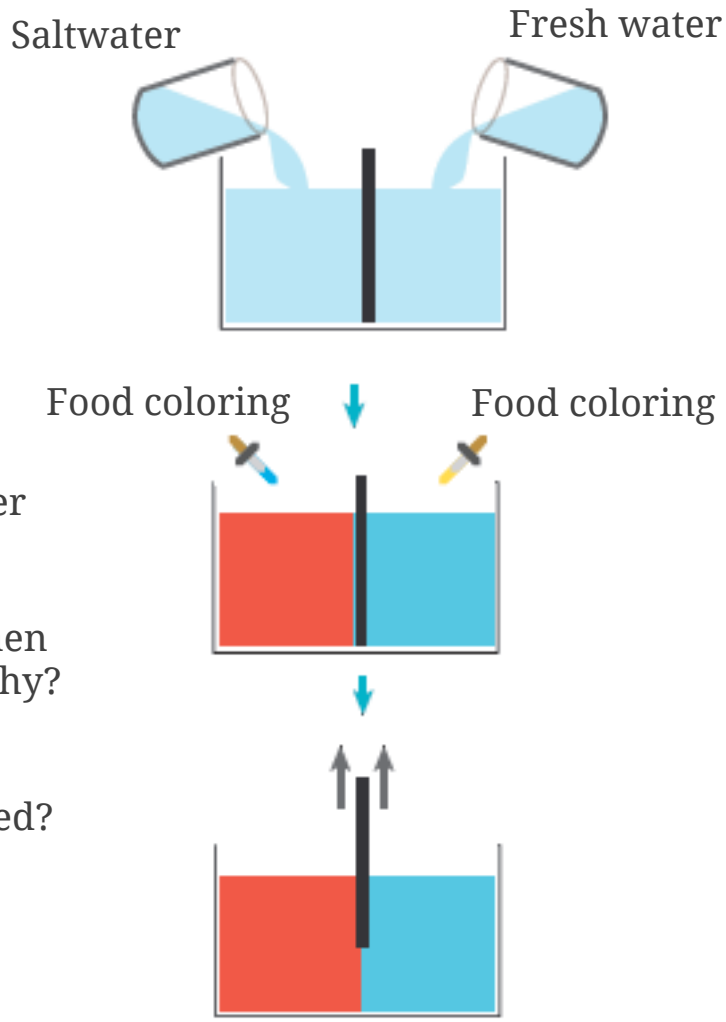
1 Fill the measuring cup with tap water.

2 Pour that tap water into one of the compartments in the divided tank. Pour the contents of the bottle with the saline solution into the other compartment.

3 Add a few drops of food coloring of one color in one compartment and a few drops of another color into the other compartment. .

4 Generate a hypothesis: What do you think will happen when you remove the divider between the two compartments? Why? Which water is denser?

5 Remove the divider. What happens? Is it what you expected?



5 ACTIVITY

The water layer trick

EXPERIMENT 2

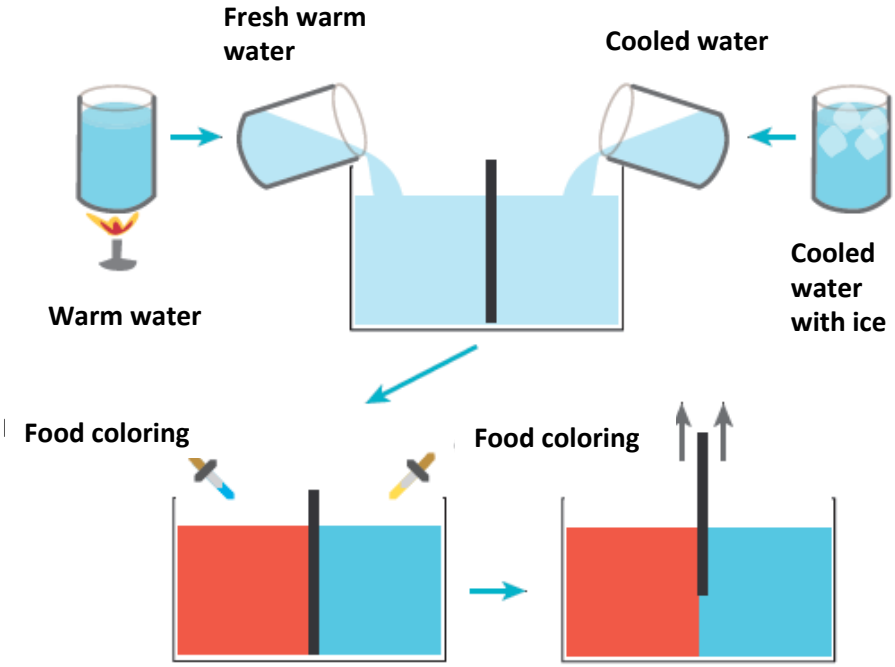
We are going to repeat the experiment, but instead of using fresh water and saltwater, we will use cold water and warm water.

1 Pour warm water into one compartment and cooled water into the other one.

2 Put a few drops of food coloring of one color in one compartment and a few drops of another color in the other compartment.

3 Come up with a hypothesis: What do you think will happen when you remove the divider between the two compartments? Why? Which water is denser?

4 Remove the divider. What happens? Is it what you expected?



5 ACTIVITY

The water layer trick

The Ibiza Channel

There are places in the ocean where large masses of water come together, with different densities, temperatures, and salinities. This has consequences for the entire ecosystem and climate in that location. One of those special places is the Ibiza Channel.

Water masses from the Atlantic and the Mediterranean meet there, with the changes in density associated with temperature. Have a look at the following articles and you will see how the data provided by gliders help us learn how this confluence of waters works and what consequences it has for some animal species, such as the Atlantic bluefin tuna.

6 ACTIVITY

Thermocline: a border

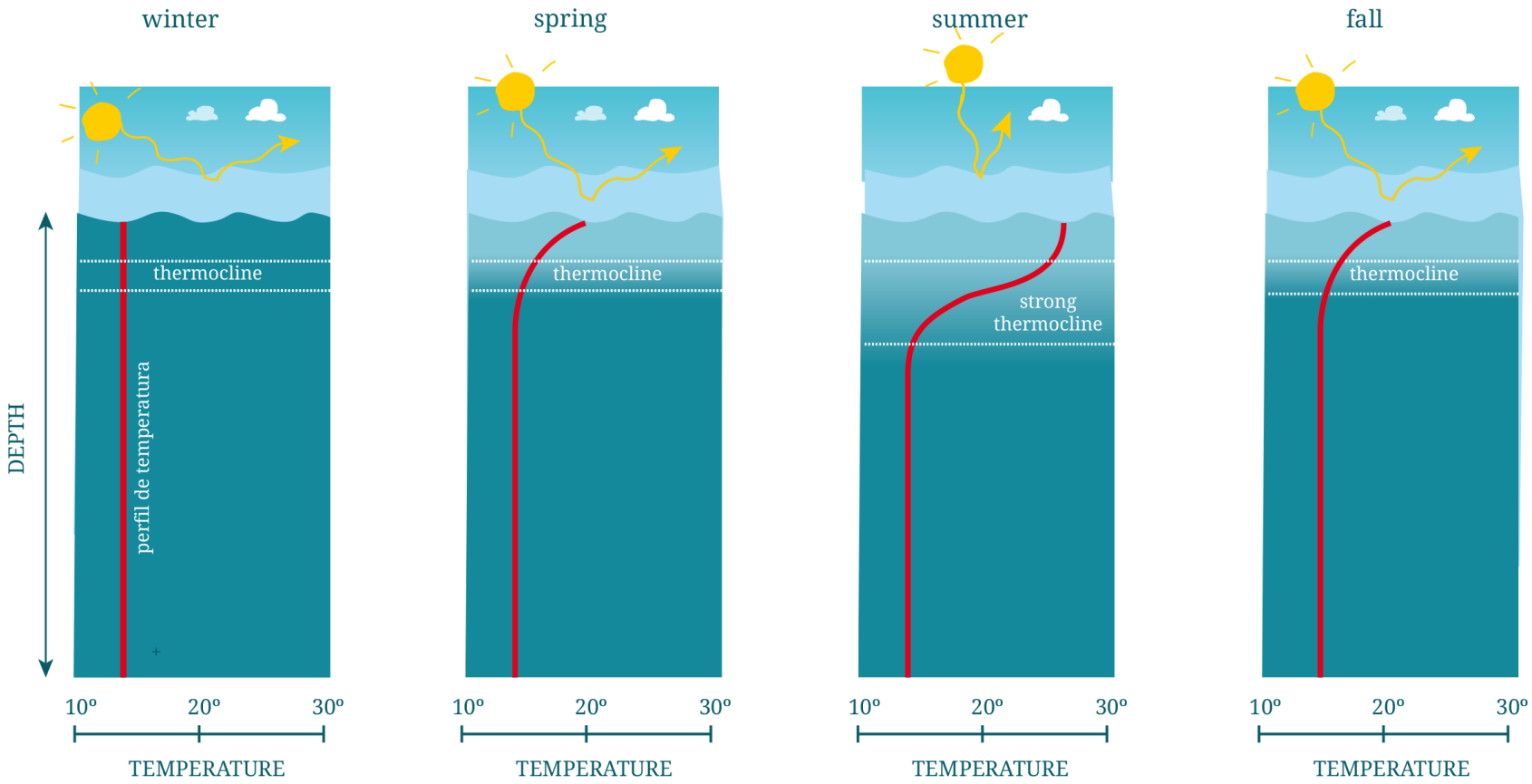
Masses of water with different densities don't mix, but what happens in the area where they meet?

The Thermocline

Waters with different densities don't mix. They only do so if they're affected by powerful external events, such as major storms. When the sun is very strong, the temperature on the ocean's surface rises sharply. However, this temperature doesn't reach the deepest water, which is colder (cold water is denser, so it sinks). Between the two layers, we find an area that separates both masses of water: that is the thermocline. When there is a big storm or a strong wind, the water is riled up, the thermocline is broken, and the masses of water mix again.

6 ACTIVITY

Thermocline: a border

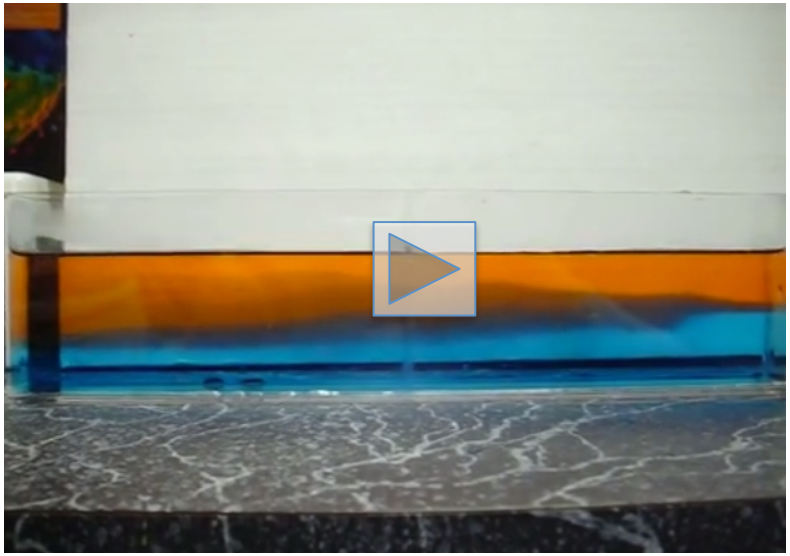


6 ACTIVITY

Thermocline: a border

Create your own thermocline

If you haven't done the experiment in Activity 5, watch this video:



http://youtu.be/RXTc-kHQN2U

1. If the water near the surface is very warm and the deep water is very cold, what time of year do you think it is? What will the thermocline be like? Why?

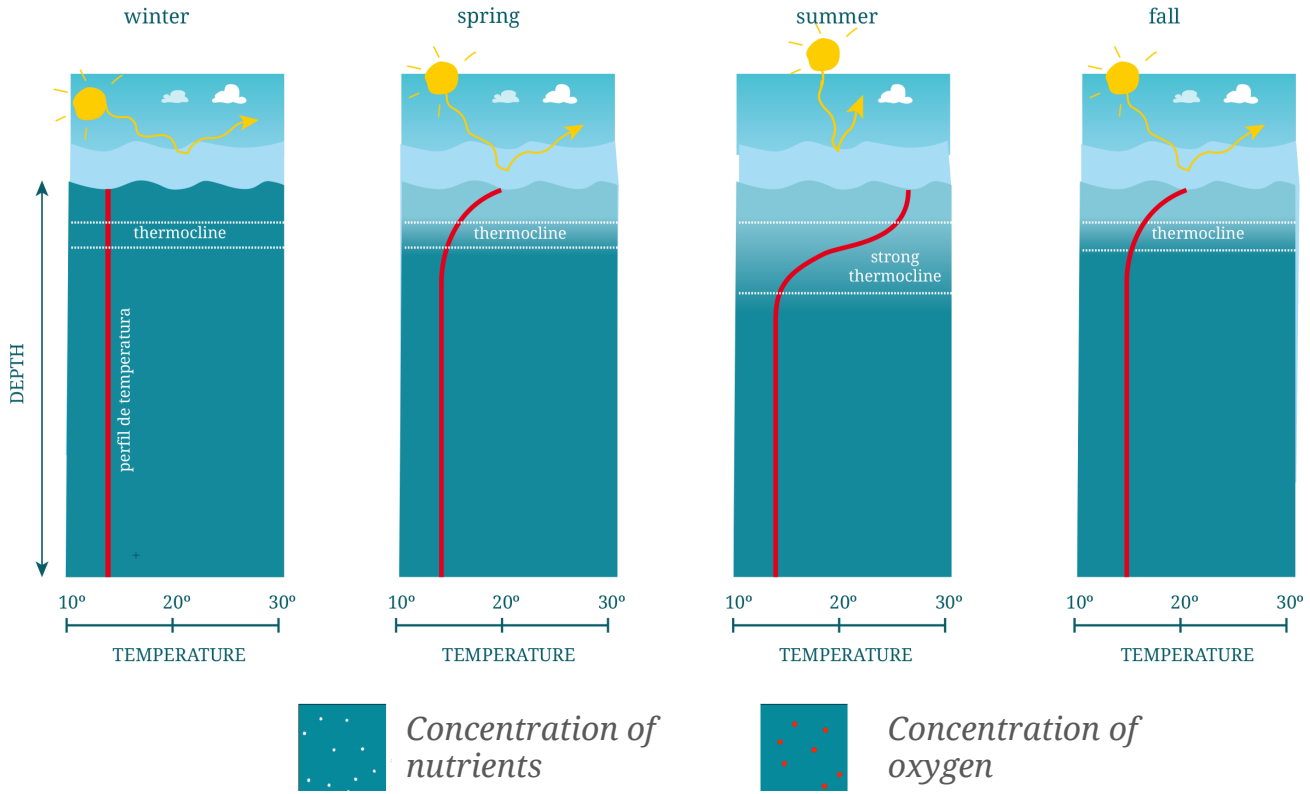
2. Why do we say that the thermocline is a border?

3. How do storms affect the ocean?

6 ACTIVITY

Thermocline: a border

4. Look at the following graph. How would you interpret what happens in the summer?



5. The data provided by gliders enable us to study the thermocline. Visit *http://followtheglider.socib.es/en/explorar/*.

Choose one of the missions, click on one of the dots on its course, and then select Temperature. Point out where the thermocline is located in this graph.

7 ACTIVITY

The ocean's smallest creatures

How can gliders help us learn about marine ecosystems?

Gliders can't collect samples; they don't pick up water that we can analyze in the lab, nor algae, nor sand from the ocean floor. However, they can supply us with certain data that enable us to draw conclusions about plankton.

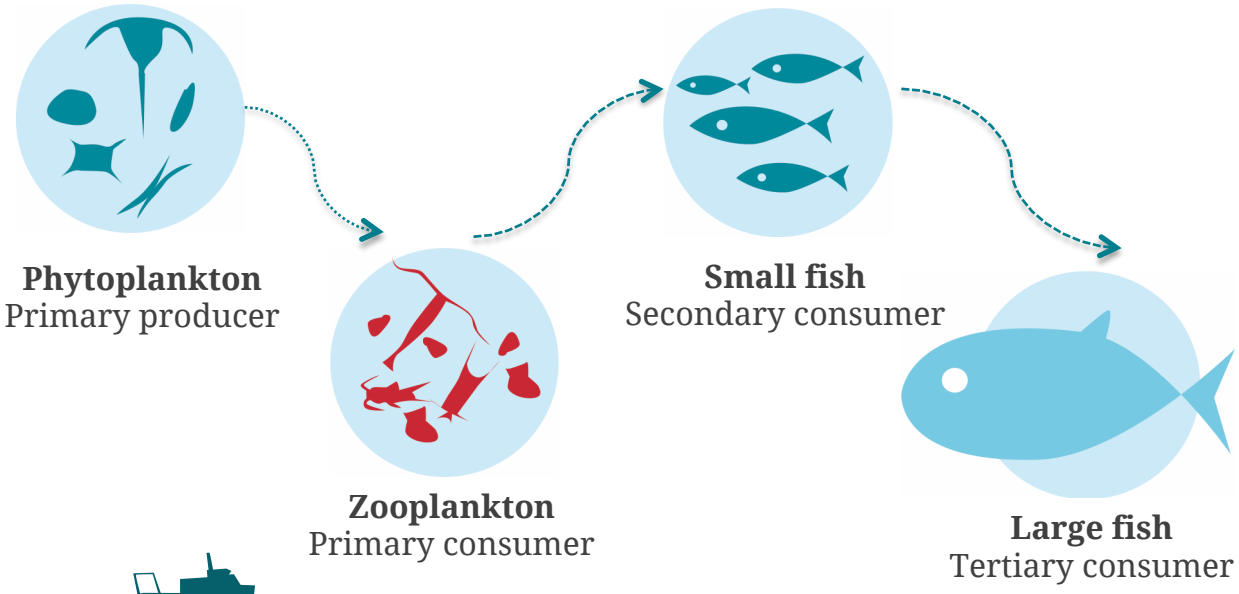
What Plankton Is
Plankton are aquatic plant and animal organisms, most very small, even microscopic, that drift in the water.

Phytoplankton
Phytoplankton are the kind of organisms that perform photosynthesis. Most are microscopic algae. They stay near the surface of the ocean to receive sunlight, which is essential for them to photosynthesize and transform light into food. To trap the energy from sunlight, they need chlorophyll, and in doing so, they release oxygen. Gliders are capable of collecting data about chlorophyll and oxygen content, and therefore tell us whether there is more or less phytoplankton in an area. Phytoplankton organisms are considered to be primary producers, and are a food source for very small organisms a well as for some very large ones, such as whales.

7 ACTIVITY

The ocean's smallest creatures

Zooplankton
Zooplankton are very small or microscopic animals that live in the ocean. They do not only live near the surface, like phytoplankton; they spread out across all different layers. They are referred to as primary consumers, because they feed on primary producers–in other words, on phytoplankton. Small fish are secondary consumers because they feed on zooplankton. The larger fish, known as tertiary consumers, eat the smaller fish. This is the **food chain**, and it involves a huge energy transfer that begins with sunlight being turned into food.



Carbon Sequestration
When phytoplankton perform photosynthesis, they capture CO2 and release oxygen. 50% of the oxygen in the atmosphere is the result of this process.

7 ACTIVITY

The ocean’s smallest creatures

1. At first glance, what kind of data would lead you to believe that there is a high concentration of phytoplankton in a given area of the ocean?

2. Why are phytoplankton considered primary producers?

3. Why are phytoplankton referred to as "the ocean's lungs"? What consequences does this have?

4. Why do you think the organisms that form phytoplankton are so light?

5. Visit *www.followtheglider.com* and click on Explore. Choose a mission and look at the chlorophyll and oxygen graphs. Based on these data, say where you think the highest concentration of phytoplankton will be.

6. How can gliders help us protect plankton?

7. ¿What would happen if a boat spills oil in the ocean? What consequences would it have for the food chain?

8. Do you think that pollution and ozone depletion can have an effect on phytoplankton? Why?

8 ACTIVITY

Let's go fishing

Can a glider help us find out in what areas there will be the greatest concentration of fish?

The microscopic plants that make up phytoplankton need sunlight, nutrients, carbon dioxide, and water to grow. There is a lot of water and carbon dioxide in the ocean, but there is not always sunlight and plenty of nutrients. These two factors–sunlight and nutrients–determine the abundance of phytoplankton. Near the surface there is more sunlight, but nutrients are more abundant in the cold, deep waters near the ocean floor. How do phytoplankton manage to get both?

Gliders provide us with graphs that help us find out where in the ocean these two factors converge, and where phytoplankton proliferate. Where you find phytoplankton, there is food for many organisms, and therefore you can assume that more species will be present in that area.

1. What are phytoplankton and what is their role in the food chain?

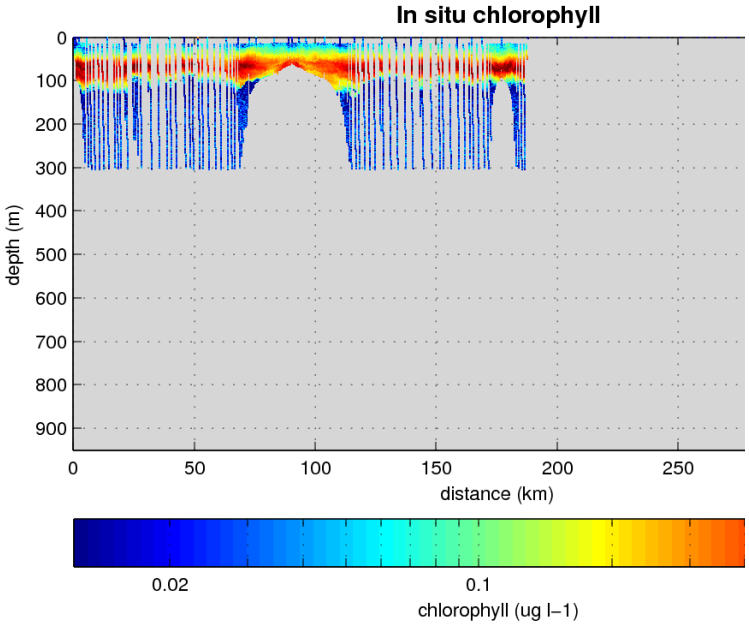
2. Based on your answer to the previous question, come up with a hypothesis that will enable you to locate concentrations of fish. Consider the different factors that can have an effect on the proliferation of phytoplankton.

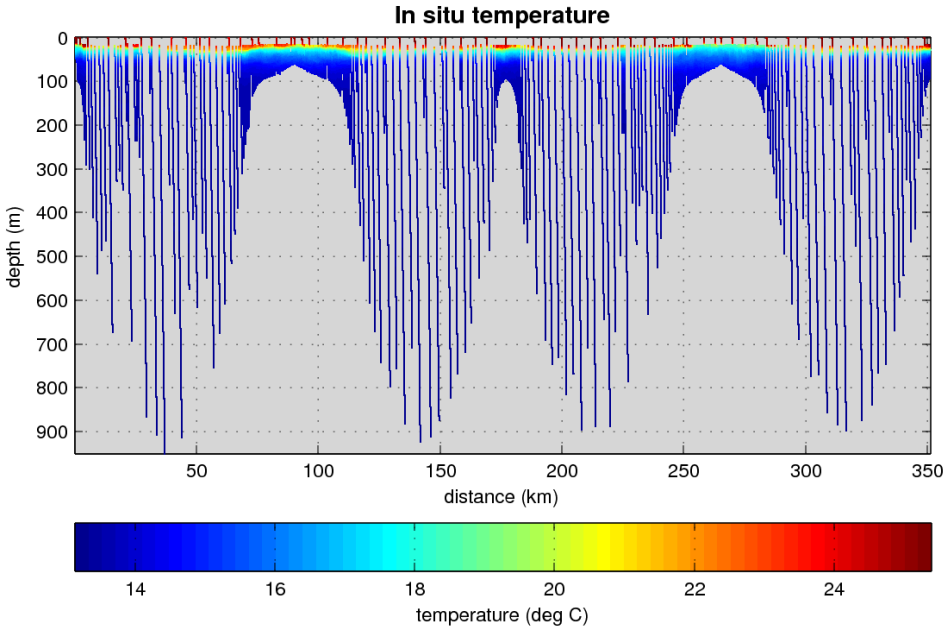
3. Can a glider give us information about phytoplankton?

8 ACTIVITY

Let's go fishing

4. It is the month of July. The glider is on a mission in the Mediterranean Sea, in the Ibiza Channel. It has sent us the following temperature and chlorophyll graphs. Observe and discuss the relationship between the two. In what area does the surface water nearest to the light meet with the deep, nutrient-rich water?



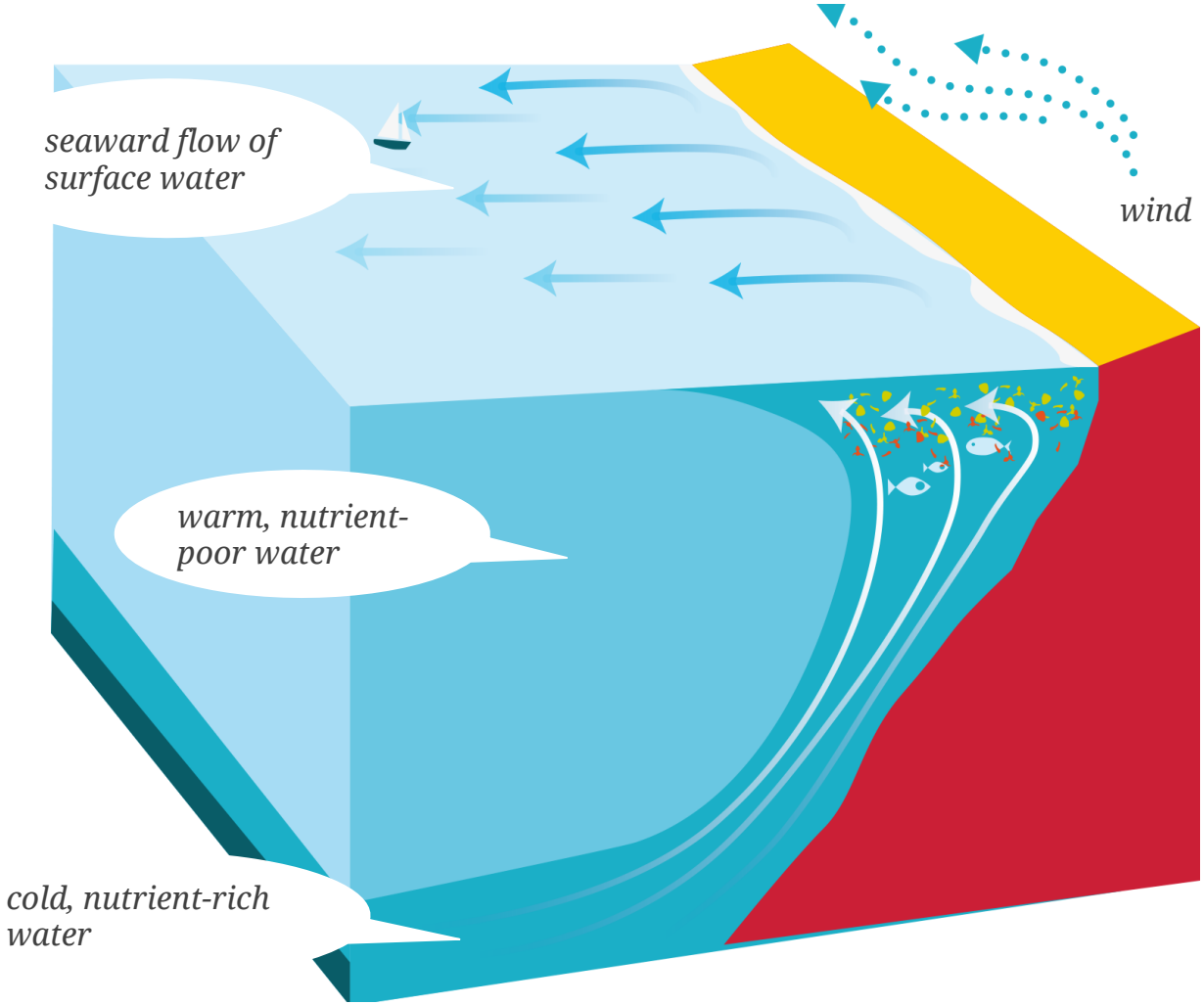


8 ACTIVITY

Let's go fishing

Upwelling occurs when cold, dense, deep, nutrient-rich water flows up to the surface.

Why does this water rise from the bottom? One of the causes is the wind on the surface of the ocean.



8 ACTIVITY

Let's go fishing

Gyres and **whirlpools**, as well as **storms**, also contribute to breaking the thermocline and making nutrients rise to the surface, contributing to the proliferation of phytoplankton. Remember than in Activity 6 we said that the thermocline acted as a border between cold, deep, nutrient-rich water and the warmer water near the surface with fewer nutrients. If a storm or a whirlpool breaks the thermocline, the deep, nutrient-rich water is able to flow upward.

This also occurs at a global level. At the Poles, when ice forms, the surface water becomes very salty, and therefore denser. This makes it sink down. And this downward motion in turn makes for an upwelling of deep, nutrient-rich water elsewhere. Look at the following map: the purple and blue areas are where the surface water sinks. Then the deep cold water flows into other areas and wells up to the surface: light green. This causes an upwelling, with a large amount of nutrients rising to the surface.

8 ACTIVITY

Let’s go fishing

5. Do you think that a situation with riled-up waters is good for fishing?

6. Do you think that the green areas in the map would be good for fishing?

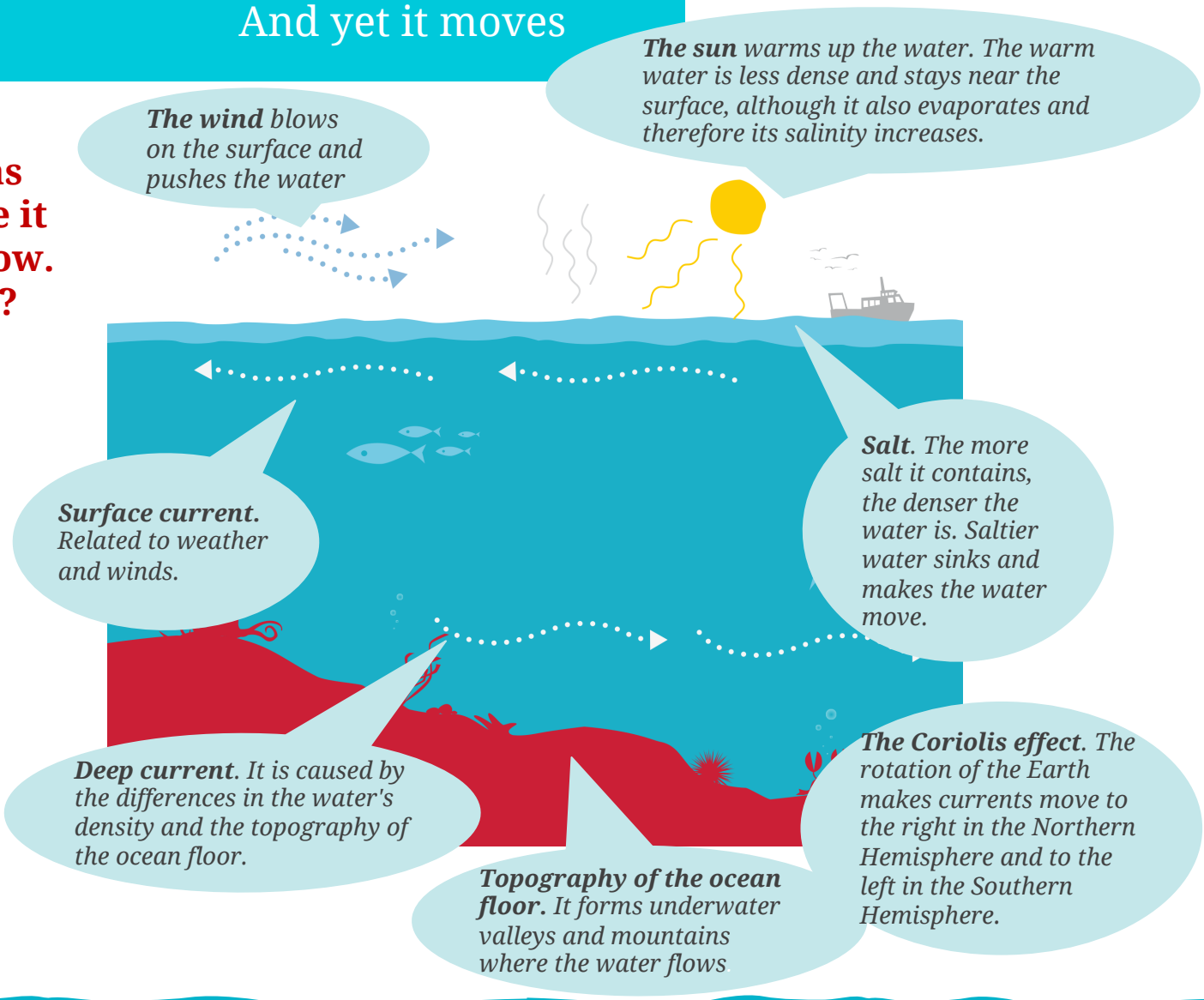
9 ACTIVITY

And yet it moves

One of our gliders has drifted off the course it was supposed to follow. Why did this happen? What dragged it off?

Although the ocean sometimes looks as if it were calm, it's always on the move.

The glider has gone off course because of the ocean currents, which are like rivers within the ocean.



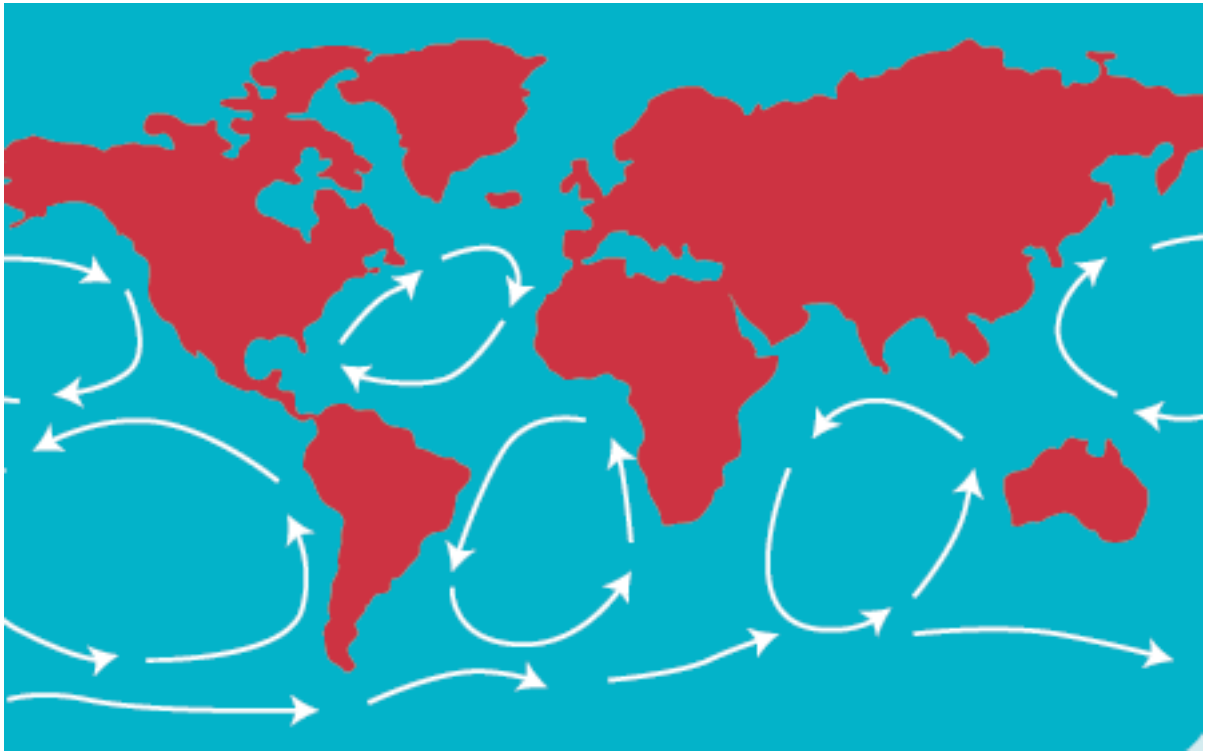
9 ACTIVITY

And yet it moves

Surface Ocean Currents

Surface ocean currents move 10% of the oceans' water and move in the top 400 meters of the water column. They are usually moved by winds, creating a large-scale circulation system formed by five major ocean gyres.

Due to the rotation of the Earth, everything that moves on the surface shifts towards the right in the Northern Hemisphere and towards the left in the Southern Hemisphere. Therefore, in the north, gyres turn clockwise, and in the south, counterclockwise.



9 ACTIVITY

And yet it moves

The wind also plays a part in creating surface currents. Gather into groups of four.

1. Fill a rectangular container with water (for example, a baking pan).

2. One of the four students will stand at each corner of the container.

3. Sprinkle black pepper onto the water in one of the corners.

4. Each student will take a drinking straw and blow gently onto the water, towards the left. Each student will blow towards his or her left

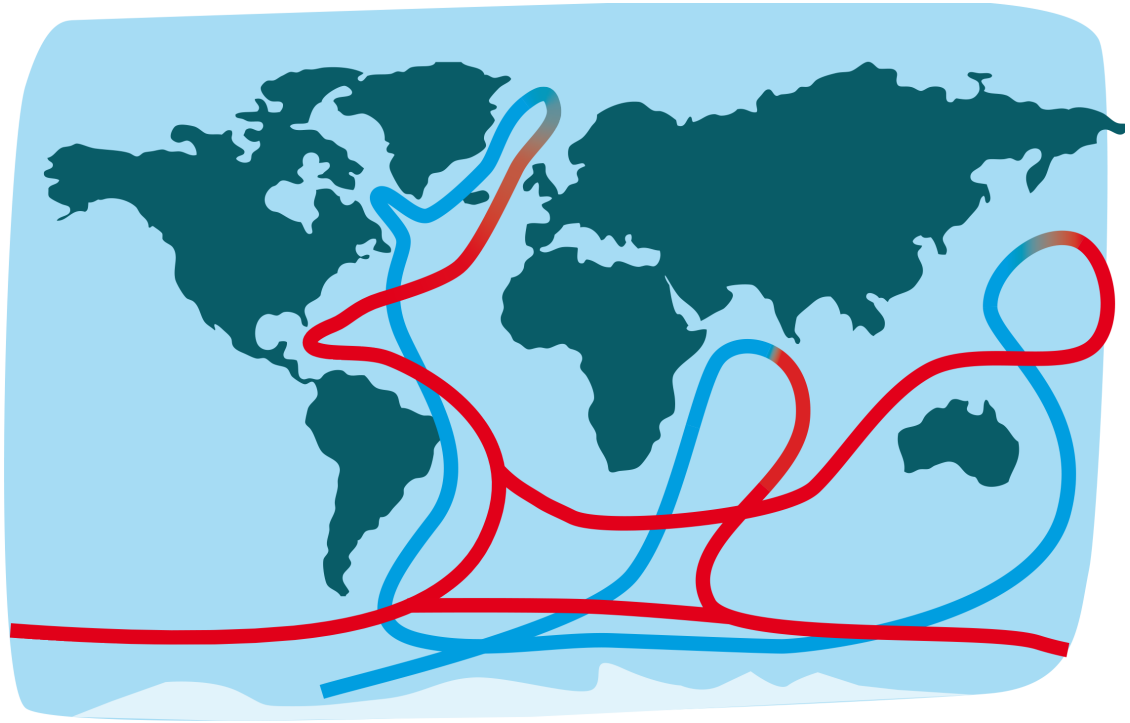
What happens? How do you relate it to what happens in the ocean?

9 ACTIVITY

And yet it moves

Deep Currents

Deep currents move 90% of the water in the ocean. Both salinity and temperature affect ocean circulation. The water that is denser (because it is colder or saltier) sinks, allowing its place on the surface to be replaced by less dense water.

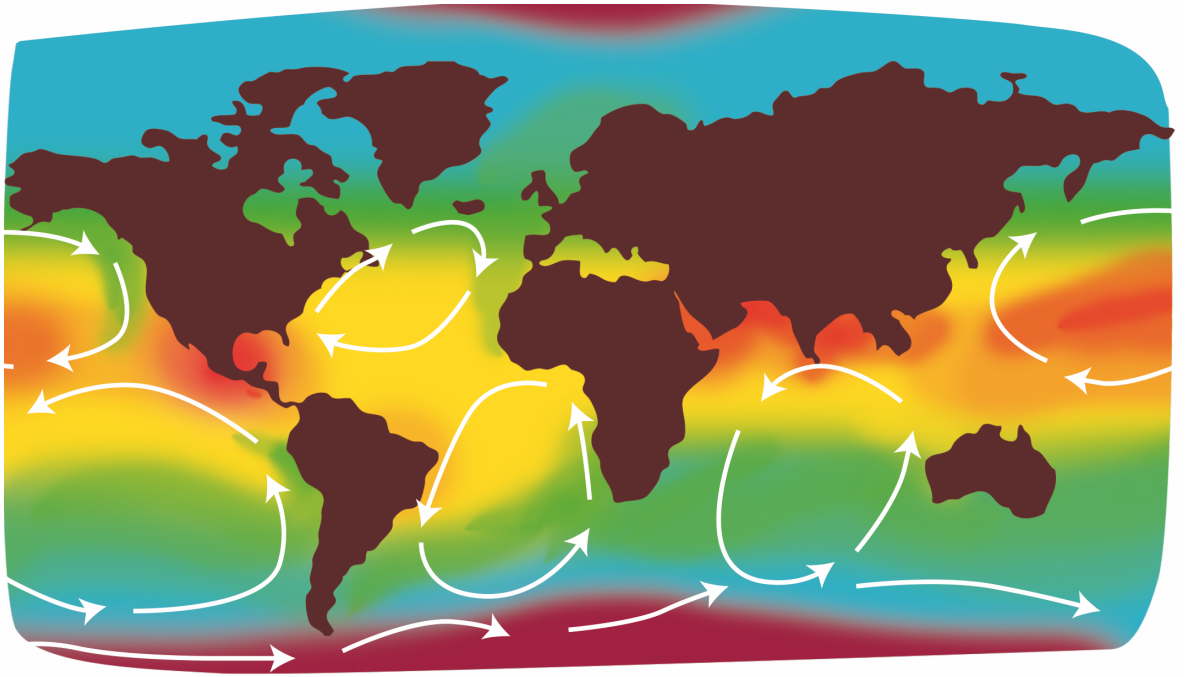


At the **Poles**, when ice forms, the water becomes less salty and therefore more dense. The water that sinks in the Arctic flows along the bottom of the ocean towards the Antarctic. There it splits and wells up again in the Indian Ocean and in the Pacific. On the ocean surface, the wind pushes the water toward the north Atlantic, where it sinks again. Look at this map of the Great Ocean Conveyor.

9 ACTIVITY

And yet it moves

2. Surface ocean currents move a lot of water and energy in the form of heat, and therefore they have an influence on the distribution of temperature around the planet. Look at the following map. The colors represent the water temperature: red for warm and blue for cold. How do you interpret it?



3. What would happen if these currents stopped moving and the warm water from the Equator did not reach the Poles, or the cold water from the Poles did not flow towards the Equator as it does now? Why could that happen? Come up with a hypothesis.

4. How can gliders help us face this danger?

El glider

1. Look at the Planning video. What do you think of this job? Why do you think it is important?

2. Watch the Setup & Programming video. Do you think it's complicated?

3. Watch the Launching a Glider into the Sea video. Would you be able to do it?

4. Watch the Monitoring video. Try to do the same thing visiting *www.followtheglider.com* and clicking Explore.

5. Watch the Data Analysis video. How important do you think this job is?

6. Watch the Recovery video. What is the most interesting part of this job?

7. Which of these jobs would you like best? Do you think they're fun? Interesting? What path would you have to follow to end up doing one of these jobs? ?

And yet it moves

More than gliders

Visit the SOCIB website at *www.socib.es* and find out what the following elements are used for:

	*Coastal HF radar*		*Coastal research vessel*
	*Surface drifters (Lagrangian platforms)*		*Fixed stations*
	*Satellite*		*Data center*

And yet it moves

How is all this research useful?

For example, gaining new insight into the sea can help us prevent the effects of the meteotsunamis known as rissagues in Menorca. Watch the following video to find out what they are.

7. In what other ways do you think having so much information about the ocean is useful?

http://www.socib.es/index.php?seccion=multimedia#current_video_title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