

Ocean research in Villefranche: an amazing (hi)story

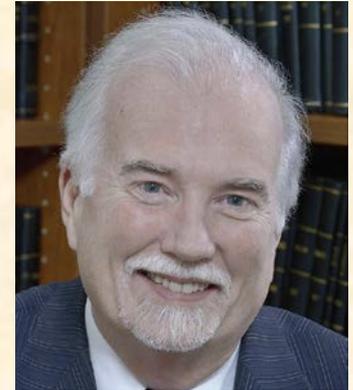
Professor Louis Legendre

Villefranche Oceanography Laboratory
Sorbonne Université

The 2018 IOCCG Summer Lecture Series
Villefranche-sur-Mer
25 June 2018

Louis Legendre: presentation (1)

- Emeritus Professor, Sorbonne University, France
- *Studies*
 - **B.Sc.** University of Montreal, Canada
 - **Ph.D.** Dalhousie University, Halifax, Canada
 - **Postdoc** Villefranche-sur-Mer, France
- *Academic and research career*
 - **1993-2000:** Laval University, Quebec City, Canada
 - **2000-2009:** CNRS, Villefranche-sur-Mer, France
 - **2009-present:** Sorbonne University, France
 - **2001-2010:** Director, Villefranche Oceanography Laboratory (LOV)
- *Academies*
 - **Royal Society of Canada, Academy of Science**
 - **European Academy of Sciences**



Louis Legendre: presentation (2)

- *Research fields*
 - biological oceanography
 - marine biogeochemistry
 - numerical ecology, with Pierre Legendre, Univ. Montreal
 - philosophy of sciences [Thursday's lecture]
- *Present activities*
 - Chair, Gordon Research Conference on Ocean Biogeochemistry, Hong Kong, 8-13 July 2018
 - collaborative research (France, China, and other countries) on different aspects of biological oceanography and marine biogeochemistry
 - book in preparation on how ecosystems took over the Earth system >3.5 Ga (with Philippe Bertrand, U Bordeaux)
 - planned new edition of my book on scientific research and

Four Parts

Maritime France and French marine research
Unique site and improbable (hi)story
From military harbour to research institute
The Russian and French research institutes

Part 1

Maritime France and French marine research

France

Map showing the location of **France** in Europe and in the world (inset)



Is this really France?

The French Archipelago (2)

- In fact, **France is an archipelago**
- map shows that, in addition to **metropolitan France**, in Europe, there are **French territories** all over the world
- because of this, the **maritime territory of France** covers 11 million km²: **second largest** in the world after that of the **USA**



The French Archipelago (3)

- Given its very large maritime territory, France is very active in **marine research**

- **IFREMER**: French public establishment on marine research and technological development

- most French marine researchers belong to **other organisations**

- **CNRS**: French national research organisation (32 000 employees, largest research organisation in Europe)

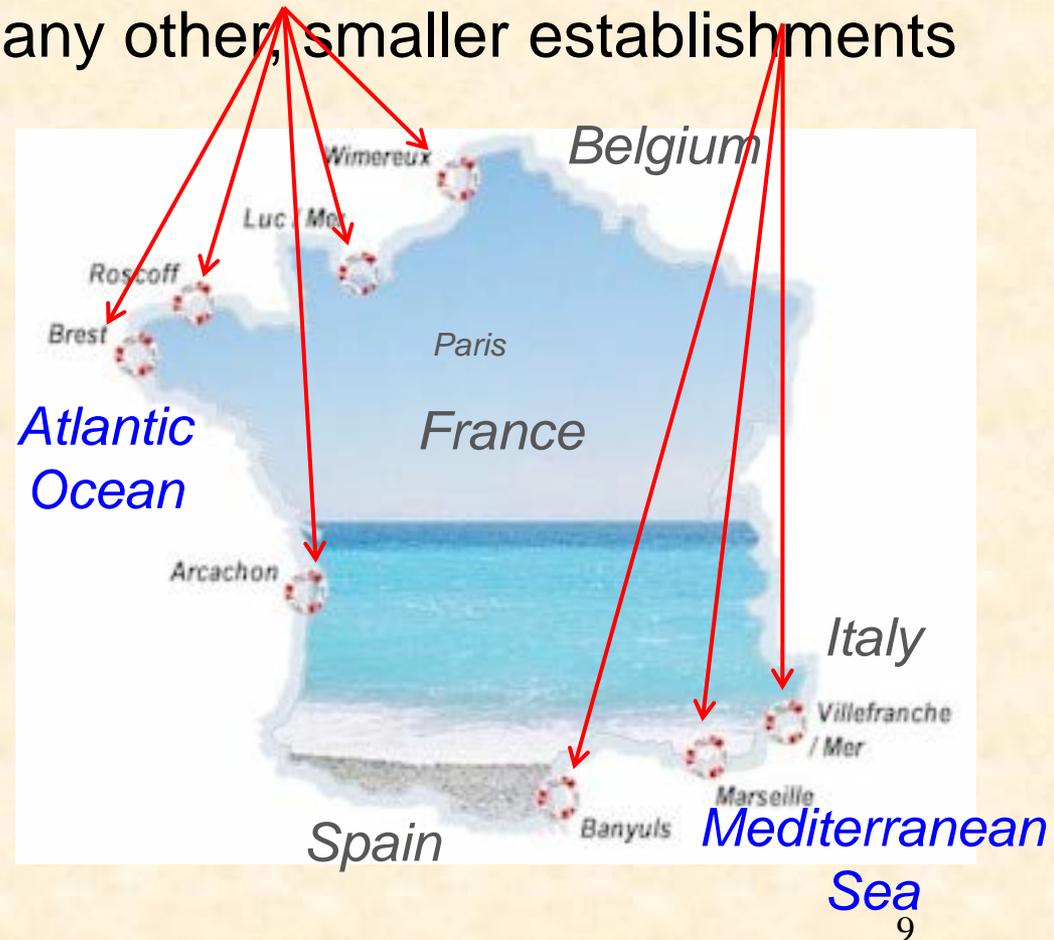
- **IRD**: French overseas research institute

- **Universities** in both metropolitan and overseas France



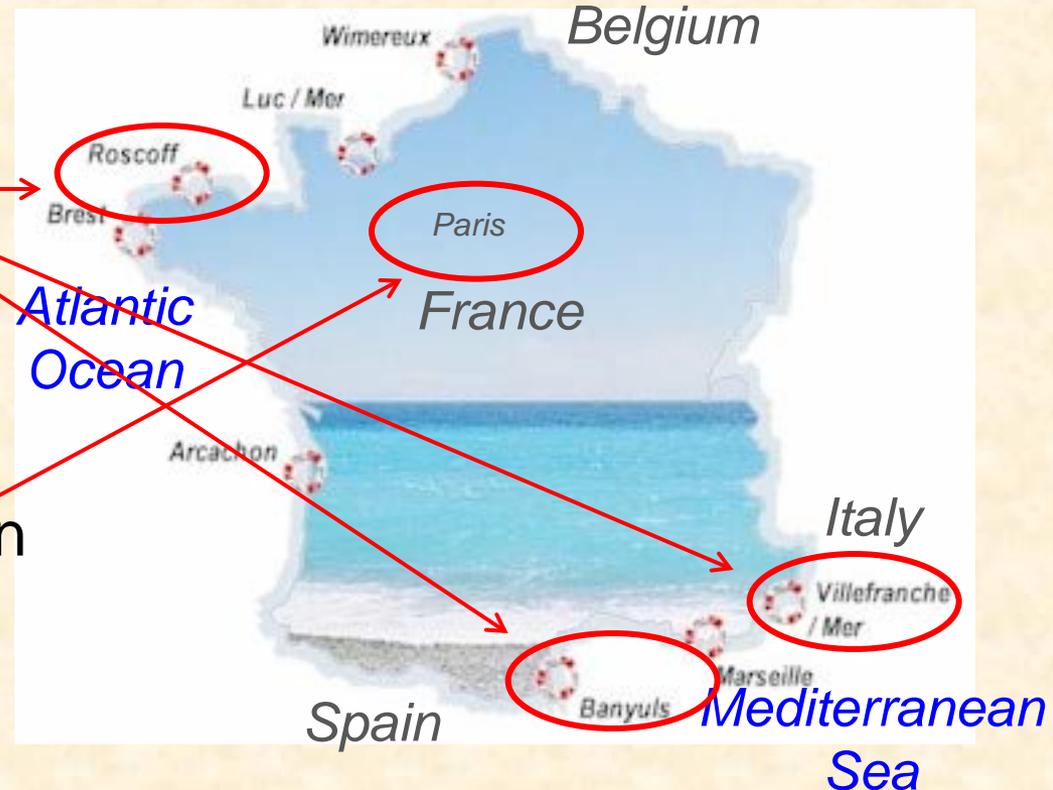
French marine research (3)

- Several **marine stations** in metropolitan France
 - **map: 8 largest stations** (5 on the Atlantic Ocean and 3 on the Mediterranean Sea) + many other, smaller establishments



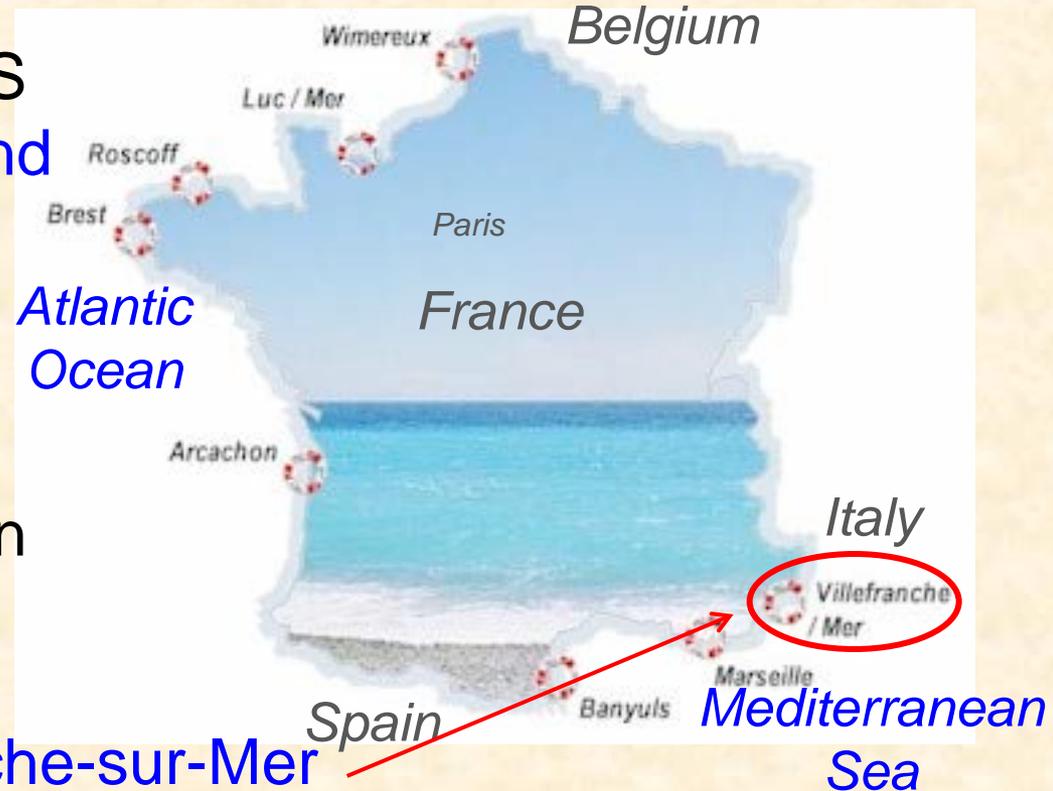
French marine research (3)

- Several **marine stations** in metropolitan France
 - **map: 8 largest stations** (5 on the Atlantic Ocean and 3 on the Mediterranean Sea) + many other, smaller establishments
 - 3 of these 8 stations are jointly operated by the CNRS and **Sorbonne Université**
 - **largest French scientific and medical university**
 - **founded >900 years ago**
 - **main campus in Paris**, on which there are **2 other marine research units**



French marine research (3)

- Several **marine stations** in metropolitan France
 - **map: 8 largest stations** (5 on the Atlantic Ocean and 3 on the Mediterranean Sea) + many other, smaller establishments
 - 3 of these 8 stations are jointly operated by CNRS and the **Paris 6 Pierre and Marie Curie University**
 - **largest French scientific and medical university**
 - **founded >900 years ago**
 - **main campus in Paris, on which there are 2 other marine research units**
 - focus today on **Villefranche-sur-Mer**



Part 2

Maritime France and French marine research
Unique site and improbable (hi)story

The Bay of Villefranche

Where is the Bay of Villefranche? Map from Nice to Italy



The Bay of Villefranche

Bay of Villefranche: general view



The Bay of Villefranche

Bay of Villefranche

- one of the best **natural harbours** in the Mediterranean Sea
- deep: **100 m depth at the mouth** of the bay
- well **protected from most winds**



The Bay of Villefranche

Bay of Villefranche

- one of the best **natural harbours** in the Mediterranean Sea
- deep: **100 m depth at the mouth** of the bay
- well **protected from most winds**
... but there are **exceptions**



Why is there a marine institute here?

A There has been a French marine institute in Villefranche since 1930 because there had been a Russian marine station in the same buildings since 1885

Q Why was there a *Russian* marine station here?

A Because of the availability in Villefranche of former military buildings from the 1700s, which the Russian Navy had used since 1858 and did not need any more

Q Why was the Russian Navy in Villefranche?

A Because of the consequence of a war Russia lost in 1856

Q Why was there a large military harbour in Villefranche?

A Because Villefranche was then the key harbour of a large country, called Savoy, that existed from 1003 to 1860

Q Why was Villefranche part of Savoy and not of France?

A Because the Nice area, to which Villefranche belonged, left France in 1388 to join Savoy

Why is there a marine institute here?

A Because the Nice area, to which Villefranche belonged, left France in 1388 to join Savoy

Q How come that there was a city in the Bay of Villefranche?

A The town of Villefranche was created in 1295 by the Count of Provence, who wished to protect the Bay of Villefranche from pirates

Q Why were there pirates in the area at that time?

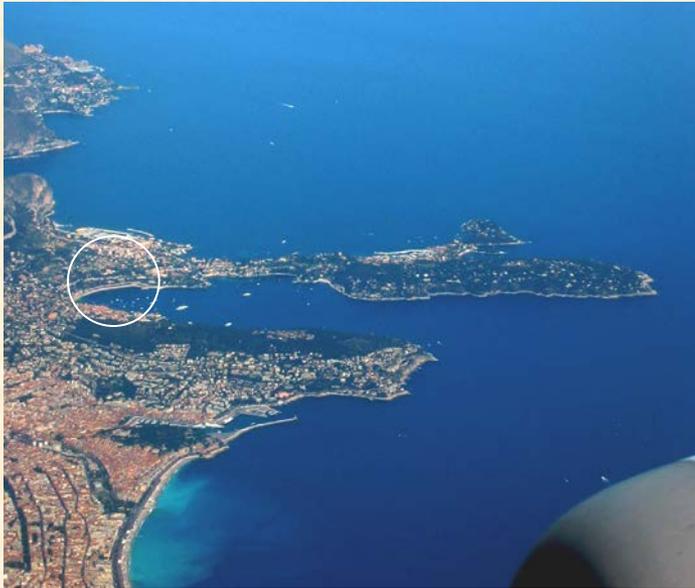
A Because of the hundreds of years of social chaos that followed the disintegration of the Roman Empire

Q Was the Villefranche area previously part of the Roman Empire?

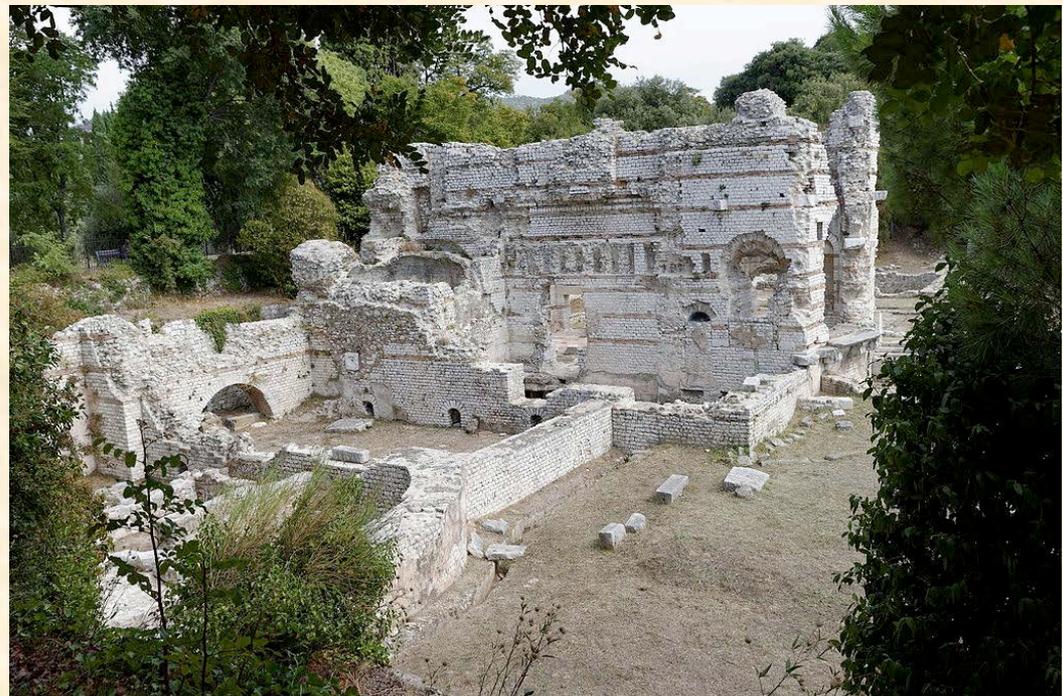
A Yes, indeed: 2000 years ago, there was a (small) Roman harbour in the well-protected Bay of Villefranche

- Let us start from that point in time, and come back from almost 2000 years ago to the present days

From the Bay of Villefranche to the town



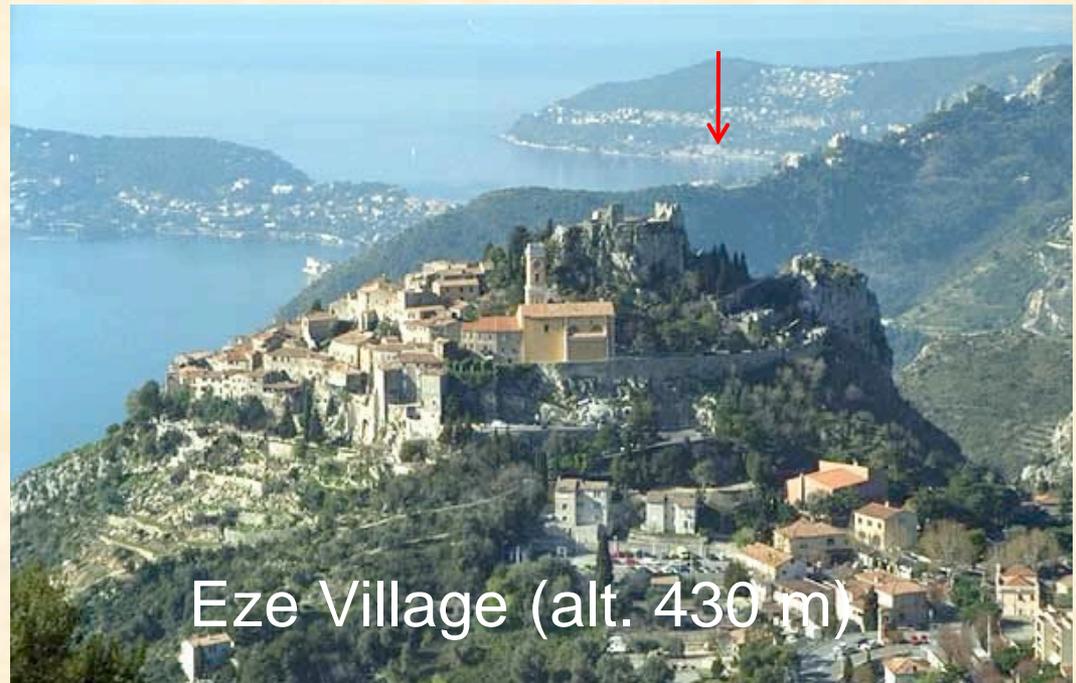
- 2000 years ago: Roman harbour in the well-protected Bay of Villefranche (*Portus Olivula*)
- no Roman ruins in Villefranche
- Roman ruins of *Cemenelum* in Cimiez (northeastern Nice)



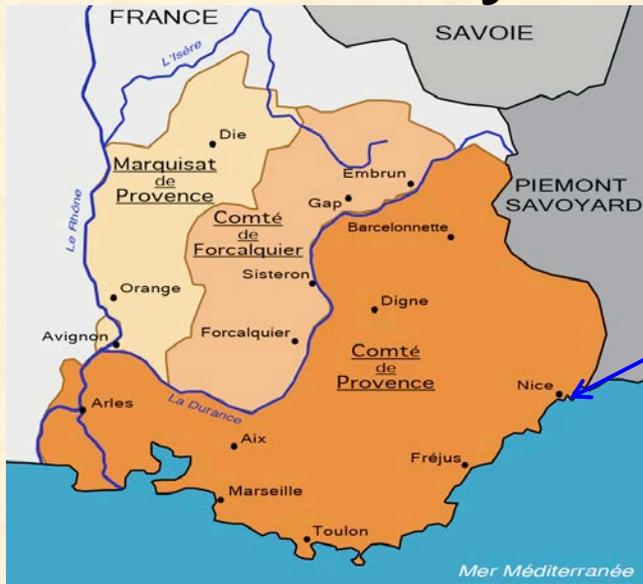
From the Bay of Villefranche to the town



- After the fall of the Roman Empire: shores of the Mediterranean became unsafe (pirates could roam the sea freely), and people moved to nearby mountains



From the Bay of Villefranche to the town



- In order to secure the Bay of Villefranche from pirates, the Count of Provence founded the town of **Villefranche in 1295**
- To encourage people to come to the new town, he offered the settlers the **privilege of not paying taxes**

- Meaning of the name **Villefranche-sur-Mer**
 - **ville = town, franche = free (of taxes)**
 - **sur Mer = by-the-Sea** (added later, to distinguish this town from other towns called Villefranche in France)
 - **Villefranche-sur-Mer = Freetown-by-the-Sea**
- Now: taxes!

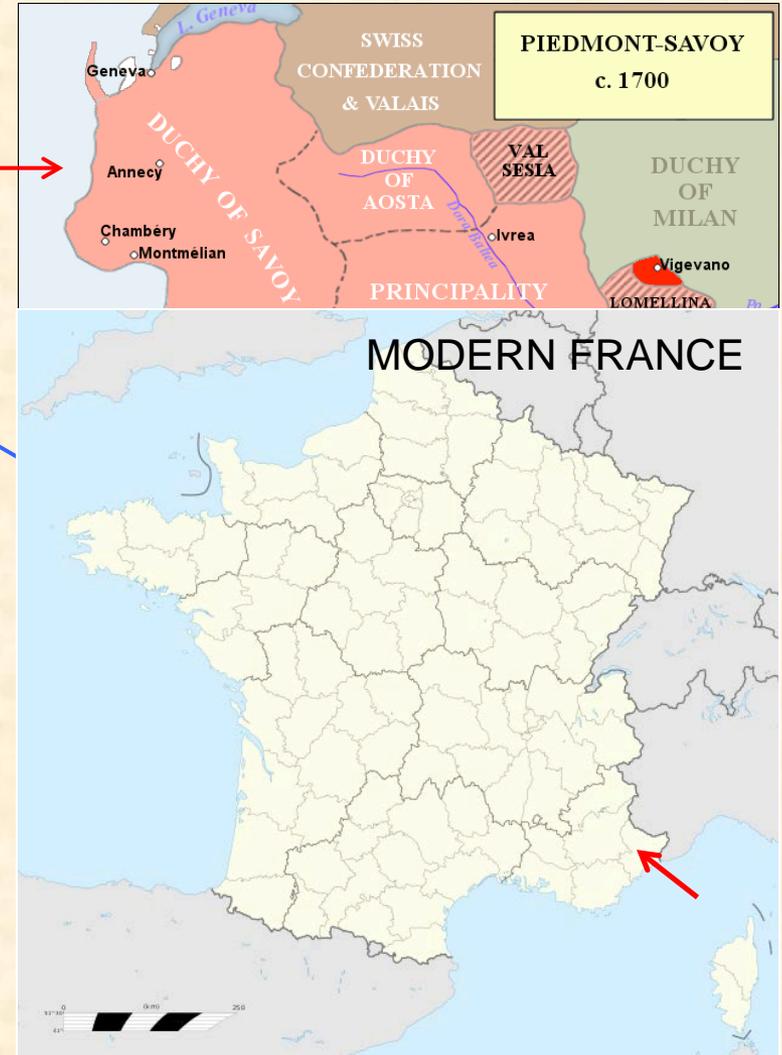
Villefranche-sur-Mer: harbour of Savoy

- In 1388, the Nice area **joined Savoy**, a big country then located between France, Switzerland and Italian states
- Villefranche became the **key harbour of a powerful country**
- over the next 400 years, the

Key event for the future
Villefranche research

Villefranche institute

- After a complicated history, the County of Nice **definitely joined France in 1860** (a little more than 150 years ago)
- Let us focus on **Villefranche's military harbour**



Part 3

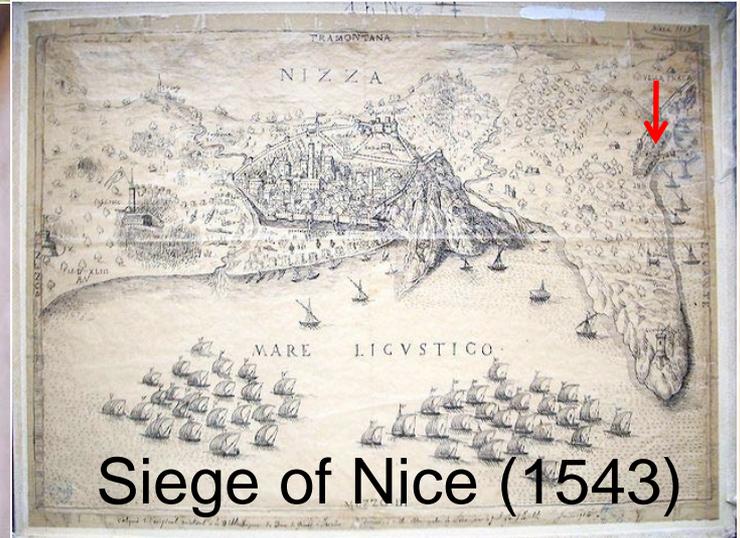
Maritime France and French marine research
Unique site and improbable (hi)story
From military harbour to research institute

Villefranche-sur-Mer: 1543

- Villefranche in 1543 (Turkish manuscript)
 - natural harbour (1)
 - small village (2)
 - no fortress (3)
 - no major military harbour buildings (4)
- Turkish warships (5)
 - Nice besieged by 120 Turkish warships and 20,000 French soldiers
 - rescued by the Duke of Savoy



Turkish cannonball
(Old Nice)



Siege of Nice (1543)

Villefranche-sur-Mer: 1543

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- For the construction of the future fortress of Villefranche-sur-Mer, the key event for the future of the Villefranche research institute

Villefranche-sur-Mer: 1909

- Bay of Villefranche in 1909: warships



Villefranche-sur-Mer: 1946-1967

- 1946-1967: US 6th Fleet based in Villefranche (postcard)

306. Environs de Nice — VILLEFRANCHE - L'Escadre



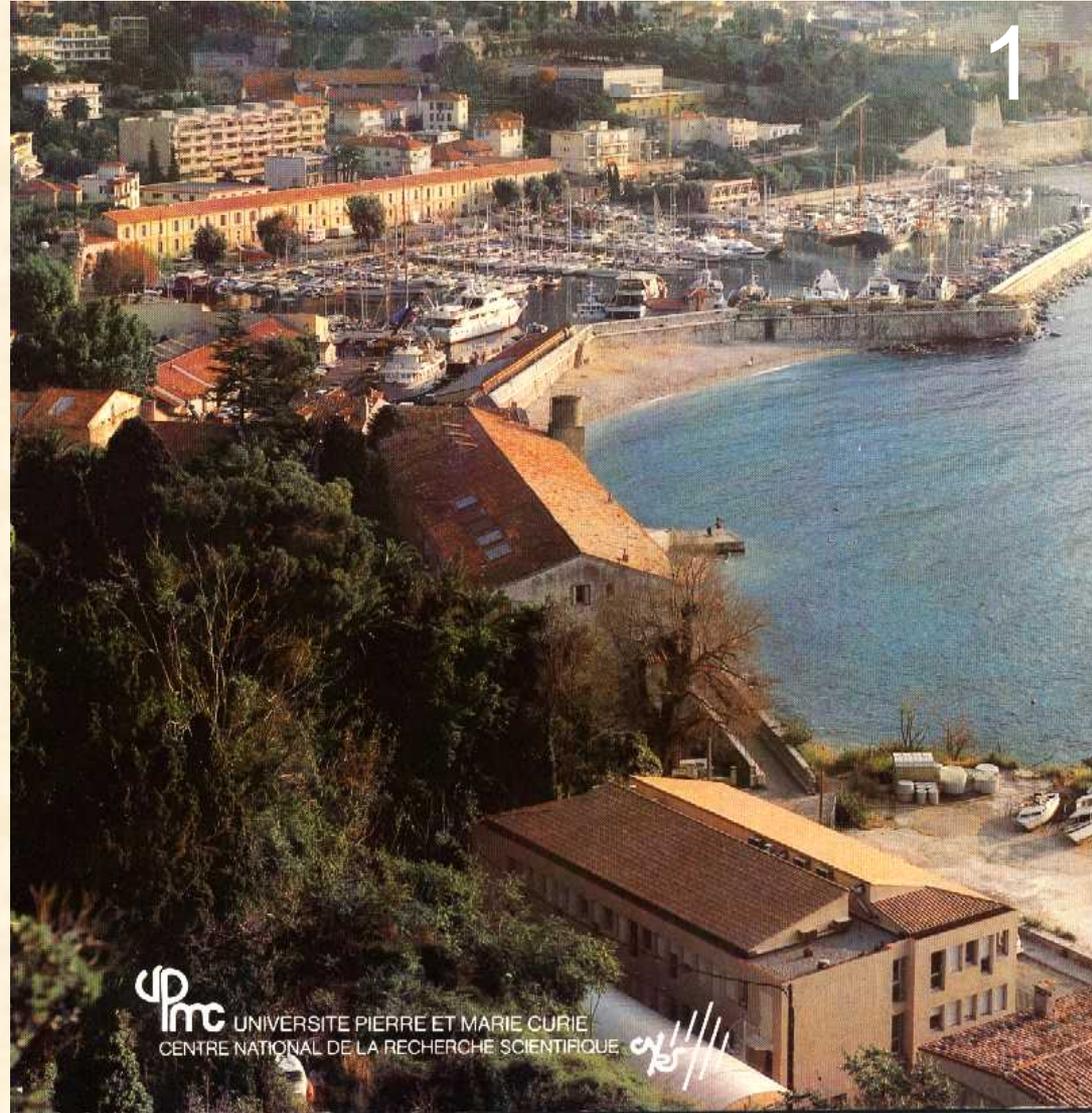
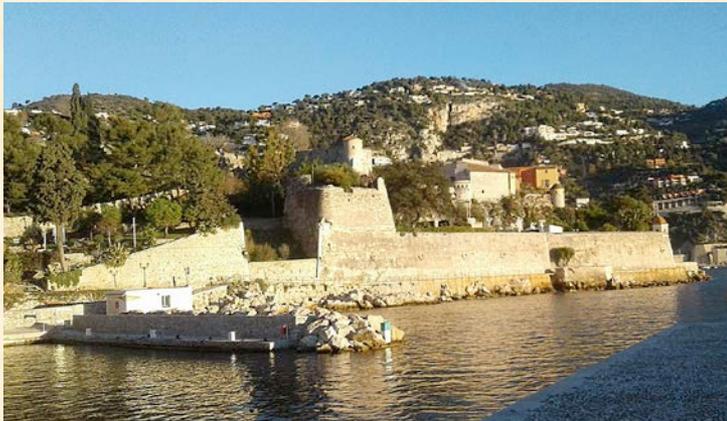
Villefranche-sur-Mer: 2018

- 2010s: Second French harbour for cruise ships



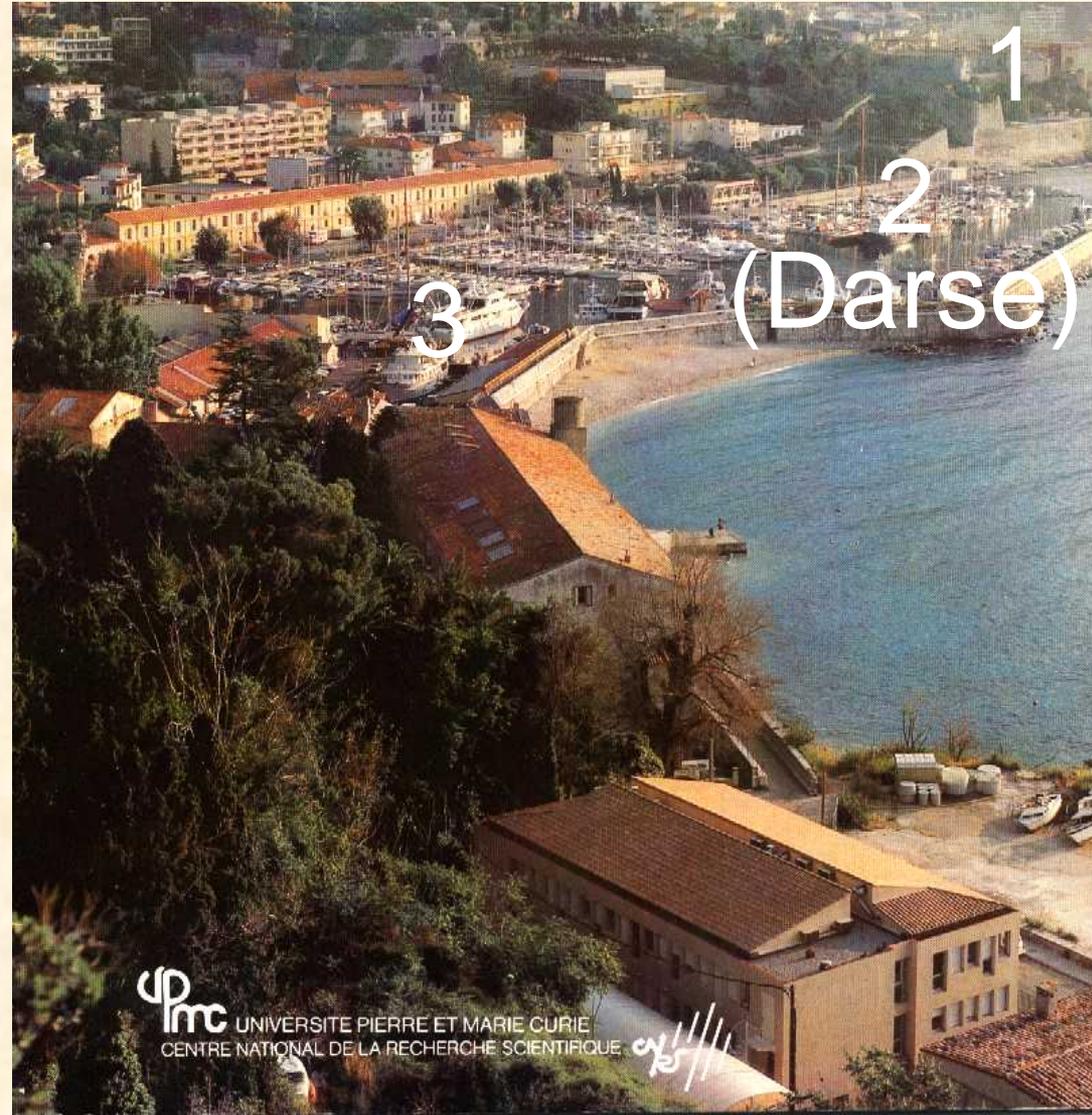
Villefranche-sur-Mer: military harbour

- Military harbour (1700s)
- citadel (1)



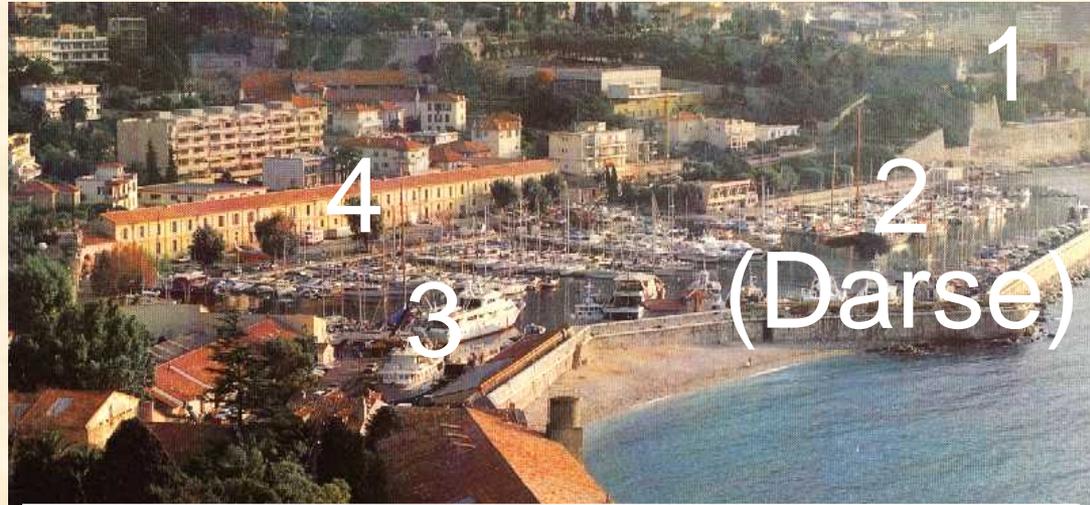
Villefranche-sur-Mer: military harbour

- Military harbour (1700s)
 - citadel (1)
 - protected basin (2)
 - dry dock (3)



Villefranche-sur-Mer: military harbour

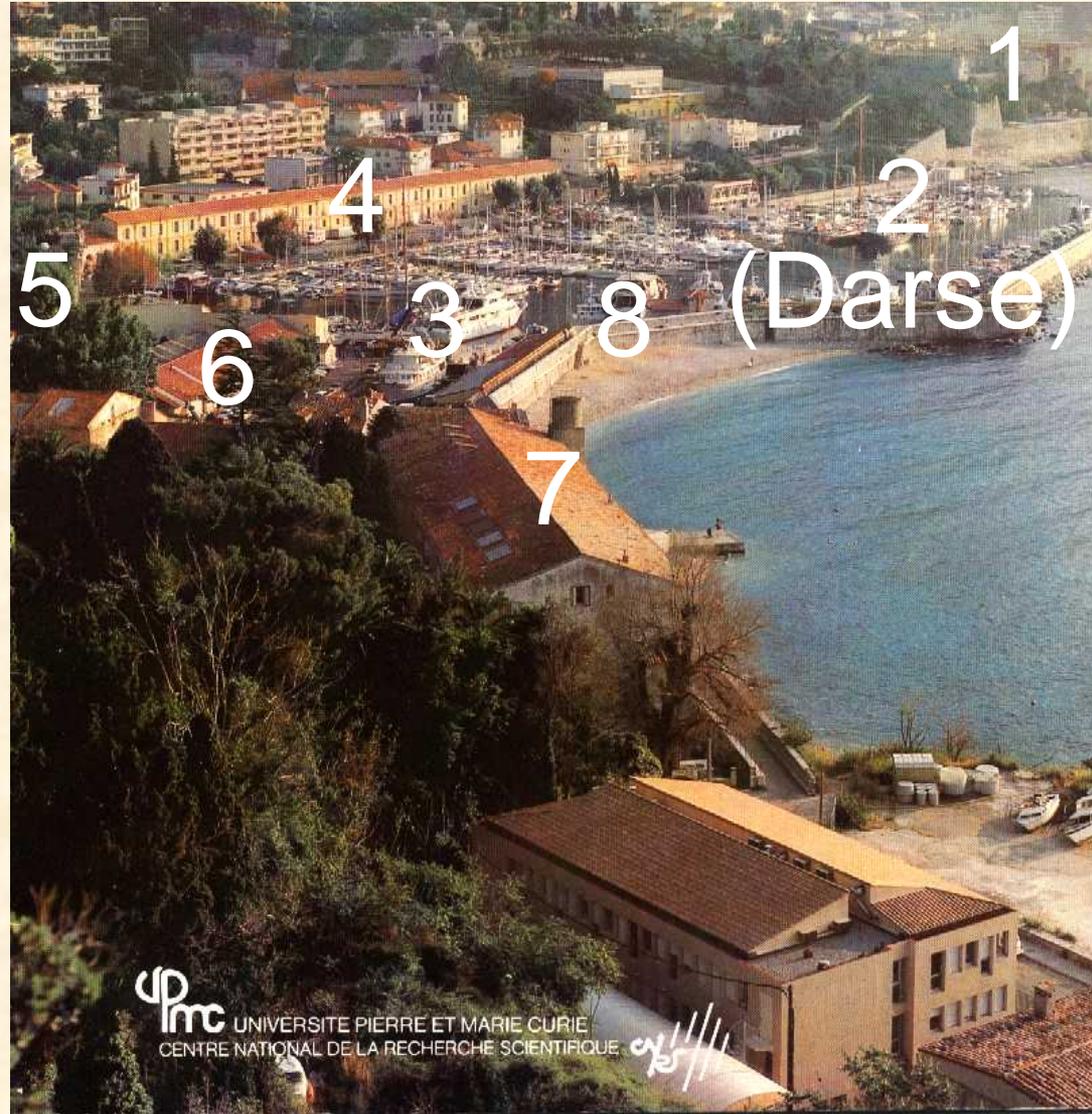
- **Military harbour (1700s)**
 - citadel (1)
 - protected basin (2)
 - dry dock (3)
 - rope factory (4 corderie)
- now: **marine optics and remote sensing + cafeteria + teaching**
- ropes were essential gears for **sailing ships**
- ropes were made in **long buildings**, where yarns were twisted into strands, and strands into ropes, along a ropewalk



Villefranche-sur-Mer: military harbour

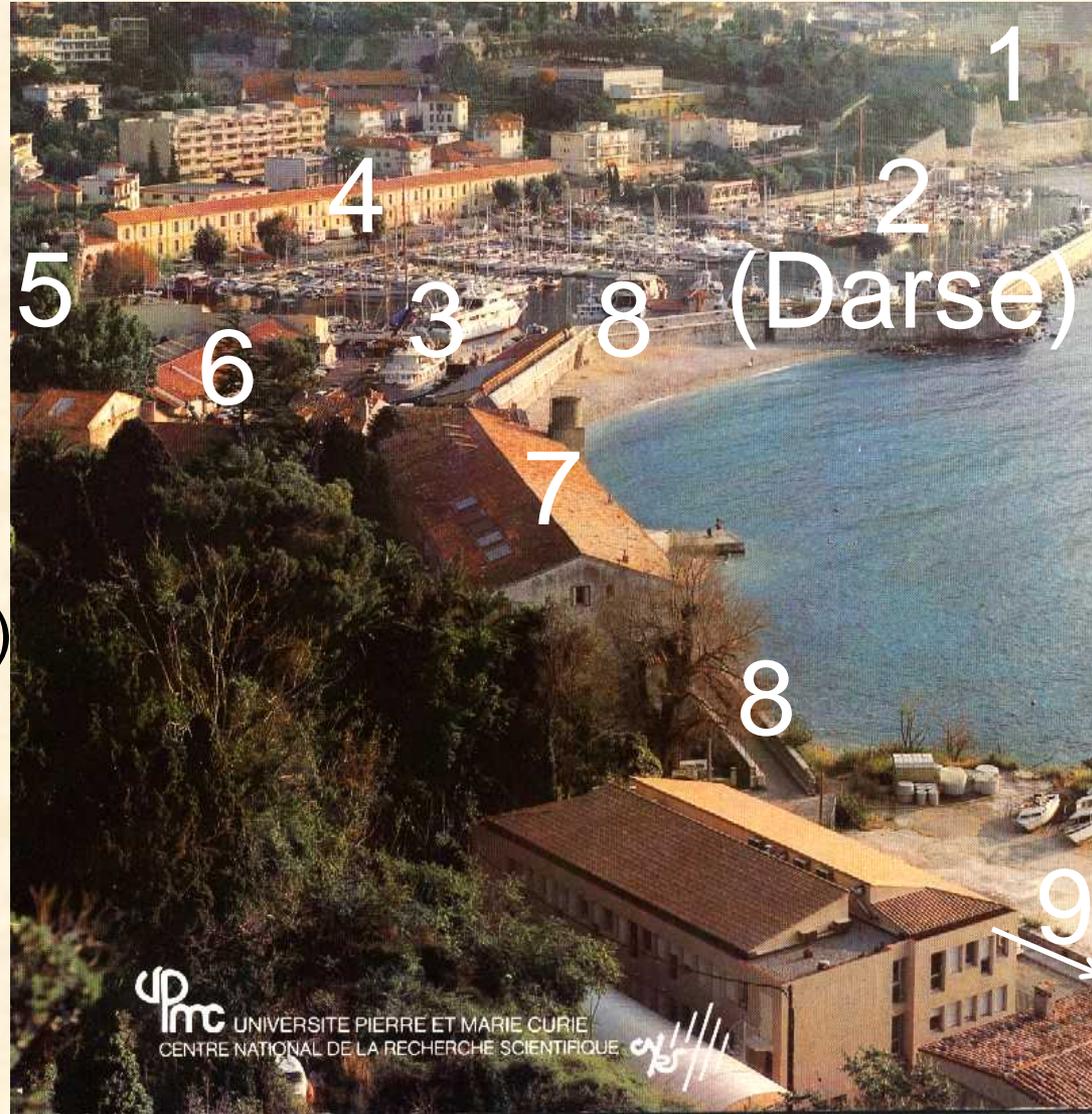
- **Military harbour (1700s)**

- citadel (1)
- protected basin (2)
- dry dock (3)
- rope factory (4)
- former barrack (5)
- support buildings (6)
- galley prison and hospital (7)



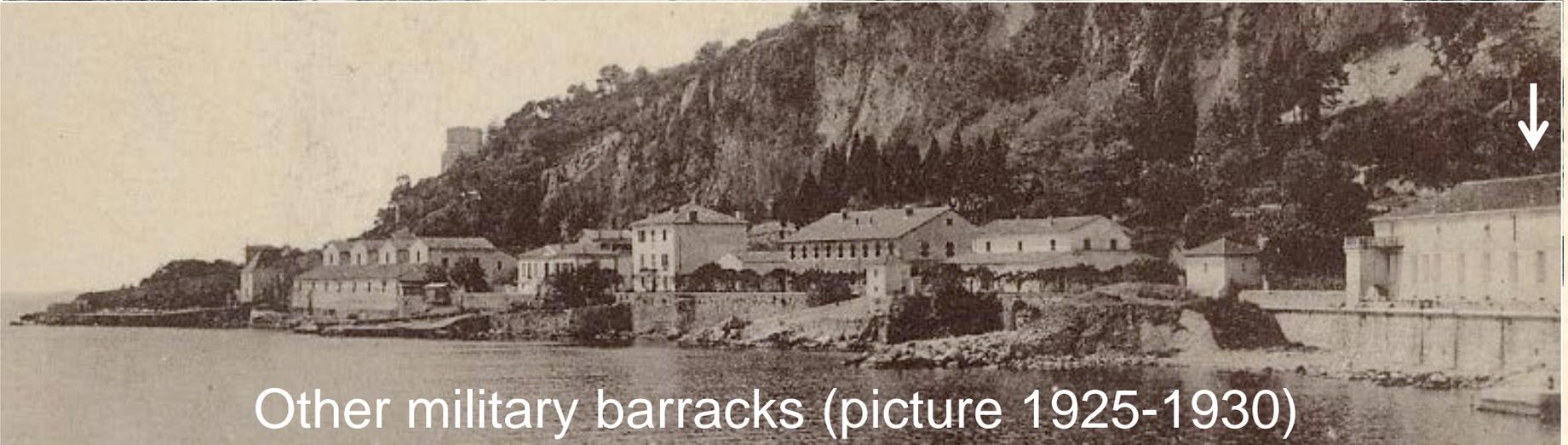
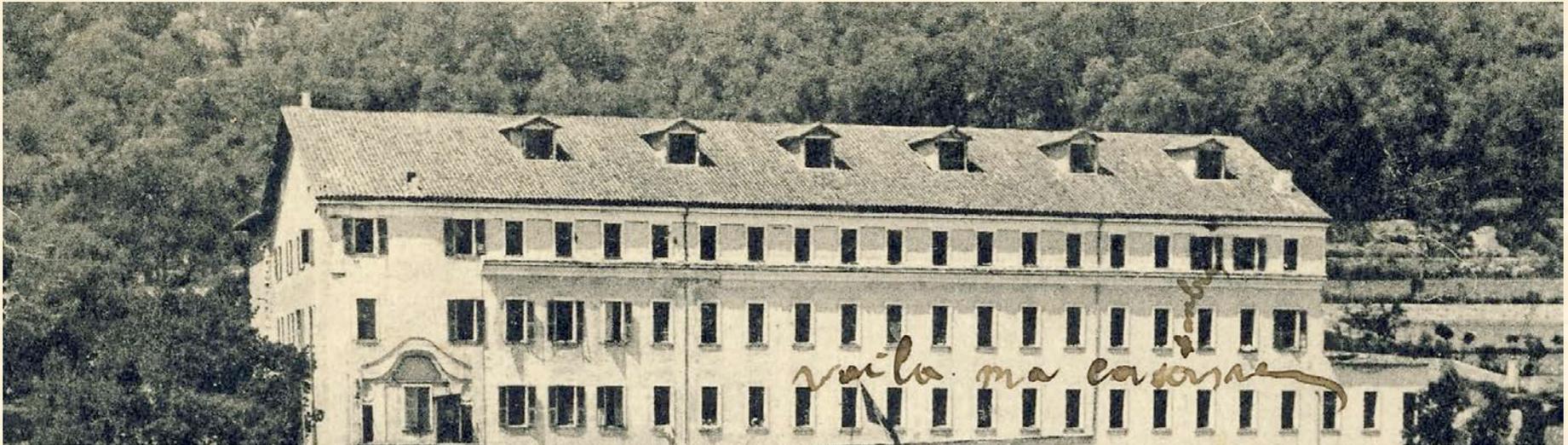
Villefranche-sur-Mer: military harbour

- **Military harbour (1700s)**
 - citadel (1)
 - protected basin (2)
 - dry dock (3)
 - rope factory (4)
 - former barrack (5)
 - support buildings (6)
 - galley prison and hospital (7), walkway (8)
 - lazaretto (9)
- **1858-1878: used by the Russian Navy**
- **1945-1966: US Navy**
(rope factory was an American supermarket)



Villefranche-sur-Mer: military harbour

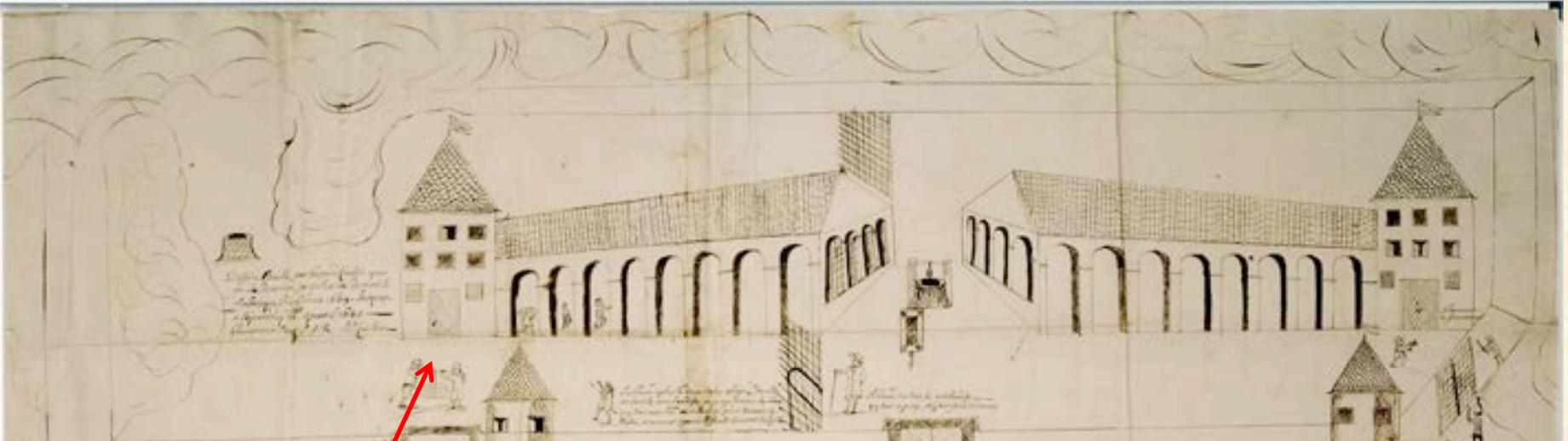
- Military harbour: buildings that do not exist any more (1)



Other military barracks (picture 1925-1930)

Villefranche-sur-Mer: military harbour

- Military harbour: buildings that do not exist any more (2)



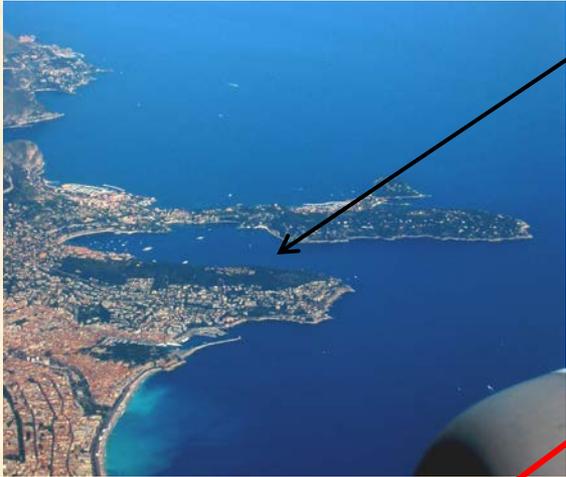
Military barracks and remaining lazaretto tower (photo 1925-1930)

Villefranche-sur-Mer: scientific campus

- Scientific campus in 2018
 - three historical buildings: 4, 6 and 7
 - modern building (9): research + collections
 - housing facility (10): final construction stage
- Why a marine research institute in Villefranche?
Why in the historical navy buildings?
- Answers
 - characteristics of the Bay
 - history of Villefranche

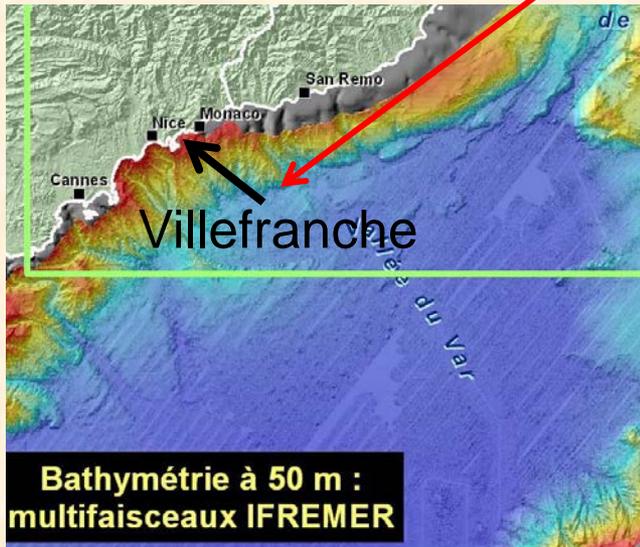


Villefranche-sur-Mer: The bay



Bay of Villefranche

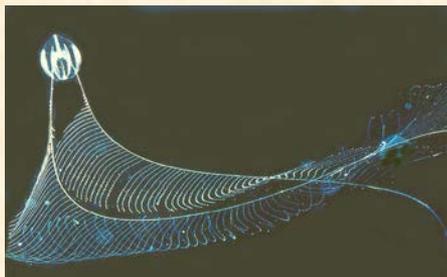
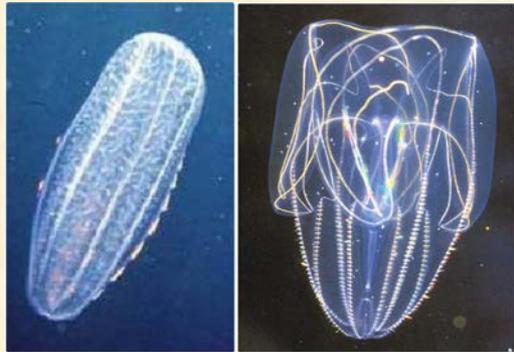
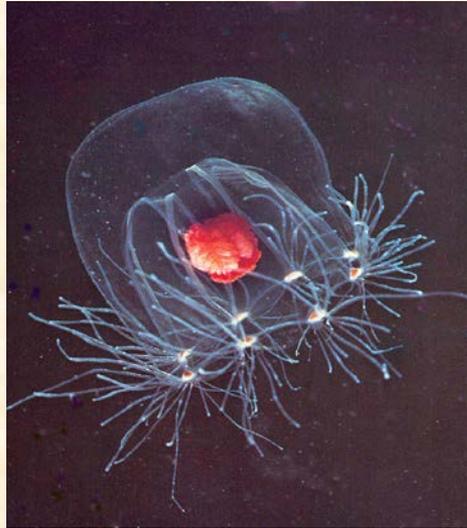
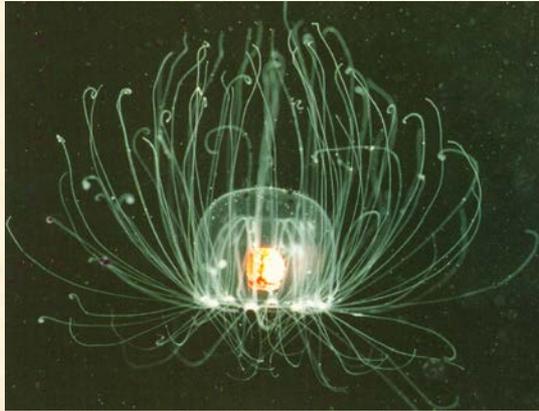
- deep: 100 m depth at the mouth of the bay
- unique access to deep waters: a few kilometres from the coast = 1000 m; 25 km offshore >2000 m
- Ideal site for studying deep, oligotrophic waters: marine biogeochemistry and oceanography,



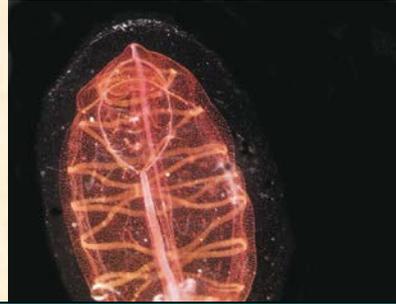
Key characteristics for the future Villefranche research institute

-
-
- offshore zooplankton (often large species) are retained in the bay

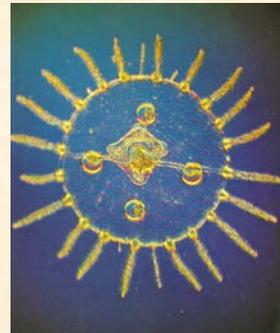
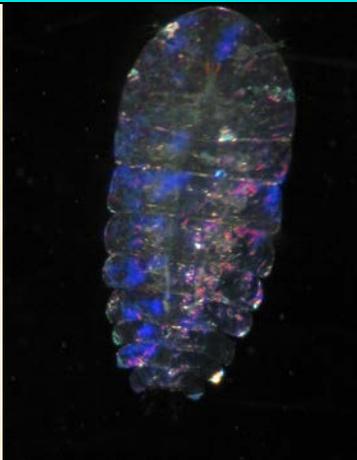
Villefranche-sur-Mer: The plankton (1)



Villefranche-sur-Mer: The plankton (2)



French researchers started to study these unique organisms at the beginning of the 19th century, i.e. 200 years ago



Part 4

Maritime France and French marine research

Unique site and improbable (hi)story

From military harbour to research institute

The Russian and French research institutes

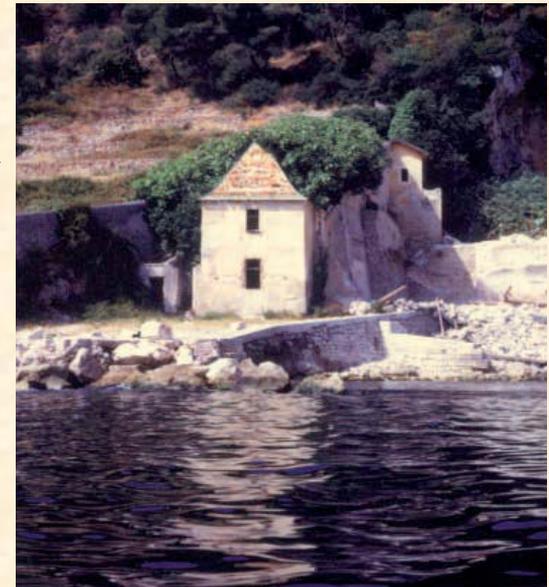
First marine laboratory in Villefranche

- Two professors created a first marine laboratory in Villefranche (*Laboratoire des Hautes Etudes*) in 1881
 - Jules Barrois, France
 - Hermann Fol, Switzerland
 - located in last remaining tower of the **Villefranche Lazaretto** (still exists, to the west of the present campus)
[lazaretto: large building where people and goods were put in quarantine]
 - this first laboratory hosted some **Russian researchers**



J. BARROIS

H. FOL



From the Russian Navy to a laboratory

- **Galley prison:** building with unique architecture, with direct access to the sea
 - prison and hospital (A)
 - smithy (B)
- Buildings



- **conceded to Russia in 1858 by the King of Sardinia-Savoy (who became King of Italy in 1861), as a base for its navy, with the Galley prison (A) and the smithy (B).**
- **after the end of the Crimean War (1853-1856) and the Treaty of Paris (1856), Russia moved its navy to the Mediterranean Sea (Villefranche) and thus did not need to use Villefranche after 1878**

Key events for the future
Villefranche research

institute

1878 – Why?

Russia), navy

1856 → Russia

Mediterranean Sea (Villefranche)

From the Russian Navy to a laboratory

- **Galley prison:** building with unique architecture, with direct access to the sea
 - prison and hospital (A)
 - smithy (B)
- Buildings
 - conceded to Russia in 1856 by the King of Sardinia-Savoy (who became King of Italy in 1861), as a base for its navy, which used the buildings until 1878
 - early 1880s: Prof. Alexis Korotneff (University of Kiev) requested from the Russian Navy permission to use the buildings
 - got the agreement although not easily

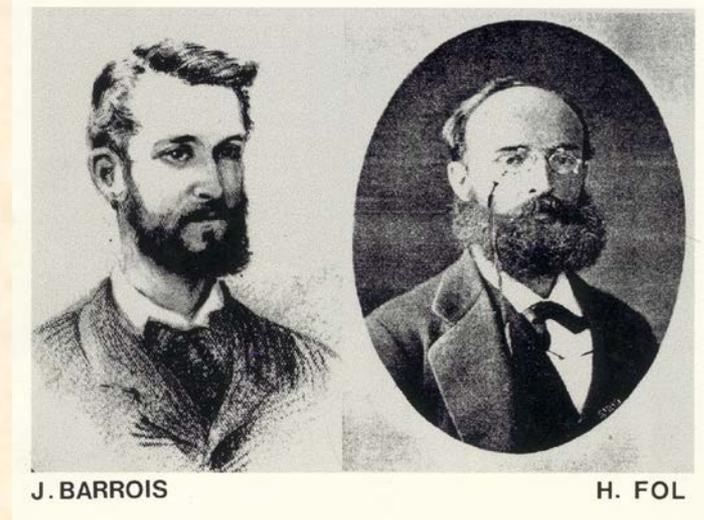
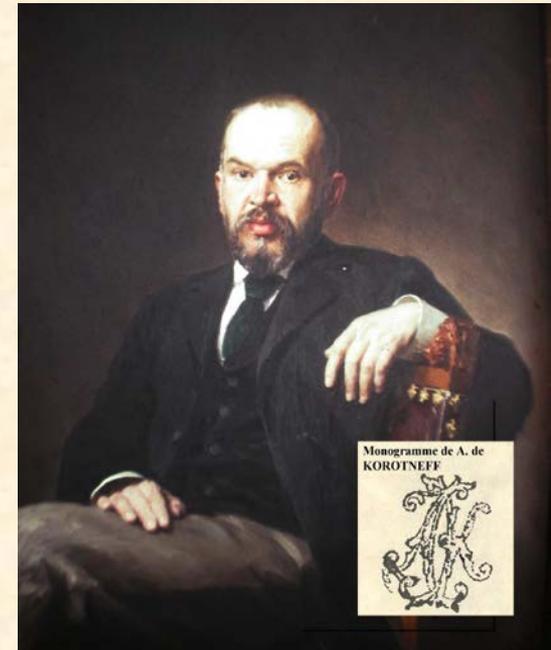


Key event for the future
Villefranche research

institute

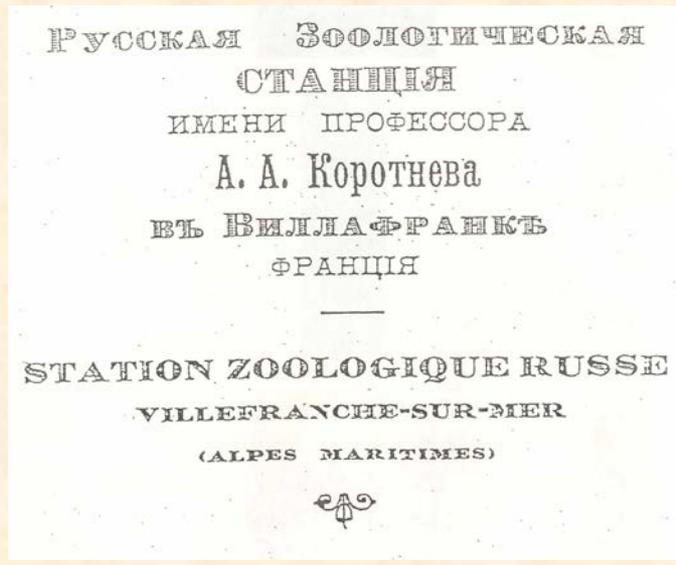
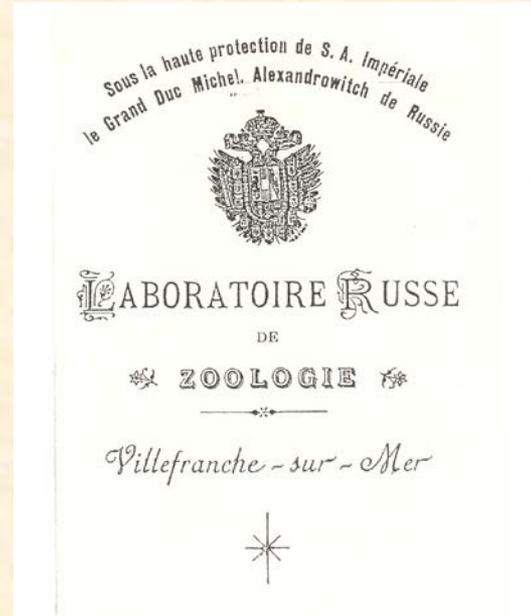
The *Station zoologique*

- *Station zoologique*
 - created in 1885 by Prof. Korotneff with Profs. Jules Barrois, France, and Hermann Fol, Switzerland
 - model: Naples zoological station (created in 1872)
 - the three researchers were interested in the unusual plankton found in Villefranche
- *Station russe de Zoologie*
 - departure of Profs. Fol and Barrois in 1888
 - laboratory 100% Russian
 - remained Russian until 1932 (in spite of the 1917 revolution)



Station russe de Zoologie (1)

- First Director: Prof. Alexis Korotneff
- member of the Académie des Sciences, Institut de France, Institut Pasteur, etc., who was the main driving force behind the institute
- the *Station russe* had little means, but it nevertheless hosted researchers from many different countries



Station russe de Zoologie (2)

The station (created in 1885) became rapidly well known

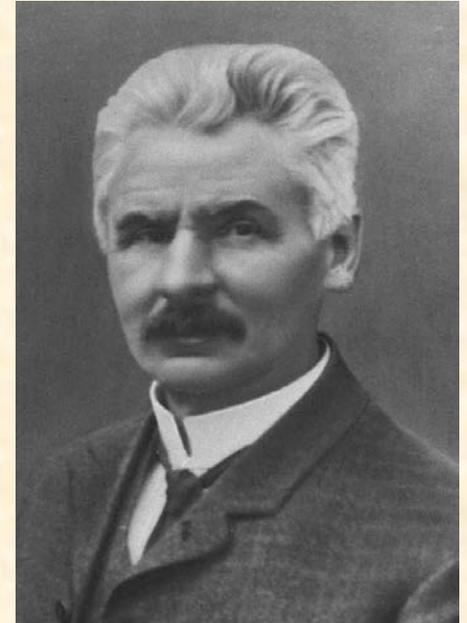
Six years later, in 1891, the Russian author [Anton Chekhov](#) wrote in his short story *The Duel*:

“All serious zoologists work at the biological station at Naples or Villefranche.”



Station russe de Zoologie (3)

- Second Director: **Michel Davidoff (1916-1928)**
 - assistant of **Prof. Korotneff**
 - very good specialist of preservation of large plankton specimens: he developed the Station's **zoological collection**, and won many prizes



MICHEL DAVIDOFF Directeur de la STATION ZOOLOGIQUE (Russe) de 1915 à 1933

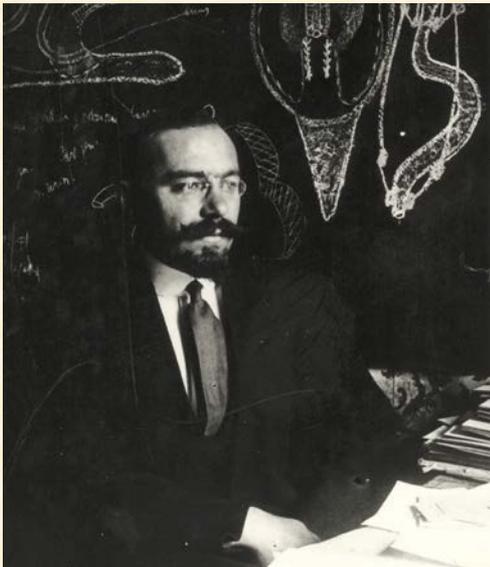
Station russe de Zoologie (4)

- Under second Director **Michel Davidoff**, the station
 - bought a **motor ship** (*Veillele*)
 - acquired increasingly better research equipment
 - published scientific papers



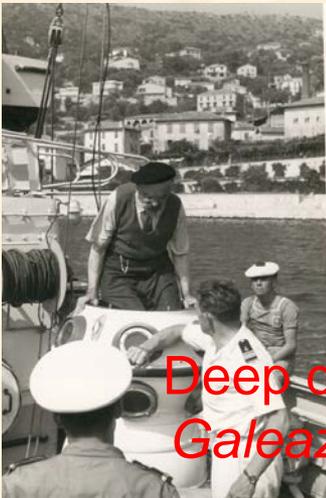
Station russe de Zoologie (5)

- New assistant: **Grégoire Trégouboff**
 - arrived in 1915
 - studied medicine and biology in Kiev and Montpellier (France)
 - excellent scientist, with very high enthusiasm and energy
 - last director of the Russian station (1929-1932)

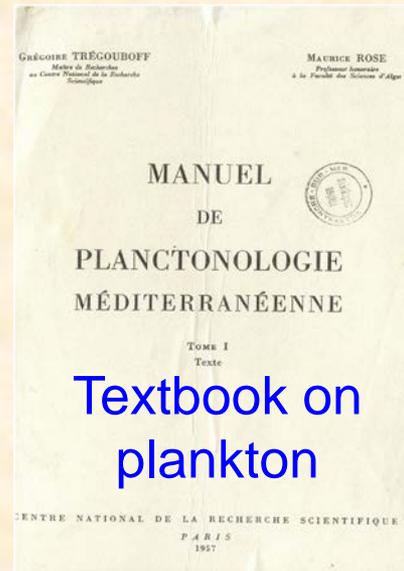


Station zoologique (1)

- Station became French in 1932, as part of the Faculty of Sciences of the University of Paris (now: Sorbonne Université)
- directed by **Grégoire Trégoïeff**
- Trégoïeff remained very active in the institute



Deep diving in Galeazi tower



Textbook on plankton



With French explorer Jacques-Yves Cousteau

Station zoologique (2)

- After Tregouboff's retirement (director: Paul Bougis, 1950-1982)
 - station underwent a **strong international development**
 - remembering the station's Russian origins, its first 20-m **ship was named N.O. KOROTNEFF**
- Over the years, several marine laboratories developed in Villefranche
- Since 1989, they are grouped into a single campus, now called **Institut de la Mer de Villefranche (IMEV)**



PAUL BOUGIS Directeur de la STATION ZOOLOGIQUE (Plancton) de 1957 à 1986



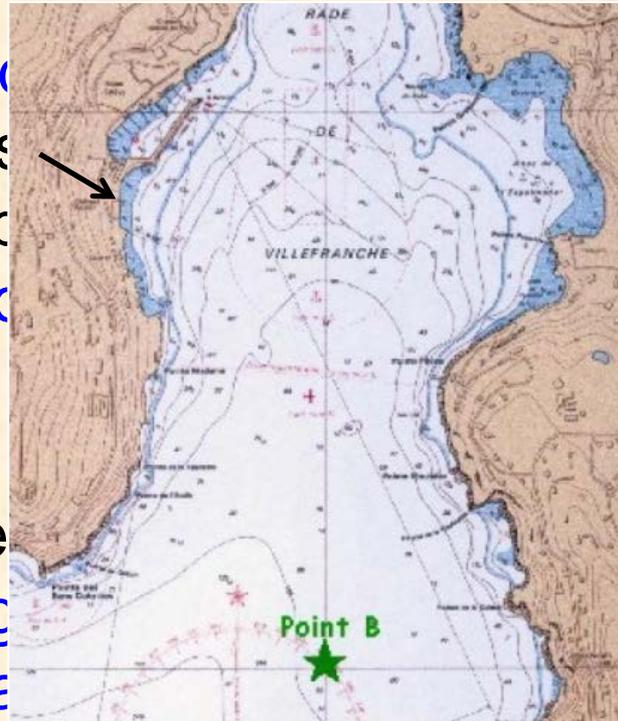
Marine optics and remote sensing

- Marine optics (plus, later, ocean colour remote sensing) present in Villefranche since 1966
 - founder and titular director of the marine physics and chemistry unit until 1982: Prof. Alexandre Ivanoff
 - following director: Prof. André Morel
 - also Key scientist for the Villefranche research
 - World leader in ~~institute~~ optics and remote sensing
 - died in 2012
- All oceanographic components of the Villefranche campus were grouped into the Villefranche Oceanography Laboratory (LOV) in 2001

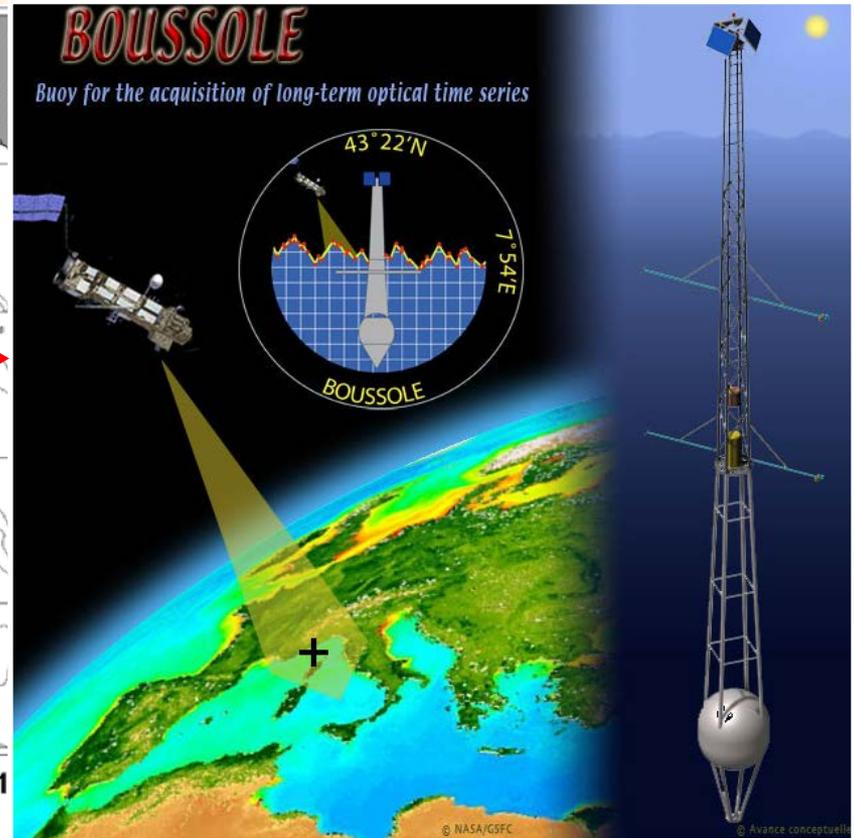
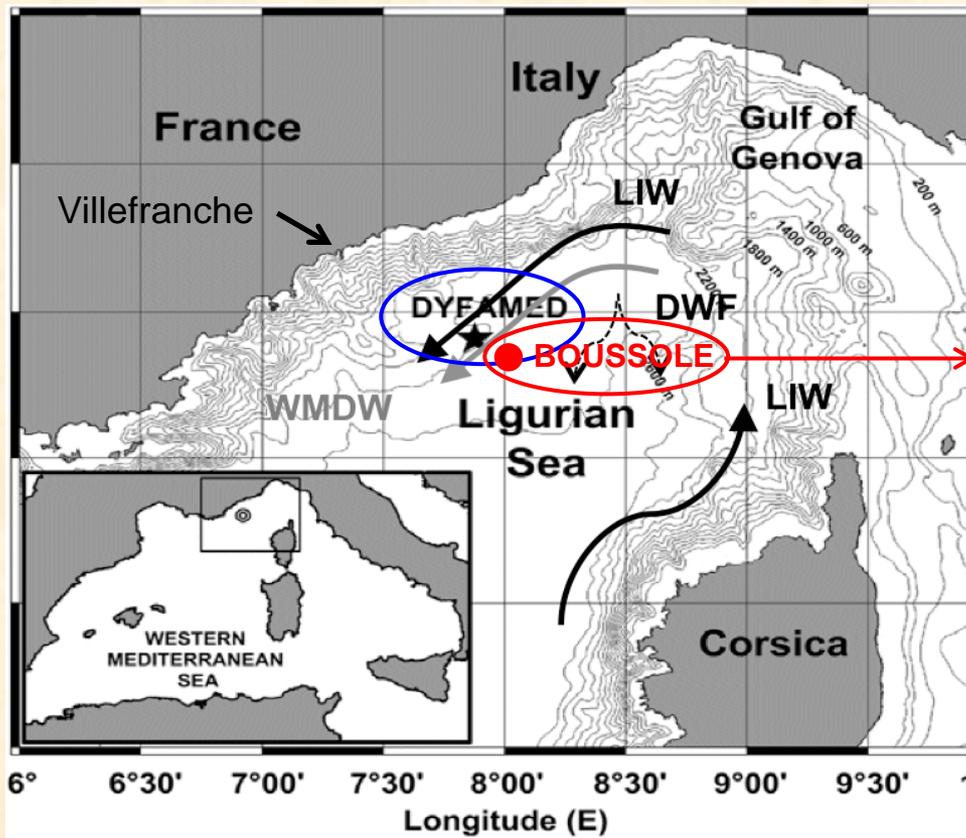


Villefranche campus now

- Institut de la Mer (IMOS) - 100 people
 - two research units
 - oceanography (at Villefranche)
 - developmental biology
 - general services
- Activities
 - research: science and technology developments (national and European)
 - graduate teaching and research in the environment
 - long-term observations
 - inshore site (Point B, >90 m): since 1957, >60 years of daily observations of physical conditions and zooplankton



Villefranche campus now



➤ offshore site

DYFAMED (2350 m): since 1989, monthly observations of physics, chemistry and biology + moored sediment traps

BOUSSOLE (2440 m): since 2003, optical characteristics

Villefranche campus now

- Villefranche research institute results from the conjunction of
 - a unique marine site
 - a suite of improbable historical circumstances
 - some exceptional, imaginative people
 - lots of fun!

Touring in Villefranche-sur-Mer

- If you have time during the week (you may be too busy) or after, you could have a look in Villefranche at
 - picturesque [old town](#)



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 - fishermen's chapel beautifully decorated by the French artist Jean Cocteau (entrance 3 €)



Thank you very much for your
kind attention

Continue to enjoy Villefranche-sur-Mer
(Freetown-by-the-Sea)

RADE DE VILLEFRANCHE

