



Ocean Plastic Mediterranean Sailing Expedition

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1. Introduction

Our goal was to complete a six-week expedition to examine the distribution of plastics in the Mediterranean, sailing in a clockwise loop of the Aegean sea from the northern town of Kavala to the most southerly point of Santorini and back. Our research focused primarily on sampling the seas around the uninhabited islands of the Aegean while the exploration aspect of our expedition included trail and mountain running, sport climbing and deep water soloing and as well as other forms of exploration interspersed with prolonged periods under sail.

Our proposed route began in Kavala in the northern Aegean, took us south east through the islands of Thasos, Limnos and Lesvos to the Turkish coast, south through the islands of the Dodecanese and the home of some world-class sport climbing. Once at the volcanic island of Nisirios, we headed west, visiting islands of differing levels of habitation such as Astipalea and the surrounding islets, to our halfway point at Santorini. We then headed north through the Cyclades islands where we encountered a vicious sub-tropical storm known as a Medicane. Still heading north we passed through the marine parks of the Northern Sporades to our final destination - the Athos Peninsula. From here we retraced our first passage back to Kavala for the end of the expedition.

The Mediterranean Sea has been proposed as one of the most affected regions of the world with regards to plastic debris, particularly microplastics. The polymeric composition and distribution of these floating particles is still largely unknown. Using a microplastics trawl we built ourselves, we collected plastic samples from various points along our trip to be held in wet sample containers and sent to collaborating researchers once we returned. Our sampling locations were chosen based on the level of habitation in the surrounding coastal area, water quality and sea conditions.

Alongside this small research aspect, the expedition had some purely exploratory objectives. Kalymnos as an unmissable, world class climbing island was visited in the first half of the journey. In addition to this we aimed to climb where possible, on sea arches, suitable coastal cliffs and pre-existing sport routes. Sparsely populated islands posed ample opportunity for hiking and trail running and other outdoor exploits. Finally, the act of completing the proposed journey itself required extensive periods at sea, overnight passages, securing anchorages during storms and a total distance of 1100 nm to be covered in the brief six-week timeframe.

We would like to extend our thanks to Lorraine Craig and Phillip Power along with the rest of the Imperial Exploration Board for financially facilitating the expedition and helping in the early planning stages. The interview stage of the application, as always, poked several holes in our initial plan which might have otherwise gone unnoticed (if only they could have done the same for our head sail). We also extend our thanks to the City and Guilds Association for their financial support, and hope that we succeeded in representing them as engineers/scientists and students of Imperial College. Special thanks also to Iskrens parents and grandparents who housed and fed us at either end of the expedition, along with all the friendly people we met along the way, especially Billy the seal (but not those guys from Mikinos Marina).

2. Aims and Objectives

Primary:

- Complete a 6-week sailing expedition in the Mediterranean, covering ~1300 nautical miles in the Aegean Sea.
- Explore Greek islands and document the marine debris we encounter, comparing uninhabited islands to densely populated areas and tourist destinations
- Trawl for microplastic samples to contribute to the *Global Estimate of Marine Plastic Pollution* and analyse samples accordingly.
- Raise awareness of ocean plastics to the wider community, challenging ourselves to change our habitual waste and encouraging others to do the same.
- Complete the journey safely and enjoy the exploration experience.

Secondary:

- Challenge all team members to apply their scientific and engineering knowledge to a real-world problem, deemed a 'planetary crisis' by the UN.
- Explore, on-land, numerous islands of different geological interest via climbing, hiking and freediving.
- A proportion of the collections will be retained after completion of the expedition. In conjunction with researchers at Imperial College London and data attained from Adam's Master's degree project, samples of marine debris can be analysed with regards to biological impacts, physical and mechanical properties and degradation mechanisms.
- Gain experience and mileage, to complete further sailing qualifications and trips in the future.

The expedition in numbers:

- Total miles covered 1100nm
- Highest speed recorded 9.4kts under sail
- Number of islands visited: 24
- Top wind speed recorded: 37.4kts
- Highest altitude: 2033m (Mt Athos)
- Longest passage: 100 nm (Limnos to Lesvos)
- Number of Dolphin sightings: 4
- Number of Monk Seals petted: 1
- Number of fish caught: 0
- Number of Greek Salads eaten: ∞

3. Team Members

Iskren Peev – Lead Skipper



22 years old – BSc Mathematics

Adam Brown – Equipment and Research



21 years old – Mechanical Engineering

Philip Rutter – Logistics and research



21 years old – MSci Physics

Zoe Williamson – Treasurer



22 years old – Electrical & Electronic Engineering

5. Expedition Logistics

4.1 Travel

We had originally found a good deal for a yacht based in Varna, Bulgaria so we booked our flights to Varna accordingly. Tivia is a 45ft, duel mast, wooden yacht with a rich history including two circumnavigations and we were excited to take her on another journey in her old age, however with only a few weeks before the start of the trip her engine broke and we had to find an alternative. The closest such was Aegli, based in Kavala, so we stuck with our original flights to Varna from where we took the night train to Plovdiv and then took an 8 hour coach through Bulgaria and Greece, arriving in Kavala as the final destination. After the expedition we retraced our steps back to Varna to take our return flights.

4.2 Navigation

The primary method of navigation relied on hard copy Imray Nautical charts covering the entire trip itinerary purchased prior to leaving. Pilotage books and Almanacs for all areas were available and carried on board for the entirety of the expedition. Traditional navigation using charts, handheld compass, course plotter and dividers were used throughout the trip but were backed up through the use of chart plotting software. This software was available using inbuilt chart plotter equipment onboard. The ship's log was maintained throughout, recording last position, planned course, distances, weather/sea conditions and the crew's current mood. A backup chartplotter was carried in the form of a tablet in a waterproof case, running the Navionics app and was used for clarification when needed. The Mediterranean Sea is mostly non-tidal, making navigation much simpler, and due to previous experience in the area, the team remained confident in their marine navigation throughout the expedition.

4.3 Minimising Environmental Impact

Whilst on the trip we focussed on reducing the environmental impact by focusing on the reduction of plastic in the items we bought. Prior to the trip we had bought 'Water to Go' filter bottles, which allowed us to drink from the boats water tanks that are usually only used for showering and washing up. This meant that we did not need to buy bottled water from the supermarket which would have come to about 340, 1 litre bottles for all members for the whole trip.

It was near impossible to go plastic and waste free on this expedition as we were often limited by what the small islands had in the port supermarkets. However, we were mindful of what could be recycled - choosing glass jars, or tin cans - whilst shopping for food, and very often the towns had fruit and vegetable venders that provided paper bags. Additionally, we ate a mainly vegan diet whilst on the expedition which will have reduced our carbon footprint.

All the waste we did produce was carefully sorted for recycling and taken to local recycling points. However, some of the very small islands did not have recycling so we stored the rubbish on the boat until it was available.

As the waste pipes of the boat go directly into the sea, we were very conscious of what we were washing with. For the kitchen utensils we had purchased some cloths that could clean without soap, and where soap was needed we used it very sparingly.

5. Equipment

This section outlines the equipment needed for the expedition, with some items duplicated within certain sections.

Boat

We acquired a 36ft sailing yacht fitted with a chart plotter, DSC VHF Radio, EPIRB, depth sounder, life raft, auto-pilot, 200L fresh water tanks, a gas hob/oven with oven and grill, refrigerator, manual sea water pump, life rings and danbuoy.

Galley Supplies

- Matches and lighter
- Can opener.
- Bottle opener.
- Corkscrew.
- Dishes (plastic and disposable).
- Plastic wine glasses.
- Cooking utensils:
 - Spatula(s).
 - Ladle
 - Wooden spoon(s).
 - Tongs.
 - Teflon-safe utensils.
- Eating utensils
- Cutting board
- Small kitchen knife w/ cover.
- Large kitchen knife w/ cover.
- Extra baggies and containers.
- Aluminium foil.
- Trash bags.
- Dish towels
- Pot holders.
- Paper towels.
- Dish soap sponge.
- Plastic hot cups.
- Plastic cold cups.
- Insulated juice/beverage container
- Frying pan.
- Saucepan.
- Large cookpot.
- Colander.
- Drain plug for sink.
- Biodegradable soap.
- Water filter.
- Cooking gas.

Head supplies

- Toilet roll
- White vinegar
- J-cloths
- Toiletries (biodegradable)

Personal/clothing/sleeping

- 20-25 litre dry bag
- Wet weather gear top and trousers
- Thermal/breathable base layer x 1 (thin)
- Fleece top
- Deck shoes
- Sea boots (optional)
- Sailing gloves x 1
- Warm hat
- Sun hat
- Sailing knife and small pocket torch or head torch (red lens)
- Sleeping bag and/or sleep sheet
- T-shirts
- Sunglasses
- Underwear as required
- Travel clothes (trousers/skirt, top, shoes, socks)
- Swimsuit
- Travel or sports towel
- Toothbrush
- Wallet or money
- Passport and other documentation
- Mobile Phone and charger
- Book/novel
- Toiletries etc
- Hammocks
- Bed sheets/sleeping bags
- Pillows
- Blankets
- Biodegradable detergent
- Reusable water bottle

Safety

- Rigging knives (1 per crewmember).
- Mirror for signaling.
- Lifesling and tackle.
- Heaving line.
- Type III life vests w/ whistles
- Inflatable life jackets w/ integral harnesses
- Safety harnesses

- Harness tethers.
- Jacklines
- Radar reflector.
- Strobes for lifejackets.
- Personal EPIRB
- Scanner set for channels 13, 14, and 16
- Portable VHF radio.
- Short-wave radio receiver.
- Handheld spotlight and chargers.
- Hands-free walkie-talkies
- Flare kit (minimum required)
 - 2 x red hand flare
 - 2 x orange hand smoke
 - 2 x red parachute flare

First Aid

Comfort

- Kleenex.
- Hand cream.
- Chapstick.
- Insect-bite relief.
- Ibuprofen.

Prevention

- Sunscreen
- Motion-sickness pills.
- Scopolamine patches

Correction

- Plasters (various sizes).
- 3" sterile pads.
- Triangular bandages.
- 1" and 3" rolled (ace) bandages.
- Knuckle bandage.
- Butterfly bandage.
- Eye patches.
- Adhesive tape (hypoallergenic).
- Q-tips.
- Cotton balls.
- Tweezers.
- Forceps.
- Antiseptic
- Antiseptic wipes
- Burn ointment.
- Cortisone ointment.
- Antifungal ointment.
- Calamine lotion.
- Eye-wash cup or irrigation packet.
- Instant cold pack.
- Blunt scissors.
- Snakebite kit.

- First-aid manual (use Reed's).
- Matches.
- Suture kit

Navigation/Communication

- Log book.
- Hand-bearing compass.
- Lights for hand-bearing compass.
- Tide tables.
- Eraser.
- Pencil.
- Dividers.
- Plotting ruler.
- Big bold protractor.
- Knotstick.
- Lead line
- 7x50 binoculars.
- Charts for appropriate areas
- Coast Pilot
- Tide current tables for areas
- Tide current charts for areas
- Nautical Almanac
- Calculator with trig functions.
- Sextant.
- Cruising guide to appropriate area.
- Dutton on Navigation and Piloting.
- Book of knots
- Arrival/departure checklists

Toys

- Dive mask.
- Snorkel.
- Swim fins.
- Camera.
- Playing cards.
- Board games.
- Reading materials.
- Hand fishing line

Tools

- Spare winch handle.
- Leatherman.
- Vise-grips.
- Knife sharpener.
- Boatswain's chair.
- Fid.
- Sail palm.
- Sewing kit with heavy-duty thread.
- Flashlight.

- Phillips screwdriver.
- Large flat-head screwdriver.
- Small flat-head screwdriver.
- 12" adjustable wrench.
- 6" adjustable wrench.
- Channel-lock pliers.
- Hacksaw and blades (all blades covered).
- Hammer.
- Wire cutters
- Pocket flashlight
- Duct tape
- 100' 1/4" nylon line.
- 50' 1/8" dacron line.
- 50' 3/8" dacron line.
- Assorted bungee cords.
- Sail ties.
- Whipping twine.
- Sail repair kit.
- Spare 6V battery.
- Assorted nuts and bolts.
- Assorted screws
- Teflon lube spray.
- Marine grease
- Batteries

Land based exploration

Climbing

- Climbing shoes
- 13 x quickdraws
- 10 x slings
- Harness

- Chalk
- 60m rope
- 2x belay device
- 1x belay plate
- Guide book
- 6 x locking carabiners
- Finger Tape
- Printed approach maps

Running/Hiking

- Boots/trainers
- Orienteering compass
- Appropriate clothing (shorts, wicking top)
- Water (bottle)
- Bag
- Printed route maps

Electronics

- Laptop x 2
- Mobile phones x 4
- EPIRB
- Relevant chargers
- External battery pack x 4

Research

- Trawl equipment (see research section)
- Camera
- Sample containers (zip locks)
- Labels
- Log book

6. Expedition Diary

28-31/08/18 – Varna and departure preparation

Adam had arrived 3 days earlier to organise and stock the boat ahead of the others arrival. Unfortunately, the boat in Varna had been damaged before our arrival and was not seaworthy, so Adam spent those days sightseeing and running around the plateau above Varna. Phil and the charts arrived in Varna late on the 31st of August and the equipment and general logistics for our 6 week sailing expedition were prepared.



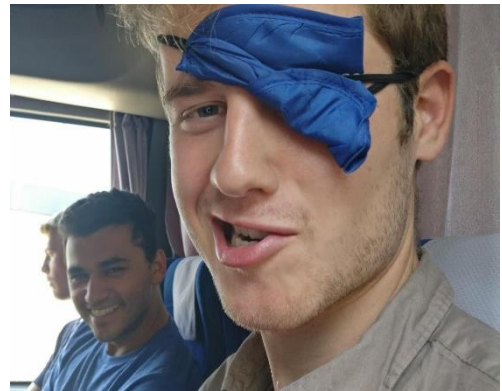
01/09/18 – Exploring Varna and departure from Varna

Awaiting the arrival of Zoe and Iskren in Varna, Phil and Adam headed out for a run (by this point Adam was pretty well acquainted with the place) and knowing we'd be staring out to sea for the next 6 weeks we did what any normal people would do – we headed straight for the coast. After getting baked in the heat while running five or six hundred steps up to an old Soviet memorial we headed further inland up to some of the hills surrounding the area. There, we got a great view of the city and the hilltop sunflower fields surrounding it but we couldn't stick around, Isk and Zoe were due into Varna in a couple of hours and we had an overnight train to catch. Once they had both arrived (Iskren minus some baggage that had been sent to the wrong country), we got underway and were on board the sleeper train heading to Plovdiv that evening.



02/09/18 – Travel between Varna and Kavala

The train rolled into Plovdiv at 5 AM and we hauled our equipment out with the aim of now catching a bus across the border to Kavala in Greece. Although we'd been promised a luscious air conditioned coach (guaranteed by the skipper himself), we were stuck with cosy old bus for the next 9 hours before we'd finally arrive in Kavala that afternoon. The road was rough and hot but considering we'd be spending 6 weeks at under sail, a last look at some land definitely did us some good. Once in Kavala we met with Dimosthenis, the owner of our yacht Aegli, and he gave us a thorough talk over the vessel and our kit for the trip ahead (so thorough it felt like he did it twice). He seemed quite distrusting of us at first, but after a bit of sailing chat and few non-tidal skipper jokes, everyone was right at home.



03/09/18 – Kavala to Thasos

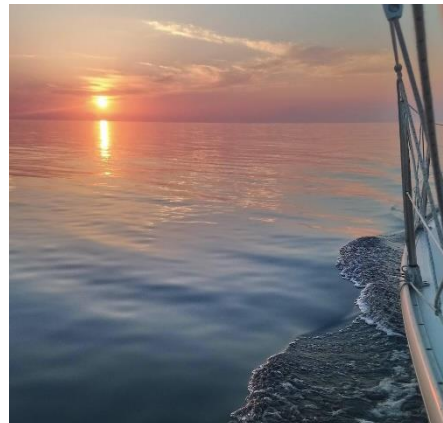
The next morning, Iskren, Phil and Adam headed out early for a quick run to explore the town and bag the first swim of the trip whilst the boat was restocked. Heading up to Kavala castle and down through the city's ancient aqueduct, Kavala had a very Roman feel to it but we couldn't wander for long, the morning's work involved stocking up and getting underway ASAP. With the go ahead from Dimosthenis and the boat fully supplied we were under sail in the late morning heading south for the island of Thasos. Almost immediately after arriving at the island, we had the dinghy in the water and were picking out caves for some impromptu climbing. Despite the swell making getting onto the rock too difficult we were still excited for some exploration once anchored that evening in Ormos Astris. That evening, Iskren, Phil and Adam ran along the east along the south coast of the island

aiming for a large rockpool feature that we had scouted on Google Earth before arriving. Giola rock pool was slightly more of a tourist attraction than we were expecting and the 'crystal water' turned out to be a big murky puddle. No need to be disappointed though, Zoe was the chef for that evening and our first meal at sea left us in high spirits.



04/09/18 – Thasos to Ormos Plati (Limnos)

Our passage for the next day covered 50 nm from Thasos to Limnos Island, and strong southerly winds first thing in the morning made for some good headway. Unfortunately, by midday the breeze had died off and we were floating at a solid zero knots for most of the afternoon. We'd been told by Dimosthenis a few days earlier that Aegli was a bit worn by her travels this year and that the hull needed a bit of maintenance work. With the slow going under sail, and not wanting to miss an opportunity, Adam was straight in the water with the barnacle scrubber (wooden spatula) closely followed by Phil with his trusty bucket to hand. Schools of yellowfin tuna moved below us as we swam and distant dolphin clicks could be heard through the water (although we couldn't spot them just yet). The slow



afternoon ended with our first dazzling sunset of the trip and we finally made it into Limnos later than evening.



05/09/18 – Ormos Moudros (Limnos) and first night sail

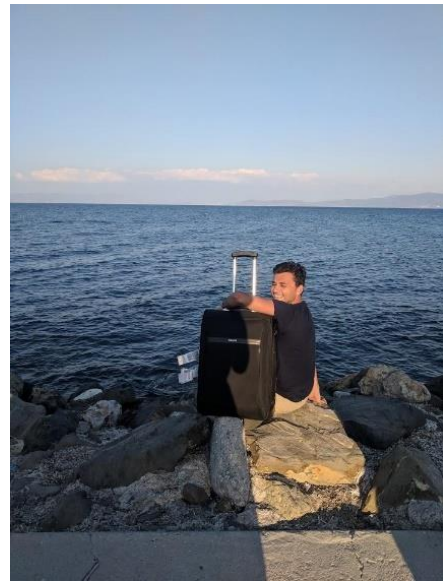
Peeping out of a hammock the next morning, the bay of Ormos Plati was a fantastic scene to view. Here in the northern Mediterranean we rarely saw other yachts on these lesser known islands. That morning we sailed further around to the main inlet on the island and moored up at the Moudros Town quayside for a quick resupply and some lunch. That evening we were planning our most significant sail yet, a 100 nm overnight passage to Lesvos with the aim of making the most of the winds and intercepting our lost baggage the next day. With the clear weather and winds due to pick up from 8 PM onwards, we moved further around the inlet to anchor in the stunning Freshwater Bay (probably made saltier by our lack of washing) before heading out that evening. On departure the team was apprehensive. The weather had not fully cleared and surrounding thunderstorms lit up the sky behind us as we headed out to sea but the sails were up and were making 8 knots so what was not to enjoy? The clear night and lack of light pollution meant the Milky Way scored across the sky to the horizon as we sailed. The first shift of sailing took us to the halfway mark by 2AM when Iskren and Adam swapped to take us close to the coast of Lesvos by daybreak.





06/09/18 – Limnos to Lesvos

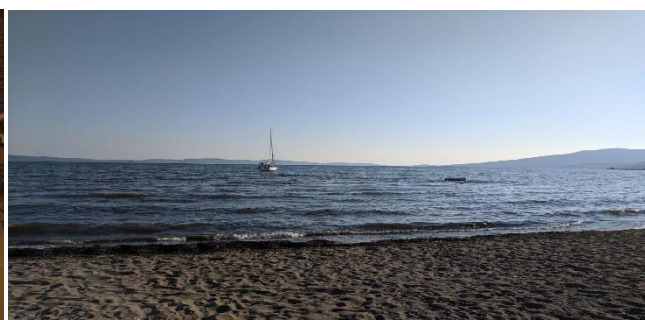
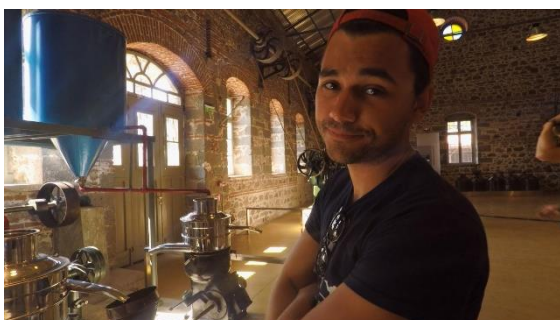
The sun rose over the petrified forests of Lesvos as we sailed south-east. Once we were hugging the coast the wind finally died for the day and we spent the remainder of the day struggling into the central inlet of the island. By early afternoon, we were moored up on a sandy beach recovering from the long sail. After a short rest we headed out to explore and attempt to make the most of the day. Iskren was reunited with his wandering bag in Lesvos Town, and then continued on to the town of Mitilini. Having read about the effects of the migrant crisis on the island of Lesvos, this was the first place we had seen the effects. The harbour was full of rescue ships - not just from Greece, but British and Bulgarian coast guard vessels as well. We continued slightly further up the coast to Castillo de Mitilene and explored the ruins. Heading back across the island was beautiful as the sunset across the varying landscape.



Meanwhile Phil and Adam set out running to the nearby salt flats in the hope of bumping into some flamingos and Lesvos locals. Having had no luck with the islanders, they instead happened across an old school running track out on the salt flats. A race was suggested, a race was ran, a race was a bad idea. Some say that Adam's lungs are still out there, lying in a pile of salt like a dead flamingo.

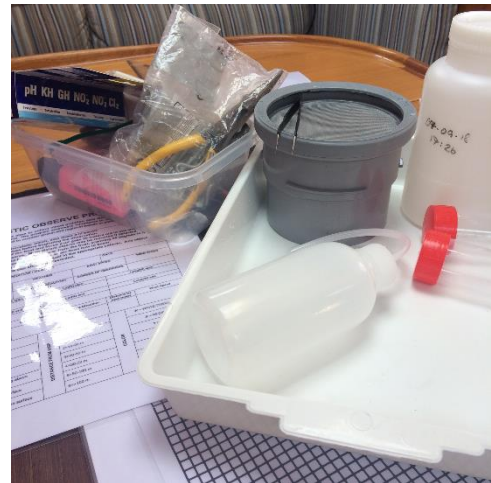
07/09/18 – Exploring Lesvos

We aimed to spend the following day fully exploring the island of Lesvos by car having done an excessive amount of sailing, running and swimming the previous few days. First, we drove to one of Lesvos' famous olive oil production sites before heading further west towards the island's petrified forests. We toured the island's active geological past during the drive and the volcanic features on the way made for some fantastic – if not slightly sketchy – scrambles. The stone forests on the far side of the island gave some character to the surprisingly featureless hills of these northern Greek islands. After a quick hike around the coast along the petrified forest trail we headed back inland, ready to sail again out of the inlet that evening to put ourselves in a better position for a long sail to the island of Chios the next day.



08/09/18 – Lesvos to Oinousses

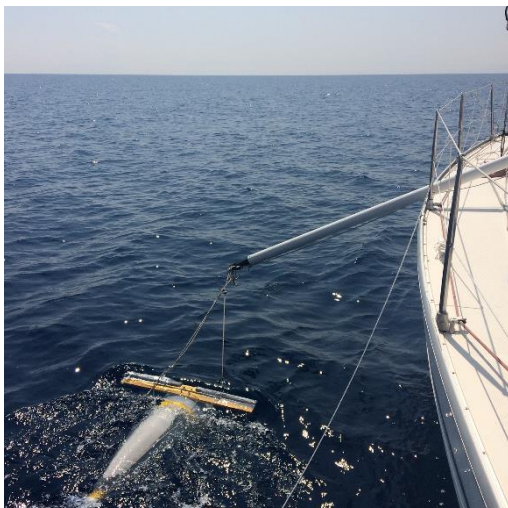
Despite the plans for a long sail the forecast for weak winds stranded us on Lesvos for most of the morning. Phil and Adam set out on a morning swim to an island in the centre of the bay where a small hut and a standing stone had been set. With the winds predicted to be picking up that afternoon and all of our equipment now to hand we used the time to head out early and fit in a couple of hours of trawling before the journey began. With our first proper microplastic samples in hand and having had our first dolphin sighting of the trip as we left the inlet the team was positive as the winds picked up. That evening we were treated to top sailing conditions and we passed another sighting of a pod of dolphins that dipped in and out of the wake as the sail south flew by. Arriving at the northern coast of Chios early we decided to put off resupplying and headed east to moor up on the island of Oinousses for the evening.



09/09/18 – Oinousses and travelling to Chios

The following morning, after another early swim, Phil, Adam and Iskren set off on a run to one of the island's many monasteries sitting at small peaks along the thin stretch of land. After a hot climb up along the island trails, Iskren headed down back to town while Phil and Adam continued on to tag more monasteries along the ridgeline of Oinousses (see section .2).

Zoe went to the small hillside town, visiting the local maritime museum and main church of the island, joined by Iskren later on. A quick bite for lunch in town and an encounter with a herd of cats at the local store, and we were soon back on Aegli headed back west to Chios town. Strong winds again made for some quality sailing on the way and we hit our top speed of the trip so far at 9.2 knots (would soon become highly contested). In all the sailing excitement we managed to sail right past Chios marina and had to travel back on ourselves to make it in for the night. Now on the edge of the Dodecanese islands the number of yachts was steadily increasing and two Germans helped us mooring up and showed us around. By this point our food stocks were dwindling and the much



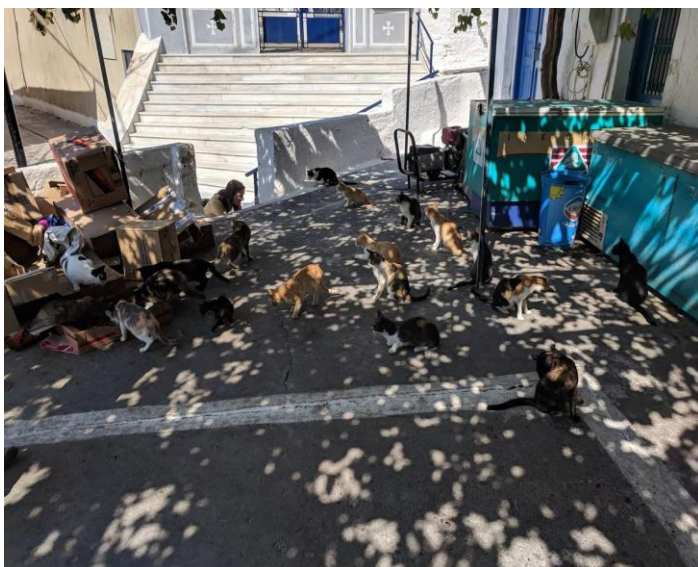
needed water and electricity supply was nowhere to be seen. We'd have to make it another day without before we could fully resupply.

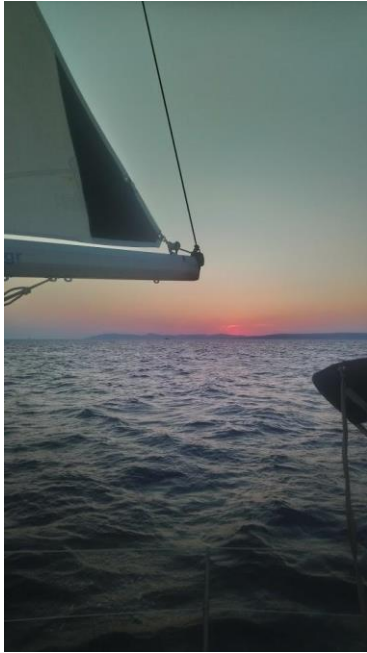


10/09/18 – Exploring Chios and night sail to Karlovaski (Samos)

Not wanting to leave Chios without having a brief look around we spent the following morning exploring the island. Zoe and Iskren headed into town while Phil and Adam decided to point at the nearest big hill and run up it. After battling through the Greek mountains for a couple of hours (see section 9.1) Phil and Adam arrived back, battered and bruised. Feeling a bit beaten physically and mentally, and with supplies running low, tensions were running high as we headed out for

another night sail to the island of Samos. We'd been incredibly lucky with the wind and the southerly carried us all the way down steadily throughout the night. Phil & Iskren had the first shift on helm while Zoe and Adam took the later stretches. Arriving into the exposed marina Karlovaski at 3 AM, we moored up and struggled with sleep until the morning. The swell made any sleep almost impossible. Although the breakwater had proved utterly useless at least there was water and food.





11/09/18 – Exploring the island and sailing the Mycale Strait

Despite the horrific night's sleep and the long sail we were relieved to arrive in Samos, the most northern of the Greek islands in the chain known as the Dodecanese. This marked the end of the long passages, more time for exploration and the countdown to the arrival at Kalymnos. Putting the night's events out of our heads, we headed to the Potami Waterfalls around the coastline from Karlovaski. Here, the Potami River sliced through the bedrock further inland creating a canyon that with the help of ropes and a bit of a scramble could be hiked end to end. With the huge climbing



potential in the area, leaving Northern Samos that afternoon to sail south felt unjust, but after almost 10 days at sea together we needed some fresh company and the prospect of picking up friends from Pythagoria that evening pushed us on. Heading out that evening we sailed through the Samos Strait on the south-eastern side of the island, a region known for strong and unpredictable winds. With the team hyped and the winds strong we hit a new record of 9.4 knots on the way south and agreed that anyone to break 9.5 would have to buy a round on principle. We arrived just after dark that evening to pick up our friends Lauren, Sophia and Polly and celebrated the completion of

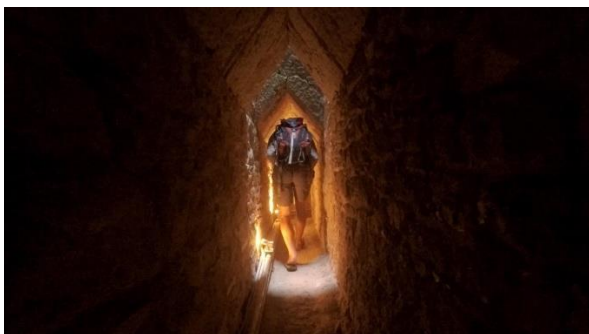


the first leg of the trip with a few drinks. The rest of this week was spent in a rather cramped boat, but it was great to have some new conversation with the fresh landlubbers.



12/09/18 – Samos to Fournoi

Feeling rough the next morning we had a steady start to the day. Spent the morning wandering some of the more tourist-type attractions on Samos – the Pythagorean museum and the ancient aqueduct to the other side of the island. After fully stocking up with food we headed out west towards the sprawled island of Fournoi with the hope of tracking down some deep water soloing Phil had previously researched. On the eastern coastline we found an interesting anchorage: pinned against a sheer cliff we dropped anchor in deep water and ran short longlines back to an underwater pillar. A quick scout from that evening suggested there were some really solid routes to climb the next morning.



13/09/18 – Climbing in Fournoi and the sail to Arki

Up in the morning for an early swim, Phil went out to check the depths and the climbing. On some ridges by the edge of our anchorage there proved to be some quality and easy level DWS routes. The rest of the group swam, snorkelled and watched from the boat as each attempted routes in turn. The clear water and caves nearby made for some great freediving opportunities, the spot was idyllic and ripe for exploring. The caves had quite a lot of rubbish build up so Iskren spent some time doing a clean up of ocean plastics in the area. Hoping to find some more challenging routes, Phil and Adam climbed straight from the dinghy up a steep sea cliff on the far side of the bay. More of a steep slab than a classic DWS, the climb was slightly harder but with the crimps acting almost like glue in the shade, the routes were still good quality with limited risk. Again not wanting to leave but having to move on anyway we sailed south-east towards the island of Arki, our next stop in the Dodecanese chain.





14/09/18 – Runs, swims, cliffs and climbs en route to Lipsi

The previous night we had moored up in Port Argousta and eaten at a one of the only two tavernas on the island. The next morning Adam and Phil set off to the southern tip of Arki to attempt a run-swim between 5 smaller islands just off the coast with Aegli poised for a sail-by pick up (racing away from us a good hundred metres once we had got close). After a stunning loop of the mini-island chain Phil and Adam waited at their pick-up point fitting in a couple of quick climbs on the sea cliffs before the rest of the group turned up. Still on our heading south, we were now aiming for a group of islands off the coast of Lipsi, famed in the area for sea caves, underwater tunnels and huge cliff wrapped rock pools. Anchoring off in deep water south of the five islands, we rowed the dinghy through a hollow sea cave to what we had heard was the entrance to the rock pool. Once in the water we could see the way in – a 5m tunnel-like opening under the water with a pale light at the far end signifying the air pocket beyond. With a deep breath and a few strong strokes we were out at the far end in a closed pool of deep, crystal clear water surrounded by jagged cliffs. The entire afternoon was spent deep water soloing and cliff jumping in the sunlit pool before hopping back on the boat to sail back to Lipsi Town for the night. Not satisfied with the day's exploration we spent that evening at a town party, dancing to the live music with crowds of Grecian locals until the early hours.





15/09/18 – Lipsi to Kalymnos and evening climbing

After the previous day of intense activity we had a slow start to the morning as everyone was in need of a real shower and some relaxation. By midday though, we were fully restocked and refreshed, so we set off out again south Kalymnos bound. After a brief stop off for lunch on the island of Leros we set a bearing for the north-eastern edge of Kalymnos, a coastal strip famed for world class sport climbing. As the dwindling daylight lit up the cliffs that lined the coast we got to planning the quickest way to shore and some late night slab climbing (see section 9.1). Already well and truly exhausted from an evening of climbing, the fun wasn't over yet. Our anchorage that evening was very unreliable, so the team spent the majority of that night up and out of bed running and re-running the anchor after multiple drags. By 2 am we had given up and tied to the nearest buoy that could be spotted in the pitch black, a fishing tether – definitely not designed for yachts.

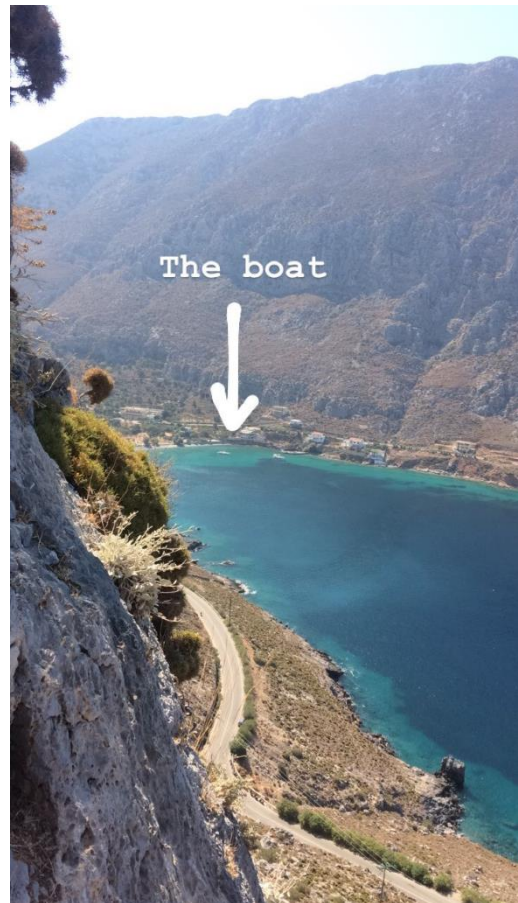


16/09/18 – Kalymnos climbing and kayaking

We survived the night though and the morning brought us a new day and lots more climbing. Just as the sun was rising Phil and Adam set off on the road north towards a set of crags not far from our mooring. Once there, they set up in the shade, started up the walls and were joined by Iskren shortly after. Having got a bit too excited, we stretched a bit too much climbing out of the morning (see section 9.1), as the sun was now high in the sky and roasting every living thing that clung to the cliffs. With minor heat stroke and a serious thirst we headed down for some R&R in the shade. Zoe spent the morning walking to the

town of Mirties.

Zoe and Iskren then set off to the town of Vathis with the hope of hiring some kayaks and scouting some more DWS. These were readily available, and we paddled out of a picturesque harbour with high cliffs on either side and large yachts moored directly to the cliff face. We found a cave and climbed a few routes before paddling further north up the coast to visit a secluded beach with for a bit of snorkeling, some more DWS and getting spooked by a few locals on a boat with guns in search of some birds to shoo. The paddle back was significantly harder with lots of gusty wind and a strong current coming out of the Vathi harbour. We followed the south cliff into the harbour and explored some more of the rock face there. Not satisfied for the day, Phil and Adam headed out for what we expected to be a reasonably easy multi-pitch visible from the boat. Adam forgot his climbing shoes and the struggles ensued from there. They arrived back in the pitch black 5 hours later.

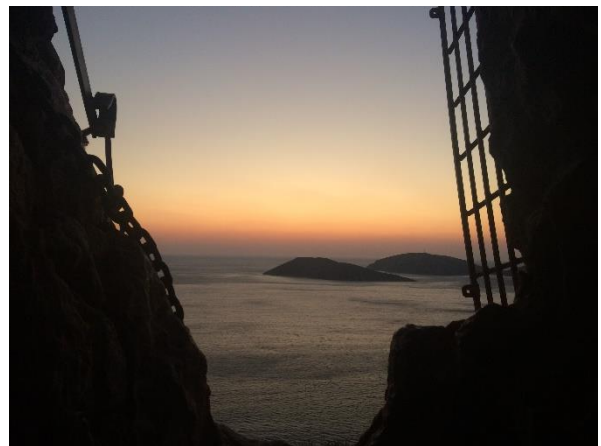
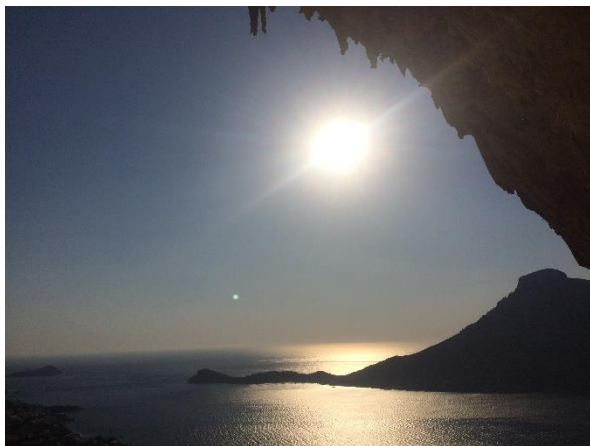
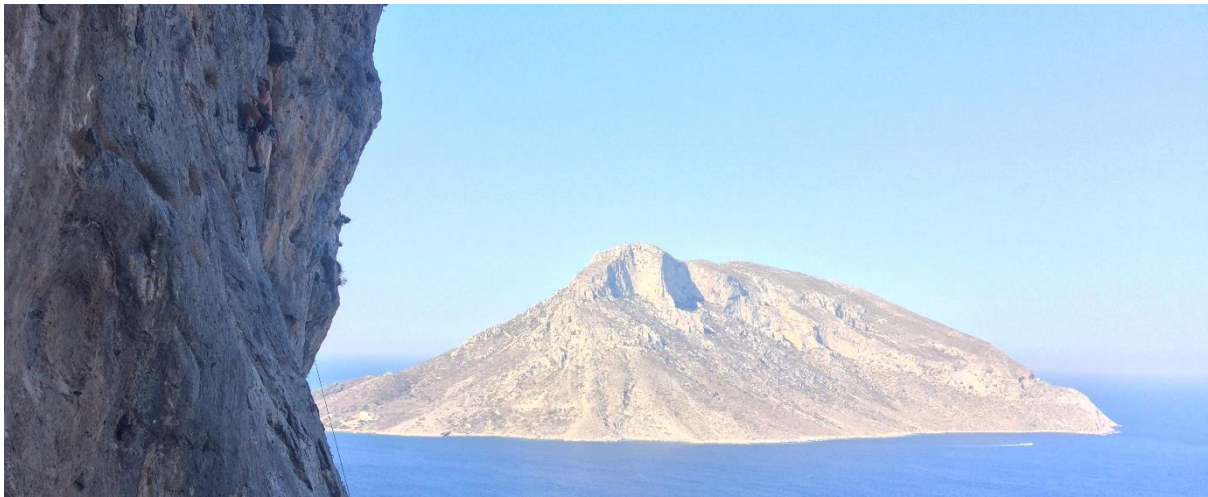


17/09/18 – Kalymnos climbing, caving and SCUBA diving

Starting early again the next day, we got to shore by 8 am and started south towards the infinite sets of the crags along the western shore, aiming for one of the nearest – Odyssey (see section 9.1). At midday the group split, Adam and Phil stayed to climb for the afternoon while Iskren and Zoe set off to a wreck diving spot further down the coast near the town of Kalymnos. Kalymnos has a rich heritage of diving, with generational sponge divers now setting up diving schools and taking even complete beginners on tours in the surrounding bays. Isk and Zoe got into extremely thick wetsuit despite the hot weather, and they set out with one instructor. They descended to approximately 25m to the sea floor. The local instructor was excellent and showed how to feed the fish out of our hands with sea urchins, explored remnants of WW2 such as sea mines (emptied of their explosive substance by locals, to use in an old tradition of exploding dynamite near the sea during celebrations), submarines, boats, scattered engine parts, sighting sea sponges and beautiful submarine flowers. An hour after starting and after a short decompression period they were back at the surface and awed by what they had seen.



On the climbing front, by early afternoon again, the sun was scorching and our fingers were shredded so we decided to hike down to a taverna to rest. On the way Phil stopped off at the Grande Grotta, Kalymnos' famed sport climbing cave to marvel at the climbs and add another 20 routes to the already extensive list to attempt when we return in the future. That evening, our group hiked to a spot only briefly mentioned in the Kalymnos climbing guidebook – a cave called



Underworld. Barred by a rusted gate, we found a small opening in the mountainside that lead us to a huge cave network under the crags via a network of old ladders and ropes. Emerging from the caves just as the sunset, we set off back to the boat to set sail for the south of the island and Kalymnos Town that night.

18/09/18 – Kalymnos to Kos

Setting off that morning the winds funnelling in off the island reached 37.9 knots at their peak. Being of sound minds and knowing it would be hard work to control a tack in these winds, Iskren and Phil wasted no time in getting the sails out. As a result, we arrived at the island of Kos in no time and moored up again for that evening. With it being Zoe's birthday the next day and finding ourselves in the heart of Greek tourism in the Dodecanese, we treated ourselves to a meal out and some relaxation after the intense week of activity.

19/09/18 – Kos to Nisiros

The next day we prepared for our final sail south and attempted to make the most of the winds we'd been riding for the last 2 and a half weeks. Unfortunately, our intense passages of the previous weeks had taken their toll on Aegli and we soon discovered a tear in the head sail that would cause us some grief in the days to come. After attempting the repairs ourselves with sail tape and a limited sewing kit we decided we'd done all we could and continued south-west for a quick resupply in the town of



Kardamaina – where half the UK appeared to have been sent on a package holiday. Not wanting to stick around, we quickly set off south to the island of Nisiros, where we were rafted onto a fishing boat for the night by a local motorshop owner.



20/09/18 – Volcano exploration and sail to Astipalea

Early morning, Adam and Phil were up and out for a run up to one of the highest points on the island, the rim of a caldera that bounded an active volcano at Nisiros' centre. The dusty volcanic rock proved difficult to ascend at any speed but after pouring some sweat into it we reached the ridgeline. Iskren and Zoe met our guy from the previous night and we all planned to meet in the crater at midday. Using some dodgy route-finding methods Phil and Adam battled through the rugged terrain

on the top plateau, along a ridge ascent noted in the local lingo as 'lava climb difficult'. Lava climb was indeed difficult, but we eventually made it to the basin pretty beaten up as usual. We met as a group and explored the smouldering craters in the area, slightly sickened by the smell of eggs in the air. When we'd had enough of pungent air, we all headed back via the town of Emporios and had a dip in the sea before setting sail to Astipalea – our first heading since starting the trip that didn't take us south. The journey was a battle. The winds weren't kind and put us on a poor point of sail in terms of both swell and heading. After spending the rest of the day with our port side handrail in the water we were relieved when we dropped a bomber anchor that evening and were finally able to stand upright.

21/09/18 – Astipalea to Santorini

A quick assessment of our sail situation in the light of day next morning didn't leave us with high hopes. The luff of the jib was now torn along a seam for at least half its length, we decided the best plan was to stick with the main alone and try to find a repair shop in Santorini. Although the journey was long and slow, the passage to Santorini marked a significant point in the trip – halfway. We arrived into the bustling marina of Santorini that night following yet another view of the sun setting, silhouetting the island's volcanic caldera. After navigating the rather sketchy approach around two ancient submerged sea barriers (in the dark) we moored up on a buoy for the evening and treated ourselves to a meal out at a taverna perched on the sea cliffs above.

22/09/18 – Exploring Santorini

For our day on the island of Santorini we'd planned a whistle stop tour of all the best sights (and climbing spots). We spent the first half of the morning organising for our head sail repair but soon after headed around to the east of the island where the best caves and cliffs were to be found. Spending the afternoon high above the town of Kamari we sat by a church built into the cliff side climbing above a cave that was the ancient source of the area's water. In the afternoon we headed down to visit Oia, where white houses and blue roofs were scattered across Santorini's volcanic rim.

23/09/18 - Santorini to los

First orders of the day – send Adam up the mast using his climbing harness and a halyard hoisted by Iskren. The culprit luff seam that had entangled the jib was cut free and the crewmember returned safely. The jib could then be lowered and folded ready for repair. In the meantime, we hoisted the storm jib and expressed our surprise at how small it really was.

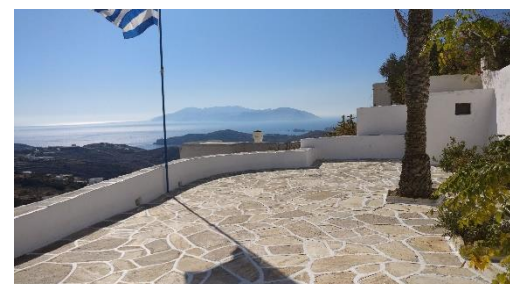
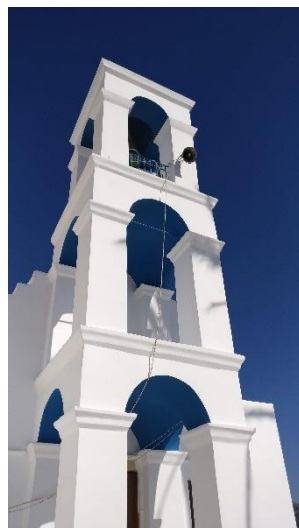


Sailing close to the shore we could see distinctive red and black volcanic beaches, not to our liking as they were crawling with the tourists that seem to inhabit every inch of Santorini. Onwards to Ios.

24/09/18 - Sail repair and dash to Milos

After worrying that the language barrier would complicate the sail repair process, Timothy the sailmaker was the first native English speaker we had come across. After just one phone call between him, us, and the boat owner the sail was packed in his truck and taken away. It was returned later that very day and all costs covered by the boat's owner.

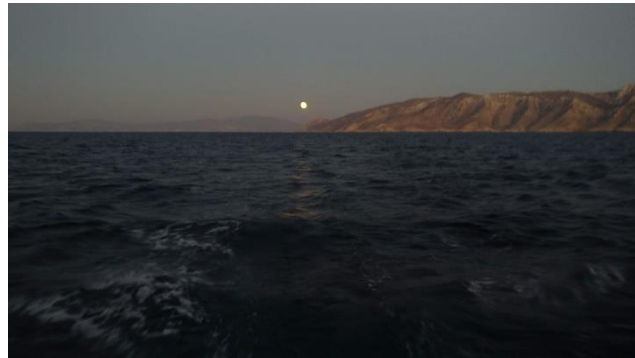
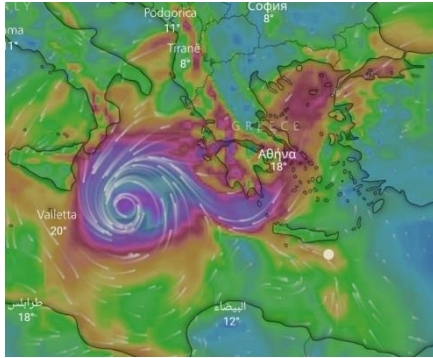
During the wait Adam composed and completed the Homer half-marathon: running to the poet's tomb via the island's second highest peak, friendliest stray dog, and driest, hottest asphalt road (narrowly avoiding heatstroke). Whilst Zoe visited the town nearby that was set into the hillside and



home to three Orthodox churches that had views across to the port and beyond. Iskren went on a run of his own, an 8k round trip to the nearest beach, a quick stop for a dip in the water to cool down and run back to meet Timothy with our beautifully repaired sail.

Taking advantage of the newly repaired sail and the short time left before the medicane hit, we did a night sail to the island of Milos, and a sheltered mooring.

25/09/18 - The medicane hits



With the light of the harvest moon and the widest sunset we'd ever seen, the night sail and mooring were enjoyable and uneventful. Due to poor harbour design, we had to slip and re-moor on the outside of the mole. By this time winds had already picked up to 20 knots within the bay, and the neighbouring boats help was much appreciated.

With little choice, we walked to Sarakinko – a lunar-esque landscape of caves, arches, channels and pools. The stormy seas bursting out like geysers from the white rocks were great to look at but prevented us from getting any nearer.



26 and 27/09/18 - Still hunkered down

Most other boats were clearly struggling with the swell; the number of mooring lines grew by the hour.

Whilst unable to sail, Iskren had a radio interview with Radio Varna, Adam ran to the roman amphitheatre and castle ruins atop the islands highest peak, and Zoe visited the local town of Plaka and everyone edited their video footage of the trip.

A lot of cards games were played below deck in these two days...

28/09/18 - Hurried departure to Paros

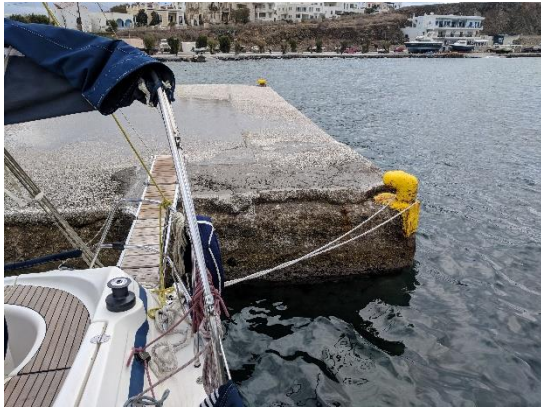
Eager to leave and make up time before the storm returned, we left just behind the main storm and hit some heavy swell. We had to adjust course to cope with the waves and prevent the wind from forcing our bow back towards Milos. This changed our passage from a perilous 50nm into a merely uncomfortable 70nm.

29/09/18 - Turned away from Mikinos

After three hours rest in Paros, an uneventful sail took us to Mikinos. The angry harbour masters seemed to have some problem with us and didn't allow us to stay in their fancy, new, well-sheltered and definitely-not-completely-full marina.

The nearest available mooring in Tinos was very poor.

With the usual yacht moorings unusable under strong southerlies, we settled for the ferry jetty alongside the only other boat in the bay. A spider's web of lines affixed the two boats onto the only two cleats and we dropped a kedge anchor in the direction of the oncoming storm.



30/09/18 - Tinos: Greece's worst harbour

Again, hunkered down for the storm.

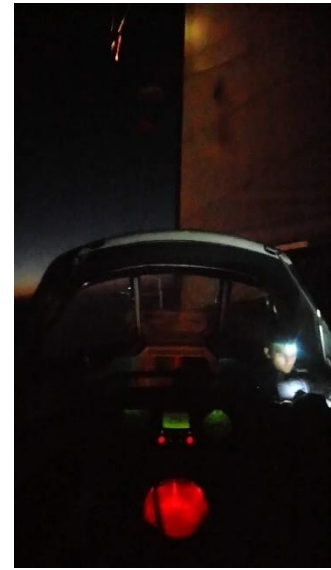
Adam ran to and climbed up Exombourgo mountain – accidentally climbing straight up the walls of a ruined venetian fortress that sits atop the steep summit cone. Iskren and Zoe went to empty Tinos and the Church of Panayia Evangelistria - an imposing white church, with white pigeons and destination for many pilgrims.



1/10/18 - Storm passed, onwards to Skyros

The second pass of the storm lasted only one day. The only damage was a bent kedge anchor, which we managed to straighten out another day.

We left early to cover the 80 nm to Pevki bay in Skyros. The smell of pine resin was overwhelming as we entered that night, signalling to us that we were now in the heavily wooded Northern Sporades island chain. The smell was much better than the holding however, and after several failed attempts at getting our anchor to set we had to settle for dumping the whole chain in a pile directly below us. There was no wind forecasted and the boat remained secure overnight.



2/10/18 - Skyros - Skopelos - Skantzoura

Sailed straight to Skopelos and onto Skantzoura.

3/10/18 - The unrunnable island and the blue cave



Adam attempted to run along the spine of Skantzoura but the new wooded terrain made it unrunnable, a swim to the neighbouring islet yielded more suitable terrain. The vegetation on Skantzoura made it impossible to do anything other than be astounded by the volume of rubbish that had collected on an uninhabited island in the middle of a marine wildlife park, so we did a trawl as we set off to Alonissos.

After climbing some steep routes inside a large sea cave that was en route, we headed to Alonissos and a harbour warned to have 'unbelievable swell', although it was deathly still

all the while we were there.

4/10/18 - Billy the seal

Whilst in Pariti harbour, we had a chance encounter with one of the parks 40 monk seals (of only 500 in the world). Clearly known by the locals, 'Billy' played with us in the water for about an hour before flopping onto the beach to sleep (nowhere near as gracefully as he had been in the water).

After visiting the old town, and Iskren setting up an impromptu job interview on the terrace of a closed taverna, we set sail for the nearby island of Skopelos.



5/10/18 - To Athos

There was little time before our visas entry date for the Athos peninsula, so we set off early to make sure we could find a suitable place to leave the boat for four days.

6/10/18 - 9/10/18 - Mount Athos

For Iskren and Adam, see section 9.3. Respecting the 1000 year ban on women in Mt Athos, Zoe stayed on the boat and explored the nearby area, which proved barren except for family resorts, the ancient site of a channel dug by the slaves of Xerxes and visiting the city of Thessaloniki 3 hours away by bus.

On the final day of Mt Athos, Iskren and Adam returned around 3pm and since Zoe was eager for a change of scenery, reunited we set off towards Thasos, our final long passage of the expedition. We arrived just before 2am and unable to find suitable anchorage, we spent the night in the marina in Limenaria.

10/10/18

The morning in Limenaria, we suddenly became very aware of how lifeless the town was. With summer well and truly over (as much as we hated to admit it) there were no more tourists and many of the shops were closed or closing and the seasonal workers were moving back home. What must have been a bustling spot for the last 100 days was now empty and sad-looking. With no more long passages ahead of us, we spent the morning starting to prepare for checking out of the boat. Our first job was to bend the kedge anchor back to its former glory, using a nearby digger and Adam and Iskren's combined weight.

11/10/18

After a short sail to the north of Thasos, Adam ran to Dragontrypa cave, while Iskren and Zoe tried to find a windsurf rental in town. This was nowhere to be seen and completely devoid of life, save for one or two shops that were packing up for the winter. Sadly, no dragons or windsurfs were found that day. We spent the night in our last port of call, a marina with water and electricity so we could clean and prepare the boat for check out the next day. Refusing to let summer go, Iskren made it a point to jump in the water for one more swim, despite it now being quite cold and the lack of sun.

12/10/18

Reluctantly, we set off on our final journey. There was great wind taking us into Kavala and perhaps even a dolphin sighting - a great way to end the trip. We met up with owner in Kavala who congratulated us on completing the journey and said that after six weeks in Aegean sea, we are now half Greek. We spent the evening relaxing, dismantling our beloved trawl and trying to fit everything back into our bags ready to travel home.



13/10/18

Iskren and Adam caught the 8am coach back to Plovdiv followed by the night train to Varna, while Zoe had a few more hours before catching a flight from Thessaloniki, so that she could go home to help her parents moving house.

14/10/18

Arriving in Varna at 5am, we were greeted by Iskren's granddad and aunt at the train station, to take us to their house for breakfast and a long overdue catch up. Adam discovered his hidden skill of listening to stories in Bulgarian and deciphering which part of the trip was being discussed in order to add insightful remarks and jokes. In the afternoon, we had scheduled a follow-up radio interview with Radio Varna so we headed over to their studio (see section 10.) Afterwards, we picked (and ate) fresh apples from Iskren's aunt's place just outside town. In the evening we met up with a marine ecologist who had heard of our story and wanted to exchange ideas. He told us of his startup producing Ocean Reef towers used to not only harvest mussels for restaurants on an industrial scale, but also recovering ocean dead zones. We had dinner at Iskren's grandparents house before heading out for a spot of Varna's nightlife before getting an early night with a busy day ahead.

15/10/18



With a schedule full of not one but two TV interviews and a flight to catch in the afternoon, we started early to the studios of TV Chernomorec (Black Sea) where we did an interview for their morning segment the following day, but not before getting lost and having to climb a wall to make it on time. Then after running some errands we were scheduled to meet with a crew from the Bulgarian National TV (BNT) in the sea garden to take part in a series on education due to air in November (see section 10.) With the end now truly in sight, we headed to the airport to catch the flight home.

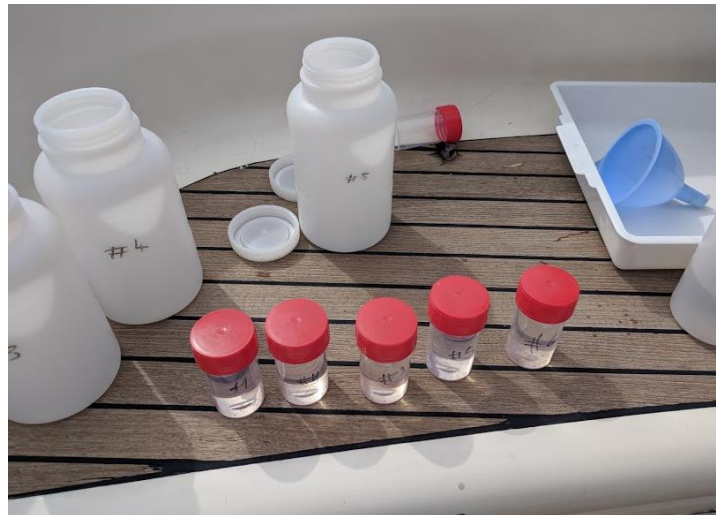
7. Ocean plastics research

7.1 The main idea:

The idea behind trawling is to collect a sample of microplastics in a particular area, by skimming the surface of the sea with a fine plankton net to collect plastic particles as small as 150 microns, whilst recording wind direction, speed, sea state, boat speed and passing visible debris. Trawling can only be done at low speeds, less than 3 knots.

We set off with the objective to complete multiple trawls per day, however this proved challenging during long passages as it would have meant adding an hour on top of an already long and exhausting 12+ hour day at sea. We also did not trawl during night passages or in challenging weather conditions out of safety concerns and the fact that the trawl would become fully submerged. When also accounting for days when we did not sail as well, such as time spent climbing in Kalymnos, sitting out a medicane and exploring Mount Athos, we decided it would be impossible to stick to our original goal so we had to manage our expectations of the amount of samples we could collect.

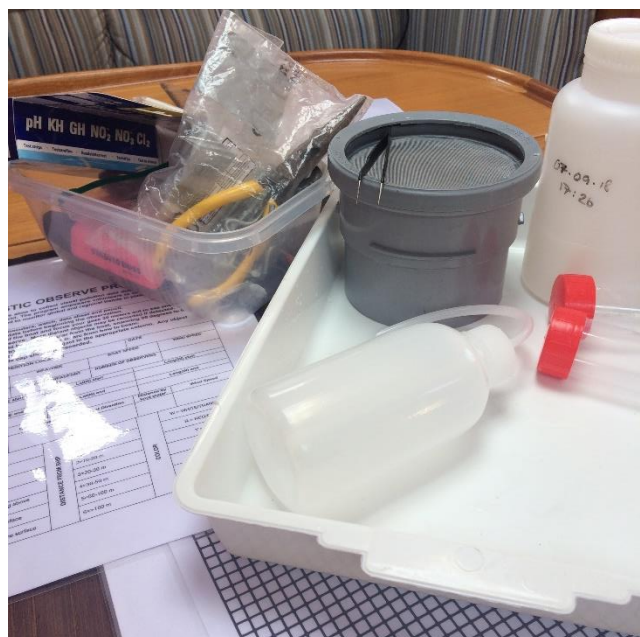
Furthermore, we were in touch with researchers at 5Gyres and Imperial and they required different types of samples: 5Gyres wanted only the largest dry plastics pieces while Imperial wanted wet samples. In our first trawls we did not find any pieces that were big enough to send to 5Gyres and having realized we would not be able to collect as many samples as we would like we decided to focus on only collecting wet samples for Imperial.



7.2 Building the trawl

Originally, we were hoping to borrow a Manta Trawl from 5Gyres to collect samples, a fancy (and expensive) bit of kit. We would have to ship the trawl from California to Kavala flying out the rest of our equipment with us. Since this meant the environmental impacts and general costs of shipping were pretty high we decided it was best to find another solution. After some discussion and a few helping tips from 5Gyres we decided to build our own.

We engaged with 5 Gyres and used their protocols and expertise to build our own trawl. When finished, the entire trawl cost less than £200, would fit in a checked in suitcase and could be taken apart for storage, perfect.



Materials to be bought:

Plankton net - 300mm diameter mouth, 150 micron mesh, £147.50

This was the major cost for the trawl and there are other alternatives, but we wanted to match the robustness of the 5 Gyres method.

Everything else was bought from B&Q:

- Mixing bucket with diameter to match the trawl net ~£6
- Plank of wood (approx 1m long), ~£4.50
- Nuts, Bolts & Washers, pack of 10, ~£3
- Pipe insulation (small diameter version, usually used for copper pipes) ~ £1
- Zip ties (we just picked up the longest ones we could find) ~£2
- Duct tape ~£4
- Yacht varnish ~£8

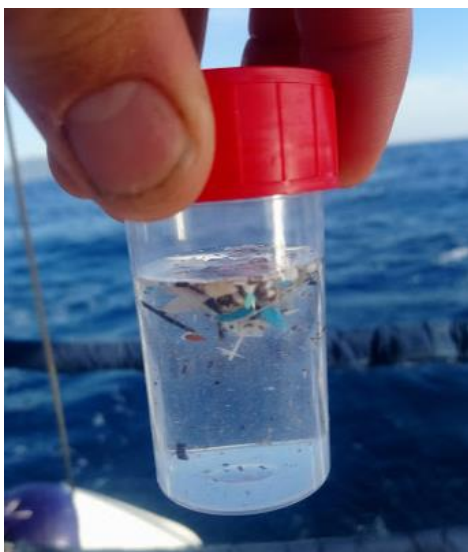
Tools required:

- Drill
- Hack saw
- Heavy duty file
- Sturdy surface to work on, and probably a pair of friendly hands to help you hold everything in place

The building process:

> Our 300mm diameter net slides about 10cm onto the bucket, so we marked out 7cm from the base of the bucket all the way around and cut along this line, leaving us with a wide plastic tube. All edges were filed and covered with tape to prevent any snagging of the (expensive) plankton net.

> The mouth of the net is then pulled over this tube and the tow lines threaded through - these are used as a safety tether when trawling, should the main tow line come undone. Zip ties were then looped through the net mouth and bucket to secure them together.



- > To keep the net on the surface of the water when towed, wings on the port and starboard sides are required to act as planes - forcing the trawl upwards as it is pulled along. A lacquered plank of wood at ~40 deg was bolted onto the top of the bucket for this purpose.
- > Holes were drilled in the wings so that the tow line could be attached and foam insulation was affixed to the leading edge for increased buoyancy.
- > The tow line was attached to our spinnaker pole which was lashed abeam the boats beam, protruding as far as possible to keep the trawl away from the boats wake. Samples are collected at ~2 knots in a container screwed to the back of the net and sorted thereafter.

Concentrating samples:

The samples are initially collected in a large plastic bottle, specially made to fit on the end of the plankton net. These contain too much water so after a few iterations of collecting samples we found that the best way to drain it while retaining all the particulates was to filter it through the net mesh again, through a funnel and into our sample pots. Occasionally, particularly after a storm, we found lots of organic debris in the sample (twigs, leaves, dead fish) which had to be carefully separated from the plastic using tweezers.

Trawling findings:

Having collected our samples and identified that they all contained microplastics we were horrified by our findings and have now sent off the samples for further analysis of their level of decomposition and concentration of other pollutants on their surface. We found that there was more large plastic debris in uninhabited islands such as Skantzoura, or in sea caves. We were also shocked to see that some of the monasteries in Mount Athos had open rubbish dumps, metres away from the sea and the fact that despite how few people visit this area, there still plenty of wrappers and cigarette butts along the trails. We did our best to collect as much of these as possible and take them to the right recycling or disposal points, as well as practicing our man overboard drills whenever we saw large debris floating in the sea along our route in order to catch and throw them away before they break down into microplastics.

8. Land-based exploration

8.1 Rock climbing

DWS

The vast majority of the climbing outside of Kalymnos was of the deep water soloing discipline. Sea caves and inland pools yielded the safest conditions and most interesting routes.

Giola pool

Having only spotted the pool from Google maps and not researched it elsewhere, we unknowingly walked into a tourist trap, making it too dangerous to attempt more than a couple of routes.

Lesbos volcanic gorge

We happened upon an impressive gorge near the roadside with steep overhanging dihedrals and extremely grippy volcanic rock. We scrambled down past cliff-jumping frogs to the stream at the bottom and climbed our way back out. As with all volcanic rock, it was very crumbly with interesting curves and fissures making for atypical movements. Being such loose rock, we did not chance our luck with a second loop.

Fournoi sea cliffs

Several short and easy stacks served as our warmup, within spitting distance of our anchorage. After sending and stylishly dismounting everything off this side of the inlet, we rowed the dinghy to the cliff opposite. We found an 80 foot slab with solid and very clean rock on the lower half, both of these features deteriorating further up. Climbing straight from the dinghy and taking the most obvious route first, Adam topped out and descended around the side where the cliff tumbled into the sea (didn't fancy the 80 foot freefall). Phil opted to take a few 'test falls' lower down before following.

Arki sea cliff

A horseshoe of steep rock with a central lone pillar formed from the collapse of a sea cliff had exposed some lovely rock. There was some care to be taken not to climb above the fallen rocks that were now submerged. The routes were all quite low down, so contained characteristic razor sharp rock which tore at our shoes and forearms. There were several routes of varying difficulty and steepness and we could have climbed longer were it not for the boats arrival insisting we swim out to meet it.

Makronisi pool

An afternoon of climbing featuring the best approach imaginable. The inland pool on Makronisi is accessible from the northern coast by walking overland. Our route from the south involved a swim through a tunnel towards a seemingly impassable cliff. Once at the cliff you can reach the pool via an underwater swim of about 5 metres.

Inside the pool were numerous routes. The initial warm-up traverse ended up being more taxing than expected, having to cut loose to pass over the top of another archway or use some serious toe strength (in wet shoes) to stick to the horizontal roof. Phil beautifully executed some elegant dismounts back first into the water – only a few feet below at this point.

Everyone sent routes inside the pool, varying from roof to slab, jug to crimp to crack, with plenty of safe falls in between. After Adam successfully broke off a foot hold, two hand holds, cut his shin and hit himself in the jaw with a rock, we swam back outside. Here we climbed around the

aforementioned tunnel and surrounding cliffs. There were many easy routes on sharp rock with safe dismounts, a good warm down before swimming back to the boat.

The Island of Kalymnos

Sport climbing

Having arrived at 8 o'clock and rushed to the closest crag we could find (Arhi main right wall), we set about ticking off some easy ascents, getting a feel for the grading's and rock type for the coming days, namely here it was grey slabs with sharp rock full of gouttes. Inevitably we got over-excited and continued climbing into the night, only arriving back at the boat at around 11.30. Thankfully it was a simple approach even in the dark. Adam, Phil and Isk all climbed around 5 routes up to 6a, which was enough after our long day.

By 7am, we were at the crag Noufaro, which promised to stay shaded for the most part of the day. Adam and Phil again starting with some easy slab routes, after which Iskren and Lauren arrived. The latter of whom then sent her first ever outdoor route. Routes here were mostly vertical technical wall climbing on smooth white and orange walls with pockets and small tufa's. Most routes sent were 6a/b, with Adam sending one 7a, Buona La Prima, a bouldery route on gouttes.

We climbed until 3pm. The shade disappeared at 2pm. Our water had just about ran out at 1pm. The standard of routes dropped as the rock heated up so we eventually called it and went for a rest before the evening ascent.

Clearly craving the Lake District, Phil decided we had to do one of the only multi-pitches on the island. An easy route peaking at 5c over 7 pitches we anticipated it taking a couple of hours at most. Another characteristically short and easy Kalymnon walk-in put things off to a good start, however, upon opening up his bag Adam realised his climbing shoes were still strung up to dry on the boat. Conscious of time, we decided Phils Keen sandals would suffice as a substitute. The first pitch consisted mostly of gouttes which were the perfect size for Phil's slim rock shoes but the bulbous sandals would not fit in any of them, and so began seven pitches of constant smearing.

We settled into our normal rhythm over some steep slabs and ditched the rope for the easier pitches which were basically scrambles. The most striking pitch was a smooth low angle slab which curved up like a skate ramp towards the summit and back down over the cliff towards the bay. This made a fall look like quite an entertaining ride, although we didn't find out. By nature of being on an island, it got dark very quickly. In the last two pitches we climbed a steep slab, a large flake and a final delicate passage in pitch black. We wasted no time hanging about at the summit, and quickly retraced our steps with (surprisingly) zero wrong turns. Back at the boat, the rest of the crew didn't seem the least bit worried that 2 of the 3 skippers had been AWOL in the mountains at night for so long.

Reckoning we had learnt our lesson, the next day we chose a crag that would stay shaded until 15:00, Odyssey. Much of this crag was overhanging with blobs, tufa's and some stalactites, making for some powerful bouldery routes with large, energy sapping hand holds. There was a short low angle slab nearby on which Zoe, Polly and Sophia all did their first outdoor top rope. The rest of us got extremely tired attempting one short 6b+ with shoulder distance tufa sidepulls, not best suited to Phils often dislocated shoulder. This battle took a couple of hours, and another ~10 routes up to 6b were climbed, again well into the heat of the afternoon. Seemingly three days were insufficient to teach us our lesson, we again ran out of water and attempted a couple of last climbs on an overheated slab. Here, Laurens 3rd ever outdoor climb was her new PB, graded 5a. We then reversed the arduous 5 minute walk in back to the road for some well earned cold drinks, and sat wishing we could stay in Kalymnos all week.

Underworld

Below the Skalia cave sector lies 'Underworld', an underground cave system which lies somewhere in between its natural state and an accessible tourist attraction. The pothole entrance is guarded by a steel gate, supposedly to prevent goats from becoming trapped, and a 15 metre steel ladder is propped up against the wall. A climbing rope tied to the base of the ladder is then used to back down a slippery slope towards a small constriction, which then opens out into the first main chamber. There was a clear common path, made obvious by smoothed rock and broken stalagmites. We stuck to this path where possible, wary that our presence alone was damaging the mineral formations. We were struck by the range of different cathedral like columns, curtains and arches and all wished that we had joined the uni caving club when we had the chance (perhaps then I would know the correct vocabulary for writing this passage).

8.2 Trail Running

Scree running on Chios Island

On day 12 of our expedition we'd just arrived on the island of Chios, one of the busiest of the islands we'd visited so far. In Chios Town we were quite a distance from the trail routes of the north-west and still far from the cliff backed bays of the south so with nothing better to do, Adam and Phil cracked out our running shoes and set off towards the biggest mountain we could see.

With a knack for starting our runs in the blazing heat of midday we weren't expecting this to be pleasant. We'd set off along the coast south with the aim of running up a paved road towards the town of Epos on the other side of the hills. The road up could've been a classic mountain stage of the Tour de France (maybe a couple of hundred meters of height gain shorter) but it gave us both a nice 'warm' up for our improvised route. At the top of the road we gained a perspective of the mountain peaks of Chios: barren and empty forming a rocky plateau over the bulk of the island.

From the top of the pass we headed southwest up the nearest set of hills and along the edge of this plateau. Even though the terrain seemed boulder-strewn and uneven, the ground was actually runnable and with a literal hop skip and a jump from rock to spike, anyone with a bit of agility and a good footing could give the mountain goats a run for their money. Around the 8km mark, at the top of these hills, we could scout a route down the cliffs and screes into the gorges below. The easy running was going to end here.

Scree running isn't the most forgiving form of descent. Large rock slides and twisted ankles are a fact of life but damn it's fun. Keeping our distance and being careful not to take half of the mountain down with us we jumped from spot to spot aiming for the smallest and crumbliest sections of rock – a bit counter intuitive. Basically skiing over rock, we flew down hundreds of feet of virgin screes down into the valley of Omiroupoli below. Once at the base we assessed the damage, eventually deciding that a bit of missing skin and lost blood was a small price to pay for a descent like this. Battered and bruised we headed back to Chios Town mentally preparing ourselves for that evening's night sail.

Run-swim repeat on the Arki Islands

One of the most northern and least visited islands of the Mediterranean's Dodecanese is the Archipelago of Arki. After a bit of a heavy night in one of the tavernas of Port Argousta, island hopping in a rather unconventional form proved to be the perfect hangover cure.

Before coming out for the trip Phil had scouted some small islands on our route for a run-swim-run route and the reefs and islands off the south coast Arki appeared to be a good spot. Hauling ourselves out of the hammocks in the early morning Zoe, Adam and Phil headed to Tiganakia Beach

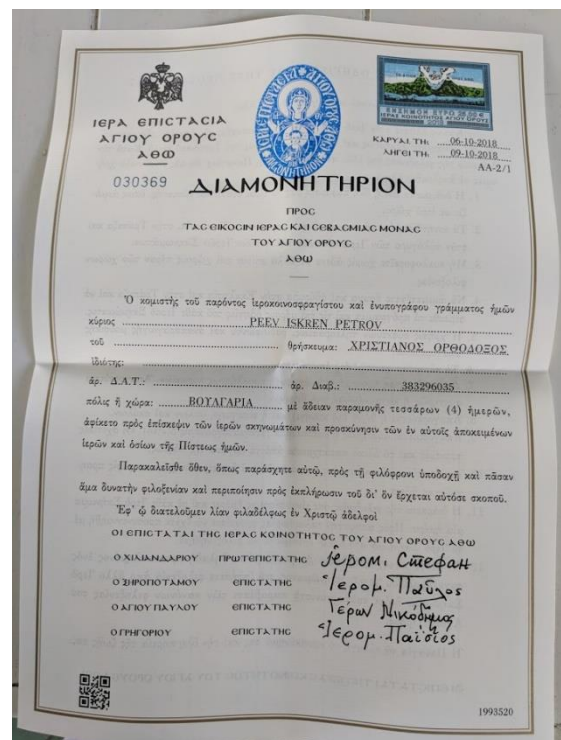
to check out the islands. There wasn't much to see of the beach itself but once in the water we were greeted by turquoise water and white sand bars. Zoe headed back to the boat while Adam and Phil got kitted up for the first of 5 open water swims.

With dry bags for spare gear, swim shorts and our trail shoes we set off to the first island of Avaptisto immediately south of the beach via short 150m swim. Not being seasoned triathletes, our transitions were a bit rough but we got running up and over the island pretty quickly.

The largest of the islands on our route, Makronisi, was home to a herd of island goats and after honing our gear swapping skills we were skipping alongside them through the rock scattered terrain in no time. Once we'd tagged the two cairns along the top ridge we headed down along the goat trails to the next swim. If one thing can be said about the goats, it's that they can put down some top quality running trails.

8.3 Mt Athos and the Agio Oros peninsula

The peninsula of Mount Athos or The Holy Mountain is possibly one of the most secluded places on Earth. Visitors or 'pilgrims' are only permitted using a special visa called a Diamonitrio. You have to apply months in advance and only 100 are issued per day for Orthodox Christians and 10 for other denominations. Women have not been granted access for 1000 years. The reason? The peninsula is home to 20 Orthodox Christian Monasteries, dating back to the 10th century. Pilgrims are welcome to visit and stay in the monasteries, pray and eat with the monks and have a glimpse of monastic life from the Byzantine era, save for a few modern luxuries deemed appropriate.



Day 0, 05/10/18:

Having obtained our Diamonitrio we thought we were all set for the trip and could pick in which monasteries we want to stay at our heart's content.

Researching them the day before, we found we couldn't be further from the truth as some sources citing that stay at the monasteries must be booked ahead of obtaining the Diamonitrio. The way to contact the monasteries is by post or fax, with only a few having an email address and telephone, often unmonitored. Having managed to only communicate with one monastery (Vatopedi), which informed us that they are fully booked, we were off to a good start with no food or shelter for the next 4 days.

Day 1, 06/10/18:

We gained access to the Peninsula by ferry from Ouranoupoli to Dafne, a sort of central transport junction on the peninsula. From there we took another ferry heading south which stopped at individual monasteries on the west coast. Even from a far we could tell that we were in for a unique experience, catching glimpses of monasteries that looked like castles, in various colours. You almost got a sense that the monks were in some sort of competition of building the most extravagant buildings, engulfed by mountains and forests, untouched by tourism and most of human influence.



We decided to try our luck at the first stop, Simonopetra, a breathtaking monastery high up above the sea, perched on top of a rock.

It was named after the saint Simonos who built it and the rock on which it sits. Having climbed a number of stairs to reach it we found our way into the guest house where we were served a shot of ouzo, water and home-made loukoums (Turkish delights). The guest-master Ilya was extremely friendly and told us that even though they were fully booked for that day, he would speak to the monk in charge of guests and see if they could find a space for us for the next day. A space was available and after confirming our booking and telling us in which monastery we would be able to find a place, we set off to the next Monastery: Grigoriou, where we were assured there would always be a few places left. So far so good! When we got there we couldn't find the monk in charge to see if there would be space and were told to wait for an hour. However we had set our sights on staying in Paolou (St Paul's) as it was closest to Mt Athos and we had big plans for Day 2. So we set off again. We walked around the next Monastery Dionysiou but eager to get to Paolou so that we could potentially get back to Grigoriou if necessary, we pressed on.



On the way we passed the most spectacular waterfall where we refreshed ourselves and finally arrived in Paolou after evening prayer had started. Not surprisingly we couldn't find any monks so we waited patiently until they were finished and were quickly ushered into the dinner hall. A monk read a story from the Bible during the entire meal, which consisted of (sour) rice porridge, bread, some olives and water. After dinner, we went to the guest house where the guest master monk told us we would be getting the last room available, which we shared with two Macedonian pilgrims. Paolou boasted electricity and hot showers, which we gladly took and settled in for an early night.

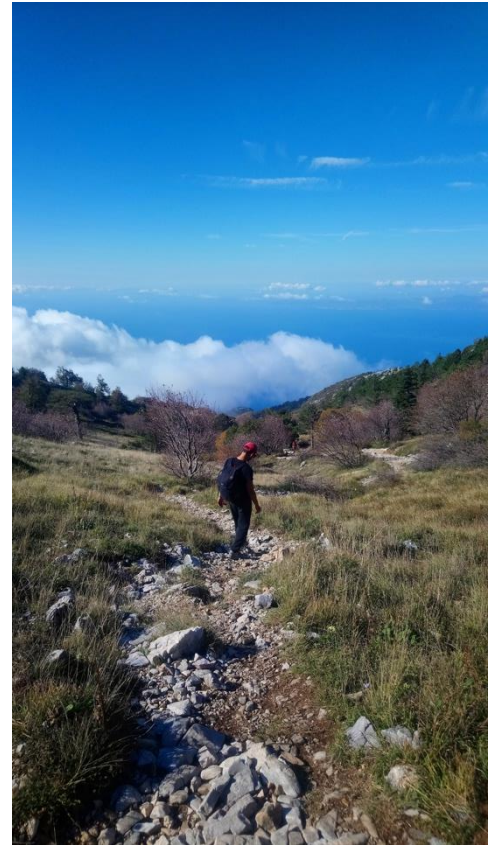
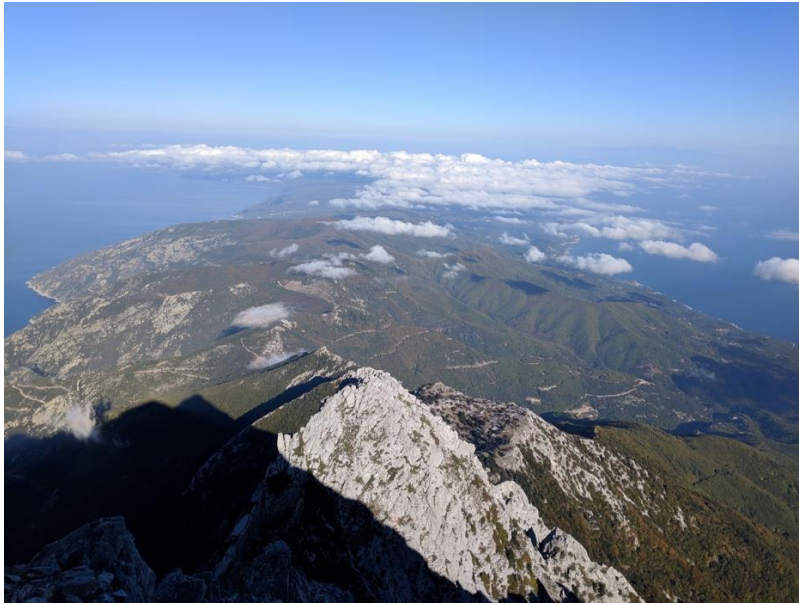


Day 2, 07/10/18:

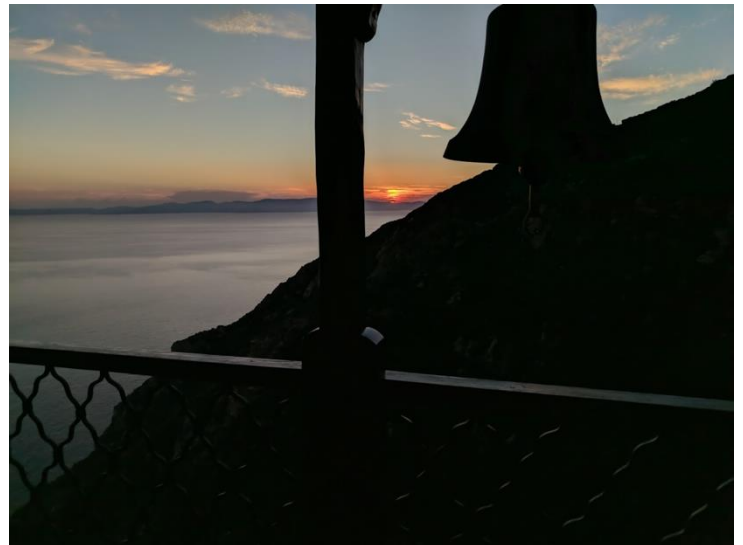
A bell is rung throughout the monastery at 3am to raise pilgrims for morning prayer starting at 4am. One of our roommates gets up for the prayer, while his friend stays in bed. At 4am we get up and quietly walk to the kitchen where we try to knock but are not let in. Finally a monk sees us and takes us to the side entrance where we ask for some provisions for the day. The monk who generously

packs us lunch (feta, olives, bread, halva) asks about our plan to climb Mt Athos and says most take 6 hours, but he did it in 4, however he is 'quite fast'. Challenge accepted. At 4.30am we are on the road with head torches. We pass by St Anne's sket, accidentally wake up a sleeping donkey and head up into the mountain. We arrive at the top at 10am and after taking in the view and a few pictures we rush to get down in time for the ferry to take us back to our home for the night - Simonopetra.





On the final stairs down we bump into our Macedonian roommates and we make the ferry with an hour to spare. All is well, except we do not queue at the ferry door in time for our stop, the ferry stops - drops its drawbridge for a moment and since noone gets off, it raises and reverses as we try to get the staff's attention to no avail. We briefly contemplate jumping overboard and swimming ashore, but with no way to waterproof our electronics we watch Simonopetra disappear behind a cliff as we head into Daphne again. Our dreams of ouzo and loukoms are replaced by the nightmare of missing dinner. In Daphne there is no transportation so we set off on a 7k hike, already exhausted from climbing a mountain earlier. We miss dinner, but a monk shows us the monastery relics (normally shown and venerated after dinner) and promises we would get a meal as soon as the rest of the pilgrims and monks are out. Dinner at Simonopetras is a 5-star experience compared to Paoulou, with tomato pasta, salad, bread, feta, olives, boiled eggs, apples and water. After dinner we head into a 5-person room which we have to ourselves, relax for a bit then go to watch the sun setting over the sea from the balcony.

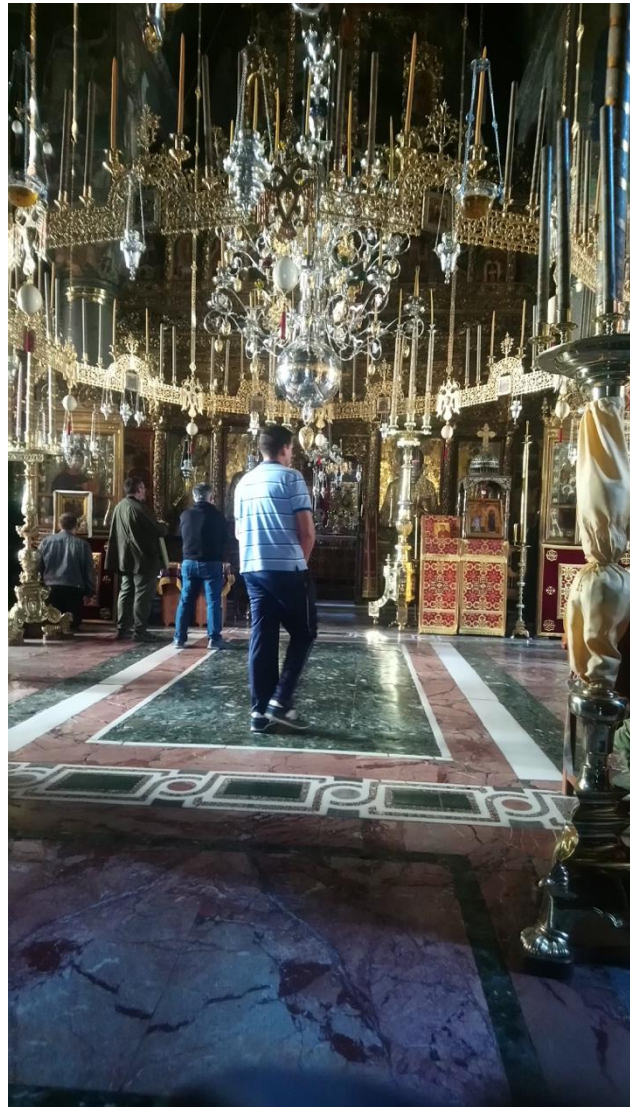


Day 3, 08/10/18:

Having a slightly more relaxed day ahead we decide to wake up with the monks at 4am and go to the morning service. Unfortunately, there is no wake-up call at this monastery and we wake up at 7am, managing to get in for the final minutes of the service where Adam tries to take communion but is caught by one of the monks for not being Orthodox and gets ushered out. There is no breakfast that day, monks only have breakfast on certain days of the week, but we are given some apples by the guest master monk who we befriended. A shuttle driven by a monk at 10am takes us back to Daphne. A bus takes us to Karies, the de-facto capital of Mt Athos where there is taxi-rank of sorts

with shuttle buses going to different monasteries. We aim to spend the night in Zografou, the Bulgarian Monastery on the peninsula, one of only two non-greek monasteries in Mount Athos. We hope that Iskren being Bulgarian would be seen as a reason to accommodate us despite arriving unannounced and we also know that the original manuscript of the first ever record of Bulgarian history is stored in the monastery, which we hope to see. But not before visiting Vatopedi, a monastery sometimes associated with starting the Greek economic crisis for a questionable deal with the Greek government which saw it obtain property in value of upwards of 1 billion euros. The hike between Zografou and Vatopedi is 4km, so we take the shuttle to Vatopedi. On the way, our papers are checked at a sort of border control, which asks for confirmations that we have permission to stay at Vatopedi. We say we are only visiting and are staying at Zografou and they let us go.

Vatopedi is a sight to behold from afar with numerous buildings spread around the hills surrounding it, some looking very modern indeed. We enter and go into the church, where we befriend father Grigorious, who speaks perfect English and studied Electronic Engineering at Stanford. He takes us around the Monastery, tell us about the history of the Monastery, Saints, Elders and Miracles that have occurred. He asks if we would like to stay the night. Having previously been rejected from Vatopedi over email, this seems like an offer too generous to refuse so we accept. He makes some arrangements and we head into the guest house for the customary ouzo, water and loukoums. A young monk shows us to our room, which we share with noone. We head back to the church, where Adam curtsy's the Abbot father Ephraim (a saint-like figure father Grigorios told us has performed many miracles). We join the monks for a 1 hour prayer (the first and only full service we attend) and have dinner on ancient-looking stone tables in an air-conditioned hall. Dinner is rice and vegetables, bread, feta, salad (DIY), pomegranates, apples, water.



After dinner father Grigorious tells us more about Vatopedi, its Elders, their many miracles. We then head into his office, where he logs onto his computer on a central system, the latest IBM technology and he shows us some of the projects the monastery has been working on, including a solar farm, biofuel energy plant, full restoration of various buildings and even an ancient university. As it is St

John's day, there is an evening prayer from 9pm to 1am. We decided to retire to our room to contemplate the day's events and our conversation with father Grigorious.

Day 4, 09/10/18:

We leave early for a short hike to Zografou, where we arrive in time for the last hour of church service (in Bulgarian!). Afterwards we bump into our Macedonian friends again who have stayed in the monastery since we last saw them, we visit the 3 churches and have a conversation with one of the monks about the history and miracles of the monastery. At 11am we have lunch, a stew with wine and wafer bars. The monks ask us to help clear away the tables. We agree to meet the monk we spoke to previously to show us around and tell us the history, but instead we see an old man who is working on the repairs in the monastery carrying huge pieces of plywood on his own. We offer to help and he graciously accepts and we spend some time carrying plywood, even getting the Macedonian guys to help out too. We don't see the monk again, but we befriend another one, father John, a young Lithuanian monk who used to live in London. He tells us we cannot see the Bulgarian 'Elder Scroll' as the only monk with keys to the room where it is stored has gone to a cell for the day to pray, as it is St John's day. He tells us his story of his life in London, his wife, why their marriage failed and how he ultimately became a monk. Before we leave we ask one of the monks in the guest house to tell us about the history of the monastery which he does somewhat begrudgingly, then berates us for not going to church regularly. We get on a shuttle to the west coast where we catch the ferry and arrive back at Ouranoupoli.



9. Publicity



Instagram:

Before the expedition the team took turns posting images related to the expedition on Instagram. These were on various topics such as Ocean Plastics, preparations and sailing, with the idea to raise awareness and build excitement ahead of the trip.

During the expedition, we posted updates to keep our friends and like-minded individuals updated on how we were progressing. @ocean_objective

Blog:

We also maintained a blog, where we wrote about aspects of the expedition that required a deeper dive. For example how we built our own trawl or a breakdown of one of our longest passages where we were officially 'at sea'. Link: <http://oceanobjective.co.uk/>

Radio:

The local radio in Varna got to know about our story and they contacted us to do an interview during the trip. This covered the aims of the expedition, the problem of ocean plastics and our progress in the expedition to date. At the time we were at Milos and preparing to face the Medicane.

Link: <http://bnr.bg/varna/post/101023924/varnenec-rakovodi-ekspedicia-ot-angliiski-studenti-v-sredizemno-more>

During the first interview we arranged to visit them at the end of the expedition, when Iskren and Adam went to the studio in Varna and made a second appearance in prime time, talking about the expedition, raising awareness for the problem and urging listeners to be part of the change.

Link: <http://bnr.bg/varna/post/101031530/prikluchi-studentskata-ekspedicia-v-sredizemno-more-opazvaneto-mu-zavisi-i-ot-otdelnia-chovek>

TV:

We also got in touch with local TV “Cherno More” or “Black Sea” and gave an interview which aired in their morning slot, where we also showcased some of our samples and Adam talked about how much he likes Bulgaria.

Link:<http://www.chernomore.bg/video/2018-10-16/shtrih-ot-utroto-16102018-varnenets-predvozhda-ekspeditsiya-sreshtu-plastmasata>

Direct to YouTube: <https://www.youtube.com/watch?v=svhEHHq93O4>

We also got in touch with the Bulgarian National Television (BNT) where we took part in a documentary series about education, discussing higher education in the UK and Bulgaria, the research in the expedition and how we prepared for it. This aired on the 27th November)

Link:<https://www.bnt.bg/bg/a/znaniebg-27112018> (Iskren and Adam around 6:25)

10. Budget

Most of the equipment outlined in section 6 is already owned by the team or will be included in the boat hire. The budget outlines the items and consumables the will need to be purchased.

Item	Total Cost	Details
Boat rental 6 weeks	£5,313.00	Rented vis Click & Boat from Kavala
Boat fuel	£367.50	Refuelled the boat three times during the trip
Food supplies	£536.00	All food required for expedition duration
Moorings, water and electric	£53.00	We mostly moored in free marinas or anchored off, and found free water and electric.
Transportation	£282.00	Includes, return train and bus tickets from Varna to Kavala, car rental in Lesvos and Santorini.
Flights	£1,112.00	Return Flights for everyone, including baggage
Sailing Charts	£204.00	Paper Imray charts covering entire expedition
Courtesy Flags	£20.85	
Filter water bottles	£60.34	
Research Equipment	£275.32	Materials to build the trawl, and equipment to process and store samples.
Sail repair tape	£12.00	
Travel Insurance	£480.00	(aprox) Specialist sailing insurance was needed.
First aid kit	20	Topped up kits held by team members & boat charter had a large first aid kit aswell.
Cooking gas	25	
	£8,761.01	

11. Safety and Risk Assessment

11.1 Offshore exploration risks

General management of risk: Three members of the team held RYA Day Skipper qualifications. The lead skipper will held a RYA Yachtmaster qualification and all team members were qualified in outdoor first aid

People at risk: Members of the expedition team. Other sailors in the vicinity of the vessel. Shorebased members of the public – during mooring periods.

11.1.1 Physical health

Hazard	Effects	Controls and/or actions needed	Likelihood - Severity	Risk Factor
Man overboard	<ul style="list-style-type: none"> · Risk of drowning · Risk of Hypothermia · Risk of impact injury 	<ul style="list-style-type: none"> · Follow all safe practices for movement about a yacht above deck at all times · Implement man overboard rescue method if needed 	2 - 5	10
Drowning	<ul style="list-style-type: none"> · Severe damage to the brain · Death 	<ul style="list-style-type: none"> · Ensure buoyancy aids are correctly fitted and worn at all times during periods of instability (bad weather or high swell) · Competent supervision by all members of the team overseen by the skipper · Establish strong swimming ability prior to departure and full understanding of possible risks in water. 	1 - 10	10
Bad weather	<ul style="list-style-type: none"> · Difficulty in navigation · Unstable sailing conditions · Increased risk of man overboard. · Increased risk of hypothermia above deck. 	<ul style="list-style-type: none"> · Research seasonal weather patterns before departing · Keep a log of weather forecast and update every 6 hours · Use barometer with ship log to document rapid changes in pressure indicating storm likelihood · Note nearest 'safe-haven' locations for each passage plan · If caught in bad weather, employ rigorous use of manual and GPS chart plotter navigation techniques 	6 - 4	24

		· Use local knowledge for safe passage to adapt route during expedition		
Hypothermia	· Lower core body temperature · Shivering/loss of feeling · Death	· Wear sufficient warm, water and wind proof layers including spares. · Maintain awareness of condition of team · Switch above deck rota if members show signs of initial stages	3 - 5	15
Exhaustion, fatigue	· Lower core body temperature · Reduced ability to function effectively	· Limit shifts above deck to 12hours during long passages · Implement group supervision to ensure all team members are adequately rested.	3 - 4	12
Dehydration	· Sickness · Death	· Frequent water breaks when working above deck or in Sun · Ensure water purifier on-board functions effectively · Maintain constant supply of fresh water and reserves.	4 - 4	16
Trips and falls above deck	· Increase risk of man overboard · Loss of consciousness · Sprains or twists · Fractures · Other injuries.	· Ensure boat shoes are worn at all times above deck for grip purposes · Keep cockpit and deck clear of rope, equipment and personal items · Maintain three points of contact with the vessel when moving both above and below deck.	6 - 3	18
Impacts with solid objects above deck	· Increase risk of man-overboard · Loss of consciousness · Head injuries · Muscular bruising	· Ensure team members have a full understanding of boom hazard · When under sail, keep members within the cockpit boundary as much as possible · Exercise care in access and egress areas · Competent use of sails and rope work above deck utilising skills gained through qualifications and theory practice	4 - 4	16

Small injuries (e.g. cuts, sprains)	<ul style="list-style-type: none"> · Inability to use affected body part 	<ul style="list-style-type: none"> · Be cautious at all times, take no unnecessary risks · All members should be familiarised with equipment before departure 	6 - 3	18
Larger injuries (e.g. severe bleeding, fractures)	<ul style="list-style-type: none"> · Serious or permanent injuries · Ending of expedition. 	<ul style="list-style-type: none"> · Be cautious at all times, take no unnecessary risks. · Operate as at least a team of two at all times · All members will be first aid trained to deal with immediate issues 	2 - 8	16
Injury due to heavy loading or physical exertion	<ul style="list-style-type: none"> · Muscular damage · Inability to continue working at full capability 	<ul style="list-style-type: none"> · Distribute loads between groups fairly, taking into account fitness and any injuries · Warm up/stretch each morning before beginning day 	2 - 6	12
In relation to using the windlass	<ul style="list-style-type: none"> · Trapping fingers/toes/limbs in the anchor hauling mechanism · Loss of fingers, toes or nails 	<ul style="list-style-type: none"> · Ensure team members have a full understanding of the windlass hazard · Ensuring team members are properly briefed on operation · Exercise extreme caution when performing physical operations near the windlass when operational 	3 - 4	12
Related to use of the winches	<ul style="list-style-type: none"> · Trapping fingers/toes/limbs · Loss of fingers, toes or nails · Bruising or breakages of larger body parts 	<ul style="list-style-type: none"> · Exercise correct rope handling technique when operating winches and handles · Keep the area clear of stray rope hazards and the working area tidy · Maintain a constant awareness of surroundings through observation and communication 	3 - 4	12

11.1.2 Vessel and equipment

Hazard	Effects	Controls and/or actions needed	Likelihood - Severity	Risk Factor
Collision with other vessels	<ul style="list-style-type: none"> · Permanent damage to either party 	<ul style="list-style-type: none"> · Ensure a watch for other vessels is kept at all times 	3 - 7	21

	<ul style="list-style-type: none"> · Severe threat to human life · End of expedition 	<ul style="list-style-type: none"> · When passing close to other vessels, employ proper fending off techniques · Maintain contact with nearby vessels at times of risk · If contact does occur, assess the situation, limit further risks and notify the relevant authorities (emergency or official) as soon as possible 		
Collision with land	<ul style="list-style-type: none"> · Permanent damage to vessel · Severe threat to human life · End of expedition 	<ul style="list-style-type: none"> · Ensure a watch for other vessels is kept at all times · When passing very close to onshore features, employ proper fending off techniques · Keep a constant watch of depth meter · Plot adequate and safe routes around reefs and shallow underwater features when planning a passage · If contact does occur, assess the situation, limit further risks and notify the relevant authorities (emergency or official) as soon as possible 	2 - 8	16
Handling vessel under engine	<ul style="list-style-type: none"> · Damage to engine · Damage to propeller/keel 	<ul style="list-style-type: none"> · Conduct regular checks of the engine each morning · Under no circumstances exceed the vessel's maximum engine rpm · Keep watch and avoid areas of floating debris 	1 - 5	5
Handling vessel under sail	<ul style="list-style-type: none"> · Damage to sails · Damage to onboard equipment 	<ul style="list-style-type: none"> · Adhere to the directions of the skipper and safe sailing practices established through training and previous experience · Understand the limitations of the vessel before departing · Use the sailing forecasts and other tools available to make a safe judgement of sailing conditions · Ensure the deck is kept tidy at all times for effective and safe equipment management 	2 - 5	10
Quayside moorings	<ul style="list-style-type: none"> · Collisions with land or vessels · Injury to a team member 	<ul style="list-style-type: none"> · Ensure team members are properly briefed on the geo/hydrographical features of the area before approaching mooring · Allocate roles and communicate with members of the team 	4 - 4	16

	· Injury to an assisting member of the public	· Communicate with staff/people onshore if possible		
Loss of equipment overboard	· High costs to replace	· Tie down expensive equipment adequately before being left unattended · Keep valuable items below deck at all times if possible	4 - 2	8
Anchorage	· Dragging of anchor at an unstable mooring · Collisions with other vessels or the shoreline	· Employ similar prevention methods to a quayside mooring · Once anchored, exercise observational techniques to identify possible dragging · Be fully aware of risks that may arise from changes in conditions over time · Maintain a constant watch of the vessel at all times · Use an anchor alarm app, using GPS to send an alert if the vessel has moved outside a pre-specified radius (the length of the chain)	4 - 3	12
Improper dinghy management	· Loss of dinghy · Loss of outboard engine · Risk of solid object impact when untethered	· Only use the dinghy in periods of calm weather · Ensure outboard and dinghy are fully tethered down when under sail	4 - 2	8

11.2 Onshore exploration risks

General management of risk: All members of the team travelled as a group when appropriate and maintained contact during any periods of separation. Team members only undertook exploratory activities that they felt comfortable and capable of achieving. The vessel was adequately moored securely and safely to the best of the team's ability before being left for any prolonged period of time. When anchored, a single team member remained aboard the vessel at all times unless departure of all four team members was absolutely necessary.

People at risk: Members of the expedition team and members of the public

11.2.1 Trail running/hiking and general outdoor activities

Hazard	Effects	Controls and/or actions needed	Likelihood - Severity	Risk Factor
Loss of direction	· Unplanned exposure	· Frequently check map and GPS · Ensure all members are aware of the route and capable of navigating alone.	3 - 4	12

Exhaustion, fatigue	· Lower core body temperature.	· Frequent, adequate rests catering to the weakest group member · Always carry sufficient water plus emergency and carry emergency, high energy food	3 - 3	9
Dehydration	· Sickness · Death	· Frequent water breaks · Carry sufficient water plus emergency	2 - 5	10
Hypothermia	Refer to physical health section above	· Wear sufficient warm, water and wind proof layers including spares · Always change out of wet items as soon as possible.	2 - 5	10
Bad weather	· Difficulty in navigation · Unsuitable outdoor conditions	· Refer to map and GPS more often · Share the responsibility between group members · Be prepared to adjust plans and return earlier than anticipated	3 - 4	12
Trips and falls	· Sprained, twisted or fractured ankle or knee · Other injuries	· Aim to be back in safe location by dark · Take care when moving around throughout the day, taking no unnecessarily hazardous routes	5 - 4	20
Group separation	· Delays · Increased likelihood of becoming lost or injured	· All members should be aware of the route and have equipment to navigate · All members carry personal first aid kits	5 - 2	10
Small – major injuries	Refer to physical health section above	Refer to physical health section above	6 - 3	18

11.2.2 Rock climbing and deep water soloing

Hazard	Effects	Controls and/or actions needed	Likelihood - Severity	Risk Factor
Hit by falling objects	· Shock · Serious injury · Death	· Maintain awareness of surroundings and climbing conditions · Always wear correct safety equipment and be prepared to raise alarm if required	3 - 7	21
Free fall from height	· Shock · Serious injury · Death	· Ensure team members are safely attached to anchor points at all times · Check equipment for faults and defects	1 - 7	7

Roped fall from height	<ul style="list-style-type: none"> · Shock · Serious injury 	<ul style="list-style-type: none"> · Ensure team members are trained to cope with roped falls when lead climbing and on belay · Wear correct safety equipment at all times. 	<p>4</p> <p>-</p> <p>3</p>	12
Trips and slips	<ul style="list-style-type: none"> · Sprained, twisted or fractured ankle or knee · Other injuries 	<ul style="list-style-type: none"> · Keep equipment and ropes tidy, specifically in confined areas · Keep routes to and from the wall clear of obstacles 	<p>6</p> <p>-</p> <p>3</p>	18
Equipment failure	<ul style="list-style-type: none"> · Un-roped free falls from height 	<ul style="list-style-type: none"> · Constantly check equipment for faults that may appear when put under load · Make individual inspections of one another before beginning a climb 	<p>1</p> <p>-</p> <p>8</p>	8
Hair catching in equipment	<ul style="list-style-type: none"> · Injury to scalp 	<ul style="list-style-type: none"> · Tie back all loose hair or cut hair if needed 	<p>2</p> <p>-</p> <p>4</p>	8
Rope burn	<ul style="list-style-type: none"> · Blistering of skin on hands, in ability to climb 	<ul style="list-style-type: none"> · Use correct rope handling techniques or gloves if necessary 	<p>3</p> <p>-</p> <p>3</p>	9
Incorrect climbing and belay techniques	<ul style="list-style-type: none"> · Increased probability of harmful fall 	<ul style="list-style-type: none"> · Team members will undergo training before the trip to ensure they are well practiced with safe techniques 	<p>2</p> <p>-</p> <p>4</p>	8
Poor rock conditions	<ul style="list-style-type: none"> · Possible rock falls · Increased risk of slips 	<ul style="list-style-type: none"> · Only climb if the route conditions are ideal. · Be aware of changing conditions and make safe judgements in changeable weather. 	<p>3</p> <p>-</p> <p>4</p>	12
Free fall from height into shallow water	<ul style="list-style-type: none"> · Broken bones/back/legs · Loss of consciousness · Drowning 	<ul style="list-style-type: none"> · Always scout the route and water depth beforehand · Have a spotter in the water outside of the drop zone at all times to watch any fall · Have a safe system of rescue in place should there be a problematic fall 	<p>3</p> <p>-</p> <p>5</p>	15
Free fall from height into deep water	<ul style="list-style-type: none"> · Impact injury with water · Damaged ear drums · Loss of consciousness · Drowning 	<ul style="list-style-type: none"> · Always remain aware of body orientation and the 'escape' position when climbing · Employ safe techniques for entering water from a height · Have a spotter in the water outside of the drop zone at all times to watch any fall 	<p>5</p> <p>-</p> <p>3</p>	15

		<ul style="list-style-type: none"> · Have a safe system of rescue in place should there be a problematic fall 		
Shoreline directed swell	<ul style="list-style-type: none"> · Impact injury with rocks · Loss of consciousness · Drowning 	<ul style="list-style-type: none"> · Never climb over water with a high swell towards the shore · Orientate body feet first towards the shoreline if caught in a swell · Have a safety line set up for emergency casualty retrieval 	4 - 4	16
Drowning	<ul style="list-style-type: none"> · Loss of consciousness · Death 	<ul style="list-style-type: none"> · Establish strong swimming ability prior to departure and full understanding of possible risks in water · Monitor one another in the water as a team and maintain visual and verbal contact at all times · Have a safety line set up for emergency casualty retrieval 	1 - 9	9