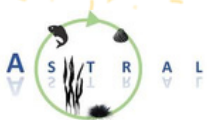


How was the ocean made?

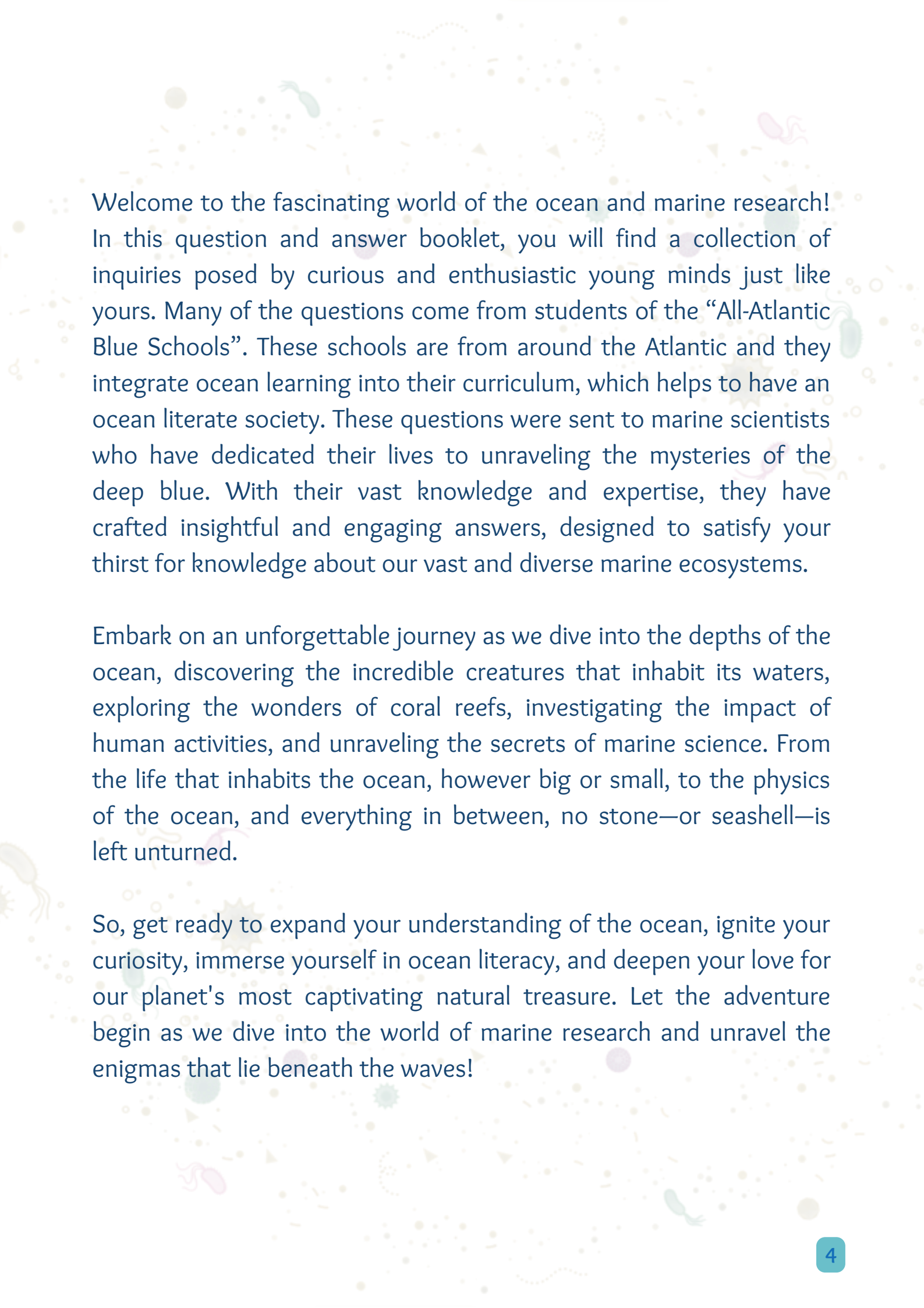
Kids' questions and Scientists' answers
on the wonders of the Ocean



This initiative is led by the AtlantECO project and supported by the All-Atlantic Blue School Network, with the participation from the ASTRAL, Nautilus and AANChOR projects.



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The background of the page is a light cream color, decorated with various marine-themed illustrations. There are several small, stylized fish in shades of green and pink. Scattered throughout are numerous small, colorful dots in shades of yellow, orange, and purple. Some of these dots are arranged in faint, dotted lines that suggest the movement of water or the paths of marine organisms. The overall aesthetic is clean, bright, and inviting, suitable for an educational or children's book.

Welcome to the fascinating world of the ocean and marine research! In this question and answer booklet, you will find a collection of inquiries posed by curious and enthusiastic young minds just like yours. Many of the questions come from students of the “All-Atlantic Blue Schools”. These schools are from around the Atlantic and they integrate ocean learning into their curriculum, which helps to have an ocean literate society. These questions were sent to marine scientists who have dedicated their lives to unraveling the mysteries of the deep blue. With their vast knowledge and expertise, they have crafted insightful and engaging answers, designed to satisfy your thirst for knowledge about our vast and diverse marine ecosystems.

Embark on an unforgettable journey as we dive into the depths of the ocean, discovering the incredible creatures that inhabit its waters, exploring the wonders of coral reefs, investigating the impact of human activities, and unraveling the secrets of marine science. From the life that inhabits the ocean, however big or small, to the physics of the ocean, and everything in between, no stone—or seashell—is left unturned.

So, get ready to expand your understanding of the ocean, ignite your curiosity, immerse yourself in ocean literacy, and deepen your love for our planet's most captivating natural treasure. Let the adventure begin as we dive into the world of marine research and unravel the enigmas that lie beneath the waves!

Thanks to all the ocean lovers for all the questions you have sent us!!

Alexandre Léo, Brazistudentl; Aline, Brazil; Ana Beatriz, Brazil; Ana, Brazil; Anaisa, Portugal; Antonella, Brazil; Aqhama, South Africa; Ariana, Portugal; Arsen, Germany; Arthur Ulrich, Brazil; Arthur, Brazil; Arthur, France; Avren, Germany; Benjamin, Brazil; Bernardo Antonio, Brazil; Bernardo, Brazil; Boitumelo, South Africa; Charlotte, Germany; Cristina, Brazil; Davi Antunes, Brazil; Davi Luiz, Brazil; Denis, Portugal; Ditebo, South Africa; Eduarda, Brazil; Eduardo, Brazil; Emerson, Brazil; Erin, England; Esther, Brazil; Fredi, Germany; Gabriella, Brazil; Gabrielly, Brazil; Geisiane, Brazil; Giovanna, Brazil; Gustavo, Brazil; Heitor, Brazil; Heronimo, Germany; Ida, Germany; Ide, Germany; Imange, South Africa; João Miguel, Brazil; João, Brazil; João, Madeira island; João, Portugal; Joaquim Régis, Brazil; Josi, Germany; Jules, France; Júlia, Brazil; Kaio, Brazil; Kaique, Brazil; Kauan, Brazil; Leonardo, Brazil; Letícia, Brazil; Luís, Brazil; Luphumelo, South Africa; Malubana, South Africa; Manuela, Brazil; Maria Alice, Brazil; Maria Eduarda, Brazil; Matheus, Brazil; Matilde, Portugal; Miguel Eduardo, Brazil; Morgana, Brazil; Moritz, Germany; Nathalie, Brazil; Noémie, France; Pedro, Brazil; Peterson, Brazil; Rafael, Portugal; Rafaela, Portugal; Raul, Portugal; Samira, Portugal; Sarah, Brazil; Sisipho, South Africa; Sky, Germany; Stela, Portugal; Tamily, Teacher, Brazil; Tanya, South Africa; Tetlego, South Africa; Tiago, Brazil; Unakho, South Africa; Vaia, Germany; Vitor, Brazil; Vitória, Brazil; Wallace, Brazil; William, Brazil; Yasmim, Brazil, and the students from the 4th grade class, Portugal; students from the 5 years old room, Portugal; students from the 5th grade class, Portugal; students from the 7th grade class, Portugal.

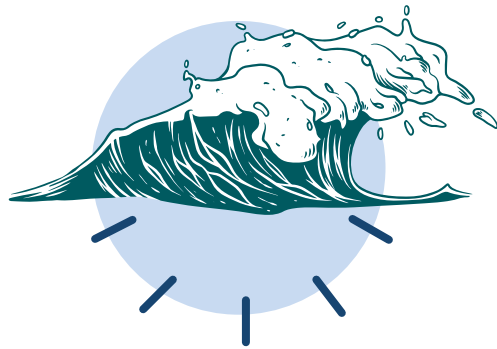
Thanks to all the ocean professionals for answering them!!

Alienor, France; Ana Carolina, Brazil; Ana, Portugal; Andrea, Brazil; Andrei, Brazil; Áurea, , Brazil; Barbara, Brazil; Bruno, Brazil; Carla, Brazil; Daniele A, Italy; Daniele I, Italy; David, UK; Dominic, Switzerland; Elisa, Norway; Eloïse, France; Emma, South Africa; Erik, Netherlands; Eva, Greece; Fabio, Switzerland; Ferenc, Hungary; Fernanda, Brazil; Flora, Germany; Gill, Spain; Hugo, Brazil; Leandra, Brazil; Leila South Africa; Lisa, Italy; Luigi, Italy; Luis, Italy; Marcello, South Africa; Marcelo, Brazil; Marta, Italy; Meike, Switzerland; Natasha, South Africa; Nicole, South Africa; Raquel, Portugal; Ronaldo, Brazil; Rutuja, India; Sandy, South Africa; Sarah, UK; Shamwari, Dominican Republic; Sigi, Belgium; Sofia, Portugal; Tonje, Norway; Vinicius, Brazil; Yolaine, Belgium; Zelinha, Brazil.

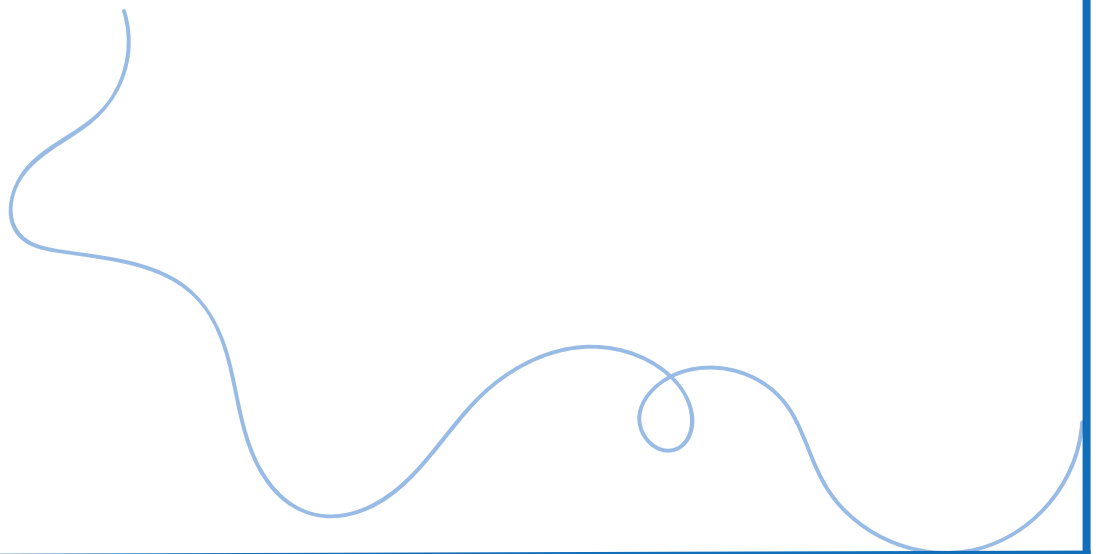


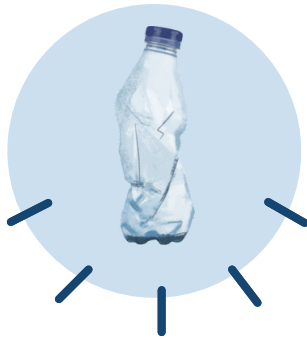
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Questions and answers on the Ocean



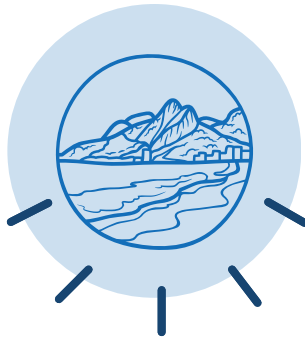


WHAT TYPES OF PLASTIC DO YOU FIND MOST ON THE BRAZILIAN COAST?

Vitória, Brazil

As with much of the world, we find a lot of single-use plastics and food packaging littering the coast of Brazil. We can usually trace these back to tourism activities and domestic use. Disposable plastic cups, cigarette butts, snack wrappers, and ultra-processed food packaging are common. Another common item, which may seem odd at first, is plastic cotton swabs. When people flush them down the toilet at home, they can flow through the water treatment systems and eventually reach the ocean and beaches. It shows us that our waste management and sanitation systems need improvements, and plastic production must be reconsidered.

Carla, oceanographer, Brazil

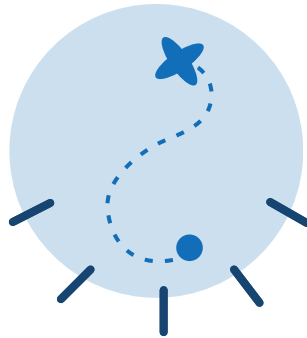


HOW ARE THE COASTAL AND ESTUARINE OCEAN AND THEIR ECOSYSTEM INFLUENCED BY THE GLOBAL HYDROLOGIC CYCLE, LAND USE AND UPWELLING FROM THE DEEP OCEAN?

Boitumelo, 14, South Africa

Great question Boitumelo! The hydrological cycle includes the atmosphere, land, rivers, estuaries and ocean. They are all connected. So if a change happens in one of these systems it could affect the others. For example, there are ecosystems in the ocean that rely on the input from rivers and estuaries for food and sediment, such as muddy ecosystems. If the the amount of water coming from the rivers to the oceans is reduced, either through lack of rain or through damming for example, we could lose those ecosystems. These muddy ecosystems are important habitats for fish species like hake and sole in South Africa. And if we lose them, the numbers of these important fish will decline which affects our food security here in South Africa. Land uses such as farming or perhaps the inclusion of sewerage plants along our rivers can also increase the pollutants in our rivers, These travel to the estuaries and oceans which can lead to dead zones - areas that are polluted or lack oxygen where marine and estuarine life cannot survive. These types of spaces are increasingly found around the world, even in South Africa. In fact, we are still studying the relationships between these various systems. We must certainly be responsible with how we manage all our systems on earth to ensure that the connections between the atmosphere, land, rivers, estuaries and ocean remain healthy.

Natasha, Marine Biologist, South Africa

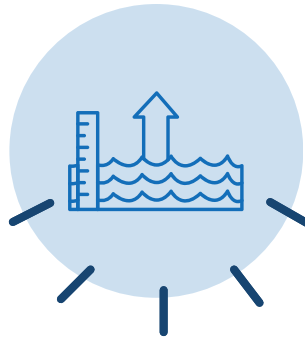


**SINCE MORE THAN 90% OF THE OCEAN IS UNDISCOVERED
HOW ARE WE PLANNING ON DISCOVERING AND EXPLORING
THE 90%?**

Tanya, 17, South Africa

Hi Tanya! As researchers we are planning to explore further and deeper into our oceans. This will be through various research cruises in partnerships with government and research institutes both nationally and internationally. In South Africa we are building our research infrastructure, i.e. sampling equipment and research vessels, to be able to explore more of our continental shelf and deep ocean. Every year we extend our exploration further to learn about new areas off South Africa. We are learning about the types of species we have, the special places that need protection and how all these spaces function. It will take some time, but we will eventually get there.

Natasha, Marine Biologist, South Africa

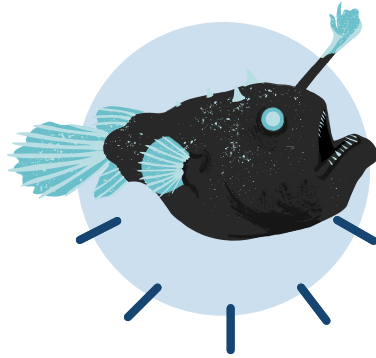


WHAT ARE THE RATES, MECHANISMS, IMPACTS AND GEOGRAPHIC VARIABILITY OF SEA LEVEL CHANGES?

Boitumelo, 14, South Africa

Using nearly 30 years of satellite measurements, scientists have measured the rate of sea level rise at 3.4 millimetres per year (that is, 3.4 cm per decade). Since 1993, the average rate of global average sea level rise has increased from about 2.5 millimetres to 3.4 millimetres per year. Sea-level rise is composed of two main mechanisms. The first is the melting of land glaciers (and other terrestrial sources), which contributed 2.1 mm per year to the global trend in the period 2002-2019. It is to note that the melting of ice already in the oceans do not contribute to the sea level rise. The other mechanism is the expansion of the oceans due to the direct warming of water. The latter process contributed 1.3 mm per year to the 2005-2019 trend. The trend of sea-level change is very different depending on the oceanic region. This is mainly due to the variability of the thermal expansion. For example, the western Pacific regions are experiencing very large increases while in the tropical eastern Pacific the sea level is even falling. (Source: NASA)

Daniele, Physical oceanographer, Italy

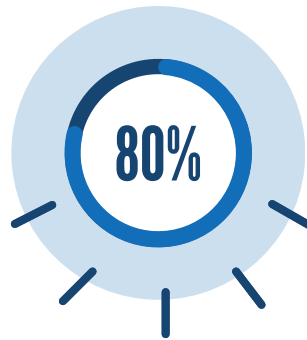


HOW MANY OCEAN SPECIES BECAME EXTINCT?

Imange, 14, South Africa

It is difficult to determine the exact number of ocean species that have become extinct, but we know that human activities have had a significant impact on marine life. Factors like overfishing, pollution, habitat destruction, and climate change increase the risk of extinction for many species. Some species, such as the Chinese paddlefish and the Caribbean monk seal, have recently gone extinct due to these human-related factors. Scientists and conservationists work to study and protect marine species, conducting research, creating protected areas, promoting sustainable fishing, and raising awareness about the importance of preserving ocean biodiversity. By understanding our impact on the ocean and taking steps to protect marine life, we can prevent further extinctions and ensure the survival of diverse species for the future.

Eloïse, Research and Innovation Manager, France



HOW MUCH OF THE OCEAN IS UNDISCOVERED?

Imange, 14, South Africa

The ocean is a vast and mysterious place, and even with all our advancements in technology, we have only explored a small portion of it. In fact, scientists estimate that we have explored less than 20% of the entire ocean. That means that more than 80% of the ocean remains unexplored and largely unknown to us. To give you an idea of how much that is, imagine you have a big chocolate cake. If you were to cut out a small slice, that would represent the part of the ocean we have explored. The remaining cake would represent the part of the ocean that is still undiscovered. It's a huge portion! The ocean is incredibly deep, with some areas reaching depths greater than Mount Everest is tall. These deep areas, known as the ocean trenches, are particularly challenging to explore because of the extreme pressure and darkness. We have only been able to send a few manned submarines to these depths. There are also many remote and hard-to-reach areas in the ocean, like the polar regions or the deep sea, where the water is very cold and there is very little sunlight. These places present additional challenges for exploration.

Eloïse, Research and Innovation Manager, France

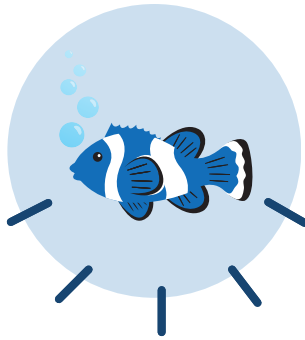


WHAT ACTUALLY CAUSES OCEAN TIDE?

Malubana, 15 South Africa

The tidal force is caused by the gravitational pull by the moon and the sun and it causes the water on earth to bulge out on the sides closest and furthest away from the moon (high tides). The extreme tides (spring tides) happen when the earth, moon and sun line up and the forces from the lunar and solar tides reinforce each other. In contrast, small tides (neap tides) happen when the lunar and solar tides act against each other.

Tonje, Molecular Biologist, Norway

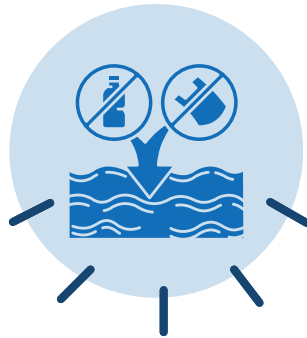


HOW DO FISH SURVIVE AND BREATHE IN WATER?

Tetlego, 15, South Africa

Fish need oxygen to breath and stay alive. They do not have lungs like us but they have gills. Gills are organs with many small blood vessels which catch the oxygen as the sea water runs into the fish mouth.

Eva, Marine Biologist, Greece

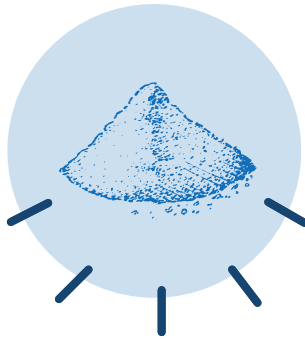


HAVE THEY EVER FOUND A SOLUTION TO END WATER BODIES POLLUTION?

Tetlego, 15, South Africa

Pollution of the water bodies is a very complex matter and it is probably impossible to avoid all sources of pollution. It is, however, possible through legislation and control to improve and limit it dramatically compared to the current state. For it to end completely one would need a united world with common laws that everyone respected. Also there would need to be a more equal distribution of resources to make sure that everyone would be able to manage their wastestreams appropriately, no wars, all our energy sources would have to be renewable, there could not be any accidents with spills anywhere, marine transportation would need to be fueled by e.g., hydrogen or electricity, etc. Thus unfortunately not very likely.

Tonje, Molecular Biologist, Norway

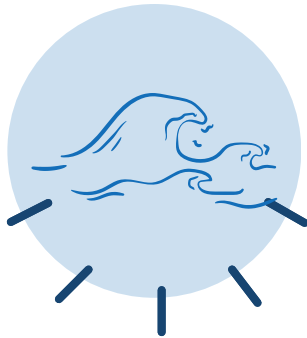


WHY DOES THE OCEAN HAVE SALT?

Sisipho, 15, South Africa

Because our rivers and ocean floors leach minerals and salts into its waters, which is found in the rocks on land. Rain dissolves these minerals, and brings them to the ocean, where they accumulate, thus making our ocean salty.

Meike, Marine Ecosystem Modeller, Switzerland

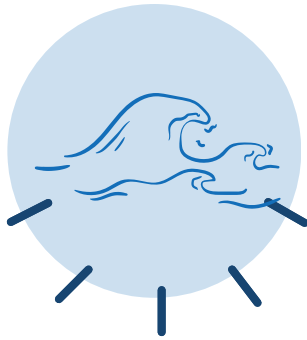


WHAT CAUSES WAVES?

Sisipho, 15, South Africa

Waves are commonly caused by the winds, which transfer energy from the atmosphere to the ocean, but there are also waves caused by the gravitational forces of the moon (tides), and some are created by oceanic earth quakes (tsunamis).

Meike, Marine Ecosystem Modeller, Switzerland



HOW ARE WAVES CREATED IN THE OCEAN?

5 years old room, Portugal

Waves in the ocean are made by the wind blowing over the water. The wind pushes the water and makes it move in a big rolling motion. When waves get close to the shore, they get bigger and break on the beach, making a splash!

Hugo, Professor, Brazil



WHY ARE THERE WAVES IN THE OCEAN EVEN WHEN IT IS NOT WINDY?

4th grade class, Portugal

Waves are created by the wind blowing over the water. The wind pushes the water and makes it move in a big rolling motion that can travel for hundreds of kilometers. Waves can travel great distances from where they were formed, and it can take several hours or even days for waves created by wind to reach the coast. So, even if there is no wind at the beach, waves can still arrive from the open ocean, creating waves for people to enjoy. Ocean currents and tides can also play a role in the formation and behavior of waves.

Hugo, Professor, Brazil

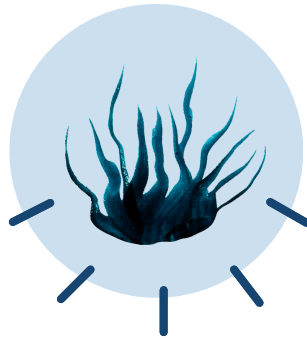


WHICH IS THE LARGEST OCEAN IN THE WORLD?

Arthur, 6, Brazil

There is only one global ocean on Earth, and it is divided into five main ocean basins: the Atlantic Ocean, the Indian Ocean, the Southern Ocean, the Arctic Ocean, and the Pacific Ocean. The largest ocean basin in the world is the Pacific Ocean, which covers an area of about 165 million square kilometers. The Pacific Ocean is so vast that it covers more than one-third of the Earth's surface, making it larger than all of the Earth's continents combined. It also has the deepest point on Earth, the Challenger Deep in the Mariana Trench, which is almost 11 Km deep.

Hugo, Professor, Brazil



HOW DOES IT FEEL TO BE IN THE DEEP OCEAN?

Ariana, 9, Portugal

The deep ocean is dark and cold. If you turn on a light, you will see lots of particles in suspension called marine snow. These particles come mostly from the surface where there is light, and phytoplankton (microscopic algae) can grow. Then they get eaten by zooplankton (very tiny animals), and all the debris from both phyto- and zooplankton slowly settles and accumulates in the deep ocean. Bacteria then start their job, degrading all these materials and bringing nutrients back to the water, but this takes a long time because the deep ocean is very cold ($\sim 4^{\circ}\text{C}$). Once ocean currents bring these nutrients to the upper ocean where there is light, phytoplankton will use them again to grow, and the cycle continues indefinitely.

Hugo, Professor, Brazil



WHY DON'T GROWN-UPS UNDERSTAND THAT WE SHOULD TAKE CARE OF THE OCEAN?

João Miguel, 9, Brazil

That is a great question, João Miguel! I think that grown-ups tend to forget how unique and vulnerable the ocean is. They don't realise that the fish they like to eat depends on a healthy ocean. Most people around the world only rarely experience the ocean, when they go on a beach holiday. It may be because the ocean doesn't belong to anyone, so that no-one feels responsible. The ocean is not represented in parliament or at the United Nations, and is therefore too often forgotten. Hopefully, the children of today will become the grown-up ocean advocates of the future!

Erik, Physical Oceanographer, Netherlands



HOW MANY SPECIES OF MARINE ANIMALS HAVE BEEN ALREADY CATALOGED?

Yasmim, Grade 7, Brazil

Olà Yasmim! So, all known species are usually cataloged in the World Register of Marine Species (WoRMS). We discover a lot of new species every year and for now we have cataloged about 240'000 different marine species. This is only a fraction of all species that really exist in the ocean as we still have not discovered all of them! Some scientists used mathematical models to estimate that there should be between 1 million and 2 million different marine species in total. There's still so much to discover! But actually, most of these species are not animals but tiny microbes and algae which we cannot see with our naked eyes. Animals only represent a tiny part of all these species. For instance, there is only 130 species of marine mammals and about 20 000 fish species.

Fabio, Marine Ecologist, Switzerland

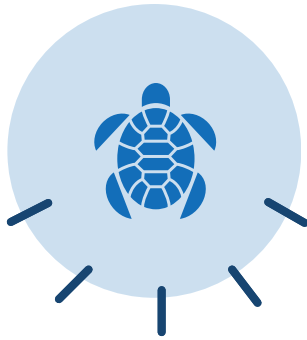


WHAT ARE MICROPLASTICS?

7th grade class, Portugal

Microplastics are small plastic pieces, typically smaller than 5 millimeters, that have been broken down from larger plastic items or products. They can also be microbeads used in personal care and cleaning products or microfibers from textiles that shed during laundering. Microplastics can be found in oceans, lakes, rivers, and even in the air we breathe. They are harmful to wildlife and ecosystems because they can be ingested and cause physical harm or blockages. Additionally, microplastics can absorb toxic chemicals and pollutants, which can then be passed up the food chain and potentially harm humans who consume seafood.

Hugo, Professor, Brazil



HOW DO YOU FEEL WHEN YOU REALIZE THAT WE CONTINUE TO THREATEN MARINE SPECIES WITH THE GARBAGE WE THROW INTO THE OCEAN?

Rafaela, 9, Portugal

It's very frustrating to me, Rafaela! The ocean is so unique and so vulnerable that we really need to be careful with it. There indeed is too much garbage in the ocean (although I don't think that many people willfully throw it in the ocean) and that threatens marine life.

Erik, Physical Oceanographer, Netherlands



WHAT DO YOU FEEL WHEN YOU REALIZE THAT HUMANS STILL DO NOT RESPECT THE OCEAN AND THE MARINE SPECIES?

Matilde, 9, Portugal

It makes me feel really frustrated Matilde! Ever since I was little I have been trying to minimise my impact on the ocean and sometimes after years and years even my friends still do not understand or care about their impact on the ocean. But what gives me hope is when I see people making changes where they can in their lives as a direct effect of things they have learned - so never give up :)

Sarah, Marine Biologist, UK



WHAT DO YOU FEEL WHEN YOU REALIZE THAT HUMANS
STILL DO NOT RESPECT THE OCEAN AND THE MARINE
SPECIES?

Matilde, 9, Portugal

I think this is mostly because we humans are terrestrial. So we are biased. And what we do not see is much less important to us. For most of us, the sea is the surface, the horizon. Remember: fish live in the sea, not under the sea :-)

Ferenc, Biologist, Hungary

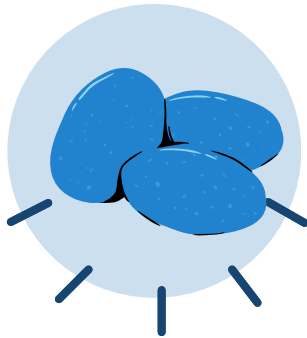


HOW MUCH PLASTIC ENDS UP IN THE OCEAN?

Sky, 8, Germany

It is difficult to estimate the exact percentage of plastic produced every year that ends up in the ocean, but studies suggest that between 1% and 10% of all plastic produced globally may end up in the ocean. Around 20% of all plastic waste in the oceans comes from marine sources. The other 80% comes from land. The amount of plastic entering the ocean each year is increasing, and if current trends continue, it is estimated that by 2050, there could be more plastic than fish in the ocean by weight. This underscores the urgent need to address the issue of plastic pollution in the ocean through better waste management, recycling, and reduction of plastic use.

Hugo, Professor, Brazil

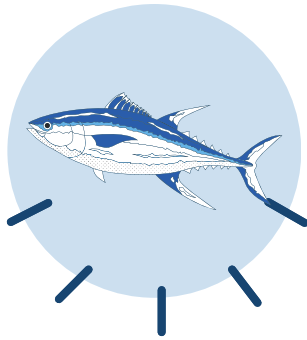


WHAT WAS THE RAREST OBJECT FOUND AT THE BOTTOM OF THE OCEANS, BESIDES OIL?

Vitor, Grade 7, Brazil

Hi Vitor, well for me it might be the deepsea nodules that we find very very deep in some of our oceans. These potatoes looking objects are filled with metals that we need to create batteries for phones, cars, and other things. But these objects are way more than that! Around them live a lot of very curious and fascinating creatures that we can't find anywhere else in the world. Right now they are debating on whether to go down and try to collect them. but without these deepsea nodules we would lose very precious life.

Yolaine, marine biologist, Belgium

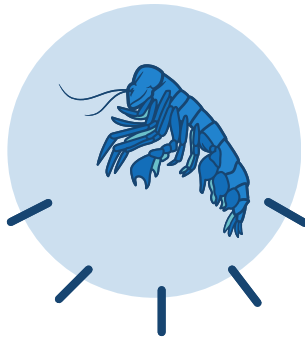


WHAT DO YOU FEEL WHEN YOU KNOW THAT THERE ARE ENDANGERED MARINE SPECIES?

Stela, 11, Portugal

Hi Stela! Well, not very happy! There are so many things that are impacting all marine life, from climate change, to pollution, over-fishing and other human impacts - it can feel very overwhelming, and quite depressing. But then I think about all the hard work my colleagues are doing, all around the world, to try and make things better. We are lucky that many governments do take what is happening to marine life seriously, and they try to make things change to help - but the trouble is, they always have to balance what is best for nature, and what is seen as best for the people. I think we should try and be positive, my job and my colleagues job is to help where we can, promote the ways we can help, and hopefully inspire the next generation of people, that's you Stela, to keep on trying!

David, plankton ecologist, UK



WHAT WAS THE WEIRDEST MARINE ANIMAL YOU HAVE EVER ENCOUNTERED DURING YOUR RESEARCH?

Pedro, Grade 7, Brazil

Hi Pedro! The weirdest thing I have seen (and I work with plankton), is probably a little animal called Phronima. It's a little crustacean that looks like a little shrimp, although quite a scary looking shrimp! What is strange about it is it lives inside other little animals, in particular something called a salp, which is a little like a barrel shaped jelly-fish. The phronima eats the inside of the salp, and then gets inside it, and uses it like a little submarine, and lays its eggs inside so its developing babies are kept safe. It's a very odd creature, it has really large eyes, really large claws and it can be almost completely transparent!

David, plankton ecologist, UK



WILL THE SALT IN THE OCEAN EVER DISAPPEAR?

Morgana, Grade 7, Brazil

Hi Morgana! Fortunately, it is VERY unlikely that all the salt of all the ocean will ever disappear. I guess for it to happen, all the oceans would need to evaporate so the salt turns into hard crystals? If you have a glass of very salty water and you let that water evaporate in the sun, you will see like a white crust remaining in the glass. That would be the crystals of the salt that was in the water before. I guess the Sun would need to get a lot closer to Earth and a lot warmer for it to evaporate all the water in the oceans. But that is not going to happen anytime soon. But the amount of salt in the oceans can vary from time to time, depending on temperature, precipitations etc.

Fabio, Marine Ecologist, Switzerland

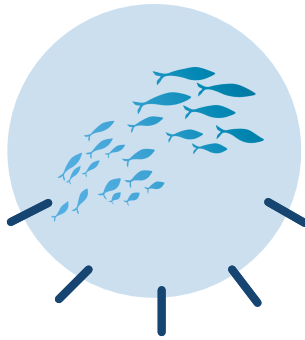


HOW LONG HAVE PEOPLE BEEN TRYING TO CLEAN UP THE OCEAN?

Morgana, Grade 7, Brazil

Hi Morgana, what an interesting question! Plastic has been around for 160 years; we've known about the effects of plastic on marine life for nearly 60 years but the direct impacts on people were only recognised in the last few decades and that has led to more significant efforts to clean up the oceans and coastlines. Plastic was originally created in 1862, but the modern versions of plastic (like Styrofoam, plastic wrap) were developed from fossil fuels (e.g. coal) from the early 20th Century onwards. It was seen as a cheap and effective alternative to using natural resources, and its production increased used a lot during World War II to produce war machinery and electrical devices. But after the war people became concerned about the effects of plastic on the environment. During the late 1960s, researchers started noticing impacts in the oceans when they discovered that albatrosses were eating plastics and fur seals were getting tangled in netting, and in the 1970s the presence of microplastics (tiny pieces of broken plastic) in the ocean became clear. Nowadays, plastic is in many items we use every day because it's a durable and affordable material, but it doesn't biodegrade so it remains in the environment for decades. While cleaning up plastic from oceans and beaches is absolutely essential to avoid further harm to animals, people and the environment, we don't yet have the capability to recycle all of the plastic that currently exists. It is urgent that companies reduce the amount of plastic that is produced but people like you and me can also help by reducing our consumption of plastic for example by choosing to buy products that don't contain plastic.

Gill, Social Scientist, Spain

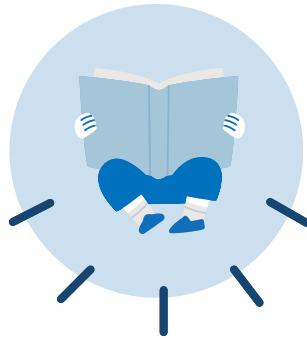


HOW MANY SPECIES OF FISH ARE KNOWN IN THE ATLANTIC OCEAN?

Kauan, Grade 7, Brazil

Hi Kauan. This is not a straight forward question to answer, but the [fishbase database](#) currently holds 4467 records for the Atlantic Ocean, but the database is not necessarily covering everything. The Oceans, also are linked and therefore also other species which are more commonly found in other oceans might migrate also to the Atlantic.

Tonje, Molecular Biologist, Norway

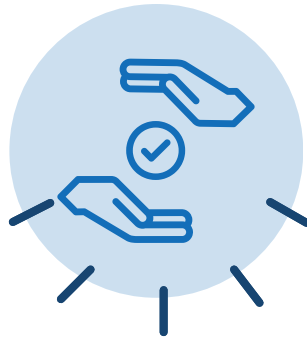


WHAT ORDINARY PEOPLE CAN DO TO HELP PROTECT OUR OCEAN AND MARINE LIFE (PARTICULARLY ACTIONS THAT ARE STILL UNUSUAL)?

João, 16, Madeira island

Hi João! This is a very important question, thank you very much for asking it. I like to think that everyone could make the difference and help protecting the ocean, including ordinary people and even those who live far from the sea. Some actions can be done everyday! For example, we all know, but it is always good to remember, that leaving garbage around, especially garbage made of plastic, can be very harmful for marine life and for the ocean – as unfortunately this is where a lot of garbage eventually ends up. Therefore, no one should ever abandon garbage in the environment, including beaches. Also, if anyone who finds plastic garbage around would pick it up (using gloves!) and put in the right bin for recycling that of course would be of help! In many countries (including Italy), disposable goods made of plastic (such as plastic bottles) are still widespread. Using re-usable objects instead of disposable ones in our everyday life would hopefully decrease the amount of plastic around, including that ending up in the ocean. Choosing wisely what to eat is another action that can have a positive impact on the ocean and on the species inhabiting it! Overfishing and unsustainable fishing practices cause significant damage to marine ecosystems, thus by buying fish and sea food from sustainable sources ordinary people can help reducing the negative impact of fishing on the environment.. However, being sure about what food is really sustainable it is not that easy and may vary depending on the region of the world where you live. This leads us to another important action that ordinary people can do to help protecting the ocean, which is ...reading about the ocean! Obtaining information about the ocean and its health status from trusted sources it is perhaps one of the most important actions that everyone could do.

Daniele, Biologist, Italy

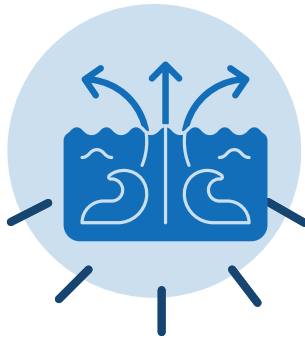


WHAT ARE THE MAIN LESSONS WE CAN LEARN FROM THE SUCCESSES AND FAILURES OF MARINE CONSERVATION EFFORTS IN THE PAST?

João, 16, Madeira island

Hi João, thank you for your very important question. Humans generally cause the environmental problems we see today therefore humans are also the solution. Often to clearly understand the nature of the environmental problem that needs to be solved, it is vital that people holding different kinds of knowledge (e.g. scientific, local, traditional, ecological) are engaged in the process. This means that multi-disciplinary approaches involving for example scientists from the social and natural sciences and the humanities can be very important to get a holistic view of the issues concerned. Perhaps the most important thing we can do to create successful marine conservation efforts is to respectfully and fairly involve all the relevant stakeholders connected with a particular conservation problem and seek their ideas, resources and commitment to identify and implement effective solutions. When people who are directly affected by an environmental problem and/or by conservation efforts feel that their concerns are being heard, when they are able to collaborate equitably, and can mutually identify solutions, they are much more likely to abide by the decisions they have agreed on together than if decisions are made externally and forced upon them. This is one way that social scientists can help to conserve the marine environment: by identifying the stakeholders who should be consulted about a particular problem, and working with them in fair and just ways to create solutions that are effective and acceptable to those who will be affected by them.

Gill, Social Scientist, Spain

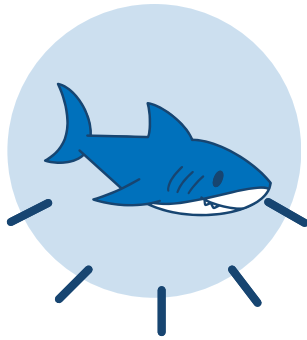


DOES THE AMOUNT OF SALT VARY ACCORDING TO DIFFERENT LOCATIONS IN THE ATLANTIC OCEAN?

Gustavo, Grade 7, Brazil

Hi Gustavo! Yes it does! Salinity, the concentration of salt in seawater, is usually higher in the tropical Atlantic Ocean than when you start going more towards the Arctic or the Antarctic. You can see a world map of salinity [here](#) if you want. Salinity depends on complex relationships between temperature (usually, warmer places have higher salinity, that is why the tropics are saltier), wind and the input of freshwater from rivers. Temperature and salinity together define what we call the "density" of the seawater which controls which water layer goes on top of which one. So differences in salinity are very important because they control the circulation of waters in the oceans. From this map you can also see that the Atlantic Ocean tends to have more salt than the Pacific Ocean or the Indian Ocean because of the specific water mass circulation that happens there. I think the saltiest places of the oceans remain the Red Sea and the Mediterranean sea though.

Fabio, Marine Ecologist, Switzerland, where most of the salt is actually stored in the rocks of the mountains

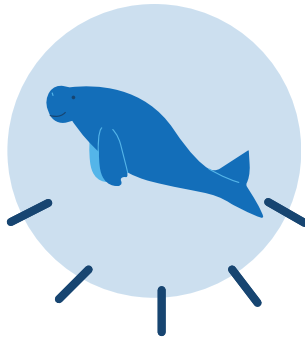


HOW MANY SPECIES OF SHARK ARE KNOWN IN THE ATLANTIC OCEAN?

Geisiane, Grade 7, Brazil

Hi Geisiane. According to the Dutch Shark Society, the Atlantic Ocean is home to around 50 of the world's 500 species of shark.

Tonje, Molecular Biologist, Norway

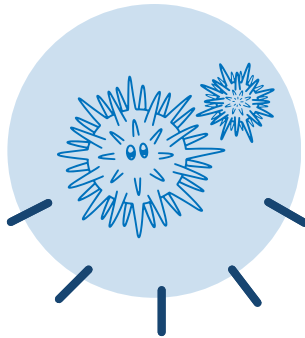


WHAT ARE THE ANIMALS THAT YOU USUALLY FIND IN THE SEA DURING YOUR RESEARCH?

Eduardo, Grade 7, Brazil

Hi Eduardo. What you can find during a dive depends hugely on where you dive. In tropical seawater, and you have examples in your beautiful Brazil, you can dive in one of the most diverse ecosystems globally, the wonderful coral reef that we all have seen in documentaries. But I can tell you that doing the dive in person is a completely different experience, as those colors and those variety of animals is astonishing. But also in our dear, old Mediterranean you can have incredible encounters. If you dive in the Aegean sea you can have the luck of being in the water with the wonderful monk seal, which is endemic of the Mediterranean. And if you move a bit more south, in the Red Sea you can find spots in which you can have a bath with a dugong, a huge animal when you get to meet with it in the water!

Luigi, Macro-ecologist and Biogeographer, Italy



WHAT ARE THE ANIMALS THAT YOU USUALLY FIND IN THE SEA DURING YOUR RESEARCH?

Eduardo, Grade 7, Brazil

Hi Eduardo! I am a marine biologist working with benthos. These are all the little animals living inside or on the top of the sea bottom sediment. They can be worms, snails, bivalves, shrimps, crabs, sea urchins and many more animals with complicated names. They might be small but they are very important for the ecosystem!

Eva, Marine Biologist, Greece

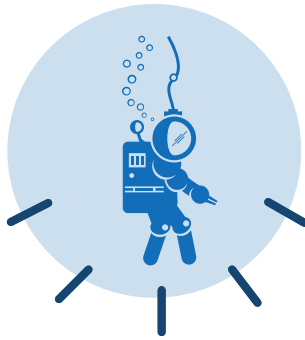


HOW DO VOLCANOES APPEAR IN THE OCEAN?

5 years old room, Portugal

Hi dear preschoolers! OK, how can we say this...imagine that our planet is like a big ball of hot lava surrounded by cold and solid pieces of land (on which we live). These pieces of land (which scientists call 'tectonic plates') are solid and float on top of the lava that is more liquid, OK? The plates move around so they spread and bump into each other. It is these movements and this touching that make the lava below come at the surface and creates volcanoes! Most volcanoes are created this way but they are other more complex ways too. And actually, most of the volcanoes that appear in the oceans never come to the surface. They remain hidden in the deep dark sea so we can't see them!

Fabio, marine ecologist and volcano enthusiast, Switzerland



WHAT IS THE DEEPEST OCEAN AND HOW DEEP IS IT?

4th grade class, Portugal

Hi dear 4th grade class! Most oceans show a similar depth of 3 700 meters (3.7 km). But the deepest point of the ocean is found in the Western Pacific Ocean, in a place called "Challenger Deep" in the Mariana trench. This place is west to the Philippines and South to Japan (next to an Island called Guam). Challenger Deep is about 11 000 meters deep! (10 935m to be precise). This place is named after the boat of the scientific crew that discovered it back in 1875. It is a very dark and cold place...for a long time we thought there was no life in it but now we keep finding all sorts of weird creatures in it. Would you like to go there? I know I would!

Fabio, Marine Ecologist, Switzerland

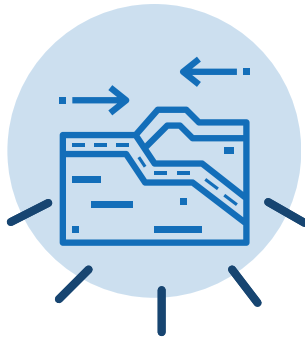


DO SCIENTISTS KNOW ALL THE ANIMALS THAT LIVE IN THE OCEAN?

Cristina, 7, Brazil

Hi Cristina. The simple answer to this is no. It has been estimated that more than 90% of marine species are still undiscovered, and this includes a large number of fishes, molluscs, crustaceans, and echinoderms (e.g., starfishes and urchins). The ocean is enormous in size and goes to high depths, thus the task of mapping the entire volume is probably impossible.

Tonje, Molecular Biologist, Norway



HOW ARE CRACKS IN THE SEA CREATED?

Charlotte, 12, Germany

Hi Charlotte. The big cracks are formed by the movement of the tectonic plates, resulting in earthquakes and underwater volcano eruptions.

Tonje, Molecular Biologist, Norway

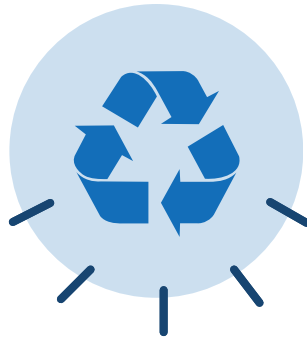


CAN THE OCEAN BECOME A PLASTIC OCEAN?

Bernardo, 6, Brazil

Hi Bernardo, I hope not because that sounds like there would be more manmade stuff in the ocean than natural life and that would cause all kinds of problems for the animals that live there as there would be nothing for them to eat. It would also make things difficult for people who rely on the oceans and coastlines for food and healthy places to live. I do hope that people will work together to end plastic pollution so that everyone including you and your children can enjoy a healthy natural ocean. All the best,

Gill, Social Scientist, Spain



WILL RECYCLING REALLY HELP PLASTIC POLLUTION IN THE OCEAN?

4th grade class, Portugal

Hello there! I believe it does help. Think about plastics, if you recycle them, less plastics will be send to waste and less plastics will be produced. Thus, less plastics will be reaching the Ocean.

Raquel, Engineer in Physics, Portugal



HOW LONG CAN SHARKS, SEAHORSES, SEALS, AND STARFISHES LIVE?

Vaia, 12, Germany

Hallo Vaia! So, I think most sharks get to live between 15 and 30 years if they survive fishing by humans. Seals also get to live quite long, usually between 20 and 40 years. Seahorses and starfishes only live a few years (2-3 years for the seahorses and 4-5 years for the starfishes). Remember that there are many different species of sharks, seals, seahorses and especially starfishes and that they all have different life spans. So life span is not fixed for these groups and is it hard to predict for a single animal.

Fabio, Marine Ecologist, Switzerland

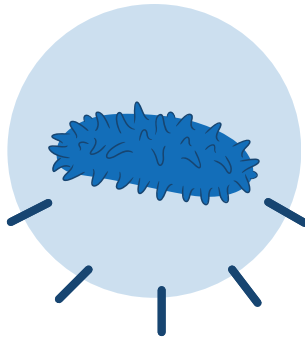


IN YOUR OPINION, WHAT IS THE MOST POLLUTED OCEAN IN THE WORLD?

Tiago, 4th Grade, Brazil

Good question, Tiago! The largest amount of plastic is found in the North Pacific ocean, but that also has the largest area. If you take into account the area of the basin, the Mediterranean is the most polluted. But the concentrations of plastic pollution can vary greatly even within ocean basins, and coastal areas are often much more polluted than the open ocean.

Erik, Physical Oceanographer, Netherlands

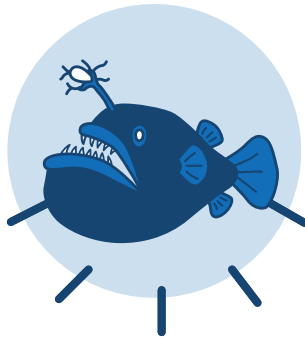


HAVE YOU DISCOVERED ANY NEW MARINE ANIMALS?

Raul, 9, Portugal

Finding a new species of fish or mollusk in the ocean is not rare, but it does not happen every day. Especially when we explore the deep sea, we often find new animal species now and then. However, when we study microscopic organisms, we find thousands of new species all the time. They are so small that we can hardly see them, even with microscopes. Therefore, we have to sequence their DNA to describe all these new species.

Hugo, Professor, Brazil



HOW DO FISH MANAGE TO LIVE IN THE DARKEST ZONE OF THE OCEAN?

5 years old room, Portugal

Hi friends! It's a great question! As a kid I've always been wondering how animals can survive in the wild. And the dark deepness of the oceans is certainly a scary place to live. Well, it turns out that animals can sense their environment in completely different ways compared to our five senses. They use electricity, they use chemical messages and you can have huge squids with eyes as large as plates that are able to see even the smallest amount of light. And in any case it's not the sun light they are looking for. Down in the deep a lot of animals are actually bioluminescent, that's a tough word to say that they are actually able to make their own light. They use it to communicate with other fish of the same species, but there are also predators that use these lights to spot their preys.

Luigi, Macro-ecologist and Biogeographer, Italy

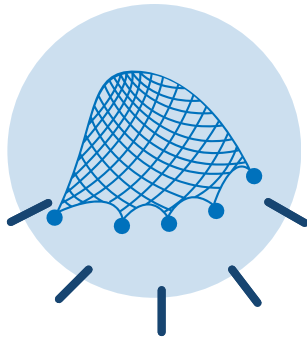


WHY IS THE OCEAN BLUE-GREEN?

4th grade class, Portugal

Dear Portugese students in the 5th grade! Light from our sun looks white to our eyes, but it is actually made of light waves in all sorts of colors. Light waves behave like wiggling snakes, and can bump into the particles making up other materials, like your skin, or the ocean. Some light is a very long, and slow, like the red light. And other light is short and energetic, like blue light. When sunlight enters our oceans, the long-waved red light bounces into the water molecules and gets absorbed by the ocean, meaning it makes the water molecules dance, and the ocean won't let this light travel back out. And when you dance, you get hotter, right? So this light can make the ocean warmer. Short-waved blue light, however, cannot be kept as easily by the water molecules, and when it hits a water particle, it bounces off it and scatters all over the place. This means, some of this blue light can escape the ocean and gets thrown back at us and this is what our eyes see - the light that the oceans do not keep, that reflects back from its surface layers.

Meike, Marine Ecosystem Modeller, Switzerland

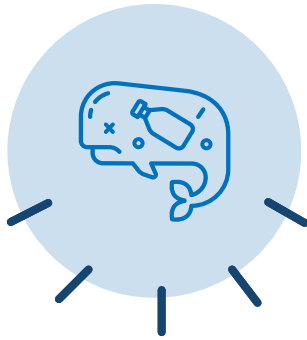


HOW DOES IT FEEL TO HELP A MARINE ANIMAL THAT IS IN DANGER (WITH FISHING NETS OR BY EATING PLASTIC OR BEING WRAPPED IN PLASTIC)?

Luís, Grade 7, Brazil

Dear Luis, I usually feel very excited cause it's the time in which I really see that my help can make a difference. When you save a stranded turtle and you see it gaining the sea again it's a sensation that can hardly be explained. But note that, as scientists, we usually don't go for single animals. Our objective, the real reason why we have studied for years to become scientists, is to save species, ecosystems, and ultimately the entire world! And that's much more exciting! You can think of us as (grown up) kids that don't lose their dreams!

Luigi, Macro-ecologist and Biogeographer, Italy

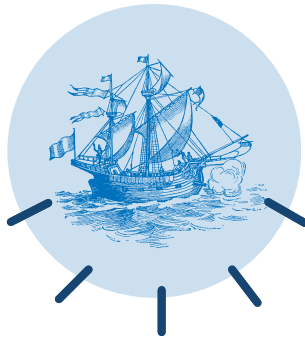


HOW DO YOU FEEL WHEN YOU SEE THAT PLASTIC CAUSED THE DEATH OF AN ANIMAL?

Kaio, Grade 7, Brazil

Dear Kaio, I feel sad when I see an animal that has died because of human waste. Plastic is useful, but it does not belong in the ocean, so we all need to do more to keep plastic out of rivers and oceans. Recycling or disposing of plastic properly is important, and everybody can also make a difference by picking up plastic litter and putting it in recycling or trash bins.

Erik, Marine Ecologist, Netherlands, AtlantECO



WHAT IS THE ORIGIN OF THE NAME OF THE PACIFIC OCEAN?

4th grade class, Portugal

Dear class, this question actually connects back to the history of your country! As you may have heard, the Portuguese navigator Ferdinand Magellan sailed through the Atlantic Ocean in 1519. He wanted to find a new sailing route to what we used to call the "Spice Islands", which are today known as the Maluku Islands in Indonesia, by going through South America instead of the Indian Ocean. Magellan and his crew faced many perils and dangerous seas through their voyage. They went through the tip of South America, which is now known as the "Straits of Magellan" and which was a very tough place to navigate with boats like the ones they had back then. But, in 1520, Magellan and his fleet went past the tip of South America and entered an unknown ocean which was waaaayyy more calm and peaceful. It was so peaceful that they called this new ocean "Pacific" (which means peaceful). Ahahah little did they know back then that the Spice Islands were still veeeery far from them!

Fabio, marine ecologist whose voyage to the Spice Islands led him to Switzerland

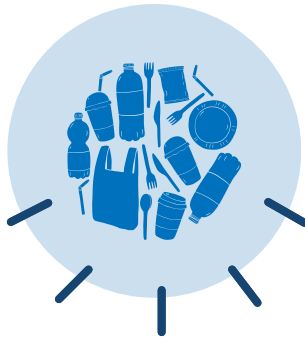


WHAT CAN YOU DO TO TAKE OUT ALL OF THE PLASTIC IN THE SEA?

Avren, 9, Germany

Dear Avren! Sadly, I think that it is very unlikely that we will ever manage to take out all of the plastic from the sea. The main reasons are that unfortunately plastic spread out all over the global ocean, which is vast, with many areas hardly reachable by humans – think about submarine canyons and abysses for example! Also, after a while plastic waste breaks apart in numerous tiny small pieces, which are hard not only to take out but even to see! Nevertheless, there are several ongoing projects that are trying to clean the ocean from plastic. And everyone can help tackling the problem by preventing plastic from reaching the sea, for example by reducing the use of objects made of plastic in every day life and recycling plastic waste.

Daniele, Biologist, Italy

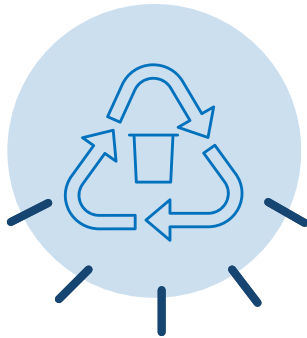


WHERE DOES MOST OF THE GARBAGE FOUND IN THE OCEAN COME FROM?

7th grade class, Portugal

Dear 7th graders. Most of the garbage comes from land-based sources where it is transported to the ocean via rivers and coastlines. If you look at plastic waste, it has been estimated that only around 20% come from marine sources like e.g., fishing nets and ropes.

Tonje, Molecular Biologist, Norway

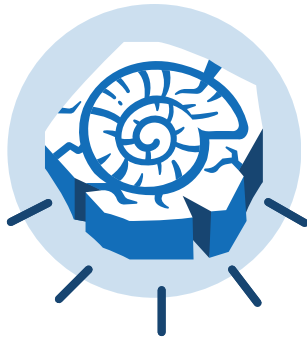


WHY DO WE FIND SO MUCH LITTER IN THE OCEAN?

5th grade class, Portugal

Dear 5th graders. This is a complex question, but it is generally believed that the litter primarily is due to poor or insufficient waste management and insufficient recycling and recovery. In costal areas and along rivers it has historically been a tradition to dispose of garbage into the waterways and the oceans, and when less degradable and synthetic materials became more common this tradition continued for a long time, leading to a build-up of litter that no longer was easily degraded. Fortunately the public awareness about ocean litter is increasing and the waste management is more regulated, although there is still a lot that needs to be improved.

Tonje, Molecular Biologist, Norway



WHY ARE THERE EXTINCT ANIMALS IN THE OCEAN?

5th grade class, Portugal

Dear 5th graders, many many marine animals have indeed gone extinct throughout the course of our planet's history. Actually, as our planet is much older than us (4.5 billion years), it had time to experience a lot of very strong changes in climate which have caused many marine species to go extinct without humans ever being there. So far, there have been 5 great mass extinction events throughout the history of our planet. These changes usually corresponded to strong changes in temperature, oxygen concentration (which can be a poison if there is too much of it) and/or changes in sea-level. The best evidence of those mass extinction events are the fossils! For instance, the animals that had solid shells (solid because made of minerals) left those behind when they all died, and we are able to extract them from the sediments and the rocks where they were preserved. What is special about the time period we live in now is that a lot of marine species are disappearing because of human activities, and not just the climate. These activities usually include the destruction of habitats, overfishing and pollution. We still do not know exactly how many species might be in danger but climate change is very likely to make this situation worst.

Fabio, Marine Ecologist, Switzerland

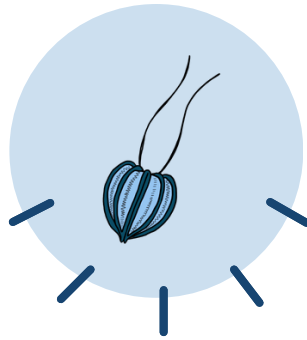


HOW WAS THE OCEAN MADE?

Jules, 7, France

Jules, what a great question! Like Rome was not built in a day, the oceans were not built in a year or a century or even one million years! Actually the oceans were made progressively over millions of years. It all started when planet Earth was still very young and extremely hot. In fact, it was so hot that there was no life on it all the water could not be liquid and could only be gas, like water vapor. The Earth progressively cooled down until about 3.8 billion years ago. Then, it became cool enough for the water vapor to become rain. So it started raining. A lot. It rained so much that it rained everywhere for hundreds and hundreds of years. It was this massive rain that started creating the first ocean which was called the primeval ocean. Then, the climate changed a lot and the continents moved around a lot over billions of years which lead to the ocean as it is today.

Fabio, Marine Ecologist, Switzerland



HOW IS PLANKTON MADE?

Ide, 8, Germany

Well, that's actually a really interesting question and it has a difficult way to answer it. Firstly, the definition of plankton is a weird one because plankton essentially means anything that is at the mercy of the ocean currents that it can't necessarily dictate its own trajectory through the ocean or how it is moved through the ocean, because generally speaking, they're relatively small, so they're at the mercy of currents and water movement. So my understanding, if I remember correctly, is that the largest plankton is the sunfish because they're so bad at swimming that they drift along with the ocean currents. But I believe your answer probably referred more to the small stuff. And so the answer there is that the plankton in the small spectrum has two primary kinds. The first one is zoo plankton, which are little animals. And then beneath that is phytoplankton which are little plants. And so phytoplankton are the smallest and they are single celled plants and like trees and plants on land. They have chlorophyll, which is a green pigment inside them. And they photosynthesize, which means they take inorganic carbon, which is CO_2 , and then they incorporate it into the organic materials of their tissues and their cells, and then they grow, they multiply and split. So one cell becomes two, two becomes four. And that's how phytoplankton grow. And then zooplankton eat phytoplankton, and then of course the whales eat the zooplankton, that sort of thing.

Sandy, Marine biologist and oceanographer, South Africa, AtlantECO



HOW MANY SPECIES LIVE IN THE OCEAN?

Fredi, 9, Germany

Well, that is a fantastic question, and I think we should really put it out to our top scientists because I'm not sure that anyone really knows how many species live in the ocean. Every day there are new creatures, new plants, new species being identified. At the same time every day we do know there is a loss of species, so it's very, very difficult to quantify. But, but we could actually try to start off a kind of game or a competition to get that answer, but not only to get the answer, to draw the attention to the fact that how important it is that we continue to invest in research by men and women to categorize them, to be able to see what is the marine biodiversity that we have, and do everything so that we don't lose any of it.

Sigi, Advisor to the European Commission, Belgium

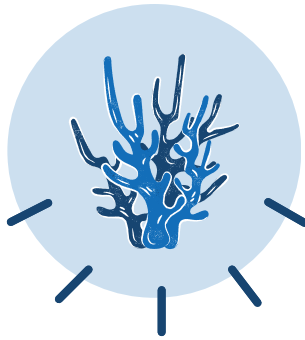


HOW MANY SPECIES LIVE IN THE OCEAN?

Fredi, 9, Germany

Hallo Fredi! We discover a lot of new species every year and we have cataloged about 240'000 different marine species for now. But this is only a fraction of all species that really exist in the ocean today as we still have not discovered all of them! Some scientiststs used mathematical models to estimate that there should be between 1 million and 2 million different marine species in total. There's still so much to discover! Did you know that most of these species are not animals but tiny microbes and algae which we cannot see with our naked eyes? Big animals only represent a tiny part of all these species. For instance, there is only 130 species of marine mammals and about 20 000 fish species.

Fabio, Marine Ecologist, Switzerland



HOW IS A CORAL REEF CREATED?

Josi, 12, Germany

Well, it all starts with plankton. Some of the plankton are larvae or babies of animals that we actually see, like crabs, fish sea urchins, or star fish, and also coral polyps. So the baby coral is floating around as a plankton moved by ocean currents until it is time to find a nice rock or a spot to attach to. Once it finds the spot it attaches to the sea floor and begins his metamorphosis into a polyp. Just like a Pokemon, a polyp looks kind of like an anemone, and this polyp will grow, get some microalgae to help it grow and start building a calcified structure, kind of like a tower. When it's growing enough, it starts cloning itself, making it bigger and making the colony bigger. So kind of making new friends, but of the same individual.

Marta, Marine Biologist and Illustrator, Italy

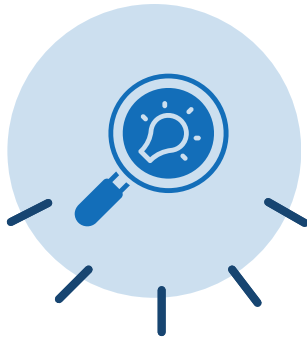


HOW DO YOU FEEL WHEN YOU DISCOVER SOMETHING NEW?

Rafael, 10, Portugal

Well, I think I feel just like you, when you discover a treasure in your garden that you didn't know existed, or when you finally learn something new that you wanted to learn or see or have for a long time. Whenever I discover something new, my mouth falls open and glance in wonder and awe at what I was allowed to understand and see with fresh eyes. And I also feel very small and humbled. Because nature has invented what I see, oftentimes millions and billions of years ago. And nature's inventions are just so perfect and beautiful! In fact, being a scientist often feels like remaining a child, being curious and adventurous and playful. Chasing the secrets of everyday life that are just in front of your eyes. Eternal kid - best job ever, huh?

Meike, Marine Ecosystem Modeller, Switzerland

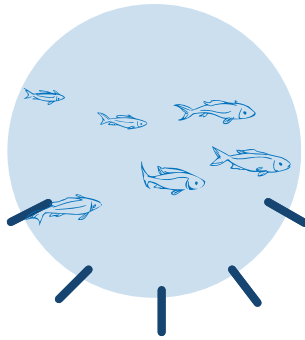


HOW DO YOU FEEL WHEN YOU DISCOVER SOMETHING NEW?

Rafael, 10, Portugal

I just want to tell it to everyone. Immediately. Then I wait a bit and the next day I realize maybe first I should discuss it with my fellow scientists.

Ferenc, Biologist, Hungary

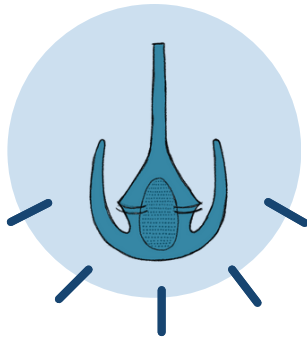


IN YOUR OPINION, HOW IS THE HEALTH OF THE ATLANTIC OCEAN?

Gabrielly, Grade 7, Brazil

Well, Gabrielly, I'd like to answer to you that I believe that the ocean is in a much better state of health than the terrestrial biosphere. Because the oceans have been around for so long and the organisms dominating life in there have evolved over millions and sometimes billions of years. And, as a scientist, I believe they will be there long after we have become extinct. So I would like to give you a hopeful statement in that we do have to worry about the ocean, but the ocean is incredibly resilient, incredibly. And whenever I study plant ecosystems and I see how they've adapted to this very hostile environment that they live in, it, it makes me feel small and it gives me hope. They will be there long, long after us.

Meike, Marine Ecosystem Modeller, Switzerland

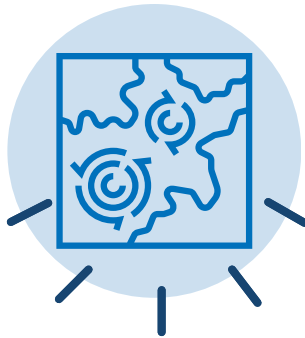


HOW MANY SPECIES OF PLANKTON ARE THERE?

Heronimo, 9, Germany

We have estimates of around 150,000 species of plankton today. This number changes from year to year, but this is the most recent estimate. So 150,000 species of plankton.

Flora, Marine Microbiologist, Germany

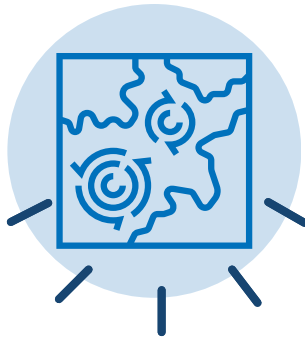


HOW DOES RUBBISH DRIFT FROM BEACH TO BEACH?

Moritz, 12, Germany

The ocean is a very chaotic environment with waves and currents carrying things around, we can never predict the movement of the water, so if you dropped two things in one place, one could end up on the next beach along the coast and the other one could travel all the way across the Atlantic and end up on a beach in America!

Ana, Cienca Viva, Portugal

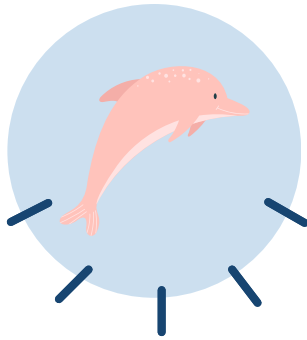


HOW DOES RUBBISH DRIFT FROM BEACH TO BEACH?

Moritz, 12, Germany

Hello Moritz, nice question. Waves approaching the shore at a certain angle cause a littoral drift. This drift runs in the sense determined by the dominant waves. It is likely that rubbish in the nearshore is caught by this current, as sediments are, being transported alongshore.

Raquel, Engineer in Physics, Portugal

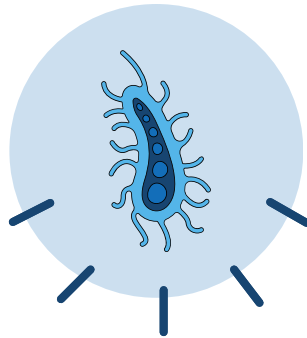


WHAT WAS THE RAREST ANIMAL YOU HAVE EVER FOUND DURING YOUR RESEARCH?

Wallace, Grade 7, Brazil

So I'm not a researcher, but I had the chance to board the ship Tara in Brazil from Belem on the Amazon, and we had the extreme chance to see an Amazon River Dolphin, which is a very big pink dolphin. So it was a very wonderful encounter because it's a species of dolphin that you can only see in this part of the world.

Alienor, Operations Officer, France

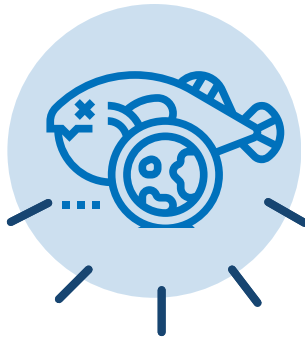


HOW DO THE PLANTS IN THE OCEAN GET THERE AND GROW?

Jules, 7, France

Okay, so that's a great question because I'm actually doing my thesis on seagrass so I can talk a lot about it. Basically, if you say plants, it's a bit of a wide spectrum, and they can be really, really big or they can be really, really tiny. So for example, phytoplankton, they're at the bases of everything in the ocean. But speaking of plants specifically, we have sea grasses, which are super cool amazing plants. I love them so much! They are terrestrial plants who evolved to go back to the ocean, so they once were on the earth and just said, you know what, we're going back to the ocean. They evolved and adapted to be able to go back and grow there so they can grow fully submerged, fully underwater.

Lisa, IMBRSea student, Italy



HOW DOES PLASTIC END INSIDE OF FISH?

Arsen, 10, Germany

It's a very, it's a very good question. We have to say that we are still doing a lot of research to be sure. But they do it through ingestion, so all fish and all the animals in the sea are actively eating or just filtering the water. We talk about small piece of plastic, microplastic, the type of pieces that you can see only through a microscope. And the animals, fish, or others, mistake microplastics for food, and they ingest them. So we definitely can find a lot of plastic in the digestive system in some areas because of these passive or active ingestions. We still don't know if this microplastic is then found also in the flesh, that is the part that we, humans, eat.

Elisa, Environmental Scientist, Norway



WHAT IS IT LIKE DOWN THERE WHEN YOU DIVE?

Ida, 8, Germany

Hallo Ida! I am so thankful I took scuba-diving courses during my studies at University. It takes some getting used to because it is a very unusual feeling to be surrounded by water and to float, which means you are not carrying the weight of your body. But once you get used to it, it is one of the most wonderful feelings I have experienced. I guess it is kind of like flying...you have to move as less as possible and breath calmly. If you manage this, then scuba-diving becomes very very relaxing, almost like meditation. You just feel calm and safe. Did you know that we actually make a lot of noise for the animals when with dive with all the bottles and equipment? You are less scary and more silent for the animals if you free dive which is why some people prefer that over scuba-diving.

Fabio, Marine Ecologist, Switzerland



WHAT IS IT LIKE DOWN THERE WHEN YOU DIVE?

Ida, 8, Germany

It is a real 3D world, you can go into any directions, you feel free and you can observe all the animals and plants that live in this magical world.

Shamwari, IMBRSea student, Dominican Republic.



HOW DOES IT FEEL TO DISCOVER SOMETHING NEW, WHEN INVESTIGATING THE OCEAN?

Eduarda, 11, Brazil

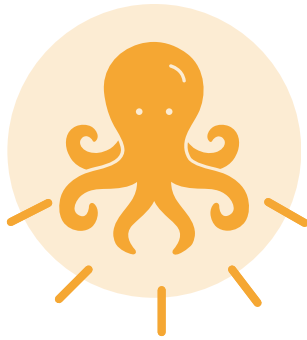
I have to say I feel two things I feel excited. Of course, you're a scientist and one of the reasons to be a scientist is to discover something new. It's also a little bit scary because you don't know anything about this new thing and you think of all of the questions you could ask and you want to answer the right questions and I find that sometimes overwhelming, but overall exciting!

Emma, Marine Microbiologist, South Africa



Questions and answers on marine research



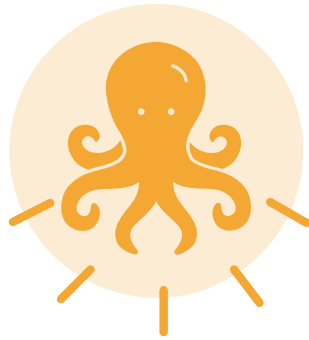


HAVE YOU EVER DEVELOPED RESEARCH WITH OCTOPUSSES?

Esther, 4th Grade, Brazil

Hi Esther. I have never done research with octopuses, but my colleague, Professor Tatiana Leite and her group, do a lot of super interesting research with them. For instance, they demonstrated that several species of octopuses are using marine litter to hide, shelter and lay their eggs. Cans, bottles, pots, various plastic objects and even toilets are being used by octopuses all over the world. The research evaluated 261 underwater images taken in at least 19 countries between 2003 and 2021. Videos and photos collected from social networks and image banks were added to materials provided by scientists and others received through international campaigns promoted by the researchers, in a citizen science approach. The aim was to determine how octopuses interact with marine litter and identify affected species and regions. In another research, her group and other partners observed that octopuses change color while sleeping and have similar sleep stages to humans, suggesting that octopuses can dream, like us. For me, octopuses are fascinating! I love watching them when I'm lucky enough to find them while diving.

Andrea, Researcher, Brazil



HAVE YOU EVER DEVELOPED RESEARCH WITH OCTOPUSSES?

Esther, 4th Grade, Brazil

Hi Esther, how are you? I really liked your question because I LOVE photographing and filming octopuses and their behavior. I work at the Atol das Rocas Reserve, which is a protected marine area located 270 km from Rio Grande do Norte and 148 km from the Fernando de Noronha Archipelago, in the Northeast region of Brazil. I am always accompanying researchers who study octopuses because in addition to enjoying observing octopus behavior, I help researchers to record their work. Also, in my experience, I help researchers find octopus burrows more easily. Outside the octopus burrows, there are remains of things that they ate, such as shells of molluscs, remains of crustaceans and even fish. Octopuses are amazing and quite intelligent. In order to protect themselves from predators or hide from their prey, octopuses camouflage themselves by resembling their environment. And when they feel threatened they release a dark ink into the water and take advantage of that moment to run away and hide and not be captured by fish, moray eels and even crabs. At Atol das Rocas they are very easy to spot because you can't fish there and so there are a lot of them, of all sizes. And the color of the water there is very transparent! So you can see them swimming, fishing, and going to their burrows. During low tide, in some moments, they walk on the rocks to catch the aratus that are resting on the rocks. It's amazing to see! Once, a rather funny thing happened. I saw an octopus, and it was inside the burrow. I was filming him to see him come out of the hole, but he didn't come out at all. So, I left the camera sub near the burrow and walked away. You know what happened? The octopus came out with its tentacles, grabbed the camera and pulled the camera into its burrow! I just didn't lose my camera because it was bigger than the burrow entrance. I never left my camera alone again :) A big hug, much peace, and let's take care of nature.

Zelinha, MPA manager, Brazil



IS THE PROJECT MANAGING TO MAKE ANY CHANGES IN THE OCEAN?

Aline, Grade 7, Brazil

yes, sure, we talk to politicians about new laws to protect the oceans, we talk to citizens to increase the awareness to the dangers of damaging oceans' life, and we work closely with environmental organizations to implement practical solutions. Our goal is to create a collective effort that safeguards our precious oceans and preserves marine life for future generations.

Hugo, Professor, Brazil



WHAT WAS THE REASON FOR CHOOSING THIS CAREER?

Ariana, 10, Portugal

We spend a big part of our lives at work. It's important to make sure that the things we spend our time on are meaningful and important for ourselves and others. For me, I wanted to be certain that the time I spend on my work is dedicated to something that I believe can make a positive difference for people and the world. It feels really good to know that what I do matters and can help others in some way. If you also want to make a difference, think about the things you enjoy doing and how they can benefit others. It could be helping friends or family, or doing something that protects the environment. When we spend our time on things that are important to us, it brings a lot of happiness and fulfillment. Remember, you have the power to make a difference no matter how young you are. Keep exploring your passions and finding ways to make the world a better place for everyone.

Hugo, Professor, Brazil



WHAT LED YOU TO CHOOSE THE PROFESSION OF SCIENTIST?

Denis, School year 6, Portugal

Denis, since I was a child I have always been very curious, and this curiosity took me through many adventures! I discovered that being a scientist is the art of discovery and seeking answers to all our curiosities.

Leandra, Marine Scientist, Brazil



HOW LONG HAVE YOU BEEN CARRYING YOUR RESEARCH IN THE OCEAN?

Joaquim Régis, 4th Grade, Brazil

I have been actively involved in research since I was 20 years old, and now, at the age of 45, I am proud to say that I have dedicated a remarkable 25 years of my life to the pursuit of knowledge, discovery and teaching others. Throughout these years, I have engaged in various research projects, exploring fascinating topics and pushing the boundaries of what we know. It has been an incredible journey, filled with learning, growth, and the thrill of unraveling new insights. I am grateful for the opportunities I have had to contribute to the scientific community and helping young researchers. Here's to many more years of exploration and making meaningful contributions to the world of research!

Hugo, Professor, Brazil

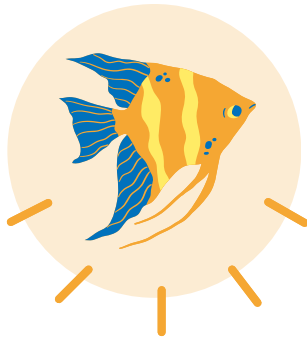


HOW LONG HAVE YOU BEEN CARRYING YOUR RESEARCH IN THE OCEAN?

Joaquim Régis, 4th Grade, Brazil

Joaquim, the ocean has always been a marvelous mystery for me. I was not expecting to try to understand what goes on the ocean (more precisely how countries decide upon ocean matters) until 20 years ago when I joined the Brazilian Government as a public servant. My admiration to the ocean's multiple sciences became my passion, and since then I can't see myself doing anything else in the world.

Andrei, Ocean Science Diplomacy, Brazil



HAVE YOU EVER INVESTIGATED FISH? WHICH SPECIES?

David Antunes, 4th Grade, Brazil

Hi David. I've studied several fish species. I dedicated the last 25 years of my life as a researcher to studying fish and other marine organisms, mainly those that live in coral reefs. I love studying these fish!

Ronaldo, Marine Biologist, Brazil

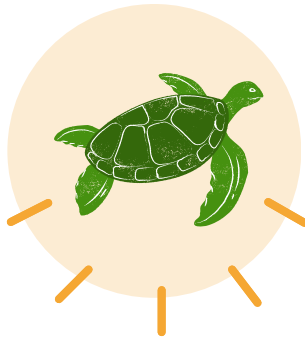


WHAT IS THE BIGGEST ANIMAL YOU FOUND?

Maria Eduarda, 4th Grade, Brazil

Hi, Maria Eduarda, thanks for the question. The biggest animal I ever encountered was the biggest animal that ever lived on the planet! I dove with a blue whale in Srilanka. The blue whale can reach 30 meters! Can you imagine a 30-meter animal? It's much bigger than a bus! And the challenge of being in the water with an animal that size is that with any little movement of its fin, the water moves a lot, and so does the whale. So the difficulty is to be close and accompany it safely. I spent five days in the water to find her, and it was exciting. A curiosity: the blue whale, like every other animal, it eats and what does it do? That's right, poops. So, Maria Eduarda, I entered the water in the middle of the blue whale poop! And what color is the blue whale's poop? You might think it's blue, but no, it's pink!

Rodrigo, Filmmaker, Brazil

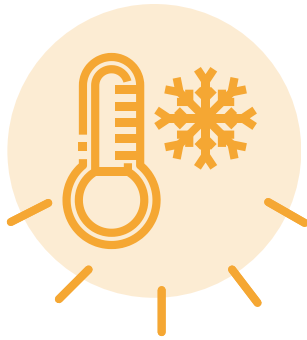


WHAT IS THE BIGGEST ANIMAL YOU FOUND?

Maria Eduarda, 4th Grade, Brazil

Hi Maria! I'd like to mention two. The first one was a green turtle when I was snorkeling in Panama. I think it is easy to assume that turtles can be relatively small but swimming next to it, I realized that it was almost my size. Also, when they are underwater they are super fast. I tried to get closer and it effortlessly swam away from me within 2 seconds. The second animal is one that often people don't realize is an animal; as part of some projects in Venezuela I spent some time diving in coral reefs and corals can grow to enormous sizes, you can find domes that are several meters diameter.

Luis, Marine Ecologist, Italy

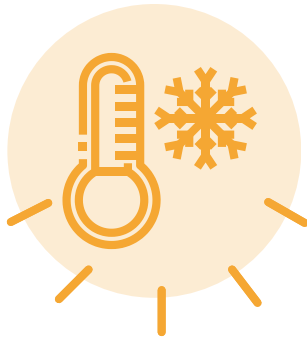


WHAT IS THE LOWEST TEMPERATURE YOU HAVE WORKED IN?

William, 4th Grade, Brazil

I have worked with water that is extremely cold, at a temperature of 2 degrees Celsius, from a depth of 4000 meters in the ocean! Did you know that the lowest water temperature ever recorded in the ocean is even colder? It's called the freezing point of seawater, and it can be as low as -2 degrees Celsius or even colder in certain parts of the world. Isn't that amazing? Exploring the depths of the ocean and studying its temperatures helps scientists understand how different marine life adapts to these extreme conditions. It's like a whole new world down there, and by studying it, we can learn so much about our planet and how to protect it.

Hugo, Professor, Brazil

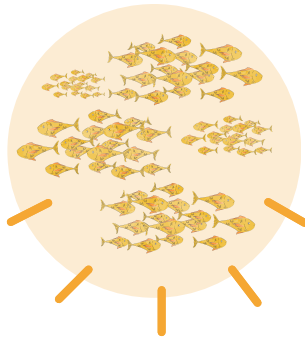


WHAT IS THE LOWEST TEMPERATURE YOU HAVE WORKED IN?

William, 4th Grade, Brazil

William, the lowest temperature I have faced in my life was in a scientific cruise in Antartic. At that time, temperatures were under about -2°C , but it felt like -15°C because of the wind speed!

Fernanda, Marine Biologist, Brazil



HOW MANY FISH SPECIES HAVE YOU WORKED WITH?

Benjamin, 4th Grade, Brazil

Benjamin, I've studied Brazilian fish almost my whole life because I'm from Brazil. But I had the opportunity to study fish from other countries of the world, for example from Japan. So I've studied many species of fish, hundreds of them!

Ronaldo, Marine Biologist, Brazil

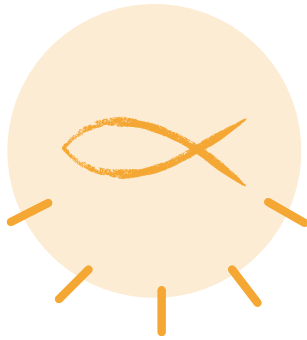


WHAT IS THE MOST INTERESTING RESEARCH THAT YOU HAVE DEVELOPED SO FAR?

Leonardo, 4th Grade, Brazil

Hi Leonardo. Thank you for your amazing question! The most interesting research I developed so far was related to improve tools to "see" phytoplankton (a very tiny microscopic microalgae) on the surface of the ocean from satellites that are monitoring the Earth from space.

Fernanda, Marine Biologist, Brazil



WHAT IS THE MOST BIZARRE FISH YOU FOUND?

Miguel Eduardo, 4th Grade, Brazil

Miguel, I loved your question. The most bizarre fish I've ever encountered is one called *Promethichthys prometheus*. I found this fish when I was diving deep in the sea, inside a submarine at a depth of 670 meters! He always swims with his head up, as if he is standing! It's very different from what we usually imagine when we think of a fish.

Ronaldo, Marine Biologist, Brazil

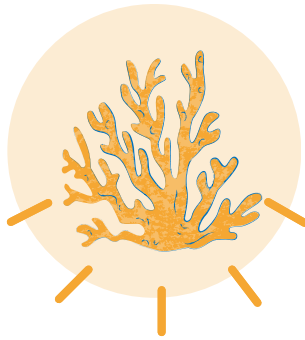


HAVE YOU EVER SEEN A LEATHERBACK TURTLE IN YOUR LIFE?

Matheus, 4th Grade, Brazil

Matheus, the leatherback turtle is a rare animal to be seen here in Brazil, even in breeding places for these animals. So, whoever has the opportunity to meet it, it's a very rewarding moment. I had the opportunity to see it twice in my life. The first time was in 2012 when one ran ashore here in Alagoas (a state in northeastern of Brazil) with one fin missing, probably a sign of negative interaction with fishing. We took care of her and took her out to sea on a raft (similar to Moana's raft) to return her to the sea. The second time was in 2015 when I was working with other turtle researchers to draw up an action plan for the conservation of these animals. During an evening meeting on the beach, unexpectedly, a leatherback turtle appeared, and we watched it spawn! It was a spectacular and moving moment. But I have yet to find a healthy, happy leatherback hatchling, and I look forward to that moment.

Bruno, Marine Biologist, Brazil



WHAT DIFFERENT SPECIES DID YOU FIND DURING YOUR RESEARCH?

Kaique, 4th Grade, Brazil

Hi Kaique, how are you? I'm Bárbara and I'm going to tell you a little about my doctoral research that was carried out at Atol das Rocas, the only atoll in the South Atlantic. During the research, I studied different species of coral, but I also evaluated the bottom cover of the atoll pools and we got a very long list of different species! From coral, sponges, ascidians, and calcareous algae, to fish, crustaceans, turtles and even sharks! There, in Atol das Rocas, it is very common for researchers to find new species for science.

Barbara, Marine Scientist, Brazil



WHAT IS THE MOST DANGEROUS OCEAN WHERE YOU CONDUCTED YOUR RESEARCH?

Nathalie, 4th Grade, Brazil

Hi Natalie. The ocean becomes dangerous for us when storms pass through it. During my research studying the ocean, the most dangerous storm I found myself in was in southern Brazil during the winter. The waves were so high, and the boat was moving so much, that we could hardly stay in bed!

Áurea, Oceanographer, Brazil

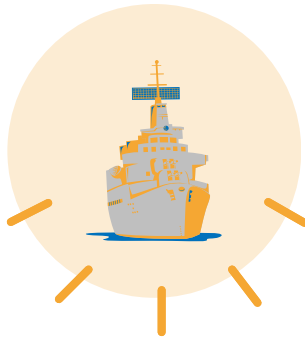


WHAT IS THE MOST DANGEROUS OCEAN WHERE YOU CONDUCTED YOUR RESEARCH?

Nathalie, 4th Grade, Brazil

The ocean can be dangerous in different occasions, especially when we are not familiar with its features. But even when we are prepared for difficult conditions, there can be surprising events, like big waves coming out of nowhere. Intense currents along the shore called rip currents can drag you away very quickly. If you are swimming in a place that you don't know, you should be careful and check with a floating stick the direction of the currents. We don't need to be oceanographers to observe some of the main features of the ocean around us! The most difficult ocean where I conducted oceanographic research is the Southern Ocean, which surrounds the Antarctic continent. It is home to some of the biggest storms and highest waves, which are persistent throughout the year. Executing planned research in the Southern Ocean is very difficult, because your plans change continuously. Especially if one wants to sample the ocean closer to the sea ice edge that changes continuously, as if your coastline on land would move of about 50 km in one day. You keep looking for it and then it escapes! Storms are as big as Australia, and the research vessel cannot run away from them. Nowadays, we have several instruments that can help us to do field research in the Southern Ocean, from good weather forecasts to ships that are equipped with sensors telling us how the big waves affects the hull and the propellers while the ship is standing and taking measures. And we also have autonomous instruments, that can measure many ocean properties for us. But still, researchers have to go on a ship to collect the water and to observe the microbiome in it, which is the base of the ocean food web.

Marcello, Oceanographer, South Africa

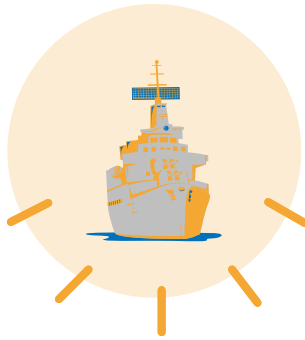


HOW DO YOU FEEL DURING THE TRIPS TO DO YOUR RESEARCH?

Giovanna, 4th Grade, Brazil

You can experience many emotions, it is always exciting to go to new places but it can also be stressful because we have to be careful; sometimes we are dealing with expensive or delicate instruments or maybe we will be in the research site for a very short time. Nevertheless, it is always refreshing to be able to spend time outdoors in contact with nature.

Luis, Marine Ecologist, Italy

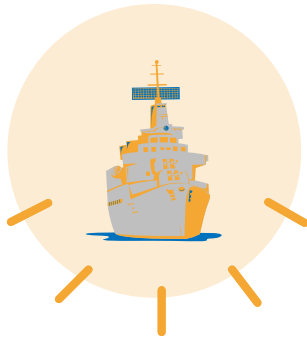


HOW DO YOU FEEL DURING THE TRIPS TO DO YOUR RESEARCH?

Giovanna, 4th Grade, Brazil

Hi Giovanna, research fieldtrips can be quite nerve-wrecking, but they are always exciting as you never know what outcome to expect. Yes, you plan the logistics of each trip way in advance, months, sometimes even years of planning is necessary. But sampling out at sea is never simple, the natural conditions of the ocean are unpredictable and can sometimes create delays or make the planned sampling procedures really difficult to perform. So my best advice would be to remain flexible and learn to adapt to changing environments/conditions.

Leila, Marine Scientist and Communicator, South Africa

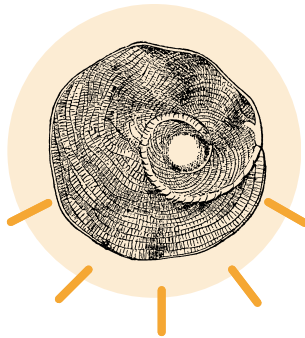


HOW DO YOU FEEL DURING THE TRIPS TO DO YOUR RESEARCH?

Giovanna, 4th Grade, Brazil

Hi Giovana. I love doing what I do. So my feeling during the research is happiness, disposition, and true pride.

Áurea, oceanographer, Brazil

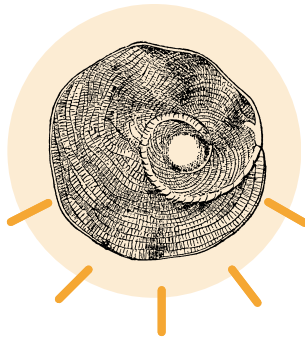


IN YOUR RESEARCH DID YOU FIND ANY PREHISTORIC MARINE ANIMALS?

Heitor, 4th Grade, Brazil

Hi Hector! Yes, I did find foraminifera during my research and I got super excited! Foraminifera are organisms the size of a grain of sand and they produce a carapace similar to a shell. Studying this shell we were able to know what the sea was like in the past, we were able to tell the temperature of the water, and how much salt it had! Super interesting, right?

Vinicius, Marine Geologist, Brazil



IN YOUR RESEARCH DID YOU FIND ANY PREHISTORIC MARINE ANIMALS?

Heitor, 4th Grade, Brazil

Hi Hector, what is interesting is that sometimes researchers think that animals go extinct and some do, but sometimes we just haven't looked in the right places. In South Africa, researchers found the coelacanth after it was thought to be extinct and recently we found very large foraminifera that were also thought to be extinct. Who knows what else we will find as we explore.

Natasha, Marine Ecologist, South Africa

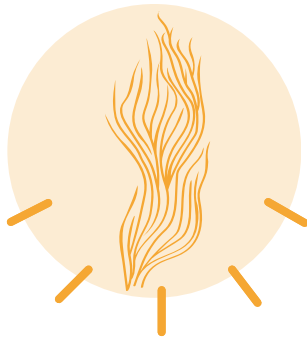


WHAT WAS THE HARDEST RESEARCH YOU HAVE EVER DONE?

Tiago, 4th Grade, Brazil

My hardest time during my research was when I was on board of a research boat in winter in the middle of the Atlantic. The weather was horrible and everyone was sick on board. I was working on some data we had collected and one incoming wave was so big that the computer screen detached from the base and landed into my arms.

Daniele, Physical Oceanographer, Italy

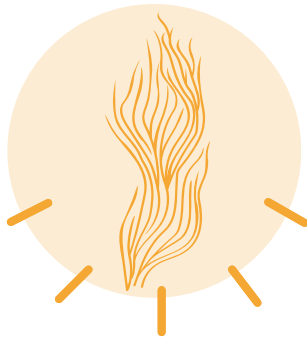


IF YOU COULD FIND OUT MORE ABOUT THE OCEAN, IN THE DEEP OCEAN, WHAT WOULD YOU WANT TO RESEARCH?

Alexandre Léo, 4th Grade, Brazil

Hi Alexandre, for the last couple of years, my research looked at what kind of marine life is living on the seafloor of South Africa's continental shelf edge and slopes (up to 1000 m deep). It has been quite exciting to explore as we head out on our research vessels offshore and use really cool underwater cameras to capture what is living at those depths. However, moving forward I would love to research how deep sea organisms and habitats are being impacted by various factors, such as fishing, pollution, mining, etc. and see how we can protect and preserve these areas.

Leila, Marine Scientist and Communicator, South Africa

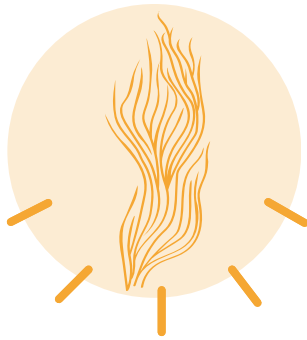


IF YOU COULD FIND OUT MORE ABOUT THE OCEAN, IN THE DEEP OCEAN, WHAT WOULD YOU WANT TO RESEARCH?

Alexandre Léo, 4th Grade, Brazil

Hi Alexandre, thanks for your super interesting question. There are undoubtedly countless mysteries waiting to be unraveled in the deep sea. We know so little about this big place. As a matter of curiosity, the deep sea is the largest area on our planet, but extremely difficult to access it. If I could have more opportunities to study the deep sea, I would like to understand the adaptation of the animals to live there. Just imagine the pressure these animals endure, the freezing temperature, and even more without light! I would like to know more and more about these adaptations, for both invertebrate and vertebrate animals.

Marcelo, Marine Biologist, Brazil



IF YOU COULD FIND OUT MORE ABOUT THE OCEAN, IN THE DEEP OCEAN, WHAT WOULD YOU WANT TO RESEARCH?

Alexandre Léo, 4th Grade, Brazil

Hi Alexandre, what I find most interesting about the deep ocean is that often what we see in the deep ocean challenges what we think we know about how life works. They found hydrothermal vents and now we know that food is created not only by plants capturing the sun's energy, but also through chemical reactions and bacteria in the dark ocean. Small animals in the shallow water can become gigantic in the deep. Animals that feed on small particles in the shallow water can become predators in the deep. Animals like sponges that can't move in the shallow water can move around in the deep. As we explore the deep ocean I can't wait to see what else is different from what we know at the moment. Exploring the deep is fascinating.

Natasha, Marine Ecologist, South Africa



WHAT STRATEGY THAT YOU HAVE IMPLEMENTED HAD THE GREATEST EFFECT ON THE PRESERVATION OF AN ENDANGERED MARINE SPECIES?

Luphumelo, 15, South Africa

Hi Luphumelo, That is a great question. After many years of research I have learned that measuring these kinds of things can be tricky. This question takes me back to my very first job, where I taught environmental education to primary school learners. To this day I still believe that teaching awareness for the younger generation is key. It is up to all of you to be aware of what the threats are to marine species, and this way we can all take every day actions (such as beach cleanups!) to help mitigate them.

Emma, Marine Microbiologist, South Africa



WHAT INSPIRED YOU TO BECOME A MARINE SCIENTIST?

Aqhama and Malubana, 15, South Africa

I was completing my university studies in nuclear physics (which I found to be quite boring, actually) when I saw the announcement for students to participate to a research cruise. I applied and went for my first cruise in the Mediterranean Sea. It was so exciting that when I went back I changed my subject of study and moved to have a degree in oceanography.

Daniele, Physical Oceanographer, Italy



WHAT INSPIRED YOU TO BECOME A MARINE SCIENTIST?

Aqhama and Malubana, 15, South Africa

When I was a teenager I had a teacher who took us to do experiments on the Brazilian coast. The first time he took us there, I was delighted with the movement of the waves, the color of the sand, and the number of organisms that we saw on the rocky shore. I was enchanted! My choice to be a marine biologist was that I fell in love with the wonderfulness that is our ocean in all its beauty and in everything that surrounds it.

Leandra, marine scientist, Brazil



WHAT INSPIRED YOU TO BECOME A MARINE SCIENTIST?

Aqhama and Malubana, 15, South Africa

Malubana, I decided to be a marine scientist because I really enjoy being underwater, and when I was just a kid (8 yo) I thought it was what marine biologists do. But then, as I became older, I saw it was a very interesting profession and I could dedicate my time to new discoveries in science and for a better planet. That's why I decided to become a marine scientist.

Ana Carolina, Marine Scientist, Brazil



WHAT INSPIRED YOU TO BECOME A MARINE SCIENTIST?

Aqhama and Malubana, 15, South Africa

Growing up in Cape Town, my family and I always enjoyed spending our holidays or weekends at the beach, so since then I have always been fascinated with what was living amongst the rocks and beyond the coastline, especially when seeing organisms washed up on the beach. The curiosity grew and sparked my interest in wanting to know more about the ocean and how we can explore the deep seas. From high school already, I made sure to do my research and find out what I needed to do or study to become a marine biologist - so I did just that. It wasn't an easy journey, but today I can say I have worked and studied hard to become a marine biologist and every single day I still get to learn something new about the ocean. It's an amazing field to work in.

Leila, Marine Scientist and Communicator, South Africa



IS THERE ANY CURRENT RESEARCH WORKING ON HOW TO STOP POLLUTING THE OCEAN?

Alexandre Léo, 4th Grade, Brazil

Yes, there are many! Scientists and people around the world are studying how to stop pollution in the ocean. They are doing different things to make it better. Some of the things they are doing are: Figuring out better ways to handle and recycle plastic so it doesn't end up in the ocean. Creating special machines and tools to clean up the plastic that is already in the ocean. Finding new materials that are better for the environment and don't cause pollution. Checking and measuring the pollution in the ocean to understand how bad it is and where it comes from. Making rules and laws to stop people from using too much plastic and to encourage them to recycle. Teaching and telling people about the problem so they can help too, by using less plastic and being more careful. All of these things are being done to protect the ocean and keep it clean and healthy for the animals that live in it and for us too!

Eloïse, Research and Innovation Manager, France

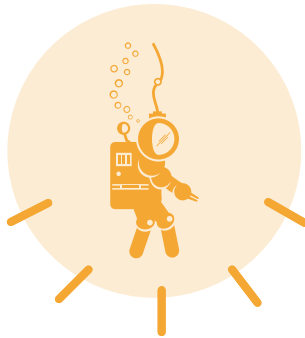


WHAT ARE THE GOALS OF YOUR OCEAN RESEARCH?

Giovanna, Brazil

In the project AtlantECO we are trying to get a better understanding of the status and health of the Atlantic ocean by looking at three main things: 1) the microbiome, those tiny creatures living in the ocean which are at the base of the food chain and who are crucial for so many things in the ocean and on land, 2) plastics and the plastisphere, where we look for tiny pieces of plastics and look at what sort of life develops on them and 3) the contact within those two first components evolves, that is a very dynamic environment with currents and connection between different regions of the ocean. We use information on these aspects to make models, and these can help us understand how the ocean could evolve over time. This will help future generations because the results that we can generate can help inform the decisions that are and will be made on how to manage the ocean and its resources, meaning that we can take better care of it and ensure that we can all keep benefiting from all the services it provides us!

Eloïse, Research and Innovation Manager, France

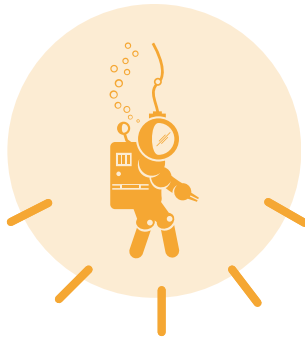


WHAT WAS THE GREATEST OCEAN DEPTH YOU REACH DURING YOUR RESEARCH?

Letícia, 4th Grade, Brazil

The deepest depth we have reached with our instruments was 3500m, in the Ionian Sea, a regional sea within the Mediterranean Sea.

Daniele, Physical Oceanographer, Italy

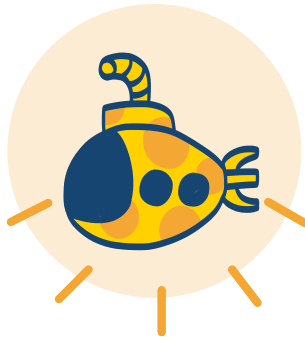


WHAT WAS THE GREATEST OCEAN DEPTH YOU REACH DURING YOUR RESEARCH?

Leticia, 4th Grade, Brazil

Hi Leticia, my research was looking at what kind of marine life is living on the seafloor of South Africa's continental shelf edge and slopes, up to 1000m deep. But there are some other projects looking at exploring deeper.

Leila, Marine Scientist and Communicator, South Africa



HOW IS OCEAN RESEARCH DONE?

Gabriella, 4th Grade, Brazil

Ocean research is conducted using various methods and instruments to explore and study the ocean. Here's a few examples of equipment used: Ships and Boats: Scientists often use research vessels, ships, and boats to explore the ocean. These vehicles allow them to travel across different areas and collect data. They may use specialized equipment, such as nets, to catch marine organisms for study. Sonar and Acoustic Instruments: Sonar is used to map the seafloor and detect underwater objects. It works by sending sound waves into the water and measuring the time it takes for the waves to bounce back. Acoustic instruments can also be used to study marine animals by listening to their sounds and tracking their movements. Remotely Operated Vehicles (ROVs) and Autonomous Underwater Vehicles (AUVs): ROVs and AUVs are robotic vehicles that can be sent deep into the ocean to explore and gather data. They are equipped with cameras, sensors, and sampling devices to collect samples, capture images, and record information about the ocean's characteristics. Submersibles and Diving: Manned submersibles, such as submarines, are used to reach great depths in the ocean where humans cannot go. These vehicles allow scientists to directly observe and collect samples from the deep ocean. Divers equipped with special gear can also explore shallow areas and conduct research. Satellites: Satellites orbiting Earth provide valuable information about the ocean's surface. They can monitor sea surface temperatures, ocean currents, and even detect the presence of algae blooms or pollution. This data helps scientists understand large-scale ocean processes. Sensors and Buoys: Scientists deploy various sensors and buoys in the ocean to continuously collect data. These instruments measure factors like temperature, salinity, currents, and even the presence of pollutants. They provide valuable information about the ocean's conditions over time. These are just a few examples of the tools and methods used in ocean research. By using these instruments, scientists can gather data, observe marine life, study ocean processes, and better understand the complex and fascinating world beneath the waves.

Eloïse, Research and Innovation Manager, France



DO YOU FEEL THAT YOUR PROFESSION IS RESPECTED?

João, 10, Portugal

Well, I used to think so, since we spend many years in training to become experts in our field. However, nowadays, I sometimes have the impression that people lose their faith in us scientists, and prefer to draw their conclusions based on social media content that only confirms what they want to think. A critical reflection of any 'facts' that people may repeat to you is needed in this age of exponential information increase. Be critical! Especially of your own opinions! Everything must make sense, as my PhD advisor used to say. If there are flaws in an argument, then the argument does not hold. As a scientist, I am trained to be suspicious of easy solutions, and simple answers. And I am well aware of my own subjectivity and try to not let it impair my judgement. I try to be humble, and to always reflect upon the boundaries where my competence ends. For this, I believe we deserve some respect as scientists. However, every person, profession or being deserves respect.

Meike, Marine Ecosystem Modeller, Switzerland



WHAT IS THE IMPORTANCE OF SCIENTISTS IN OUR WORLD?

4th grade class, Portugal

Scientists are important because they expand our knowledge, solve problems, drive innovation, protect the environment, and inspire curiosity. They conduct research and make discoveries that add to our understanding of the world. Scientists work on finding solutions to challenges like climate change, pollution, and health issues. They drive technological advancements and innovations that improve our lives. Scientists also study and conserve our environment, helping us make informed decisions to protect the planet. Their work inspires curiosity and encourages young people to pursue careers in science. In summary, scientists make the world a better place by advancing knowledge, solving problems, and inspiring us to explore and learn, maybe you will become one too?

Eloïse, Research and Innovation Manager, France



WHAT IS THE MOST EFFICIENT WAY TO DO OCEAN RESEARCH?

Davi Luiz, 4th Grade, Brazil

Each scientist may have their own view on this, but I'd say a combination of targeted field and laboratory work, data synthesis, remote sensing and modelling to identify key processes and impacts is probably an efficient approach. Have a look at projects such as the American EXPORTS project or the Tara Oceans expedition and see how science is done there. Oftentimes, if we integrate our scientific information across instruments, methods and in space and time in an inter-disciplinary way, this is where we gain a lot of understanding of nature's rules.

Meike, Marine Ecosystem Modeller, Switzerland



WHICH OCEAN HAS THE HIGHEST NUMBER OF SPECIES USED FOR HUMAN CONSUMPTION?

Antonella, 4th Grade, Brazil

The ocean that has the highest number of species used for human consumption is the Pacific Ocean. The Pacific Ocean is the largest ocean in the world, covering a vast area, and it is home to a wide variety of fish and seafood that are caught and consumed by people. The Pacific Ocean is known for its diverse marine ecosystems, including coral reefs, kelp forests, and open ocean habitats. These different environments support a great variety of marine life, making it a rich resource for human consumption. It's important to note that responsible fishing practices and sustainable management are crucial to ensure that these species are not overfished and that the ocean ecosystems remain healthy. By taking care of the ocean and its inhabitants, we can continue to enjoy its delicious seafood for generations to come.

Eloïse, Research and Innovation Manager, France



AS A RESEARCHER, WHAT WAS THE BIGGEST RESEARCH YOU CARRIED OUT, WITH THE MOST FUNDING AND PEOPLE INVOLVED?

Júlia, 4th Grade, Brazil

The biggest ocean-related project I have been involved in is the ongoing AtlantECO project (<https://www.atlanteco.eu/>).

Tonje, Molecular Biologist, Norway



WHAT ARE YOUR BIGGEST CHALLENGES IN CARRYING OUT YOUR RESEARCH?

Ana Beatriz, Grade 7, Brazil

Lack of regular funding and increased bureaucracy can be real challenges when you are working on research.

Eva, Marine Biologist, Greece



WHY DO YOU STUDY THE OCEAN?

Pedro, Grade 7, Brazil

I study the ocean because I feel it is fascinating and impressively wisely built! We have so many things to learn from the wisdom of nature. The ocean gives me a sense of freedom and creativity so I am doing my best to protect it and to create awareness to young kids like yourself!

Eva, Marine Biologist, Greece

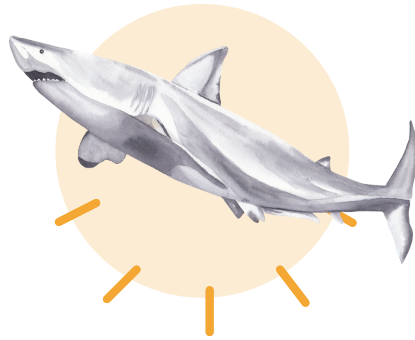


WHY DO YOU STUDY THE OCEAN?

Pedro, Grade 7, Brazil

Hi Pedro, I study the ocean because I'm curious. What kinds of animals do we have in the ocean? What do they do? Where are they found? Why are they there? How do they interact with other animals? What do they eat? What eats them? Are they big or small? Why? How far do they travel? Can we find the same animals in South Africa and north Africa? Always more questions than answers. That's the fun part of studying the ocean.

Natasha, Marine Ecologist, South Africa



WHAT WAS THE BIGGEST SHARK YOU HAVE ENCOUNTERED?

Manuela, 4th Grade, Brazil

The biggest shark I have encountered was a Great White Shark and roughly 5.5 meters in length. I was doing research in South Africa in Gansbaai, a hotspot for Great White Sharks. We studied their population structure and monitored their behavior. In some cases, we even tagged the sharks, so we could follow their migratory patterns.

Dominic, Marine Ecologist, Switzerland



HOW MANY SHARK SPECIES HAVE YOU RESEARCHED IN YOUR LIFETIME?

Bernardo Antonio and Maria Eduarda, 4th Grade, Brazil

I have only worked with one shark species, which was the Great White Shark. This apex predator has always fascinated me. I was in South Africa for one month to support a marine biologist in his research effort collecting data. During my stay, I have probably seen more than 100 individuals.

Dominic, Marine Ecologist, Switzerland



HOW WOULD YOU DEAL WITH A TEAM MEMBER WHO HAS DIFFERING VIEWS ON IMPORTANT MARINE ENVIRONMENTAL ISSUES?

Luphumelo, 15, South Africa

I discuss with them, formulate my arguments based on the known facts, and listen to their arguments in turn. And who knows, maybe their arguments are far better than mine, and I change my opinion?

Meike, Marine Ecosystem Modeller, Switzerland



WHERE IS YOUR OFFICE FOR FUTURE REFERENCES?

Ditebo, 14, South Africa

In most of our research projects, there are numerous partners involved, from many different countries! For example in AtlantECO, we have 36 partners, coming from 13 different countries. This is essential to ensure that we have the best team to do the job, and also that everyone that should be involved is involved... and in our case, the South African members of the team are based at the University of Cape Town MARIS and the University of Pretoria.

Eloïse, Research and Innovation Manager, France



WHERE DOES THE FINANCIAL SUPPORT TO CARRY OUT YOUR RESEARCH COME FROM?

Family, Teacher, Brazil

AtlantECO is funded by the EU's framework programme for research and innovation called Horizon2020, so it is publicly funded. In this particular case, funding was also allocated to specific countries outside of Europe, so that we could collaborate at the Atlantic basin level

Eloïse, Research and Innovation Manager, France

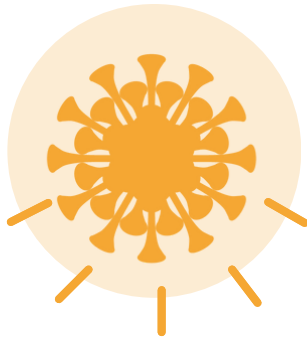


WHAT HAS MOTIVATED YOU TO GO INTO SCIENCES?

Athur, 16, France

I grew up in the 80s and early 90s where the awareness about pollution and the need to protect and conserve the environment was increasing. Biotechnology was in its infancy, but we were told that this would be the future industries to dominate down the line. I've always been a curious person that excelled in natural sciences, so the choice to become a scientist was taken long time before I started at the university. I chose biotechnology because I believed and still do, that many of the polluting industries can be replaced by more sustainable solutions using microorganisms, and besides it is a very fascinating and broad research field. Microorganisms are so versatile and can e.g., be used to convert waste or even CO₂ gas into food, feed or materials replacing petrochemical alternatives. Many of the antibiotics and drugs currently in use are also produced by microorganisms, but their efficiency are decreasing due to the spreading of antibiotic resistance. To counteract this dismal development, scientists are searching for biosynthetic gene clusters for the production of new drug candidates in the plethora of microbial genomes and metagenomes that are unravelled in big international research projects like AtlantECO. The knowledge that what we do may improve someone's life or even save their life in a crisis is definitely motivation to keep up the good work.

Tonje, Molecular Biologist, Norway



WHAT ARE SOME OF THE BIGGEST MISTAKES PEOPLE MAKE ABOUT MARINE BIOLOGY?

João, 16, Madeira island

Ooh, that's a very big question. One of the biggest mistakes I think come from people coming in asking me about marine science and they assume it's mostly big stuff, so whales or dolphins or sharks, which it partly is. And they're all really important and really cool. I see them when I'm on on field trips and I find it amazing BUT that covers about 2% of marine biology. There's also the physical side, there's the microbe side; and a lot of people don't know that they exists. A lot of people don't know there are viruses or little crustaceans in the ocean, and so much more, which makes it so much more interesting, so much more exciting.

Emma, Marine Microbiologist, South Africa



DO YOU LIKE YOUR JOB? WHAT ARE THE HIGHLIGHTS OF IT?

Maria Alice, 4th Grade, Brazil

Do I like my job Maria Alice, absolutley. Everyday...not at all. My job is very exciting, there is always something new to learn and do. The best thing about doing research in the environment is you get to go to the ocean and spend time on a boat, then you come back to the laboratory and do experiments. Then when you have new infromation, you get to communicate your science to different people. Some days you tell other scientists and students what you do, then you have to tell the public and then somedays you are telling kids from all around the world about your work. This is all very fun, but a lot of work, which can make it difficult to love my job all the time. I would say that there are more good days than bad days though, which means research is a good job for me. Now what are the highlights of my job...hmmm. I think one highlight for me was doing marine research while on a boat for a month during TARA Mission Microbiomes. The other highlight was when I taught univeristy students about microorganisms and what they do in the ocean, it was so fun. Finally, I think a highlight was when my research allowed me to get a doctoral degree, I worked reallyt hard and it was an amazing "prize" for my hard work. I hope you love your job one day, maybe not everyday but most days! Thanks for your question.

Nicole, Marine Microbiologist, South Africa



HOW IS A SCIENTIST'S DAILY ROUTINE?

4th grade class, Portugal

Haha. Different to what you'd imagine. Get up, get kids out of bed, prepare breakfast and school rations. Have coffee. Breathe. Race your bike to the train station, catch train to work. Check e-mails on train, read about 30 new things you are supposed to do. Ah yes, until tonight. Get to work. Sit in front of a computer. Trouble shoot some of the issues mentioned in the e-mails. Run to classroom. Teach a range of students about global biogeochemical modelling. Suppress a yawn. Get some good questions. Discuss some marks that you gave on a poor piece of homework. Stay behind with that fascinating young person who asks further questions. Ah no, you are late for your Zoom meeting with colleagues in Brazil who'd like to discuss some new collaboration. Laugh, great the faces of people you'd like to meet at the next conference! As soon as you finish the Zoom call, there is a knock on your door. Discuss new results with your MSc students, then with your PhD student, then with the postdoc. A lot of results look mysterious, which is nice. Keeps you in work for the next 10 years! Finally have a closer look at some data sent by a colleague. Do some calculations. Wow, this looks curious! Oh! It's 14:00. You missed lunch again! Grab Thai food, the take away is closest to your office. Spill food onto your laptop while reading. Read 5 papers, consult the data, get super excited about all the ideas how you could turn this data into science! Spend 2 hours drafting a proposal, in order to get money to fund the idea. Pling, new e-mail arrives. A reviewer made nasty comments about your recent paper. Sobbing PhD student, who is co-author on this study, needs some consolation. One more meeting, and off you are in a fast jog to the train station again. It takes 7 minute if you run, you have optimized your times. Read paper draft on the train, make too many comments. Realise that oops, there was an important deadline for tomorrow, that you now miss, unless you do a night shift. Pick up kid, make dinner for family, bed time routines. Be honest, your partner does dinner, because you hate cooking. Crash on sofa, exhausted. But what if I just checked that data again, only for some minutes...?

Meike, Marine Ecosystem Modeller, Switzerland

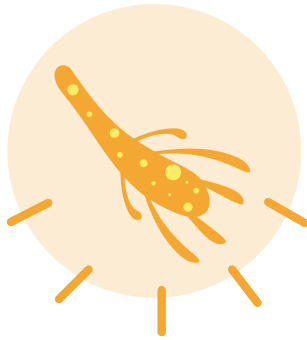


IN WHICH PART OF THE OCEAN DO YOU DO YOUR RESEARCH?

Arthur Ulrich, 4th Grade, Brazil

Hi Arthur! I study the really really small organisms in the 5 or 6 km from the coastline of South Africa. This water is in the Benguela Current System, in the bigger Atlantic Ocean. So we are studying these organisms on the opposite side of the Atlantic ocean from Brazil. The water there has a lot of food (phytoplankton) in it for zooplankton to eat, which are then eaten by fish. Our job is to understand this phytoplankton food source and the even smaller organisms that can effect this food source. Thanks for the great question.

Nicole, Marine Microbiologist, South Africa



IS YOUR RESEARCH ABOUT MARINE BIODIVERSITY?

Geisiane, Grade 7, Brazil

Hi Geisiane! Good question, it depends on the researcher answering the question! For me, yes it's totally about biodiversity, I look at plankton, the really small plants and animals in the ocean. We try and identify everything we see, so we can hopefully understand what the plankton community is doing. Lots of work only focuses on a few species, but we like to look at everything! Plankton are vital for pretty much all life in the ocean, from the smallest fish to the largest whales, and many things people eat, such as crabs, lobsters and shellfish, actually start their lives in the plankton. So by trying to understand what the plankton community is doing, we can hopefully understand how the rest of the animals in the ocean are going to react.

David, Plankton Ecologist, UK

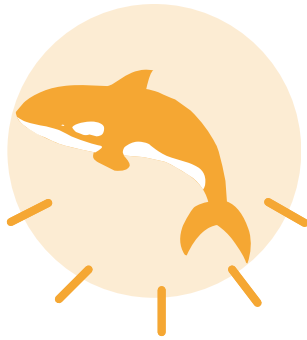


IS YOUR RESEARCH DONE ONLY IN THE ATLANTIC OCEAN? HOW MANY NAUTICAL MILES FROM THE COAST?

Kaio, Grade 7, Brazil

Hi Kaio! Well, I work for a group and we collect plankton data, and we work in the Atlantic, and the Pacific, and also now in the Arctic. Sometimes, we also go down to Antarctica, but not very often. Our work starts further out from the coast, maybe from 20km offshore right out into the middle of the oceans - it's really exciting, but it is a challenging place to sample, the weather can be very bad!

David, Plankton Ecologist, UK

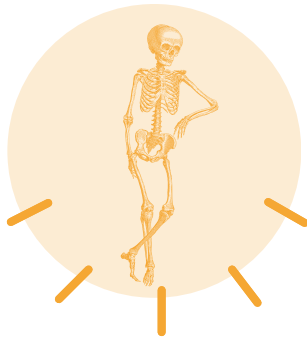


WHAT IS THE MOST SINGULAR EXOTIC ANIMAL YOU HAVE EVER ENCOUNTERED?

Maria Eduarda, 4th Grade, Brazil

Hi Maria. What is described as exotic probably depends on the perspective of the observer. The most majestic ones I've encountered here in the wild probably is a tie between the orca whales that I observed from a ferry along the Norwegian coast and the moose (*Alces alces*) during hiking. People here might not describe any of them as exotic so personally I found it equally "exotic" to encounter the coati when I visited Brazil, even though they are not very rare, right.

Tonje, Molecular Biologist, Norway



WHAT WAS THE MOST DANGEROUS ANIMAL YOU ENCOUNTERED DURING YOUR RESEARCH?

Nathalie, 4th Grade, Brazil

Homo sapiens sapiens.

Meike, Marine Ecosystem Modeller, Switzerland

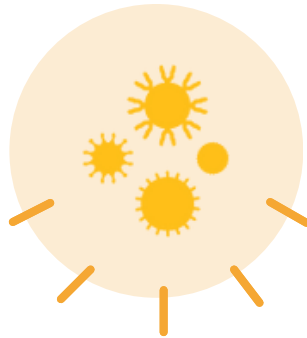


WHAT IS YOUR RESEARCH AREA?

Ana Beatriz, Grade 7, Brazil

I am currently conducting research for my masters thesis which is about how fishers relationships with patrons in Nayarit, a climate change hot spot in Mexico, affect their responses to climate change. Patrons are people that can provide benefits to fishers either by giving fishing permits, or things like boats or fishing gear. This is important because if these relationships have the ability to affect fishers adaptations to climate change and we can use this information to help people in government make better decisions on how to help fishers and regulate fishing.

Sarah, Marine biologist, UK



WHAT FASCINATES YOU ABOUT STUDYING THE OCEANS?

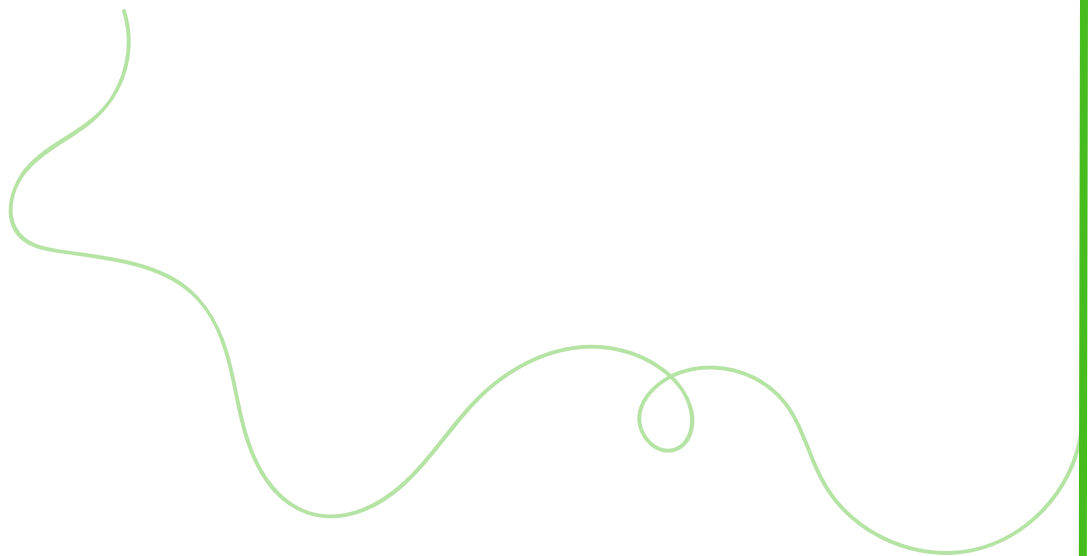
Samira, 10, Portugal

When I was little, I wanted to become an astronomer, and discovering the stars. Then I realized that life under a microscope was as fascinating as life through a telescope. And I fell in love with the small ocean creatures that you cannot see with your naked eye, and yet they run the show in terms of producing half the new oxygen that you breathe each year. In effect, I fell in love with the beauty of nature, at large and small scales.

Meike, Marine Ecosystem Modeller, Switzerland



Questions and answers on inclusive sciences - focus on women





ARE WOMEN SCIENTISTS PRESENT ACROSS ALL SCIENTIFIC DOMAINS/DISCIPLINES?

Arthur, 16, France

Yes, women scientists are present across all scientific domains and disciplines. There are some variations in their representation across these disciplines, for example to date, there are still significantly less women in computer sciences, physics and engineering. Overall, there is an increase in the number of women in STEM careers, so that's good news! What is important to keep in mind is that diversity is crucial to ensure we achieve the best science possible, so that means encouraging everyone to pursue these careers will be beneficial to us all, and this for all underrepresented groups equitably.

Eloïse, Research and Innovation Manager, France

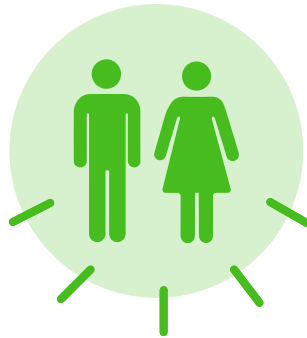


WHAT MAKES YOU MOST PROUD ABOUT INTERNATIONAL WOMEN'S DAY?

Erin, 15, England

Uh, that's a tricky one. There's a lot of things to be proud about for International Women's Day, but the first thing that comes to our mind is, , even though it's a celebration of all of the things we've achieved, I think it's still very much a springboard for all of the things that need to happen. I think International Women's Day is usually a really big push for things that need to change. And, I like to think that you can see things changing more and more. Every year is a reminder that things still aren't the way we want them to be and things still need to change, and it's motivating, inspiring people to ignite that change.

Sarah, IMBRSea student, England.

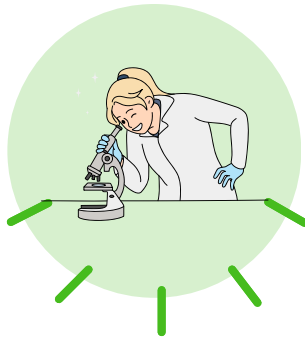


ARE WOMEN NOW RECOGNISED TO THE SAME LEVEL AS MEN, COMPARED TO BEFORE?

Arthur, 16, France

Arthur, I wish the answer to this question was a clear yes. Women recognition in science is increasing, however the harsh reality is that even in countries that have high gender equality overall, women typically struggle harder to get promoted or get paid equally to men even if their overall level of education is the same. For some reason the professions dominated by women on average are paid less than professions with the same education level, but that are dominated by men. In disciplines where there overall are more female than male scientists, the higher positions (professor, senior researcher etc.) are still often dominated by men. I have no good explanation to this beside what I personally have observed – men are perceived as more confident and therefore assumed to be more qualified and unfortunately many men prefer to hire and promote other men presumably for the same reasons. Hopefully this misconception is something we can fix in the years to come.

Tonje, Molecular Biologist, Norway



WHAT ARE SOME ADVANTAGES AND DISADVANTAGES OF BEING A WOMAN SCIENTIST?

Arthur, 16, France

Gosh, I find this a different question to answer because generally speaking, I just don't see myself as a female scientist or a woman scientist, I just see myself as a scientist. So it's a hard question to answer because I think we should just be considered the same and equal, and both having the similar ability to do science. There's just no reason to think that a male or a female could science any better based on gender. So, I just don't really see the disadvantages myself, and I haven't felt them myself. And that's not to say that they don't exist and you need to be sensitive to the fact that other people have felt them. It has also been an advantage, to be perfectly frank, to me to be one of few female scientists at the moment because there is a huge push and an emphasis on trying to include and diversify and it does mean that I get noticed a bit more.

Sandy, Marine biologist and oceanographer, South Africa, AtlantECO



WHY ARE MEN/PEOPLE AFRAID OF WOMEN WHO CHOSE A SCIENTIFIC CAREER?

Arthur, 16, France

Hi Arthur. In my experience people often are intimidated by others who appear smarter than themselves or work with topics that they do not understand themselves as it makes them feel insecure or even inadequate. I have the same uneasy feeling when I have to interact with someone "famous". Talking to high-ranked scientists in my reserch domain is not a problem since we speak the same "language" and I know how to talk to them, but put me in front a celebrity and my brain short-circuits. As for the gender-issue, I believe that this is linked to tradition, where men were the providers of the families while the women stayed home and cared for their children. Somehow the shift to a more gender-equal society translates this into some people still believing that women who choose scientific careers must be different than men going down the same path.

Tonje, Molecular Biologist, Norway



AMONG WOMEN AND MEN SCIENTISTS, WHICH RESEARCHER IS THE MOST RELEVANT?

João, 11, Brazil

I think there's many, many important scientists. Many people think of Darwin as one of the founding fathers for basically everything. So I might say that. And specifically for marine biology I want to mention Cousteau, but talking about women, I want to mention Sylvia Earle, because she is great. She is really trying to put her face out there and be there when there are conferences like in the UN panel. I think she's really showing that you can do science and you can discover new things, but you also have to, take a stand and participate to change things then, because I think it's super important to go out, do science, discover new things, but also do what you can to preserve the things that you study because they are in danger most of the time!

Lisa, IMBRSea student, Italy

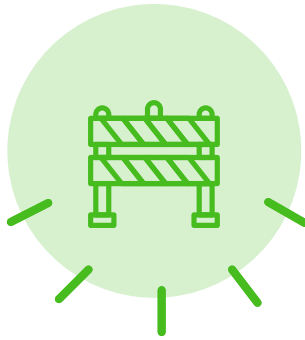


AMONG WOMEN AND MEN SCIENTISTS, WHICH RESEARCHER IS THE MOST RELEVANT?

João, 11, Brazil

There are many different lists that try to determine the most influential scientists in any given year, based on their awards, citations, coverage of their work the media, and so on. Obviously, these metrics cover only a limited range of criteria. Have a look here for the most influential climate scientists 2022: <https://www.reuters.com/investigates/special-report/climate-change-scientists-list/>.

Meike, Marine Ecosystem Modeller, Switzerland

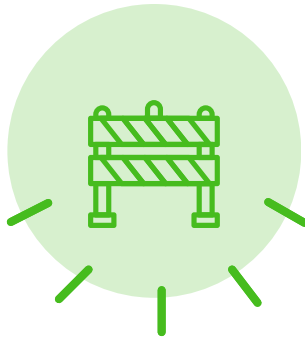


ARE THERE MANY OBSTACLES FOR WOMEN TO BECOME SCIENTISTS?

Arthur, 16, France

I think this is highly dependent on the culture you come from. In my country we have a high gender equality and your limitations and possibilities with respect to career primarily depends on what grades you get from school and studies. I studied in the mid-90s in Norway and I chose my career based on my interests and paid no attention to what others (e.g., my family) said. In other cultures this may, however be different, especially in areas where there are only a few career deemed suitable to women.

Tonje, Molecular Biologist, Norway

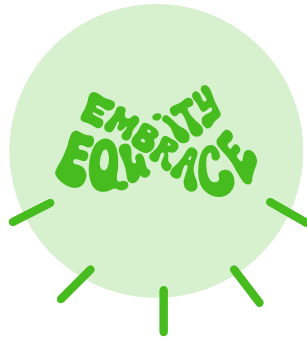


ARE THERE MANY OBSTACLES FOR WOMEN TO BECOME SCIENTISTS?

Arthur, 16, France

We still lose quite a few talented female scientists in the transition from PhD and postdoctoral researchers, where women are well represented, to senior scientist and professor, where the ratio of women to men is still low. This is usually the time in a young researcher's lives where family considerations influence career decisions in dual career couples, and where the high mobility requirement in science take a social toll on people. So this is where we still have to think carefully as to how to overcome obstacles for female scientists, who seem to compromise more often than their male counterparts. Among other often cited measures, affordable day care options, family friendly work hours, more part-time and long-term jobs, as well as job assistance for dual career couples may help.

Meike, Marine Ecosystem Modeller, Switzerland

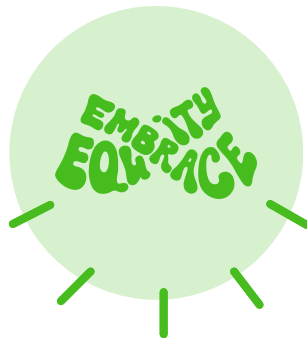


DO YOU EXPERIENCE DISCRIMINATION FOR BEING WOMEN AND RESEARCHING IN THIS AREA?

Ana, Grade 7, Brazil

No I have never felt discriminated. In my PhD, my supervisor was a woman and the majority of my colleagues were women too, and in my job as science manager the majority of my bosses have been men and I have never felt any discrimination. I actually had the opportunity to become a coordinator quite soon after I started in my institution. I don't know if it depends on the field or if I was just lucky, but I believe that if you work hard, you will be recognized.

Sofia, Science Manager, Portugal

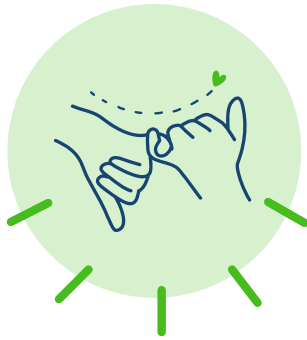


DO YOU EXPERIENCE DISCRIMINATION FOR BEING WOMEN AND RESEARCHING IN THIS AREA?

Ana, Grade 7, Brazil

I'd like to tell you, Ana, I don't experience discrimination now as a senior researcher and also since my PhD, but I did experience discrimination in school. In fact, when I announced to my teachers that I wanted to study theoretical physics, my parents were asked to school and the teachers told my parents that I should really not study physics because then I'd be too well educated and I would never find a husband. Well, here I am nearly 30 years later, and believe me, none of this worry materialized. So I think at a young age, society really tries to shape women into what it wants us to be, but scientists tend to be tolerant people and in our field there's as many women as men, at least at the PhD stage. So I have not felt this discrimination after my studies ended.

Meike, Marine Ecosystem Modeller, Switzerland

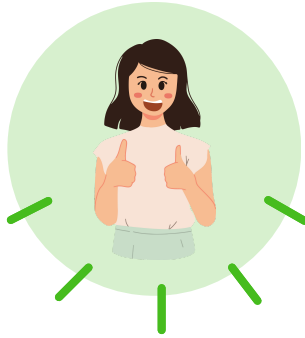


WHY DON'T MEN TRUST WOMEN?

Noémie, 11, France

That is a very interesting question, Noémie, that not necessarily is true. In my experience at least within the science community, men trust women and men equally (some may even find women more accountable), but some men may not fully understand women and it is probably easier to involve and interact with persons who you are socially more compatible with. Men also tend to be better at the game of "fake it till you make it" and may therefore be perceived as more knowledgeable than they really are. Overall I have not felt like men don't trust me, so when I have been excluded it has been for other reasons and by women just as often as men.

Tonje, Molecular Biologist, Norway



HOW DOES IT FEEL TO BE IN A TEAM WHERE IT IS MOSTLY BOYS?

Noémie, 11 France

This happens quite a lot when you are in fields that are usually male-dominated like mathematics, physics and aquaculture! At first it can be intimidating and you can feel a little bit alone, but you have to remember that science has no gender, and that we are all there to share our research, our results and our passions. We can all benefit from a diverse team, learning from each other. If you are in that position it is because you know what you are talking about and you are doing a good job, that is the only thing that matters!

Elisa, Environmental Scientist, Norway



WHAT MADE YOU AWARE OF WANTING TO BE RECOGNISED FOR THE PERSON YOU ARE? OR DID YOU NOT WANT THAT RECOGNITION IN THE FIRST PLACE?

Erin, 15, England

Uh, no, I didn't want that attention in the first place because I wasn't aware of myself, or how I would be in the place where I am right now. But I was once talking to a woman for a survey collecting the data, and she asked me "is this going to help us in any way?" And I didn't have any answer for that. It stumped me, surprised me, and also made me aware of how disconnected research is from people, and especially the fishing communities. So, yeah, that one point made me very much aware of a lot of things. The place that I come from, the privileges that I've had or the opportunities that I had, and the fact that I was born in a good place with good parents and all the things that I've got. So, yes, that one moment changed my life.

Rutuja, IMBRSea student, India.



WHAT MADE YOU AWARE OF WANTING TO BE RECOGNISED FOR THE PERSON YOU ARE? OR DID YOU NOT WANT THAT RECOGNITION IN THE FIRST PLACE?

Erin, 15, England

Hi Erin. I don't care about becoming famous, but I do hope that when I've finished my career, I have made some positive impact on the world and that something that I was involved in developing still will exist once I'm gone. When people take credit for something that I know that I have done it bothers me, not because I need appraisal, but mostly because I don't like being ignored. I will be quite happy if there never is any wikipedia page with my name on it, but at the same time I'm proud of several of the publications with my name on so I guess you can say that I don't mind receiving recognition for something I've achieved, but I'm quite happy being a nobody to the general public.

Tonje, Molecular Biologist, Norway



WHAT IS ONE PIECE OF ADVICE YOU WOULD GIVE TO YOUNGER WOMEN ABOUT WHAT THEY CAN DO FOR THE ENVIRONMENT AND SOCIETY? I SOMETIMES FEEL CONFUSED ABOUT THAT...

Erin, 15, England

Well, Erin, yes. We're all confused about that and my advice to younger women, men or people in general would be to be more aware. More aware of the impact we have on the planet, more aware of the creatures that live with us on the planet and try to reduce our impact by changing, even slightly, our daily action. And then share all that we know with other people around us. The more we learn about the ecosystem and the planet we live in, the more we can actually have a greater impact on the planet. Because we are all part of an ecosystem.

Marta, Marine Biologist and Illustrator, Italy



WHAT IS ONE PIECE OF ADVICE YOU WOULD GIVE TO YOUNGER WOMEN ABOUT WHAT THEY CAN DO FOR THE ENVIRONMENT AND SOCIETY? I SOMETIMES FEEL CONFUSED ABOUT THAT...

Erin, 15, England

I want to say that women rights, equality, climate change are huge and global society issues that require for you to fight individually and collectively for your ideals. And you should not question your radicality. It is relevant. It is appropriate, and it is normal to be angry sometimes when you feel you're not being heard and when you feel it's not moving fast enough

Alienor, Operations Officer, France



WHAT IS ONE PIECE OF ADVICE YOU WOULD GIVE TO YOUNGER WOMEN ABOUT WHAT THEY CAN DO FOR THE ENVIRONMENT AND SOCIETY? I SOMETIMES FEEL CONFUSED ABOUT THAT...

Erin, 15, England

I would just say open your eyes. See how important an environment is for the survival of your generation, of even the younger generation. And let's really join forces because everyone can make a difference in doing tiny little actions, whether it is not to put plastic in the sea or even in the wrong bin, when you collect the waste or switch off the light because we also need to save electricity. We need to be much more mindful when it comes to how can we save resources, because resources are not endless. We know that now. So. I think you can become a great, advocate for a [00:22:00] healthy environment just by taking on every day something, bringing it to the school, discussing it with your friends, discussing through your social networks, and then you become as well part of this whole movement, which is so much needed because every voice counts.

Sigi, Advisor to the European Commission, Belgium



WHAT IS ONE PIECE OF ADVICE YOU WOULD GIVE TO YOUNGER WOMEN ABOUT WHAT THEY CAN DO FOR THE ENVIRONMENT AND SOCIETY? I SOMETIMES FEEL CONFUSED ABOUT THAT...

Erin, 15, England

Well Erin, you know that rising carbon emissions, land degradation, and anthropogenic activities are having unfavorable effects on our ecosystem and biodiversity. Young women like yourself often feel helpless as they feel that they do not have the resources to act. You need to work together with society to make a difference by taking on small projects. Join other organizations that are doing these environmental projects or start your own environmental, non-governmental organization. If you are passionate about making a difference to our environment, never let anyone or anything be an obstacle to your ambitions.

Kogie, Science Engagement Coordinator, South Africa.

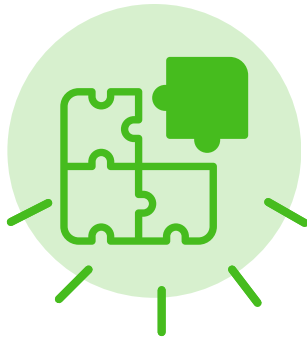


HOW IS IT TO KNOW THAT YOU ARE AN IMPORTANT WOMEN OCEAN SCIENTIST

Sarah, Brazil

Dear Sara! I don't need to be important. But I hope that some of my science could be!

Meike, Marine Ecosystem Modeller, Switzerland



HOW DOES IT FEEL TO KNOW THAT WOMEN SCIENTISTS ARE CHANGING THE HISTORY OF THE OCEAN

Júlia, Brazil

Hi Júlia. I'm not sure that I have very strong feelings about the gender of the scientists changing the ocean history or making any impact, really. But I am very happy to see that women now are engaged in a wide variety of sciences and are making impact everywhere (together with men).

Tonje, Molecular Biologist, Norway



HOW IS THE LIFE OF A WOMAN SCIENTIST

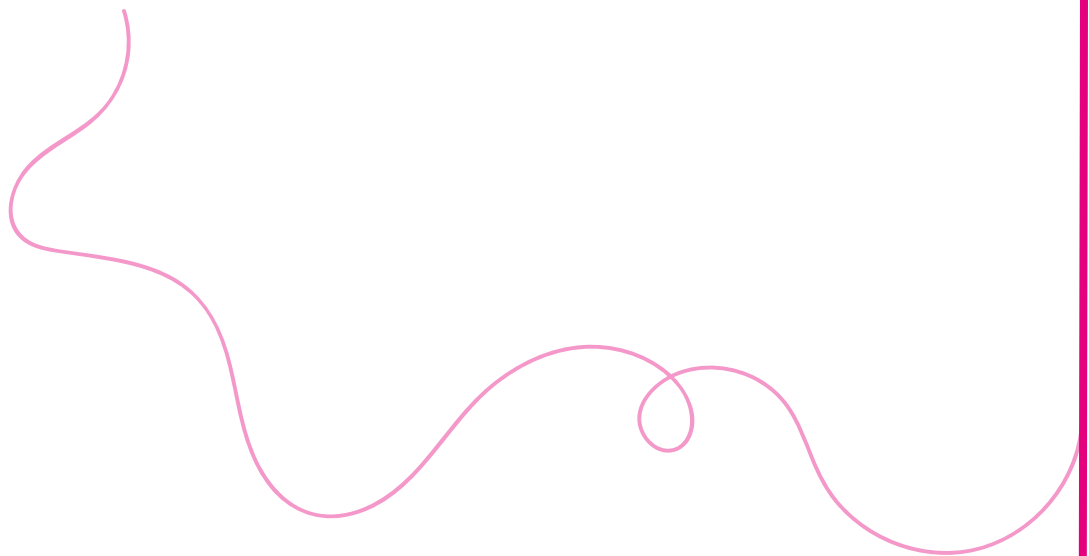
Peterson, Grade 7, Brazil

We talk less and work more. No, jokes aside, the life of a female scientist is rather similar to that of a male scientist, I would guess. Except that some of us still do more housework when we get home, stay home more often when the kids are sick, travel less, and shoulder a larger fraction of the mental load associated with modern family life. We also don't get cited as often as men, we receive fewer awards, and fewer of us are professors or senior scientists. Some of us get told that we are too critical, or too intense, or too opinionated, or too intellectual. We choose our partners and friends wisely. But just like male scientists, we do get paid to spend a lot of time with something we love, which makes up for some of these challenges.

Meike, Marine Ecosystem Modeller, Switzerland



Questions and answers on education and careers in marine sciences



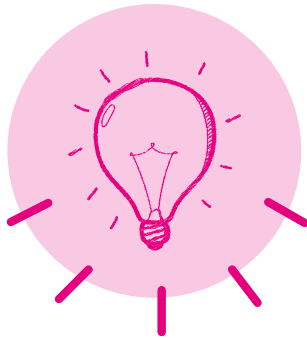


WHAT ARE THE QUALIFICATIONS NEEDED TO BE A MARINE SCIENTIST?

Aqhama, 15, South Africa

To become a marine scientist, it helps to have a background in science, in biology, chemistry, and physics for example. Pursuing a bachelor's degree in marine science, marine biology, or oceanography is recommended and then higher degrees like a master's or Ph.D. can provide specialisation and research opportunities. Practical field experience through internships and research projects is essential for gaining hands-on skills. Developing research abilities, including designing experiments, collecting and analysing data, and communicating findings, is crucial. Having passion, curiosity, and a genuine love for the ocean and its inhabitants is vital to stay motivated. There are so many options to become a marine scientist, you could get involved in research, conservation, policy-making, or education. Exploring different aspects of marine science early on can help you find your own specific interests and set a course for an exciting career in the field.

Eloïse, Research and Innovation Manager, France

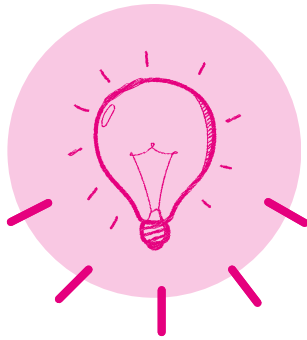


WHAT INSPIRED YOU TO STUDY MARINE BIOLOGY?

Tanya, 17, South Africa

I did not study marine biology. I studied theoretical particle physics. But this works just as well... ;-)

Meike, Marine Ecosystem Modeller, Switzerland



WHAT INSPIRED YOU TO STUDY MARINE BIOLOGY?

Tanya, 17, South Africa

Growing up in Cape Town, my family and I always enjoyed spending our holidays or weekends at the beach, so since then I have always been fascinated with what was living amongst the rocks and beyond the coastline, especially when seeing organisms washed up on the beach. The curiosity grew and sparked my interest in wanting to know more about the ocean and how we can explore the deep seas. From high school already, I made sure to do my research and find out what I needed to do or study to become a marine biologist - so I did just that. It wasn't an easy journey, but today I can say I have worked and studied hard to become a marine biologist and every single day I still get to learn something new about the ocean. It's an amazing field to work in.

Leila, Marine Scientist and Communicator, South Africa



WHAT ADVICE WOULD YOU GIVE TO PEOPLE WHO WANT TO BECOME A MARINE SCIENTIST?

Unakho, 14, South Africa

Be curious, be studious, be industrious and just actively follow this dream of yours! There are many ways to Rome, and eventually, you will end up where you're supposed to end up. I wanted to become an astronomer when I started my career, but life took me elsewhere. Yet, I really think I am just exactly where I am supposed to be.

Meike, Marine Ecosystem Modeller, Switzerland



WHAT EDUCATION IS NEEDED TO BECOME A MARINE SCIENTIST?

Unakho, 14, South Africa

Well, graduating from high school and getting a college/university degree helps. Many of us then continue to complete PhD degree. But we're never done learning new things.

Meike, Marine Ecosystem Modeller, Switzerland



WHAT EDUCATION IS NEEDED TO BECOME A MARINE SCIENTIST?

Unakho, 14, South Africa

Hi Unakho, this is a great question. In high school, from Grade 10-12, I would suggest majoring in biology, physics and pure mathematics. If extra classes or a tutor is needed, I would say make use of all the opportunities you can to better your chances of getting good grades, so that you can get into university to study marine sciences. Make sure to do your research of what is necessary for applying at different universities - apply as early as possible too. There are various institutions where you can study marine sciences in South Africa (such as UCT, UWC, UKZN, NMU, UP and Rhodes University) but never limit yourself and apply internationally as well. Firstly do your undergraduate studies and then postgraduate studies. Usually it is best to study up to a Masters/PhD level - but make sure that you are passionate about the field and everything will be worth it. I would also encourage you to get involved with ocean initiatives to gain experience and build up skills - you're never too young to start learning, so go for it and remember to have fun while learning!

Leila, Marine Scientist and Communicator, South Africa

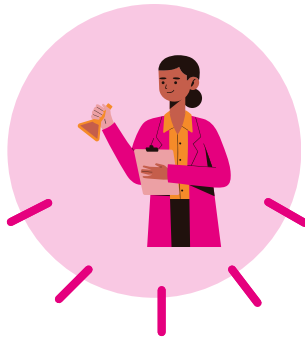


DO YOU WORK OR KNOW ABOUT THE BLUE SCHOOL PROGRAM?

Emerson, Grade 7, Brazil

I do! As I coordinate the project where this Blue Schools program was developed, and even before this joint activity took place in the Atlantic Ocean, I already knew the Portuguese school program. But if you ask me if my family knows about it, then probably no. Unfortunately, in my view, the ocean is still not at the center of society, and maybe this is because we are still not able to pass the message on the importance of this natural resource and the services it provides for our daily life? Things are changing and I was very happy to know that my kids school they are already speaking about the sustainability, agenda 2030, Sustainable Development Goals and the importance of ocean for our daily lives. I think it is important to talk about it when kids are quite young to already embed it in their way of thinking

Sofia, Research Manager, Portugal

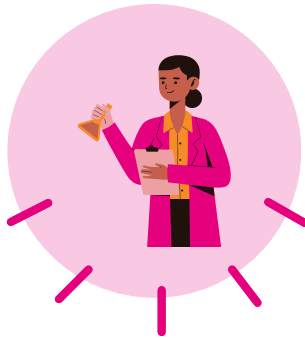


WHY DON'T WE TALK ABOUT FEMALE SCIENTISTS AT SCHOOL?

Noémie, 11, France

It is a shame that this doesn't happen in your school. In Portugal we have many occasions where scientists, men and women, go into schools to talk to students. You should ask your teacher to invite scientists in the classroom or to organise visits to meet scientists where they work. This is really important.

Ana, Ciencia Viva, Portugal.



WHY DON'T WE TALK ABOUT FEMALE SCIENTISTS AT SCHOOL?

Noémie, 11, France

I recommend you get yourself a copy of 'Good Night Stories for Rebel Girls', pick a special woman from the book, and present her life and work during a presentation at school. There are so many great and amazing women in all fields of science and society, and YOU can make sure they get talked about!

Meike, Marine Ecosystem Modeller, Switzerland



WHAT DEGREE DO WE HAVE TO TAKE TO DO WHAT YOU DO?

Anaisa, 10, Portugal

Olá Anaisa, I am currently a postdoctoral scientist which means I went to the University to pursue a PhD. So, after highschool, I did a bachelor's degree in general biology and life sciences (3 years), then a master's degree in marine sciences (2 years), and then I was lucky to receive funding to become a PhD student for an additional 3 years (the length of a PhD depends on the country where you are but also the type of funding you managed to secure). Usually, a PhD is required to become a professor at the university or a senior scientist in a research institute. But you know, there is more than one way to contribute to science in marine ecology or biology. Science is a very broad field where all kinds of profiles are needed. Not everyone needs to do a gazillion years of studies to get a gazillion degrees. Depending on what you want to do later on in life, you should try to meet the diverse people working in the field you are interested in and discuss with them about their jobs and what they like and do not like about it. And there is usually more than just one way to get where you want to go.

Fabio, Marine Ecologist, Switzerland



We hope that you have thoroughly enjoyed this journey through the depths of the ocean and the realm of marine research. We trust that your curiosity has been ignited, and your understanding of the marine world has expanded.

The ocean is an endless source of wonder, and there is so much more to explore and discover. We encourage you to continue your exploration of marine science, to seek out new knowledge, and to share your passion with others. Remember, each one of us has the power to make a positive impact on our oceans and the incredible life within them.

We invite you to stay connected and be a part of our annual edition and be an ocean literacy ambassador. If you have more burning questions or exciting insights to share, we would love to hear from you. Your curiosity and enthusiasm are vital in furthering our understanding of the ocean and protecting its delicate ecosystems.

Get in touch:
atlanteco@szn.it and
allatlanticblueschool@gmail.com

Thank you for joining us on this incredible journey, and we look forward to your continued participation in future editions of our Q&A series. Together, let us dive deeper, learn more, and champion the preservation of our awe-inspiring seas.

How was the ocean made?
Jules, 7 years old, France

Hello Jules, what a great question! Like Rome was not built in a day, the oceans were not built in a year or a century or even one million years! Actually the oceans were made progressively over millions of years. It all started when planet Earth was still very young and extremely hot. In fact, it was so hot that there was no life on it. All the water could not be liquid and could only be gas, like water vapor. The Earth progressively cooled down until about 3.8 billion years ago. Then, it became cool enough for the water vapor to become rain. So it started raining. A lot. It rained so much that it rained everywhere for hundreds and hundreds of years. It was this massive rain that started creating the first ocean which was called the primeval ocean. Then, the climate changed a lot and the continents moved around a lot over billions of years which lead to the ocean as it is today.

Fabio, marine ecologist, Switzerland

In this booklet, we embark on a captivating voyage through the world of the ocean and marine research. It features a collection of questions asked by curious kids, answered by dedicated scientists to explore the wonders of our marine ecosystems. With each turn of the page, we dive into the mysteries of the sea, unraveling its secrets and expanding our knowledge. We learn about the impact of human activities on our oceans, gain insight into how the ocean works and discover the incredible diversity of marine life. Through the challenging questions of curious minds and expert guidance of scientists, we gain a deeper appreciation for our planet's most treasured natural resource. This booklet serves as a catalyst for curiosity, encouraging young minds to explore and learn more about the ocean. We invite you to join us in the ongoing exploration by participating in future editions. Your questions, insights, and passion are essential in shaping our understanding of the marine world and promoting its conservation. Let us continue to be ocean explorers, champions of marine science, and stewards of our oceans. Together, we can make a difference in preserving the marvels that lie beneath the waves.