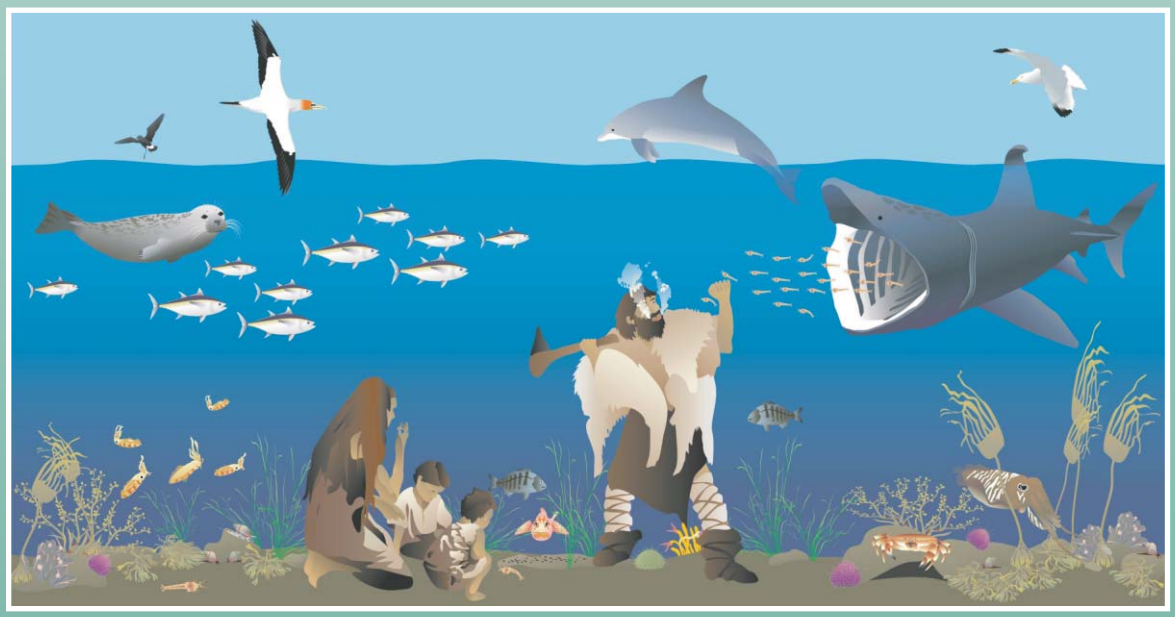
Explore the Seafloor

Geography
Teacher's Pack

How did climate change affect prehistoric people?

This teacher's pack contains activities and suggestions designed to complement the teaching of a case study on marine research, focusing on prehistoric climate change at Key Stages 3 and 4.



Marine
Aggregate Levy
Sustainability Fund
MALSF

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Case Study

How did climate change affect prehistoric people?

This teacher's pack contains activities and suggestions to complement the teaching of a case study on marine research, focusing on prehistoric climate change at KS3 and KS4. The case study aims to support the curriculum by providing a real-life example of the application of geology and archaeology in the workplace, and the relevance of geography within this. It was developed as part of the Explore Seafloor project, funded by the Marine Aggregate Levy Sustainability Fund (MALSF).

This case study comes from the research undertaken as part of a Regional Environment Characterisation (REC) survey. In 2008, MALSF commissioned research into four main dredging regions in the United Kingdom – the Thames, South Coast, East Coast and Humber. These studies involved experts from universities, survey companies and heritage organisations to investigate the archaeology, geology and ecology of the seafloor. The aim of the studies was to ensure that we use the sea sustainably, without damaging its natural or physical heritage.

Using this teacher's pack

This pack provides background information to accompany a PowerPoint presentation on the case study, which can be downloaded from web address http://ets.wessexarch.co.uk/teachers/geography/

The Explore the Seafloor project has produced an interactive website http://ets.wessexarch.co.uk/, full of interesting resources and more information about each REC. In addition, there are many ways to develop this lesson beyond Explore the Seafloor. Through this pack, colour-coded boxes will indicate opportunities to use our resources, where to find out more and possible discussion topics.

Blue	**Activity or resource**
Green	**Find out more**
Red	**Film**
Yellow	**Discussion**

The following resources are available to download from web address http://ets.wessexarch.co.uk/teachers/geography/

E-Games

1. Be a Seafloor Explorer

Interactive Whiteboard Lessons

2. What did you find on the seafloor?
3. Studying environmental remains
4. What animals lived here in the past?
5. What archaeological material survives?

Film

6. Prehistoric Climate Change
7. Fly through: palaeo-Arun prehistoric reconstruction

PDF

8. Prehistoric Climate Change Timechart

Films are downloadable from the website or you can watch them online at YouTube and Vimeo - links to channels available on the lesson webpage.

Check out our Resources page http://ets.wessexarch.co.uk/resources/ for more material to use in your lessons.

Learning Outcomes

- Understand that the earth and its environments are constantly changing
- Develop knowledge and understanding about glaciers and their role in affecting this change
- Understand how humans were affected by climate change in the past
- Explore different methods of research
- Understand geological terms used in scientific research
- Develop the ability to critically analyse and evaluate evidence from scientific research
- Link prehistoric climate change to modern-day issues

Case Study

How did climate change affect prehistoric people? [Slides 1 - 2]

This provides background information to support a PowerPoint presentation or case study PDF, which you can download from http://ets.wessexarch.co.uk/teacher/geography/

What is an REC? [Slide 3]

This case study comes from the research undertaken as part of a Regional Environment Characterisation (REC) survey. A REC is a regional assessment of the geology, ecology and archaeology of the seafloor using information gathered through desk based assessment, geophysical data and sampling surveys. The website http://ets.wessexarch.co.uk allows you to explore the results for four of the REC study areas – South Coast, East Coast Humber and Outer Thames Estuary.

Activity - Online E Game: Be a Seafloor Explorer

South Coast REC Archaeological Research [Slide 4]

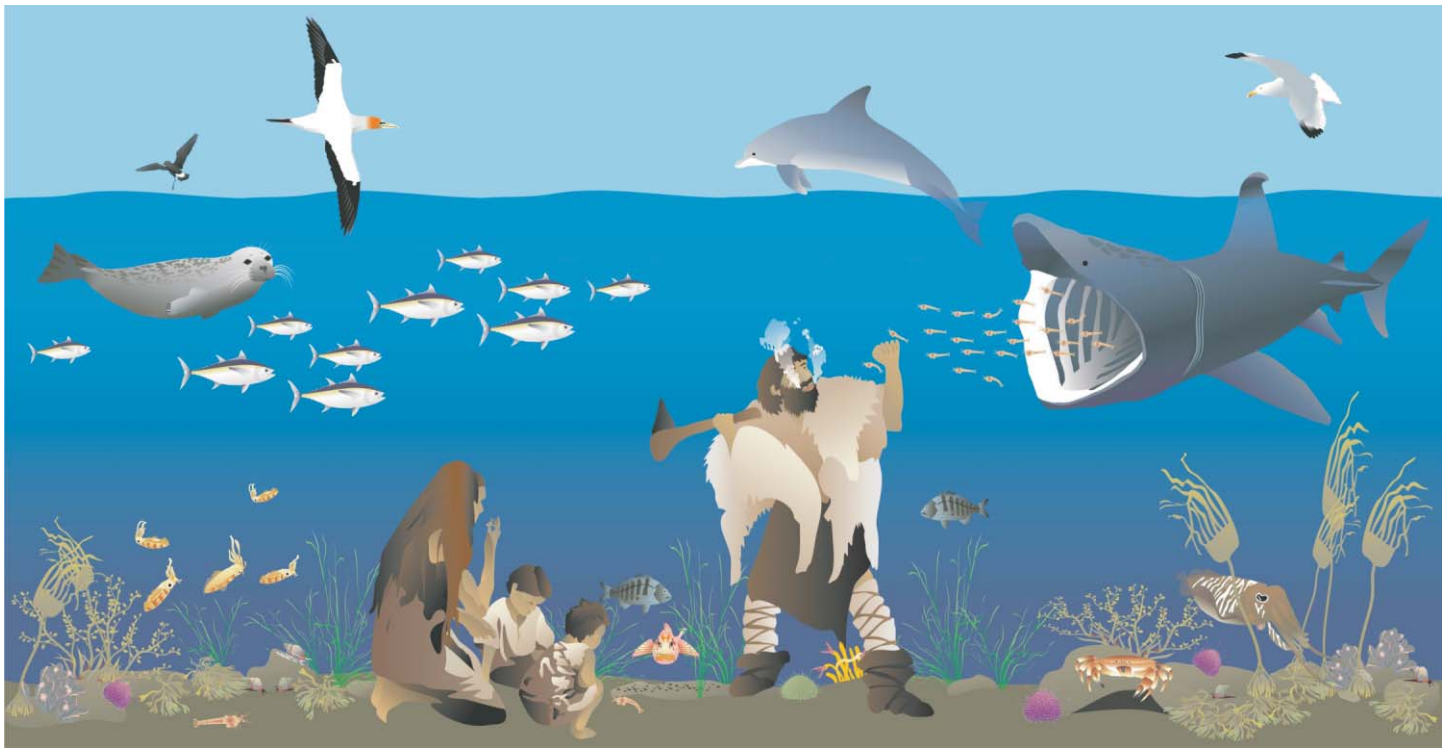
This lesson focuses on the archaeological research undertaken within the wider study. The South Coast seafloor is rich in archaeology. The aim of the research was to create maps showing the distribution of underwater archaeological sites and to identify areas where there is a strong possibility of finding archaeological material. This will inform marine planning. When industries apply to government authorities for licences to use an area of the sea (for example for dredging), the authorities can ensure that the work is undertaken responsibly, taking into consideration our underwater heritage.

Find out more - Useful background information

Explore the Seafloor South Coast REC Summary
http://ets.wessexarch.co.uk/recs/southcoast/

Original South Coast REC Report
http://www.cefas.defra.gov.uk/alsf/projects/natural-seabed-resources/rec-0802/final-report.aspx

Submerged Prehistory: Research in Context
http://www.cefas.co.uk/media/463676/monograph5-web.pdf



What can you find on the seafloor? [Slide 5]
Archaeologists study the material remains of the past to understand how people lived. This lesson focuses on the archaeological evidence discovered on the seafloor for prehistoric people.

However, the study involved examining a wide variety of archaeological material, ranging in date from the Lower Palaeolithic (970,000 Before Present) to World War Two. The majority of the archaeological material found on the seafloor relates to Britain's long maritime history. As Britain is an island, people have been using boats since prehistoric times for transport, trading and as defence against attack by sea. There are hundreds of thousands of shipwrecks around our coastal waters. From the 20th century, there are also aircraft wrecks; many relate to World War Two. Wrecks are like time capsules – they contain lots of information about what everyday life was like at the time they ended up in the sea.

Note: Before Present (BP) = Before **1950**

Activity - Interactive Whiteboard Lesson: What did you find on the seafloor?

What is a submerged prehistoric landscape? Did people live on the South Coast REC seafloor? [Slide 6 - 7]
Archaeologists use the term **'submerged prehistoric landscape'** for areas of dry land where people once lived, but that are now covered by the sea.

Therefore, when we ask if people have lived on the seafloor, the answer is yes and no. In the ancient past, the South Coast study area was dry land, and at times prehistoric people lived there. One of the key tasks for the REC archaeologists was to assess the potential for finding prehistoric evidence within the sediments beneath the seafloor.

This lesson focuses on the research undertaken to reconstruct the prehistoric landscape of the South Coast REC study area, where people once lived. In understanding this period, archaeologists must work closely with geologists, to explore how the region has formed and changed over time. To do this they must understand how the climate affected this change over the past million years.

Discussion - What is a submerged prehistoric landscape? Did people live on the seafloor?

Glaciers and glaciations [Slide 8]

Glaciers are one of the major geological forces affecting the Earth. During the last 2.5 million years (known on the geological timescale as the Pleistocene, followed around 10,000 BP by the Holocene) there have been numerous cold periods called **'glacials'**, separated by warmer periods, called **'interglacials'**. Archaeologists are particularly interested in the last 700,000 years, when our ancestors are known to have occupied Britain.

During the **cold phases**, large continental ice sheets covered much of Britain and most of the north-west European peninsula. During cooler periods, when water was locked up in ice sheets, the sea-level was lower than today. Britain was not an island, but a peninsula, joined to continental Europe.

During **warm periods**, the sea-levels were similar to those today and Britain was an island.

In the transition phases in-between, when it was not too cold and the sea levels were low, our early ancestors were able to occupy large parts of the land, now submerged beneath the sea.

Timeline [Slides 9 - 12]

The last glacial period is called the Devensian and it lasted from around 70,000 BP until 12,000 BP. At the end of this glaciation we see a lot of changes, which are marked by both archaeologists and geologists by new periods in their timescales, which you can see on the chart on Slide 9.

- **Coastline and climate changes**: Slides 10 to 12 cover the end of this glacial and show how the coastline changed until they are similar to what they are today. Around 12,000 years ago (Slide 11), the climate became warmer again, so people could live on the land. Then, as the glaciers continued to melt, the sea level rose and gradually submerged many places where people had lived (Slide 12).

- **Geological period ends**: This is the end of the geological period called the Pleistocene (commonly referred to as the Ice Age) and the start of what geologists refer to as the Holocene, which continues to the current day (though sea levels and temperatures continued to fluctuate during this period).

- **Archaeological period ends**: This also marks the end of the archaeological period called the Palaeolithic (commonly known as the Old Stone Age) and the start of the Mesolithic (the Middle Stone Age; 10, 500BP – 6, 000BP). The Mesolithic period of prehistory is defined by the distinctive stone tool technology used at the time. The warmer climate led to people and animals living on the land. Megafauna (large animals associated with the Ice Age) and animals specialised for the cold began to die out.

Activity [Slide 9] - Prehistoric Climate Change Timechart and film. Use the timechart to explore the different times prehistoric people lived on the seafloor.

Film [Slide 10] - Prehistoric Climate Change:

Changing sea levels [Slide 13]
The graph on Slide 13 shows another way of looking at how the sea levels changed since the end of the Wolstonian glacial period, through the Devensian glacial, until the present day. Since 200,000 BP, the UK area was only an island for relatively short periods of time. At the peak of the Devensian glaciation, the UK area was too cold to be inhabited.

Discussion - What does this graph tell us?

Changing the planet's surface [Slide 14]
Glaciers are heavy and powerful and can change the planet's surface as they move across it, in other ways than through changing sea levels. This section covers how and when some of these changes occurred, as background to the case study. You can use the diagrams to cover glacier terminology.

Carving the planet's surface
Underneath the glacier, water remains liquid. This is because the pressure of all the weight of ice lowers the melting point to below 0° Centigrade. This water moves around underneath and beyond the glacier, creating rivers that carve out what geologists call **ice tunnels**. The rivers also flow out beyond the glacier's limits. Without the glacier above the tunnels become rivers called **tunnel valleys**.

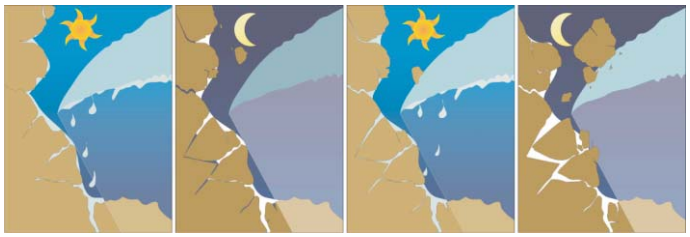
Abrasion, Plucking and Freeze/Thaw [Slides 15 - 16]
Glaciers can break off and erode the planet's surface.

- **Abrasion:** when rocks and stones, which are frozen into the bottom or side of the glacier, rub on the base rock as the glacier moves.

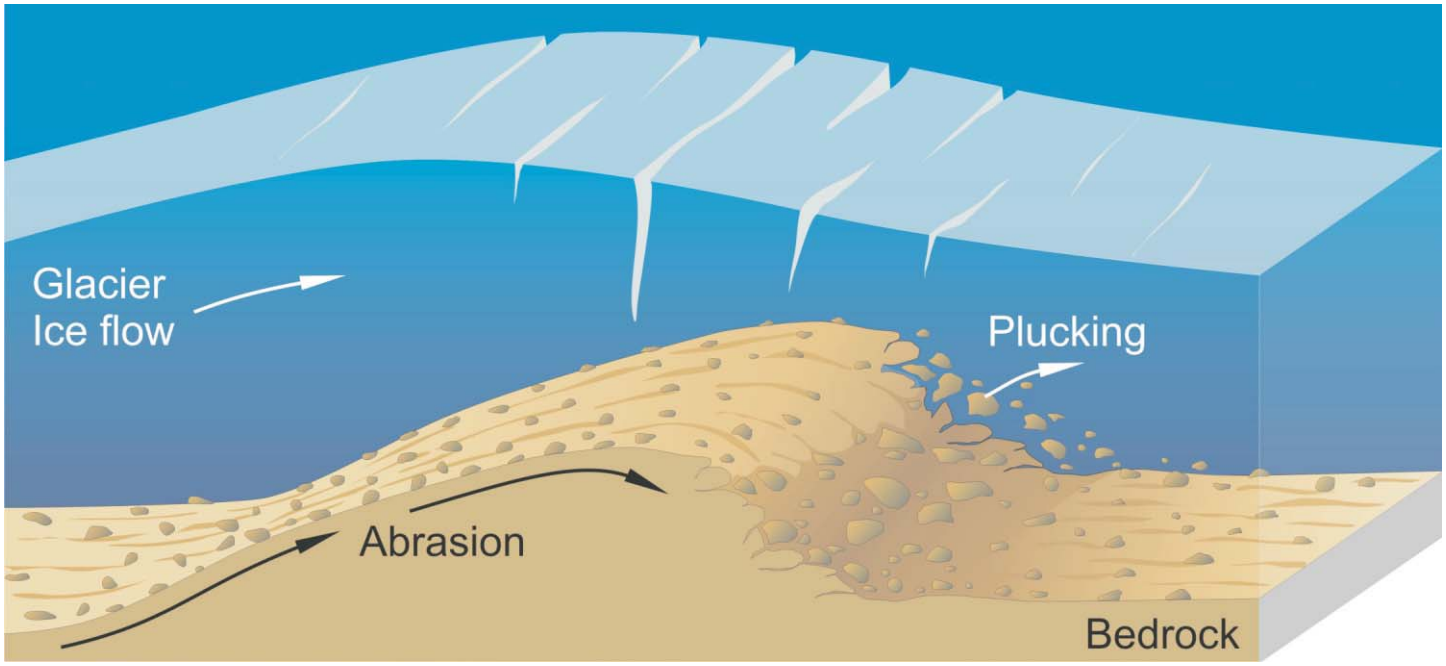
- **Plucking:** when glaciers freeze around rocks and pull them out of the bedrock as they move.

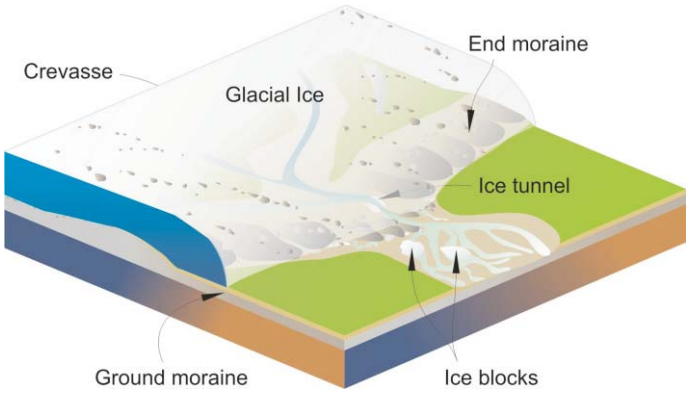
- **Freeze/thaw:** during warm days, water around the glacier melts and moves into crevasses in the surrounding rocks. At night, this water freezes and expands. Over time the freeze/thaw effect causes parts of the rockbed to break off and form part of the moving glacier.

Abrasion causes smaller particles to be picked up, while **plucking and freeze/thaw** are responsible for big rocks and boulders.



Freeze/thaw





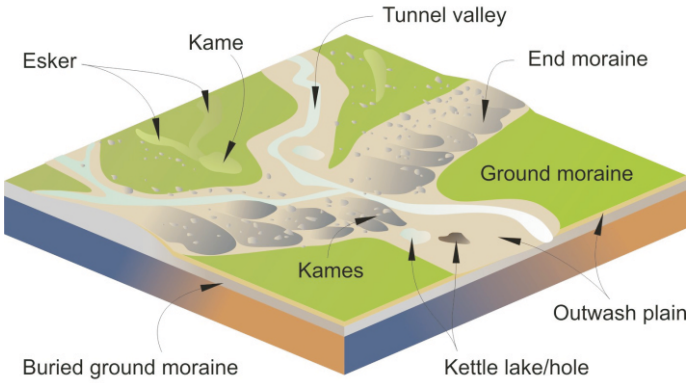
Transportation

Transportation and Deposition [Slides 17 - 18]

Glaciers can **transport** sediment through ice movement and meltwater. The size of particles moved ranges from fine sand to boulders. **Deposition** is the laying-down of sediment which has been eroded and transported by a glacier. The material is deposited by melting ice and glacial streams, or dropped directly from the glacier. Geologists call this material **till**. The movement of the glacier means that these rocks can be deposited hundreds of miles from where they were picked up.

This sediment now forms part of the seafloor sediments in the South Coast REC.

Over time, the movement of mobile seafloor sediments, such as sand, by sea currents fills in or buries features, such as the tunnel valleys and ancient rivers so that they are no longer visible on the seafloor surface.



Deposition

Archaeologists' challenge [Slide 19]

With the help of geologists, archaeologists face a difficult task trying to recreate the ancient landscapes now submerged under the water in the South Coast REC study area. They aim to:

- Map ancient river courses that existed when people lived on this land.
- Identify areas where potential prehistoric archaeological material will survive under the seafloor surface
- Understand what life was like when people lived on what is now the seafloor.

This is a challenge because:

- They are not looking at just one period of history or in this case prehistory - they need to understand a landscape that changed over a very long time. Different people used the land on and off from 700,000 BP until most recently, 8,000 BC, when it was fully under water.
- They are not looking at a 'site' but at the entire landscape that people lived in.
- The landscape they are examining is completely different now; it is under water and the movement of seafloor sediments, by glaciers and then by sea currents (moving mobile sand), has changed what it looks like.
- To imagine what it once looked like, they must find archaeological evidence now buried under the seafloor sediments, e.g. evidence for what plants, animals and people lived there.

Discussion - What is a landscape? Why do archaeologists want to map ancient rivers?

South Coast study area [Slide 20]:
How did glaciers affect it?
During the last Ice Age, the South Coast REC area was not covered in ice, but there was a massive glacier to the north across Northern England and the North Sea. Therefore, unlike the other REC areas the **glaciers had no direct effect on the formation of the seafloor.**

In other REC areas, glaciers created tunnel valleys, which became rivers, and people ended up living nearby, once the glacier had melted.

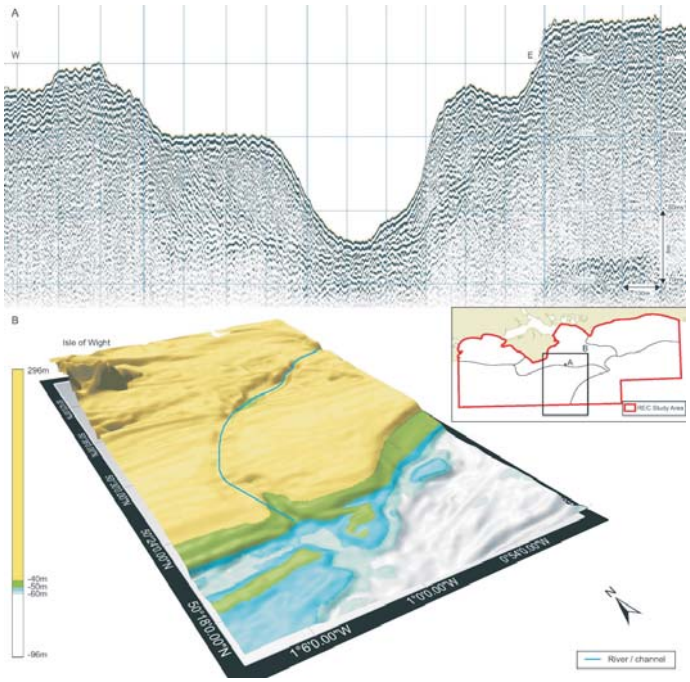
In the South Coast study area, rivers already existed during the Ice Age; other earlier geological processes created them. But when the glaciers melted, these rivers:

- carried higher volumes of water
- flowed much faster
- were much wider
- carried sediment eroded from glaciers to places far away from the glaciers

The seasonal melt of the glaciers could be very dramatic.

In Slide 20 you can see a map of the palaeo-Solent, an ancient river off the South Coast. Archaeologists created this map from the geophysical data they collected. When the glaciers melted they made this river bigger, and eventually made the sea rise up and cover them up. We will find out more about how the archaeologists mapped this river in the following section.

Discussion - This river was not created by glaciers, but how was it affected by them?



Palaeo-Solent

The REC Methodology [Slide 21]
There are three main stages to the REC study. In any research project, the methodology must suit the aims of the project, but also take into consideration schedule and budget. A REC survey covers a large area and therefore does not aim to provide detailed information but rather an overview of the whole area.

Stage 1	Collecting Data	• Fieldwork: - Geophysical survey - Vibrocorer - Grab samples • Desk Based Assessment
Stage 2	Results - Using the data	• Creating maps • Final report
Stage 3	Recommendations	Highlighting what is special about the South Coast REC study area

Stage 1: Collecting data [Slide 22]
There are two main ways that the archaeologists collected data, through their own fieldwork and through reviewing information already available.

Fieldwork
Fieldwork involves collecting original data for the purpose of the research aims. Fieldwork for the REC is multidisciplinary, involving a range of different scientific specialities.

Often, when people think about underwater archaeologists, they think of a SCUBA diver on the seafloor. Working in an underwater environment is a challenge. When excavation does occur, it is largely a process of uncovering material buried in seafloor sediments, for example ship and aircraft wrecks, or large deposits of prehistoric stone tools. Divers will survey ship or aircraft wrecks to record their structure and artefact positions in detail. However, this is a small percentage of their work. It is impossible for divers to examine every part of the seafloor: not only is it expensive and very time-consuming, the often low visibility in British waters makes it difficult to see.

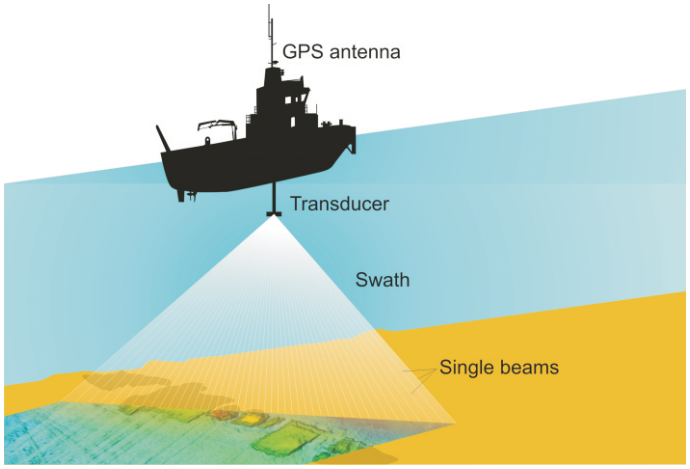
These are the principle methods used during the fieldwork to collect information, further explanation of each method follows later in the lesson.

Geophysical survey is an important element of marine archaeological research. It is used to create images of the seafloor by collecting information about its physical properties. Many companies that specialise in this field employ marine geophysicists and geologists, who collect and interpret the information. It provides a method of recording large areas of the seafloor to build up a picture of what archaeology survives there.

A Vibrocorer takes cores (samples) from beneath the surface of the seafloor; again this involves both geologists and archaeologists.

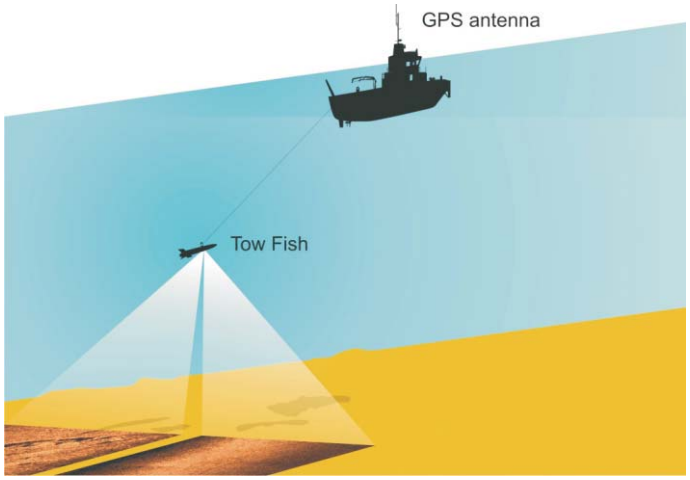
Grab samples are taken from the seafloor surface, using a Clamshell grab or a Hamon Grab. The samples help them understand how the seafloor was made and what it is made of.

Find out more - Find out about the different marine scientists on our Marine Career webpages http://ets.wessexarch.co.uk/resources/marinecareers/



Fieldwork: Geophysical survey techniques [Slide 23]
The survey is undertaken on a boat. The REC used a variety of sonar survey techniques, which use sound waves, and magnetometry survey, which measures magnetic changes. Different techniques have different strengths. For example, magnetometry is useful for finding metal shipwrecks, rather than wooden shipwrecks, because they are made of iron.

Find out more - Download our Physics Lesson: How do we map the seafloor?



Sonar Techniques [Slide 24]
Sonar systems emit sound waves, which travel through the sea and reflect back up when they meet either an obstruction or the seafloor surface. There are three principal techniques:

Sidescan Sonar – this measures the intensity of the reflected sound wave, which can indicate hard surfaces (which reflect sound strongly) and soft surfaces (where less sound is reflected). Areas of no return, where there is no reflection, are shown as shadows, which are useful for interpreting shipwreck features as they indicate where something rises up from the seafloor.

Multibeam Bathymetry Sonar – this measures the time it takes for sound waves to travel to the obstruction or seafloor and back again. It provides accurate depth measurements, so that 3-dimensional images of the seafloor or wrecks can be created from the data. The image on the slide is a German submarine.

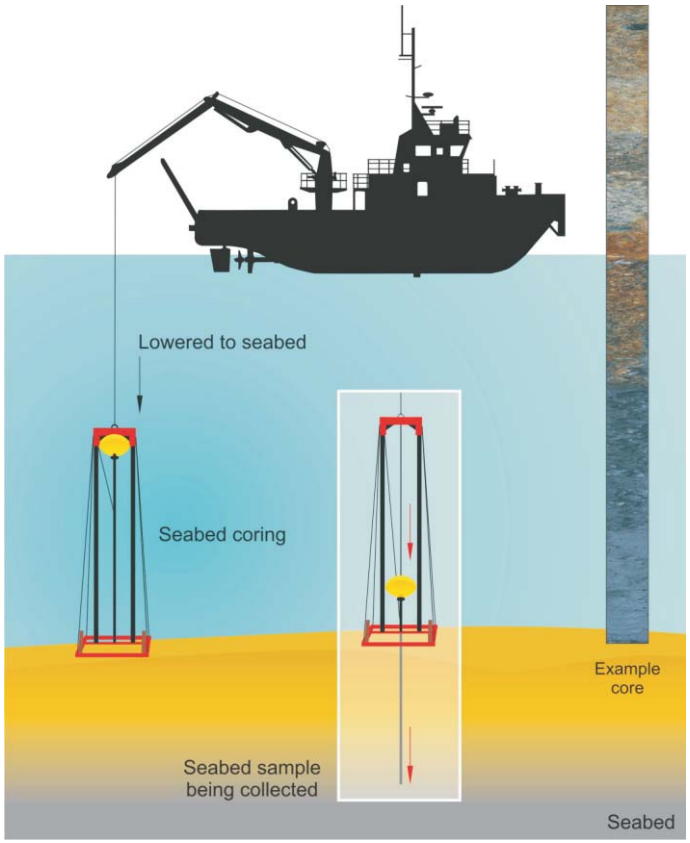
Sub-Bottom Profiler – the sound waves using this technique penetrate the seafloor and reflect back when there are changes in the seafloor sediments. This records a section (or profile) of what the seafloor looks like underneath the surface. Sub-bottom profiling is particularly useful for discovering prehistoric landscapes that are now buried, for example ancient infilled river channels.

Results vary [Slide 25 - 27]
When processing the data collected to create images of the seafloor, many different factors are taken into consideration which can affect the results, for example, the sea currents. The results also vary depending on what you are surveying for. For example, surveying a known wreck for more information can produce a very detailed image, but will take a long time and be very expensive. In most cases the geophysical images show a lump or a bump, known as an '**anomaly**'. It is rare to get a detailed image like the plane shown in Slide 25. It takes expertise to be able to tell if an anomaly is a wreck or a geological feature, such as an outcrop of rocks.

Covering the study area [Slide 26] and Filling in the gaps [Slide 27]
The marine geophysicists work from a boat, which travels in transects (lines), to and fro across the water, collecting information usually over several kilometres. The REC covers 5600 km^2; therefore they cannot survey the entire study area; instead they survey a representative portion. This is still a large amount and so a less detailed survey was undertaken. Slide 26 shows the geophysical transects undertaken, it highlights that only part of the area was covered, this was due to a lot of bad weather during the allocated time for the fieldwork. The solution was to look at information from previous surveys, undertaken for a variety of reasons, to fill in the gaps, this is shown on Slide 27.

Discussion - [Slide 26] What do the lines on the map represent? Do they provide a representative coverage of the study area?

[Slide 27] What are some of the considerations and issues when undertaking geophysical fieldwork?



Fieldwork: Coring [Slides 28 - 30]

Coring involves taking samples of seafloor sediments from underneath the seabed. Both geologists and archaeologists study these samples. The REC geologists focused on analysing the different layers of material, recording their character and thickness, to help understand how the seafloor was formed over time. The REC archaeologists studied this and the environmental remains found in the different deposits, to understand what plants and wildlife lived on the land over time.

Unlike the other three RECs, there were no core samples taken as part of the South Coast fieldwork. However, as we will see in a moment, there were many past projects undertaken in the South Coast area, which had taken core samples; so the archaeologists could use that information for the REC project instead.

How does a Vibrocorer work? (Slide 28)

Working from a boat, a Vibrocorer is used to take these samples. The Vibrocorer works by vibration and consists of a long tube up to 6 metres in length, known as a core. First it is lowered from the boat to the seafloor. Once stable, the motor is turned on, which vibrates the core into the seafloor. It is allowed to run until it either reaches the end of the core or it hits a hard layer that it cannot be pushed through. It can penetrate quite hard layers, like clay.

Processing cores (Slide 29)

Samples were taken across the REC study area. At each sample site, two cores were collected. One core was sealed in a black core liner so that it could be dated using a technique called Optically Stimulated Luminescence (OSL). In the laboratory, the other core was split in half lengthways for scientists to record sediment grain size, type of sediment, colour of sediment and any other material found inside. Types of material included shells and bits of wood.

Discussion - What kind of information do you think the scientists collected about this core?

Environmental remains (Slide 30)

For archaeologists, it is most useful when peat is found in a core sample. Peat is created when plant material rots in conditions where there is no oxygen (anaerobic conditions). The lack of oxygen means the plant material does not completely break down. Peat is exciting because it is organic material which used to grow on dry (or marshy) land. By studying pollen and seeds found in peat, we can figure out what types of trees and plants were growing in the area at the time when it was dry land.

Desk Based Assessments (DBA) [Slide 31]

DBAs are often the first step for archaeologists, both on land and sea, when asked to assess an area for archaeology. This assessment is required as part of the planning process for certain activities that could affect archaeology underneath the ground or on the seafloor, for example, before installing a wind farm. It allows archaeologists to assess the potential of finding archaeology in that area, based on what is already known from the locality. This can help to decide what needs to be done next, to ensure that the archaeology is recorded before the construction takes place, or to prevent the work happening, in very special situations.

A DBA collects and **summarises in a report** archaeological information about a defined area, in this case the REC. This includes any relevant research already undertaken and other sources of information about the archaeology for the study area. Often an area, particularly a large one, has been subject to lots of archaeological investigations. A DBA is useful as it brings together many individual pieces of work into one place so people can reference it easily. This information is usually created by a variety of different organisations for a variety of different reasons. Again, like the survey, the detail the DBA goes into is affected by time, money and the aims of the project. Often DBAs will tell where you can find information, with a brief summary of what it is and its significance, rather than repeat ALL the information in a new report.

Archaeological Evidence for Prehistory

For more recent periods, archaeologists would look at historical evidence, such as letters, books or photographs, as part of the DBA. However, the prehistoric period, as demonstrated by its name, does not have historical sources available. Archaeologists can however look at reports of past archaeological research about prehistory as part of their DBA.

Find out more - Explore the Marine Aggregate Industry Protocol website
http://wessexarch.co.uk/projects/marine/bmapa/

Artefacts found on the seafloor [Slide 32]

One source of information is reports of archaeological artefacts found at sea. Protocols set up with industries that work in Britain's coastal waters help these industries to report any discoveries of archaeological artefacts found on the seafloor to archaeologists, who in turn report anything of significance to authorities such as English Heritage. The British Marine Aggregate Producers Association's (BMAPA) Marine Aggregate Protocol for the Reporting of Finds of Archaeological Interest is the longest running protocol, which started in 2005. Dredgers sometimes pull up artefacts along with the marine aggregate, including prehistoric artefacts or the bones of animals who lived on the land at that time. On occasions lots of significant prehistoric material is found in an area. When this happens, authorities place an exclusion zone in that area to prevent industries working there and destroying the archaeology.

Past Projects: Seabed Prehistory Project and the palaeo-Arun case study [Slide 33]

Past projects are an excellent source of information as they look at smaller areas in the overall REC study area in more detail. An important source of information was the Seabed Prehistory project, which was funded by the Marine Aggregate Levy Sustainability Fund (MALSF) and undertaken by Wessex Archaeology. This project explored the best methods and techniques for gathering archaeological information about prehistory on the seafloor, as well as ways of presenting the information.

The main case study area was the **palaeo-Arun** in the South Coast REC study area. This is a submerged continuation of the River Arun, located approximately 10 kilometres south of Littlehampton. This project undertook detailed geophysical survey, core samples, and used computer modelling to recreate the landscape as it would have looked in the past. We will return to this example in the Stage 2: Results section.

Find out more - Seabed Prehistory
http://www.wessexarch.co.uk/projects/marine/alsf/seabed_prehistory/index.html

Stage 2: Results [Slide 34]
The REC report, looked at the potential for archaeology, relating to prehistory, maritime and aviation for the South Coast REC survey area.

The precise location of prehistoric archaeological material offshore is largely unknown at present but areas have been highlighted where there is a higher potential for that material to survive. The data is mapped using GIS.

What is GIS?
GIS stands for Geographic Information System. GIS takes data with a known geographic position and places it on a map. It allows you to view, analyse and interpret data to reveal relationships and patterns. Geographically-referenced information from different sources can be added to one GIS to gain a greater understanding about an area. The RECs produced four WebGIS's, to make their data available to the public

Archaeologists identified evidence for people living in the study area on and off from as early as 500,000 Before Present (BP) during the Palaeolithic (Early Stone Age). We will look at the results for the **later prehistoric occupation during the Mesolithic around the palaeo-Arun**.

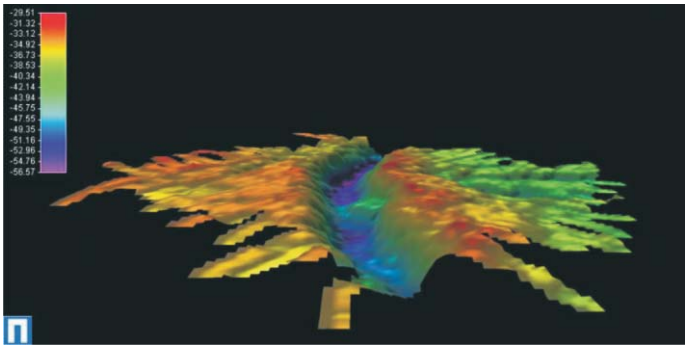
Find out more - South Coast REC GIS
http://www.southcoastrecgis.org.uk/sc/

Geophysics results [Slide 35 - 38]
The geophysical data both from past projects and the current survey, produced a map of what the seafloor looks like now. This highlighted the paths of channels in the seafloor, which archaeologists interpreted as ancient river courses. This includes the palaeo-Arun, and the palaeo-Solent, which both continue from mainland rivers.

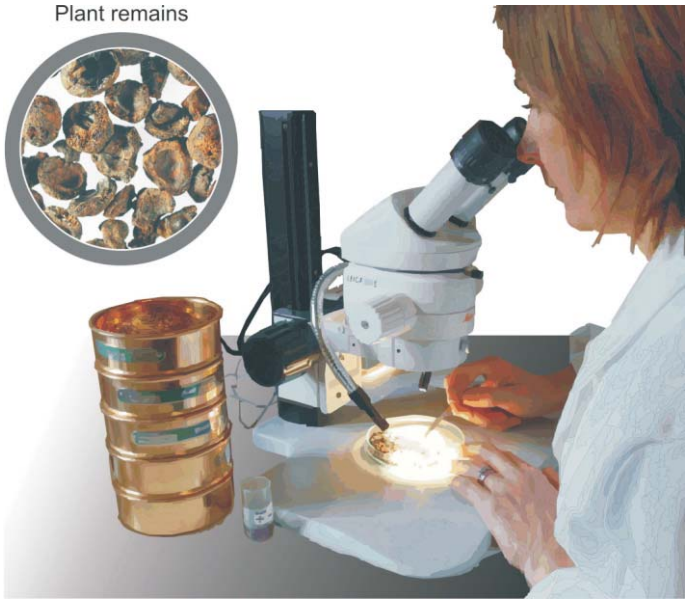
These ancient rivers are partially or completely buried by seafloor sediments. To obtain the profile of the rivers, their depth, and to identify old courses, sub-bottom profiler geophysical data is used.

Discussion - Sub-bottom profiler:
Can you see the outline of the seabed channel?

All this information can be combined, and computer modelling used to fill in the gaps, to create a 3-dimensonal map of the course of these rivers in the past. [Slide 38]



Coring Results: Recreating landscapes [Slides 39 - 42]
The environmental evidence, such as seeds and pollen from cores, can give us a picture of the landscape at that time. Examination of environmental remains from core samples taken at the palaeo-Arun, showed that during the Mesolithic, birch and pine woodland surrounded the edges of marshy areas.



Activity - Interactive Whiteboard Lesson:
Studying environmental remains

Evidence for animals [Slide 40]
The cores can also provide information about some of the animals that lived in the landscape. Microfauna (tiny animals) like snails are often found in samples.

In addition, animal bones found in the sea and on land can tell us about the animals that lived around the time we are studying. Bone is a material that does not survive well, but sometimes, under the right conditions, the bone is fossilised (it's structure is replaced by mineral deposits that make it appear to have turned to stone) and this means it preserves well.

Different animals prefer different climates – such as woolly mammoths, which lived in extremely cold climates. Megafauna (large animals associated with the Ice Age) like mammoths did not live long when the climate became warmer. Aurochs (large cattle-like animals) were more adaptable than woolly mammoth and lived long after the climate warmed up.

Activity - Interactive Whiteboard Lesson: What animals lived here in the past?

Discussion - How would climate change affect what animals live in the UK?

Evidence for people [Slide 41]
Prehistoric people used natural materials such as skin, bone and plants in their everyday life. Information about this is difficult to find, because most organic material decays, leaving no trace behind. Most of what we find are stone tools made of flint.

Different shapes, sizes and types of stone tools were using at different times during the very long period we call the Stone Age. These can help us to date other artefacts found with them, and tell us something about how people were hunting and living at a particular time.

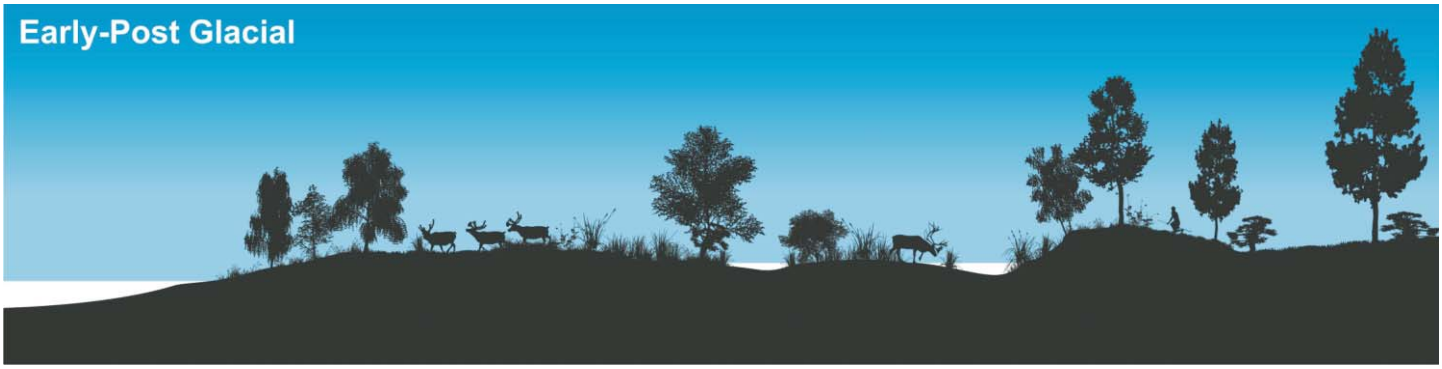
Archaeologists also take information from excavations undertaken on land to build up a picture of what people were like, but even then few human remains survive from this time. We have some very rare examples where skin and bone of ancient humans remain because they were kept in extreme cold or hot conditions. These are known as natural mummies.

Even though they come from different locations, evidence from mummified remains are one of the few sources of information about prehistoric humans.

Find out more - BBC - Otzi the Iceman http://www.bbc.co.uk/science/horizon/2001/iceman.shtml

Activity - Interactive Whiteboard Lesson: What archaeological material survives?

How the landscaped changed [Slides 42 and 43]
What all this evidence tells us, in terms of the end of the last glaciation, is that as the climate grew warmer, different plants began to grow. This in turn meant that animals and humans could live there.



Stage 3: Recommendations [Slide 44]
One of the tasks for the South Coast archaeologists was to assess the archaeological value of areas of the South Coast REC study area. In other words, is there the potential for important archaeological evidence that needs to be protected or monitored when industries are working at sea? This included highlighting important ship or aircraft wrecks.

There were several areas of prehistoric archaeology that the archaeologists highlighted, namely the ancient river courses, as people would have lived nearby.

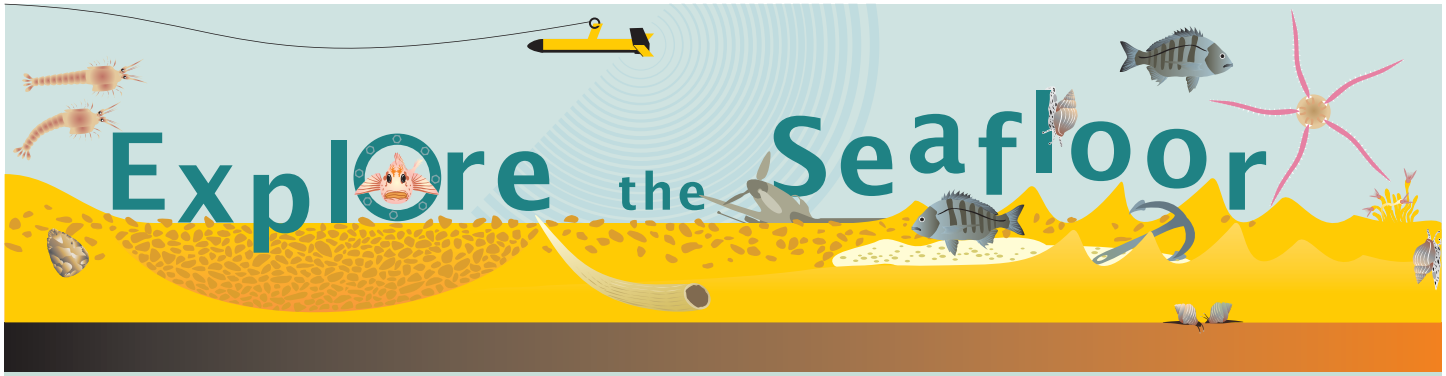
Feature of Special Interest: palaeo-Arun
One of the areas highlighted as important was the palaeo-Arun, which we have been studying.

Bringing all this information we have covered in this lesson together, the archaeologists reconstructed a landscape. Slide 41 is an image from a short 3-D film that archaeologists made to show the environment of the palaeo-Arun during the Mesolithic period (Middle Stone Age). You can download the film from our website or watch it on Vimeo or YouTube.

Film - Fly-through: the Palaeo-Arun prehistoric reconstruction

Discussion [Slide 45]

- So, how did climate change affect prehistoric people?
- Name the different methods and techniques that the archaeologists used to reconstruct the palaeo-Arun landscape.
- What types of archaeological evidence did they look at?
- What did they find out?
- Do you think it is important to protect the archaeology on the seafloor? Why?
- How does climate change affect Britain today?



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