Institution: University of Southampton		
Unit of Assessment: 15 Archaeology		
Title of case study: 15-02 The Black Sea Maritime Archaeology Project		
Period when the underpinning research was undertaken: 2015 - 2020		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s):	**Role(s) (e.g. job title):**	**Period(s) employed by submitting HEI:**
Jonathan Adams	Professor of Archaeology	1994 – present
Lucy Blue	Senior Lecturer in Archaeology	1998 – present
Fraser Sturt	Professor of Archaeology	2008 – present
Helen Farr	Senior Lecturer in Archaeology	2009 – present
Rachel Bynoe	Lecturer in Archaeology	2018 – present
Rodrigo Pacheco-Ruiz	Senior Research Assistant	2015 – 2018
Julian Whitewright	Senior Teaching Fellow	2010 – present
Period when the claimed impact occurred: August 2015 - December 2020		
Is this case study continued from a case study submitted in 2014? N		

1. Summary of the impact

The **Black Sea Maritime Archaeology Project (2015-2019)**, led by the University of Southampton's Centre for Maritime Archaeology (**CMA**), was a major international collaborative survey of the Bulgarian waters of the Black Sea. The unique discoveries, including ancient shipwrecks, were widely communicated throughout the Project, capturing the fascination of millions globally through the front pages of major international newspapers, an interactive roadshow, US and UK documentaries produced by a dedicated film crew, and ongoing exhibitions. Offering a model for integrated maritime research and impact, the Project championed international best practice as defined by UNESCO and shaped policy on cultural heritage management in the Black Sea region and beyond. In the UK, it delivered a highly successful embedded STEM Scholar programme providing opportunity to A-level students from challenging school environments.

2. Underpinning research

Operational since 1995, the CMA is the hub for global research on early seafaring, maritime infrastructure, maritime landscapes and palaeo-landscapes; and work on methodology, heritage value and ethics within maritime archaeology. Expertise on ship technology and underwater archaeology is represented by the work of Adams, Whitewright and Blue; maritime heritage and capacity building (notably in Egypt, the Arab world, and the eastern Mediterranean) by the work of Blue [**3.1**]; while Sturt, Farr and Bynoe lead major projects on submerged palaeo-landscapes and prehistoric maritime migration. Along with Professor Justin Dix and Dr Michael Grant (based in the National Oceanography Centre, Southampton), Sturt directs Coastal and Offshore Archaeological Research Services (COARS), an enterprise unit that has provided specialist heritage support to key infrastructure projects (including Hinkley Point, Sizewell, High Speed 2 and London Array).

The extensive, large-scale datasets these projects provide have facilitated innovative methodological and analytical procedures that carry over directly into frontline CMA Research. This experience, depth of expertise and proven research excellence in maritime archaeology was instrumental in the design and implementation of the ***Black Sea Maritime Archaeology Project,*** the largest and most ambitious project of its kind ever undertaken. The five-year Project (2015-2019) was funded by the Julia and Hans Rausing Trust through the Expedition and Education Foundation, with a total value of GBP15m. It represented a collaboration between researchers from the CMA: Adams (Scientific Lead), Dix, Farr, Grant, Pacheco-Ruiz, Sturt, Whitewright and doctoral researcher Pedrotti; the Bulgarian Academy of Sciences, National Institute of Archaeology with Museum (Vagalinski) and the Bulgarian Centre for Underwater Archaeology (Angelova, Dimitrov); along with the Maritime Archaeological Research Institute at Södertörn University (Sweden) (Rönnby), the University of Connecticut (USA) (Batchvarov), the Hellenic Centre for Marine Research (Greece) (Sakellariou) and Swedish industrial partners MMT (Oskarsson, Holmlund).

The Project integrated long-standing research strengths of the CMA in palaeo-landscapes, environmental change and ancient seafaring. Utilising state-of-the-art remote sensing, geophysical and geotechnical survey techniques, its primary focus was to establish the chronology and processes of environmental change in the Black Sea region since the last glacial maximum in order to understand their impacts on human populations. The research design, including systems specification, was written by the CMA (Adams, Dix) with Bulgaria's Centre for Underwater Archaeology (Angelova). CMA directed each phase of the deep water and coastal fieldwork, processed geophysical data and managed an exhaustive programme of core sample analysis. In total, an area of over 2000km^2 was surveyed, with 6000 line km of geophysical data acquired, along with 92 cores recovered from 78 locations. The results have enabled the construction of a new robust chronology for events relating to the exposure and subsequent inundation of the palaeo-landscape on the Bulgarian shelf, supported by underwater excavation of inundated prehistoric coastal settlement sites [**3.2**; **3.3**; **3.4**; **3.5**].

During the Project, 65 ancient and historical shipwrecks were discovered, many unique within the archaeological record, preserved in the Black Sea's anoxic waters. They include the best-preserved wrecks of Ancient Greek, Roman, Byzantine and Ottoman periods currently known, offering unparalleled insight into early vessel technology, seafaring and maritime affairs. High resolution 3D acoustic and optical surveys of these sites were made using two robotic systems sequentially: the unique high-speed 'Surveyor Interceptor', a Survey Remotely Operated Vehicle (SROV), designed by MMT, acquired multibeam, sidescan and chirp sub-bottom data as well as laser bathymetry and hi-resolution still images. A work class ROV carrying ultra-HD video and stills cameras then captured imagery for photogrammetric models. These systems recovered data at depths, acquisition rate and resolutions unparalleled in archaeological work to date [**3.6**]. Together with the paleoenvironmental data this has enabled not only modelling of the changing land/seascape of the Black Sea but has significantly increased our understanding of how people engaged directly with it through seafaring over the millennia.

Together with the Science Team, the Project embedded Education and Documentary teams as integral, fully funded elements of the Black Sea Maritime Archaeology Project, and which contributed directly to the impact described below.

3. References to the research

3.1 Blue, L., Breen, C. *Maritime Archaeology and Capacity Development in the Global South*. J Mari Arch 14, 321–332 (2019). https://doi.org/10.1007/s11457-019-09244-x

3.2 Adams, J. et al. (2017). *The Black Sea Maritime Archaeological Project: I*n L. Vagalinski (ed.) *Archaeological Discoveries and Excavations 2016* pp720-723. Sofia: Bulgarian Academy of Sciences, National Archaeological Institute with Museum. Available on Request.

3.3 Adams, J. et al. (2018). *The Black Sea Maritime Archaeological Project:* In L. Vagalinski (ed.) *Archaeological Discoveries and Excavations 2017:* pp713-723. Sofia: Bulgarian Academy of Sciences, National Archaeological Institute with Museum. Available on Request.

3.4 Pacheco-Ruiz, R., Adams, J., & Pedrotti, F. (2018). 4D modelling of low visibility Underwater Archaeological excavations using multi-source photogrammetry in the Bulgarian Black Sea. *Journal of Archaeological Science* 100, 120-129. https://doi.org/10.1016/j.jas.2018.10.005

3.5 Dimitrov, K. et al. (2019). *Underwater Archaeological Excavations (Early Bronze Age, Antiquity and Ottoman periods) at the mouth of the Ropotamo River.* In H. Popov (ed.) Archaeological Discoveries and Excavations Book 1: pp369-376. Sofia: Bulgarian Academy of Sciences, National Archaeological Institute with Museum. Available on Request

3.6 Pacheco Ruiz, R., Adams, J., Pedrotti, F., Grant, M., Holmlund, J., & Bailey, C. (2019). Deep sea archaeological survey in the Black Sea – robotic documentation of 2,500 years of human seafaring. *Deep Sea Research Part I: Oceanographic Research Papers*. https://doi.org/10.1016/j.dsr.2019.103087

Note: In addition to the *anual publicatios* Adams 2017, 2018, Dimitrov 2019, listed above, published by the Bulgarian Academy of Sciences, the full annual reports are lodged with the National Institute and the University of Southampton.

Grants:

Black Sea MAP Grant, Julia and Hans Rausing Trust:
- Development Grant 2014 (GBP60k)
- Science components: (GBP2.14m; research vessels, diving operations GBP7m);

Follow-on funding: (Ropotamo; GBP60k)
- Supplementary core analysis; (2019 GBP31.5k)
- Ancient hull analyses (2020, GBP22k)

Angelova Memorial Post-Doctoral and Research Student awards: GBP297k

4. Details of the impact

Engaging publics with Maritime Heritage

The ***Black Sea Maritime Archaeology Project*** **(BSMAP, 2015-2019)** communicated its unique findings to publics throughout the research period with the aim of influencing public attitudes to submerged heritage and demonstrating that research of this nature can and should be entirely compliant with the UNESCO 2001 *Convention on the Protection of the Submerged Cultural Heritage*.

The shipwrecks especially captured media and public attention. The discovery of a well-preserved ship from the time of Marco Polo, an intact Roman ship from the 1st Century AD, and the oldest intact shipwreck yet found – a 2,400-year-old Greek vessel – reached the pages of news outlets across the world, from the UK to China to New Zealand, and were reported in multiple languages. BSMAP generated the only story to push Donald Trump off the front page of the *New York Times* in November 2016. Written by double Pulitzer Prize winner William Broad, the online version received over 1 million hits in 24 hours, a record for an archaeological story (Broad NYT 14/11/16). In 2018 news of the discovery of the Greek ship was so widely read that satirists referenced it from the Daily Mash (23/10/18) to a Peter Brookes cartoon in the UK *Times* (24/10/18) lampooning the Brexit process, showing Teresa May (as Odysseus) lashed to the mast. [**5.1**]

Reaching these publics helped to raise awareness of the unique, international heritage value of the anoxic Black Sea and of ancient trading relationships. As the National Geographic's archaeologist in residence Fredrick Heibert put it, the discoveries highlighted that the Black Sea is "an incredibly rich museum of human history…This [Greek] wreck shows the unprecedented potential for preservation in the Black Sea, which has been a critical crossroads of world cultures for thousands of years." [**5.2**]. This find also caught the imagination of the archaeological press: it was voted the world's most significant archaeological discovery of the year by the readership of a consortium of national archaeological magazines [**5.3**]. The associated award, presented to Adams at Paestum, Italy in November 2019, is named for Khaled al-Asaad and commemorates his life's work protecting cultural heritage as the Director of Palmyra before he was murdered by Isis in 2015.

Public engagement was continued in 2018 after the final offshore season through a travelling exhibition which was designed to disseminate results to a wider public in tandem with the Project's STEM-related educational aims (below). The 'Black Sea MAP Roadshow' included virtual reality tours of key shipwrecks (via headsets), 3D-printing of shipwrecks and a hands-on exhibit relating to geological core sampling. The Roadshow was taken to seven venues in the UK during 2018, run and curated by doctoral research students (Newman, Socha). The exhibit was professionally built by Swim Productions with content generated by the Science Team. The combined footfall of these festivals was 11,608 visitors, 7,800 of them directly engaging with the Black Sea stall. The 'Roadshow' was then donated to the Muzeiko – *Children's Science Museum* in Sofia, Bulgaria, which saw a footfall of 50,000 in the first 6 months. [**5.4**] BSMAP's Documentary Team *Black Sea Films* filmed the Project throughout 2015-2018. They comprised film makers whose CVs included work on the series Blue Planet and Planet Earth. Underwater footage was captured with ultra-HD cameras and resulted in two one-hour documentaries premiered at the British Museum on 23 October 2018 coinciding with the first of two international conferences (London, at the Wellcome collection, and Sofia at the National Museum). They were subsequently aired in the USA on the *Discovery Channel* and in the UK on *More4* (7 & 14 June 2019). Viewing figures in USA were the second highest for an archaeology programme since 2010 [**5.5**]. As well as capturing public interest, these films featured in policy and practice advocacy as outlined below.

As the data from the ancient shipwrecks was unprecedented, a follow-on grant was awarded for reconstruction and analysis of hull form, including computational analysis and tank testing. An approach from the Science Museum led to them becoming a Project partner and they will include the results of analysis of the 400 BC Greek ship in a forthcoming exhibition on Science and Technology in the Ancient Greek World (November 2021) [**5.6**].

Improving outcomes and increasing STEM knowledge of A-Level Students

The core of BSMAP's Educational aims were centred on an embedded STEM Scholar Programme running continuously through 2015 – 2017, coordinated by Education specialists, *Catalyst*, with material and activities provided and delivered by the BSMAP Science Team. 32 students from challenging school environments were selected to join the programme to engage with Science, Technology, Engineering and Maths components of maritime archaeological research. Half worked on an onshore placement at the *National Oceanography Centre Southampton*, and half offshore on the research vessel itself. The onshore groups engaged in a series of activities taught/supervised by the Science Team related to the Project: acquisition and processing of geophysical data, core sample processing and shipwreck recording. Offshore groups participated in the same activities during the cruise. The Project encouraged subject engagement and promoted the opportunity to enter higher education, inspiring a new generation of young scientists, extending knowledge, and changing the way these young people view and engage with science and the marine environment. The students stated that the Project *"opened my eyes to what marine [maritime] archaeology is and the amount of work that goes on." "It's completely changed what I want to do" "I've had such a fantastic time and met so many wonderful people and learnt so many things! I have a clearer idea of what I want to do!"* [**5.7**]. Most of the students had not originally planned to go to university or had doubted they would get in if they applied. 31 STEM Scholars gained their CREST Gold Award, a national scheme for student-led project work in the STEM subjects from the British Science Association, which is academically recognised and translates into other academic areas (e.g., Extended Project Qualification and Welsh Baccalaureate). This helped scholars with their university applications: *"MAP helped me get into university - without it, I don't think I'd get in" "Don't think I'd be where I am today without the experience."* [**5.7**]. Currently 22 are now in Higher Education with three more completing their A-levels or taking Gap Years with a view to HE. These scholars also acted as STEM Ambassadors in their schools and community widening the visibility of the programme (e.g., on CBBC Newsround), demonstrating their new confidence and skills as science communicators. Feedback from the scholars emphasised not only the academic impact of their involvement in the programme but the other skills gained: *"It's been an amazing experience that I will appreciate and remember forever, and I think it'll contribute to my future greatly."* [**5.6**]

To broaden this STEM Scholarship programme to a wider audience, an educational portal was developed with work packages, lessons, STEM Careers advice, and educational films for use by schools (Farr, Grant). This was launched with educational posters that were sent to 5,500 secondary schools and 22,360 primary schools across England and Wales, and emails with the weblinks sent to the same schools in July 2019. From her involvement with this educational project Farr has been named as a STEM Champion by The Curiosity Box, an award-winning UK company specialising in STEM-related educational toys. Farr donated her time to develop a diving and underwater science themed box, 'Under Pressure,' for home subscription and for schools with the aim of reaching 1 million children with STEM. During the Covid-19 pandemic, boxes are being sent free to children receiving free school meals who are being home-schooled [**5.8**].

Black Sea Maritime Heritage: Awareness and Policy

A key legacy of Black Sea MAP is an increased awareness of maritime heritage in both central and regional Bulgarian administrations. In 2016, the Bulgarian *National Archaeological Institute with Museum* judged Black Sea MAP the most significant archaeological project that year. The Bulgarian Government recognised the Project's significant contribution to the understanding and protection of underwater cultural heritage when in 2017, the Prime Minister of Bulgaria, Boyko Borisov, spent time aboard the research vessel during the survey and subsequently bestowed special awards on team members. Adams, as Chief Scientist, was awarded the national honour of the Golden Century [**5.9**].

This high-profile Project, and the resources BSMAP brought to bear, directly assisted the development of Bulgaria's Centre for Underwater Archaeology (CUA), which now, with increased staffing and equipment, is the most capable and best resourced in the region. Follow-on funding

continues capacity-building in the form of two PhD studentships for CUA staff, now at Southampton. Increased awareness of the nature and cultural value of their submerged heritage as demonstrated by BSMAP's discoveries means Bulgarian authorities now exercise more direct monitoring of companies holding hydrocarbon prospection licences such as Total and Royal Dutch Shell, who are now encouraged to liaise with heritage agencies, particularly the CUA [**5.10**].

The MAP's success in Bulgaria has also been recognised as a demonstration of best practice with the potential to influence policy and practice more widely. As stated above, the Project Research Design was written (in concordance with the CMA Southampton's Ethical Statement), to explicitly foreground the UNESCO 2001 *Convention on the Protection of the Underwater Cultural Heritage.* The added value of the Project in meeting and indeed exceeding the standards set out as 'Rules' in the Annex to the Convention, was its demonstration to relevant Government Ministries and heritage managers worldwide that deep water archaeological sites should no longer be accessible to commercial exploitation and treasure hunting [**5.11**].

The Director of UNESCO stated: "I wish to also laud the CMA for the excellence in its research, teaching and capacity building world-wide, with which it frequently supported UNESCO. This was recently evidenced within the Black Sea Maritime Archaeology Project (BSMAP). Its re-search design emphasized compliance with the UNESCO 2001 Convention with the express intention to highlight how cutting-edge archaeological research can be conducted in deep water, achieving ethical and valuable scientific aims. CMA thus demonstrated to heritage-related Ministries and Agencies that large-scale deep-water archaeology is not the preserve of commercial salvors and treasure hunters but should be the sphere of appropriate scientific research. The presentation of a film on the Project at UNESCO Headquarters in Paris in presence of heritage professionals from all over the world was thus a powerful and much noticed testimony to the importance of UNESCO's and the 2001 Convention's objectives." [**5.12**]

To project this aspect of the Project as well as its results, UNESCO, at the 32nd Meeting of the States Parties to the 2001 Convention, screened the second Black Sea MAP documentary to delegates on 20th June 2019 at the UNESCO Headquarters in Paris with the Director General of UNESCO and the Bulgarian Ambassador to France in attendance [**5.13**].

5. Sources to corroborate the impact

5.1 Media coverage report: results of a Nexus database search, email from William Broad at the New York Times, sample of newspaper headlines collected by Julia and Hans Rausing Trust.

5.2 Ancient Black Sea shipwreck is unprecedented discovery', National Geographic, October 2018: https://www.nationalgeographic.com/culture/2018/10/black-sea-shipwreck-archaeology-map

5.3 Khaled al-Asaad Award 2019.

5.4 Roadshow evaluation*:* Figures for UK roadshow approved by the Public Engagement with Research Unit Southampton: letter from Executive Director MUZEIKO - America for Bulgaria Children's Museum.

5.5 List of broadcasts worldwide (to Dec 2019) Data from Black Sea Films/Drive.

5.6 Letters from Jane Desborough and Tim Boon, British Science Museum

5.7 Evaluation of the Maritime Archaeology Project Education Programme *by Cloud Chamber Evaluation Services*

5.8 Additional Education activity report: materials from Catalyst and Curiosity Box.

5.9 Golden Century Honour (photograph of award ceremony) and Testimonial Minister for Culture

5.10 Statements: Directors of National Archaeological Institute with Museum and CUA.

5.11 Correspondence with Dr Ulrike Guerin, UNESCO Convention on the Protection of Underwater Heritage.

5.12 Testimony letter from Lazare Eloundou Assomo, Director of UNESCO

5.13 Invitation to UNESCO screening.