

## Week 3: Understanding the sea

This document brings together all of the links shared in the course during Week 2, in one convenient location. Links to educator and facilitator profiles are only listed once.

### Welcome to Week 3

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- Progress page: <https://www.futurelearn.com/courses/shipwrecks/progress>

### Our changing seas

#### Our changing seas

- N/A

#### Sea level change

- Video on Ice Age Cycles by National Geographic:  
<http://channel.nationalgeographic.com/channel/videos/ice-age-cycles/>
- The Milankovitch Theory: <http://www.ncdc.noaa.gov/paleo/milankovitch.html>
- Eustatic Sea Level During Past Interglacials:  
[http://www.cwr.uwa.edu.au/~jimberger/Resources\\_Climate\\_Eco\\_Wealth\\_Env/Resources\\_CC\\_R\\_C\\_O/References/Siddalletalbook2005.pdf](http://www.cwr.uwa.edu.au/~jimberger/Resources_Climate_Eco_Wealth_Env/Resources_CC_R_C_O/References/Siddalletalbook2005.pdf)
- The Theory of Isostasy: <http://large.stanford.edu/courses/2007/ph210/pan2/>
- Tectonics, global changes in sea level and their relationship to stratigraphical sequences at the US Atlantic continental margin:  
<http://www.earth.ox.ac.uk/~tony/watts/downloads/WattsThorne84.pdf>
- Buoyancy: <http://en.wikipedia.org/wiki/Buoyancy>
- Asthenosphere: <http://en.wikipedia.org/wiki/Asthenosphere>
- Tectonics: <http://en.wikipedia.org/wiki/Tectonics>
- Institute of Nautical Archaeology Port Royal excavations:  
<http://nautarch.tamu.edu/portroyal/>

# Explore further – extended reading

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- Antarctic temperature and global sea level closely coupled over the past five glacial cycles, published online 21<sup>st</sup> June 2009:  
<http://www.nature.com/ngeo/journal/v2/n7/full/ngeo557.html>

## Core analysis

- N/A

## Exploring sea-level change

- Eustatic Sea Level Change Images:  
[https://ugc.futurelearn.com/uploads/files/32/34/323464c8-aab5-4edd-b9ba-25e662569d58/Eustatic\\_sea\\_level\\_change\\_images.pdf](https://ugc.futurelearn.com/uploads/files/32/34/323464c8-aab5-4edd-b9ba-25e662569d58/Eustatic_sea_level_change_images.pdf)

## Checking your understanding

- N/A

## Geophysical survey

### Marine Geophysics for Archaeological Investigations

- English Heritage guidelines for marine geophysics data acquisition and processing: <http://www.english-heritage.org.uk/publications/marine-geophysics-data-acquisition-processing-interpretation/>

### Geophysical techniques for maritime archaeology

- N/A

## Submerged Landscapes

### Submerged landscapes and prehistory

- N/A

### Submergence, memory and the myth of Atlantis

- Atlantis: <http://en.wikipedia.org/wiki/Atlantis>
- Lyonesse: <http://en.wikipedia.org/wiki/Lyonesse>

# Explore further – extended reading

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- 'Britain's Atlantis' found at bottom of North Sea:  
<http://www.dailymail.co.uk/sciencetech/article-2167731/Britains-Atlantis-North-sea--huge-undersea-kingdom-swamped-tsunami-5-500-years-ago.html>
- Pavlopetri: <http://www.nottingham.ac.uk/pavlopetri/index.aspx>
- Island Arlantis: <http://www.theoi.com/Phylos/Atlantes.html>
- Atlantis – true story or cautionary tale?  
<http://science.nationalgeographic.com/science/archaeology/atlantis/>
- Echoes of Plato's Atlantis:  
[http://www.bbc.co.uk/history/ancient/greeks/atlantis\\_01.shtml](http://www.bbc.co.uk/history/ancient/greeks/atlantis_01.shtml)

## Marine geophysics for submerged landscape investigations

- United Kingdom Hydrographic Office:  
<http://www.ukho.gov.uk/inspire/pages/home.aspx>
- Dispersals of Early Humans – Adaptations, frontiers and new territories:  
<http://www.ahobproject.org/>

## Geophysics for submerged landscapes

- NOAA Geophysical Data Center:  
<http://www.ngdc.noaa.gov/mgg/global/global.html>
- SCRIPPS Institution of Oceanography: [http://topex.ucsd.edu/marine\\_topo/](http://topex.ucsd.edu/marine_topo/)
- British Oceanographic Data Centre:  
[https://www.bodc.ac.uk/data/online\\_delivery/gebco/](https://www.bodc.ac.uk/data/online_delivery/gebco/)
- GEBCO: <http://www.gebco.net/>
- UKHO Inspire Portal: <http://www.ukho.gov.uk/inspire/pages/home.aspx>
- Joint Irish Bathymetric Survey Project:  
<http://www.marine.ie/home/services/surveys/seabed/JIBS.htm>
- NOAA's Bathymetric Data viewer:  
<http://maps.ngdc.noaa.gov/viewers/bathymetry/>
- Doggerland:  
[http://archaeologydataservice.ac.uk/archives/view/nspp\\_eh\\_2011/](http://archaeologydataservice.ac.uk/archives/view/nspp_eh_2011/)
- Crown Estate Marine Data Exchange: <http://www.marinedataexchange.co.uk/>

# Explore further – extended reading

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## Archaeological methods for submerged landscapes

- Dredges: <http://oceanexplorer.noaa.gov/facts/marinearch-tools.html>
- Airlifts: [http://en.wikipedia.org/wiki/Airlift\\_%28dredging\\_device%29](http://en.wikipedia.org/wiki/Airlift_%28dredging_device%29)
- Bouldnor Cliff (Maritime Archaeology Trust):  
<http://www.maritimearchaeologytrust.org/bouldnor>
- Palaeolithic handaxes:  
[http://www.britishmuseum.org/explore/highlights/highlight\\_objects/pe\\_prb/p/pointed\\_flint\\_handaxe.aspx](http://www.britishmuseum.org/explore/highlights/highlight_objects/pe_prb/p/pointed_flint_handaxe.aspx)
- Wessex Archaeology:  
[http://www.wessexarch.co.uk/projects/marine/alsf/seabed\\_prehistory/area-240/background](http://www.wessexarch.co.uk/projects/marine/alsf/seabed_prehistory/area-240/background)

## Case studies of a submerged landscape: The Bristol Channel, UK

- Severn estuary levels research committee: <http://www.selrc.org.uk/>
- Submerged forests on the UK coastline:  
<http://www.bbc.co.uk/programmes/p00xq9pt>
- The extent of Doggerland: <http://www.bbc.co.uk/news/uk-scotland-edinburgh-east-fife-18687504>
- National Geographic webpages on Doggerland:  
[http://education.nationalgeographic.co.uk/education/maps/doggerland/?ar\\_a=1](http://education.nationalgeographic.co.uk/education/maps/doggerland/?ar_a=1)
- North Sea palaeolandscapes webpages:  
[http://www.iaalocal.bham.ac.uk/North\\_Sea\\_Palaeolandscapes/](http://www.iaalocal.bham.ac.uk/North_Sea_Palaeolandscapes/)
- Tybrind Vig: <http://www.abc.se/~pa/publ/tybrind.htm>
- Bouldnor Cliff: <http://www.maritimearchaeologytrust.org/bouldnor>

## Finding shipwrecks

### Surveying for shipwrecks

- N/A

### Case study on marine geophysical surveys: The SS Richard Montgomery wreck

- SS Richard Montgomery. Wikipedia article about SS Richard Montgomery:  
[http://en.wikipedia.org/wiki/SS\\_Richard\\_Montgomery](http://en.wikipedia.org/wiki/SS_Richard_Montgomery)

# Explore further – extended reading

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- Does WWII wreck SS Richard Montgomery threaten Thames airport? BBC News article from June 2013: As the deadline looms for submissions to a review of Britain's future aviation policy, does a wartime wreck still packed with explosives prove the biggest threat to those wanting to build a super-airport in the Thames Estuary? <http://www.bbc.co.uk/news/uk-england-17513286>
- Maritime & Coastguard Agency reports on SS Richard Montgomery: <https://www.gov.uk/government/publications/the-ss-richard-montgomery-information-and-survey-reports>
- 1981 Thames TV news report. Thames News' Colin Baker reports at the site of the 1981 survey: <https://www.youtube.com/watch?v=FAq1mTzUe-g&feature=youtu.be>
- SS Montgomery – Ticking Thames bomb. Short documentary on the infamous wreck: <https://www.youtube.com/watch?v=OThvSw1ult8&feature=youtu.be>
- Sonar survey video of SS Richard Montgomery. Wreck survey – no sound. [https://www.youtube.com/watch?v=88\\_bZV6cFZk&feature=youtu.be](https://www.youtube.com/watch?v=88_bZV6cFZk&feature=youtu.be)

## Finding shipwrecks

- Channel Coastal Observatory: <http://www.channelcoast.org/>
- Padlet: <http://padlet.com/Shipwrecks/FindingWrecks>

## Week 3 Summary

### Checking your understanding

- N/A

### Explore further – extended reading

- Clip from the BBC series *Coast* on the impact of climate change. Discussion on the causes of climate change and its impact on sea levels across the world. A focus on the effects of this on the UK coastline, and in particular on the sea levels in the south east of England and the Fens area. (3:09) <http://www.bbc.co.uk/programmes/p017j75l>
- Clip from the BBC series *Coast* on how the Ice Age affected the Norfolk coastline. The shape of the Norfolk coastline has been determined by successive ice ages, which have carved the land into its current profile. Core samples taken from the sea bed

# Explore further – extended reading

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reveal how the North Sea was once dry land connected to the rest of Europe. Animal bones dredged up from the North Sea reveal elephants, hippos and rhinos once lived in this ancient marshland environment. (5:36)

<http://www.bbc.co.uk/programmes/p00xqc0s>

- Prehistoric climate change. A 33 second video produced by Wessex Archaeology as part of the Explore the Seafloor project.  
<https://www.youtube.com/watch?v=AHXqteDtOys&list=UUkGLrMy2aotUuRFZsDYZrwA>
- Clip from the BBC series *Coaston* the erosion of the English South coast Discussion of how coastal erosion occurs focusing on the coastal areas and cliffs of southern England. (00:45) <http://www.bbc.co.uk/programmes/p017hyx3>
- Clip from the BBC series *Coaston* coastal erosion and landforms. An explanation of the causes of coastal erosion and the development of coastal erosion landforms. The rate of coastal erosion varies due to factors such as the make-up of the cliffs and the strength of the waves. Coastal erosion leads to the formation of cliffs, headlands, caves, arches, stacks and stumps. Erosion is a problem where homes are close to the cliff edge, for example at Haisborough in Norfolk. Sea defences can be used to protect these areas. (2:31) <http://www.bbc.co.uk/programmes/p00xr65v>
- Clip from the BBC series *Coaston* The Gower Peninsula - physical and human change The Gower Peninsula has attracted many visitors and in 1956 it was designated the UK's first Area of Outstanding Natural Beauty (AONB). Human settlement on the Gower can be traced back 30 000 years. In 1823 an ancient human burial was discovered in a cave on the coast. These remains became known as the 'Red Lady of Paviland' and have revealed much about the changing coastline and the lives of early hunter-gather communities. (2:20) <http://www.bbc.co.uk/programmes/p00xn9bm>
- Clip from the BBC series *Coaston* the landforms created by longshore drift and coastal deposition. Longshore drift and the formation of spits, barrier beaches and tombolos are explained with case studies. Longshore drift moves material along the coastline and creates spits, such as those found at Blakeney and Spurn. Barrier beaches are formed where spits are joined to the mainland at both ends, trapping water behind in a lagoon; an example of this can be seen at Slapton in Devon. Tombolos are found where barrier beaches form a bridge between an island and the mainland; an example of this is Chesil Beach in Dorset. (1:56) <http://www.bbc.co.uk/programmes/p00xlktr>
- Clip from the BBC series *Coaston* how the fens were created. A description of the impact of human intervention on the shape of our coastline, with particular reference to the Fens. The Fens lie on the East coast of England. They were created when mudflats were drained using artificial waterways to make space for agricultural land. This dramatic change has altered the shape of the coastline and created miles of fertile farmland. Reclamation continued until the 1970s, but with sea levels currently

# Explore further – extended reading

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- rising, the management of the fens may need to be reconsidered. (3:11)  
<http://www.bbc.co.uk/programmes/p00xjr8s>
- Ancestors on the beach. Patricia Ash explores the evidence of our ancestors on the coast – and how they lived their lives. An Open University resource.  
<http://www.open.edu/openlearn/nature-environment/natural-history/ancestors-on-the-beach>
  - Wrecks around Britain: The SS *Richard Montgomery*. 12 minute documentary.  
<http://youtu.be/r9UePXNdqIQ>
  - Italy, Romania, Spain: the ancient towns submerged underwater. Dramatic photographs showing cities that were flooded to make way for modern technology.  
<http://www.news.com.au/travel/world-travel/italy-romania-spain-the-ancient-towns-submerged-underwater/story-e6frfqai-1227009469823>
  - Clip from the BBC series *Coaston* the ancient footprints at Sefton Sands. Ancient human footprints dating back 5000 years often appear at Sefton Sands, before being washed away again by the tide. Originally formed in mud, the prints were baked solid by the sun and preserved by the sand on top. The footprints give us a unique insight into the life of hunter-gatherer communities when the climate of the UK was very different. (4:15) <http://www.bbc.co.uk/programmes/p00xll3y>
  - Submerged forests revealed by UK storms. Article in *The Telegraph* by Matthew Payton  
<http://www.telegraph.co.uk/earth/environment/10653204/Submerged-forests-revealed-by-UK-storms.html>
  - Second 4000 year old timber circle revealed. News article from Past Horizons - Adventures in archaeology, July 2014.  
<http://www.pasthorizonspr.com/index.php/archives/07/2014/second-4000-year-old-timber-circle-revealed>
  - Clip from the BBC series *Coaston* coastal erosion at Hallsands - causes and effects. A report about coastal erosion and conflict along the coastline, illustrated by a case study of the abandoned Hallsands village in Devon. Hallsands used to be a thriving fishing community but in 1917 the entire village was engulfed by the sea and the villagers were never able to return to their homes. The loss of Hallsands has been attributed to the dredging of a shingle ridge in front of the village, which was used to expand a naval dockyard near Plymouth. It is thought the shingle previously acted as a natural sea defence. (5:15) <http://www.bbc.co.uk/programmes/p00xjqfw>
  - Divers explore sunken ruins of Cleopatra's Palace. News article by Jason Keyser.  
<http://news.discovery.com/history/archaeology/cleopatra-underwater-ruins.htm>
  - Cleopatra - The search for the last Queen of Egypt. An exhibition from *National Geographic*. 5 minute video  
<http://www.nationalgeographic.com/events/cleopatra/underwater-world/>

# Explore further – extended reading

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- Shipwrecks. A public database of shipwrecks around the globe. This database contains information from over 800 major maritime disasters from Roman times to 2014.  
<https://shipwrecks.silk.co/>
- Archaeological Atlas of the 2 Seas. The A2S Geoportal aggregates information about archaeological sites that lie beneath the Channel and the North Seas, as well as sites situated on the foreshore, dating from prehistoric to the present time.  
<http://www.a2s-geoportal.eu/#/welcome>
- Clip from the BBC series *Coast on coastal flooding in the UK*. In 1953 a deep depression off the coast of the UK caused a tidal surge to build up in the Atlantic. The surge caused extensive flooding along the East coast of Britain, killing 307 people and leaving 40 000 homeless. Canvey Island was hit hard due to its low-lying pre-fabricated housing. The banks of earth which defended the island were quickly breached and all 160 000 acres of Canvey Island were flooded. (4:07)  
<http://www.bbc.co.uk/programmes/p00xjptc>
- Nautilus live. Explore the ocean live with Dr Robert Ballard and the Corps of Exploration. <http://nautiluslive.org/>
- If you are interested in ocean currents, this recent news story may be of interest to you: The Cornish beaches where Lego keeps washing up.  
<https://www.futurelearn.com/courses/shipwrecks/steps/9975/www.bbc.co.uk/news/magazine-28367198>
- Thousands of containers fall off ships every year. What happens to them? Article from *The Huffington Post*, July 2014.  
[http://www.huffingtonpost.com/2014/07/17/med-taipei-shipping-container-study\\_n\\_5593719.html](http://www.huffingtonpost.com/2014/07/17/med-taipei-shipping-container-study_n_5593719.html)
- Arch-Manche: Archaeology, Art and Coastal Heritage. The Arch-Manche project will be delivered through three core activities; Activity one involves the study of archaeology, palaeoenvironmental data and coastal heritage features to demonstrate coastal change. Activity two involves the study of artistic representations of coast, recording geology, geomorphology and coastal heritage, and the third activity aims to seamlessly integrate the results from activities one and two using GIS software as well as developing a range of illustrative presentations.  
<http://archmanche.hwtma.org.uk/>
- There will be a free public lecture on 'Vanishing Archaeology: The Greenwich Foreshore' on Monday 20/10/14 at Museum of London. For more information, visit the Gresham College website. <http://www.gresham.ac.uk/lectures-and-events/vanishing-archaeology-the-greenwich-foreshore>

# Explore further – extended reading

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## Explore further – extended reading [advanced]

- Jensen, K.S. and C.P.P. Lemée 1999. Total Station Recording of Large Ship Structures in Connection with the Excavation of Eight Ship-Wrecks at the B&W Site in Copenhagen, in: Barceló, J.A., I. Briz and A. Vila (eds.), *New Techniques for Old Times*. CAA98. Computer Applications and Quantitative Methods in Archaeology. Proceedings of the 26th Conference, Barcelona, March 1998 (BAR International Series 757). Archaeopress, Oxford, pp. 85-88.  
[http://proceedings.caaconference.org/paper/12\\_jensen\\_lemee\\_caa\\_1998/](http://proceedings.caaconference.org/paper/12_jensen_lemee_caa_1998/)
- Ancient cities lost to the seas. Dunwich, England, is one of several underwater sites where divers are discovering new information about historic cultures by Robin T. Reid in *Smithsonian*, July 28, 2009. <http://www.smithsonianmag.com/history/ancient-cities-lost-to-the-seas-37942779/>
- Kon-Tiki sails again. A new film recreates the epic voyage—and revives the controversy over its legendary leader, Thor Heyerdahl by Franz Lidz, *Smithsonian Magazine*, April 2013. <http://www.smithsonianmag.com/history/kon-tiki-sails-again-5404357/>
- Gulf of Mexico SCHEMA: Shipwreck Corrosion, Hydrocarbon Exposure, Microbiology and Archaeology. This is a George Mason University project to investigate corrosion and degradation of shipwrecks. <http://www.boem.gov/GOM-SCHEMA/>

## Academia.edu

- Transformations in Conceptual Approaches to Ship Construction: Development of the Confederate Inland Ironclads by Peter B. Campbell.  
[https://www.academia.edu/485941/Transformations\\_in\\_Conceptual\\_Approaches\\_to\\_Ship\\_Construction\\_Development\\_of\\_the\\_Confederate\\_Inland\\_Ironclads](https://www.academia.edu/485941/Transformations_in_Conceptual_Approaches_to_Ship_Construction_Development_of_the_Confederate_Inland_Ironclads)
- High Tech on a Budget: Recording Maritime Cultural Heritage Using a Total Station, RhinoPhoto, and Rhinoceros NURBS by Peter B. Campbell.  
[https://www.academia.edu/485943/High\\_Tech\\_on\\_a\\_Budget\\_Recording\\_Maritime\\_Cultural\\_Heritage\\_Using\\_a\\_Total\\_Station\\_RhinoPhoto\\_and\\_Rhinoceros\\_NURBS](https://www.academia.edu/485943/High_Tech_on_a_Budget_Recording_Maritime_Cultural_Heritage_Using_a_Total_Station_RhinoPhoto_and_Rhinoceros_NURBS)
- The Neolithic and Early Bronze Age - Marine and Maritime Archaeological Research Framework by Fraser Sturt.  
[https://www.academia.edu/7227494/The\\_Neolithic\\_and\\_Early\\_Bronze\\_Age\\_-\\_Marine\\_and\\_Maritime\\_Archaeological\\_Research\\_Framework](https://www.academia.edu/7227494/The_Neolithic_and_Early_Bronze_Age_-_Marine_and_Maritime_Archaeological_Research_Framework)
- The social context of submerged prehistoric landscapes by Fraser Sturt.  
[https://www.academia.edu/7227467/The\\_social\\_context\\_of\\_submerged\\_prehistoric\\_landscapes](https://www.academia.edu/7227467/The_social_context_of_submerged_prehistoric_landscapes)

## What's coming up next week?

## Explore further – extended reading

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- Progress page: <https://www.futurelearn.com/courses/shipwrecks/progress>