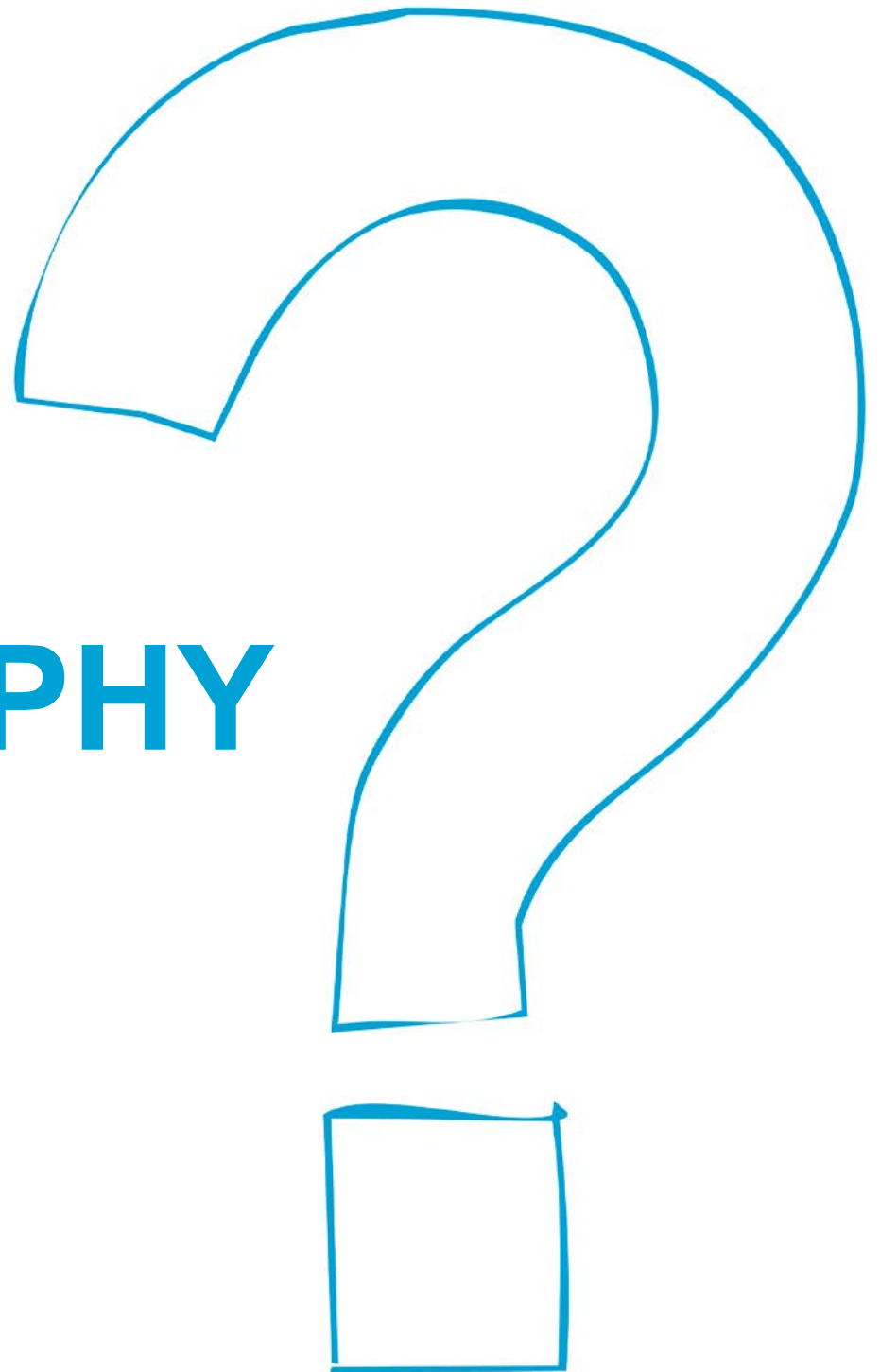


WHAT IS THE USE OF OCEANOGRAPHY

by www.oceansconnectes.org



EDITORIAL

This 11 February 2022 will undoubtedly be a historic date.

For the first time, an international environmental summit, entirely dedicated to the oceans, the «**One Ocean Summit**», will take place in France, in Brest «itself», facing the Atlantic.

At the initiative of French President Emmanuel Macron, scientists, practitioners, entrepreneurs, government and European representatives, regional and local players and civilians are invited to sit around the table, with the aim of imagining together concrete solutions for a reasoned and sustainable management of the maritime space.

A space that is mostly beyond any jurisdiction, a pillar of our life on Earth and yet highly threatened by multiple human pressures.

Ahead of the meeting of European heads of state, a number of workshops have been scheduled over two days as a creative forum. Solutions must emerge from a cross-practice approach and the sharing of scientific, technological and environmental knowledge.

Therefore, as this event approaches and looks like the first «mini-COP of the oceans», we wanted to fulfil our role as a media dedicated to marine sciences and contribute to this objective of sharing scientific knowledge.

We offer you this guide to shed light on the question you are probably asking yourself: **«What is the use of oceanography?»**

By tracing the history of marine science, we explain how oceanographers have been able to put the oceans at the heart of their work and demonstrate the crucial role they play in the planetary balance.

Today, the scientific community is warning us that the health of the oceans is deteriorating under the pressure of our human activities. It calls for collective action for an intelligent and sustainable co-management of the maritime space.

Convinced that the prerequisite for any action is a better understanding of the issues by science, we hope that this guide to oceanography will help to crystallise on the issues and challenges posed by science. We hope that it will help lay the foundation for building a common and shared ocean culture.

Available in a bilingual version (French and English), the format of this dossier is exclusively digital.

As a white paper open to the marine sciences, we hope that it will be distributed free of charge, so that together we can connect the oceans.



ESSENTIAL TO LIFE ON EARTH

WHAT THE OCEANS BRING US

THE AIR WE BREATHE



>50% The oceans produce more than 50% of the planet's oxygen and store nearly 30% of the CO2 produced by human activity

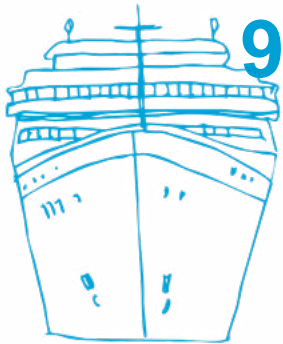
CLIMATE CONTROL



70% The oceans are the main regulators of the climate.

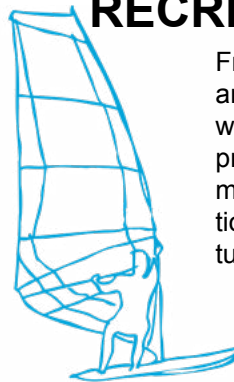
Covering 70% of the earth's surface, they transport heat and energy from the equator to the poles. They balance the climate of the planet.

TRANSPORTATION SYSTEM



90% 90% of world trade is carried out by sea, i.e. 9.1 billion tonnes of goods

RECREATION



From sailing to fishing, and kayaking to whale watching, the oceans provide humanity with its main source of recreation and tourism opportunities

ECONOMY

3000 B\$



Globally, the market value of marine and coastal resources is estimated at \$3 trillion per year, or about 5% of global GDP.

FOOD

>3 billion



Over three billion people depend on marine and coastal biodiversity for their livelihoods and protein supply.

HEALTH



Many medicines come from the oceans, including ingredients that help fight cancer, arthritis, Alzheimer's disease and heart disease

OCEANOGRAPHY

THE STUDY OF SEAS AND OCEANS

A MULTIPLE SCIENCE AND A CHAIN OF PROFESSIONS

Oceanography is a multi-scientific discipline, touching many fields of study.

Biological, chemical, geological and physical phenomenon and processes often interact with each other.

Scientists from different disciplines therefore carry out their experiments each in their own speciality, but come together to work and interpret their results on a common research programme.

The oceanographer may be a technician, an engineer or a researcher, but one is never without the other. The work is done as a team, and the expertise of each person is necessary and complementary.

An oceanographer spends some time at sea, mainly during oceanographic campaigns.

But most of their work is done in the laboratory. There, they prepare missions, process data in front of their computers and share their results by publishing them and presenting them to the community at scientific conferences.

In France, various organisations such as the CNRS (Centre National de la Recherche Scientifique), IFREMER (Institut Français de Recherche pour l'Exploitation de la MER), IRD (Institut de Recherche pour le Développement), SHOM (Service Hydrographique et Océanographique de la Marine Nationale), MÉTÉO-FRANCE and universities host laboratories specialised in oceanography.

They are spread throughout the country, mainly in Brest, Cherbourg, Paris, Marseille, Toulouse and Grenoble.

The main specialities of oceanography include :

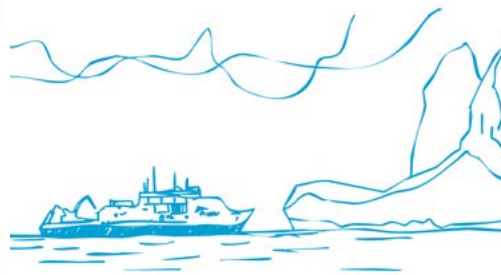
marine biology

which studies marine biodiversity, organisms and ecosystems



physical oceanography

which is concerned with the physical characteristics of the ocean: major ocean currents, waves, tides, etc.



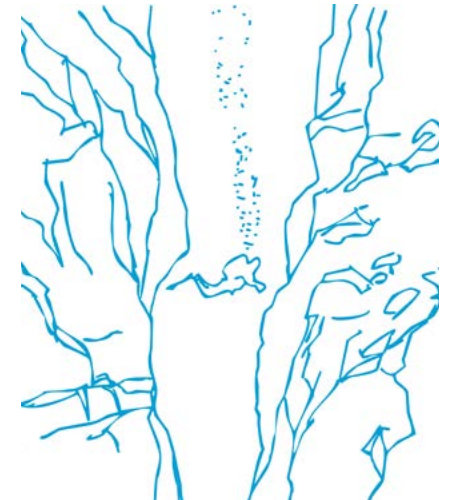
marine chemistry

which deals with the study of the chemical composition of the oceans



marine geology

which analyses the ocean floor and its present and past characteristics

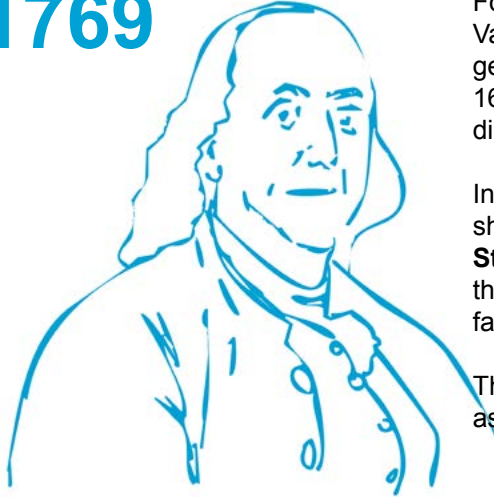


A FASCINATING STORY

SAILORS & SCIENTISTS CONQUERING THE OCEANS

THE AGE OF ENLIGHTENMENT

1769



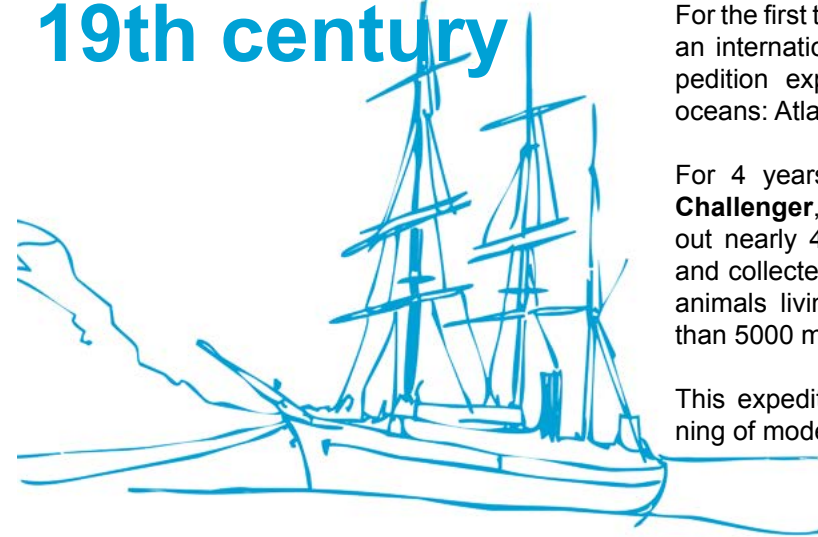
Following Christopher Columbus, Vasco de Gama and Fernand Magellan, the great navigators of the 16th and 17th centuries set out to discover new sea routes.

In 1769, **Benjamin Franklin** published the very first map of the **Gulf Stream**. He gave the whole world the first representation of the most famous ocean surface current.

This was the birth of oceanography as a scientific discipline.

THE GREAT EXPEDITIONS

19th century



For the first time, from 1872 to 1876, an international oceanographic expedition explored the three main oceans: Atlantic, Pacific and Indian.

For 4 years, on board the **HMS Challenger**, the scientists carried out nearly 400 measuring stations and collected numerous plants and animals living at a depth of more than 5000 metres!

This expedition marked the beginning of modern oceanography

FROM THE EQUATOR TO THE POLES...

20th century



In the twentieth century, scientific expeditions increased in number.

As early as 1902, from Greenland to Antarctica, **Commander Jean-Baptiste Charcot** led the way to the polar zones on board his ship «Pourquoi Pas?»

In France, Prince Albert I of Monaco (1848-1922) led several campaigns on board his yachts, resulting in the first bathymetric map of the oceans and the discovery of more than 1,280 new species.

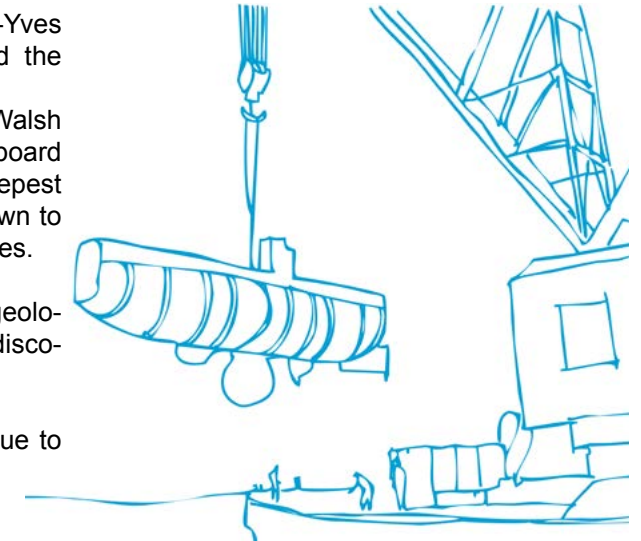
...FROM THE SURFACE TO THE ABYSS

As early as 1943, Captain Jacques-Yves Cousteau and his team developed the first autonomous dives.

In 1960, Jacques Piccard and Dan Walsh succeeded in making the first dive aboard the **submarine «Trieste»** into the deepest oceanic trench of the Marianas known to date, at a depth of over 10,000 metres.

Under the surface, an exceptional geology, geography and biodiversity are discovered.

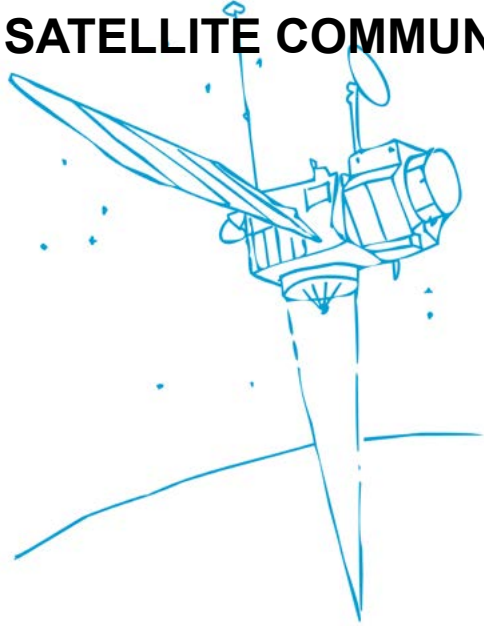
The ocean becomes a strategic issue to explore and understand.



OCEANOGRAPHY TODAY

OPEN HEART OCEANS

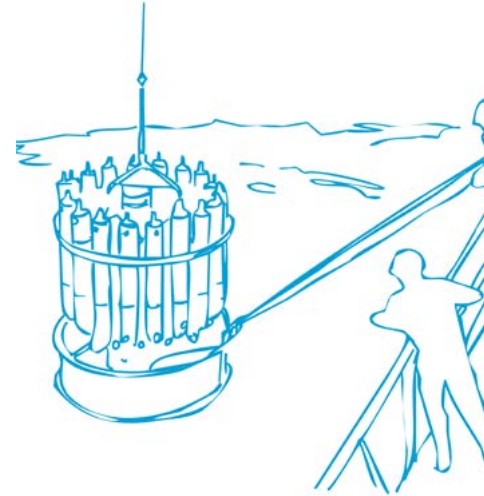
SATELLITE COMMUNICATION



In 1957, after the launch of Sputnik, scientists imagined that they could use space altimetry to measure sea levels.

The **Seasat** satellites in 1978, followed by **Topex/Poseidon** in 1992, made it possible to observe the seas in detail. Scientists are discovering oceans that are constantly in motion, agitated by numerous multi-scale structures that are essential to their functioning and stability. The ocean seen from the sky gave rise to a new discipline of modern oceanography: space oceanography.

TECHNOLOGICAL DEVELOPMENTS



Technological and theoretical developments have led to major advances in the observation of the marine environment.

Drifting floats, seawater sampling, current measurements, deployment of moorings or bathysondes... The technologies and instruments, often complementary, are multiplying and are deployed during scientific campaigns from oceanographic vessels.

Data collection and location by satellite with worldwide coverage, using the **Argos** system, gives all these **in situ measurements** an extra dimension. The data are available in real time in all the laboratories on the planet!

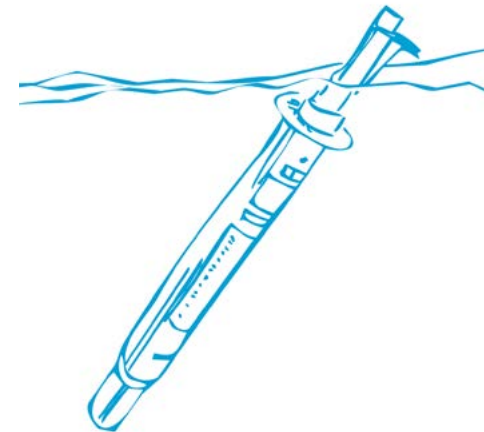
GLOBAL COOPERATION



Given the immense extent of the area to be explored, oceanographers knew that scientific, technical and human collaboration between teams was a necessity. The scientific community quickly organised itself and joined forces to cooperate intelligently on major observation programmes at sea.

This is how **WOCE** was born in 1991, the first major international oceanographic experiment conducted over ten years and which resulted in the collection of exceptional deep in-situ data.

THE DIGITAL REVOLUTION



The digital revolution is enabling the development of new tools for measurements at sea, together with the development of numerical models.

In 1998, the **international Argo programme** was launched. Autonomous underwater robots are created to continuously monitor the oceans. Drifting with the currents, these instruments take measurements between the surface and the depth. In 20 years, these floats have enabled us to better understand how the oceans work and their essential role in the balance of the planet. Today, 35 international countries are developing an operational Argo network of 4,000 active floats, which is needed to assess the impact of human pressures on the health of the oceans.

AND TOMORROW

THE CHALLENGES OF OCEANOGRAPHY

BETTER UNDERSTANDING TO PRESERVE

The ocean is the pillar of our life on Earth. Rich in exceptional biodiversity, it is the heart of the climate machine. But we are still far from knowing everything about the functioning and behaviour of the ocean as a whole.

We must therefore continue to explore in order to better understand.

We must also continue to monitor the health of the oceans and the evolution of their behaviour in the face of the pressure of our human activities. Multiple and increasingly intense activities in the maritime space are leading to a loss of biodiversity, pollution of all kinds and major climate change.

Oceanography must also play its part in supporting political decision-making by developing decision-making tools that will enable marine stakeholders, decision-makers and states to define the global strategy to be implemented for a sustainable ocean.

SHARING SCIENCE FOR ACTION

Science is alerting us on the causes and consequences of our human activities. Each of us must act at our own level and become aware that taking care of the ocean, from near or far, means taking care of ourselves.

The 5 oceans of our planet are connected, both literally (to form one) and figuratively (since they are under technological and digital surveillance). Now is the time for us to connect with them.

Because we only respect what we know, it is time to enter a new era of shared scientific knowledge of the oceans. This is the only way we will be able to address the changes already underway and collectively design the path to a sustainable planet.

With ambition and modesty, this is the mission that **océans connectés** has set itself.

argos
2030



ABOUT US

océans connectés is a new online media entirely dedicated to marine sciences.

Its ambition is to give access to a new scientific culture of the oceans. Conceived as a collective and collaborative project, this media is intended to be a meeting point for scientists, journalists and the general public.

It is a space for meetings and exchanges necessary to raise awareness, education and training on the issues of protection and sustainable management of the seas and oceans.

A digital platform for popularising science, **www.oceansconnectes.org** invites the general public to understand how the oceans work through science. The media shares news, events, jobs and resources on French, European and international oceanography.

océans connectés was created in February 2021 by Carole Saout-Grit, a research engineer in physical oceanography and director of the Glazeo research department.

Link to the platform:

www.oceansconnectes.org

Social networks:

<https://www.facebook.com/OceansConnectes/>

<https://twitter.com/OceansConnectes>

<https://www.linkedin.com/showcase/oceans-connectes/>

<https://www.instagram.com/oceansconnectes/>

Free publication of connected oceans

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