

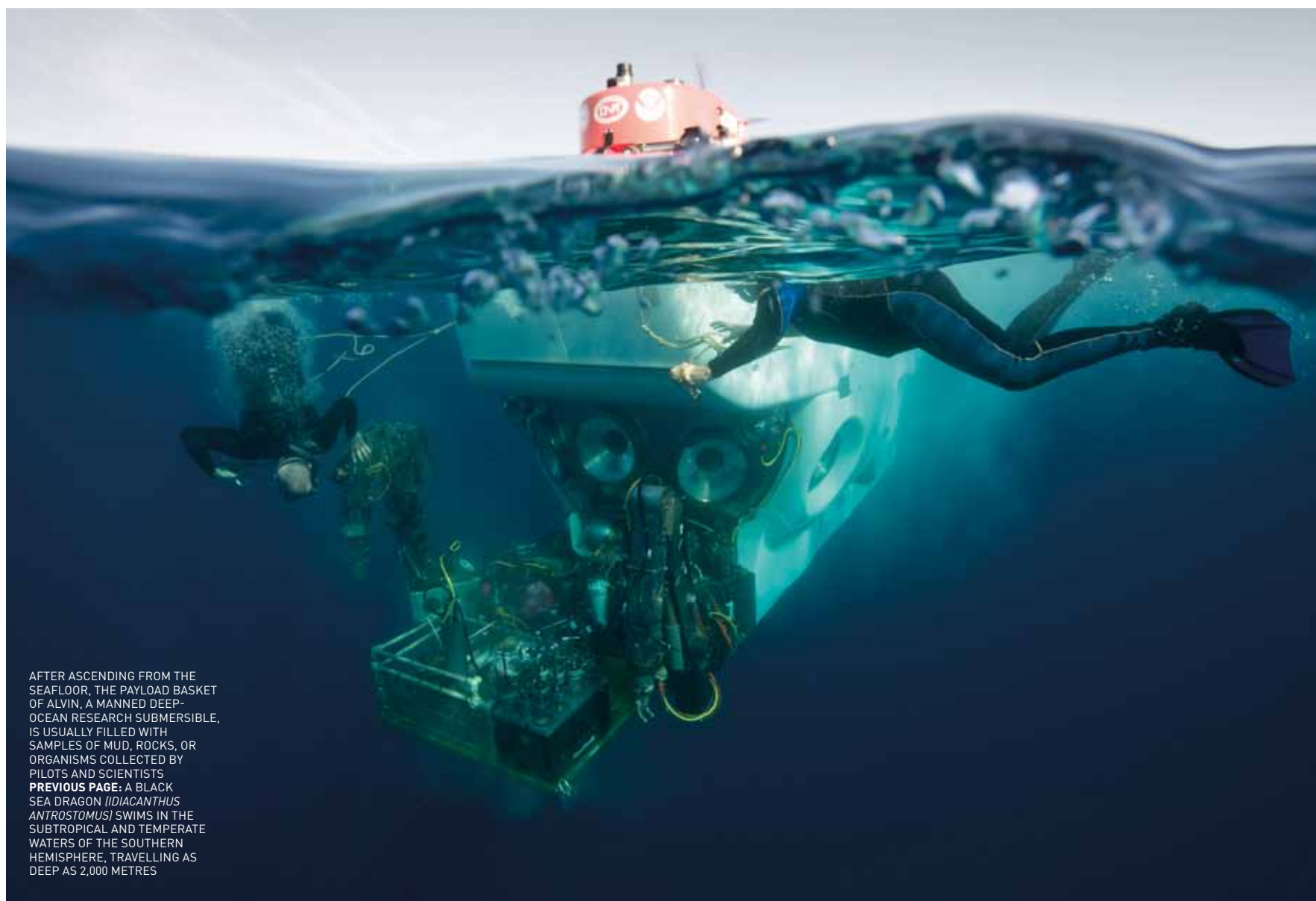
It is a great, vast, unexplored land. And it's a land about which we still know remarkably little. Yet as **Chris Wright** explains, it's not a distant planet — but the stuff that surrounds us. Join us on a journey to the ocean's depths, to explore just how much of it is still yet to be discovered

DEEP SECRETS

PHOTO: GETTY IMAGES

As a species, human beings have a tendency to look up before we look down. Most people tend to know a lot more about the stars above us than the oceans beneath us. We are captivated by the idea of space travel, much more than we are about the sea floor — despite the fact that the sea is all around us, on our very own planet.

Did you know that four times as many people have walked on the moon, as have been to the very bottom of the sea? So perhaps it should be little surprise then, that when Don Walsh, one of the first two men to go to Challenger Deep at the bottom of the Mariana Trench off Guam — the deepest point in the Earth's surface — finally comes to write his autobiography, he is thinking of calling it *The Right Stuff. The Wrong Direction*.



AFTER ASCENDING FROM THE SEAFLOOR, THE PAYLOAD BASKET OF ALVIN, A MANNED DEEP-OCEAN RESEARCH SUBMERSIBLE, IS USUALLY FILLED WITH SAMPLES OF MUD, ROCKS, OR ORGANISMS COLLECTED BY PILOTS AND SCIENTISTS
PREVIOUS PAGE: A BLACK SEA DRAGON (*IDIACANTHUS ANTROSTOMUS*) SWIMS IN THE SUBTROPICAL AND TEMPERATE WATERS OF THE SOUTHERN HEMISPHERE, TRAVELLING AS DEEP AS 2,000 METRES

PHOTO: CHRIS LINDER © 2014 WOODS HOLE OCEANOGRAPHIC INSTITUTION

ur indifference towards the sea, and in particular the sea floor, is illogical. "We're talking about 70 percent of the planet's surface," says Rob McCallum, a long-standing ocean explorer with a rich CV that ranges from the wrecks of the *Titanic* and the *Bismarck*, to the ocean vents of the mid-Atlantic ridge. "Look what we found on the first 30 percent: some pretty cool stuff," he says. "There's no reason to think it's going to be any different down there."

And yet, comparatively speaking, we know very little about it. McCallum says that the ocean's depths remain one of our final frontiers. "You could spin a globe and throw a dart at it, and anywhere you decided to search the ocean would be new and exciting," he says.

"Because we know virtually nothing. We've explored so little of the sea floor."

Partly, this is about cost. And partly, it's about convincing people that there's a point to it. "Many years ago, one of our members of Congress was asked questions about investing in ocean research, and he replied: 'Fish don't vote,'" Walsh, a true pioneer of the bottom of the ocean, tells *DCM*.

"It's a profoundly stupid statement but it encapsulates, almost in a Confucian proverb, the basic problem," he reflects. "Well, shame on us: knowing the world's oceans, and what's going on there, affects every living thing on the planet."

Clearly, ocean exploration does happen, but it's not necessarily in the name of

science, but resources. "In our society, science is not always a key motivator, unless people can see there's going to be some benefit from it," says McCallum.

For a while, he says, the idea of exciting new compounds was seen as a motivation: perhaps there was some creature, some plant, some biological resource in the deep that might yield the cure for cancer or reverse Alzheimer's disease or some other medical use. Now, the prompt, if anything, is likely to be the search for mineral resources: an extension of the mining industry on land.

"We do a lot of deep water engineering for people who want to exploit minerals, perhaps rare earth elements or valuable industrial compounds," says McCallum. "If all the

THE DEEPSEE IS A CUSTOM-BUILT SUBMARINE, CAPABLE OF CARRYING A PILOT AND TWO PASSENGERS TO A DEPTH OF 450 METRES

OPPOSITE: PARTS OF THE WRECKAGE OF AN AIR FRANCE FLIGHT 447 FOUND IN THE ATLANTIC AFTER CRASHING OFF BRAZIL IN 2009 INCLUDED THE ENGINE, SEEN HERE, FOUND RESTING ON THE OCEAN FLOOR

THE MISSING MH370

In January 2015, less than one year since its mysterious disappearance with 239 passengers and crew on board, Malaysia officially declared its missing flight MH370 to be an accident, although the deep-sea search still continues. Search ships are focused along an area of the southern Indian Ocean dubbed “the 7th arc”, where international investigators believe the plane ran out of fuel. The current search area is the result of months of analysis of satellite data, combined with aircraft performance factors such as fuel range, speed and altitude.

PHOTOS: GETTY IMAGES (MAIN); REUTERS (AIR FRANCE ENGINE); WOODS HOLE OCEANOGRAPHIC INSTITUTION (ALVIN SUBMERSIBLE)

exploitation of minerals so far has been on 30 percent of the world, it’s logical to go to the next 70 percent, and find just as much or more than what you found,” he reasons. “It’s the same planet. It’s just covered in sea water.”

McCallum today runs a business called Williamson & Associates, a deep water search facility. Part of its role is industrial, looking at

“THE ROMANTIC NOTION IS THAT YOU DRIVE AROUND IN A YELLOW SUBMARINE AND LOOK OUT OF THE WINDOW. IN REALITY, IT’S MOSTLY DONE THROUGH OTHER MEANS”

cable routes for undersea telecommunications and power, for example. Another part is finding things that have gone missing. Williamson has sonar equipment capable of acoustic measurement spanning up to 7,000 metres deep.

Is there much call for that? “Well, there are over a million shipwrecks out there,” says McCallum. “The most high profile things are aircraft. When an aircraft goes missing at sea, which they often do because 70 percent of our planet is covered

in water, and if they’re below five hundred metres, finding them is a real challenge.”

To cope with such challenges, McCallum built a ship, the *Alucia*, for deepwater research. Its debut mission was to find Air France flight 447, which went missing in 2009 off Brazil. Impressively, they succeeded in finding debris.

So how exactly does one set out to find a missing object at the bottom of the sea? “It’s like searching for anything. You need to know roughly where to start,” he says. “If you lose your car keys, did you leave them outside? In the pub? You have to know where to start looking.”

McCallum believes that this was a central problem with the 2014 search for Malaysian Airlines flight MH370. “No-one really knows where to look — as there hasn’t been a single scrap of physical evidence.” Once that’s identified, he says, it’s then about three things: first, having sonar that can work at the necessary depth, and a high quality of coverage so that no area is missed out.

Then it’s all about having skilled people who can interpret that data. “Because acoustic data is just a physical representation of sound waves. You’ve got to have someone who can read the signals, and tell what they’re looking at.”

Increasingly, a new technology is being used which involves charging the sea water with electricity, and then examining how the sea bed reacts to that change. This in turn enables people to understand more clearly what’s down there. “The romantic notion is that you drive around in a yellow submarine and look out of the

window. In reality, it’s mostly done through other means.”

Exploration for its own sake is comparatively more rare. Both Walsh and McCallum



were instrumental in helping Jim Cameron on his solo dive to Challenger Deep, in 2012. Do they think that this deep sea journey heralded a new period of interest in exploring the depths?

“You know, I’ve got to be honest and say, I am skeptical,” says McCallum. “I was on the Cameron team on *Deepsea Challenger*, a fantastic project. Jim did so well to develop that technology, and to have the gumption to drive it through,” he says. “But when I went to see the movie of Jim’s project, I saw it in a picture theatre with two other people. I went again and there was one person, and that was me.”

McCallum feels that people may be missing a beat, in terms of the epic nature of these endeavours. “It was tremendously sad. I wondered how big the audience would have been if it had been ‘Burt’s Voyage to the Moon’.”

When Don Walsh did his own dive with Jacques Piccard on a craft called the *Trieste* in 1960,

ACCOMPLISHED DIVERS

1620

ARE WE SCREWED?

DREBBEL’S SUBMERSIBLE

DUTCH PHYSICIST CORNELIUS DREBBEL CREATES THE FIRST HUMAN-POWERED SUBMARINE IN HISTORY, A ROWBOAT-LIKE CRAFT WITH A SYSTEM OF SCREWS THAT ALLOWS THE CRAFT TO SINK TO A DEPTH OF 4.5 METRES UNDER THE RIVER THAMES



1953

DEEP LADY

TRIESTE

MANY HAVE HEARD OF THE BATHYSCAPE (MEANING “DEEP BOAT”) *TRIESTE* — AND WITH GOOD REASON. IN 1960, THE SUBMERSIBLE DIVED TO 10,911 METRES, THE DEEPEST POINT ON EARTH, THE MARIANA TRENCH. SHE EMERGED UNSCATHED, HAVING SURVIVED PRESSURES OF EIGHT TONNES PER SQUARE INCH

1964

TITANIC BOMB-HUNTING

ALVIN

THE FIRST DEEP-SEA SUBMERSIBLE CAPABLE OF CARRYING PASSENGERS, ALVIN HAS TAKEN MORE THAN 13,000 SCIENTISTS AND OBSERVERS TO THE SEA FLOOR, AND IS STILL OPERATING. SHE HAS VISITED THE *TITANIC*, AND IN 1966 EVEN HELPED RETRIEVE A LOST HYDROGEN BOMB



1976

NEUTRAL OBSERVER

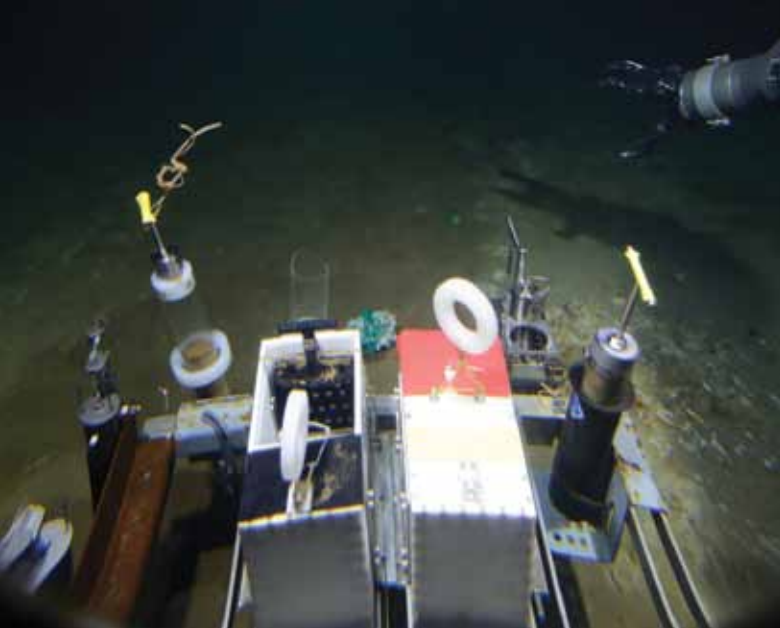
CLELIA

THE BEATLES WOULD LOVE THIS CRAFT (SHE’S A YELLOW SUBMARINE). OUTFITTED WITH ACTIVE SONAR, A SUCTION SAMPLER AND A MANIPULATOR THAT CAN HANDLE 70 KILOGRAMS, SHE CAN ALSO BE BALANCED TO NEUTRAL BUOYANCY, PROVIDING A STABLE PLATFORM FOR OBSERVATION

Flip your perspective for a terrifying, awe-inspiring look at the depths of the ocean. There might not be much light as you dive ever deeper, but you can still find life, warmth and evidence of humanity



CHALLENGER DEEP THERE HAVE ONLY BEEN TWO MANNED MISSIONS TO REACH THE DEEPEST POINT OF THE OCEAN, THE UNIQUE VERTICAL SHAPE OF THE *DEEPSEA CHALLENGER* ALLOWED THE VESSEL TO DESCEND QUICKER, ALLOWING JAMES CAMERON TO EXPLORE THE BOTTOM FOR NEARLY NINE TIMES LONGER THAN THE *TRIESTE*



there was a period of celebrity. He used the opportunity to try to lobby for further exploration and budget.

"After we surfaced on the *Trieste*, Jacques and I were topside, idling, and we said: how long will it be before someone comes back and does another dive here for science? We agreed on two years. It was 52 years. We were out by half a century, and Jacques never lived to see it." Walsh says he was "extremely proud" to be involved in Cameron's dive: after 40 years, he had begun to believe that nobody would ever bother going back.

Today, it would be exceptionally difficult to conduct a manned dive to those depths anyway. "We really do not have any capability of exploring the deep ocean beyond 6,000 metres," says Walsh. "There are a handful of vehicles, less than six in the world, that could go down there and come back."

Even among those craft that *can* make it down there, several have suffered ill fortune in

recent years. The Japanese ROV *Kaiko*, an unmanned vessel that became the second craft to go to Challenger Deep in 1995 (and the first to take photographs, as Walsh's dive had stirred up too much sediment), was lost at sea in a typhoon in 2003 when a cable snapped.

Then there was the *Nereus*, another unmanned vehicle, built by the famed Woods Hole Oceanographic Institution in the United States, and the next to go to Challenger Deep, in 2009. That, too, was lost at sea, exploring the Kermadec Trench in the South Pacific, after apparently imploding.

Walsh says that Cameron's craft, *Deepsea Challenger*, will likely never dive again: Cameron has bequeathed it, at least temporarily, to Woods Hole. But as a single-person submarine, it is unlikely ever to be used for meaningful scientific exploration, as no biologist would ever be allowed to take off to that depth by themselves.

There is a Chinese manned sub, *Jiaolong*, named after a

mythical sea dragon, that can reach 7,000 metres, and a Japanese one, *Shinkai 6500*, yet both of those would implode if they tried to go as deep as Walsh and Cameron did. "And that," says Walsh, "is it."

The next undersea pioneers are likely to be from China. Walsh says the Chinese are working on a project to build a new submersible that could reach 11,000 metres. But given that existing subs can cover 98 percent of the sea floor, what's so important about the trenches?

"These trenches are only two percent of the sea floor — but that two percent is about the same area as the US, Alaska, and half of Mexico," Walsh explains. "So it's worth doing. It's like telling a mountain climber they can't climb above 5,000 metres. We have to explore every nook and cranny of the world's oceans."

Besides, these are the deepest accessible parts of the Earth's crust, and there is a lot to learn down there. Walsh talks about plate tectonics, the method through which continental plates move and collide. Some of the most interesting aspects of this are happening under the sea, where new crust is formed, moved and subducted — in the Mid-Atlantic Ridge or the East Pacific Rise off Mexico, remarkable things are happening.

"How are we going to understand that process of plate tectonics if we don't know about the trenches?" says Walsh. "I've been on the mid-Atlantic ridge at the Azores. I've watched the smokers [the hydrothermal vents deep in the sea which emit geothermally heated material]. But without knowing

the whole system, the conveyor belt of the sea floor, from its creation to its destruction by subduction, we don't know a lot. It's very important."

In truth, from our armchair or desktop, we can now see more of the sea than ever before, not because of submersibles scouring the

"IT'S LIKE TELLING A MOUNTAIN CLIMBER THEY CAN'T CLIMB ABOVE 5,000 METRES. WE HAVE TO EXPLORE EVERY NOOK AND CRANNY OF THE WORLD'S OCEANS"

depths, but because of the satellites we currently have in space.

In October 2014, scientists at Scripps Institution of Oceanography at UC San Diego used two satellites (one from NASA, the other from the European Space Agency) to obtain gravity measurements; using them to create the most detailed map of the world's sea floor ever attempted.

As an ordinary viewer, it's fun to play around with this: but for scientists, it may be useful for exactly the sort of information that Walsh is looking for. "One of the most important uses of this new marine gravity field will be to improve the estimates of

PHOTOS: GETTY IMAGES (MAIN); CORBIS (TOP LEFT); ADVANCED IMAGING AND VISUALIZATION LABORATORY, WOODS HOLE OCEANOGRAPHIC INSTITUTION (NEREUS)



A HULA SKIRT SIPHONOPHORE (*PHYSOPHORA HYDROSTATICA*), A DEEP SEA SPECIES, INHABITS THE ARCTIC OCEAN AND PACIFIC OCEAN
OPPOSITE: THE CHINESE MANNED DEEP-SEA SUBMERSIBLE *JIAOLONG* REACHED 7,062 METRES BENEATH THE SEA AT THE MARIANA TRENCH IN THE PACIFIC OCEAN, 27 JUNE 2012

ACCOMPLISHED DIVERS

1987 RUSSIAN DEEP COVER *MIR I AND II*

THE RUSSIANS ARE RIGHTLY PROUD OF THESE CRAFT, WHICH DIVE TO 20,000 FEET (6 KILOMETRES). THIS MEANS THEY CAN ACCESS UP TO 98 PERCENT OF THE WORLD'S OCEANS. DIRECTOR JAMES CAMERON USED THEM TO FILM *TITANIC*, AND IN 2008 THEY EXPLORED LAKE BAIKAL, THE WORLD'S DEEPEST BODY OF FRESH WATER

1990S SHE'S A BABE *AUTONOMOUS BENTHIC EXPLORER (ABE)*

NOWADAYS WE'RE FAMILIAR WITH DRONE AIRCRAFT, BUT ABE WAS THE FIRST UNDERWATER VEHICLE OF HER KIND, NEEDING NO ONBOARD CREW. SHE CAN OPERATE AT 16,500 FEET (5 KILOMETRES) DEPTHS FOR 16 MONTHS AT A TIME, HAPPILY PHOTOGRAPHING UNCHARTED TERRITORY, COLLECTING DATA AND TAKING SAMPLES

2014 ARE YOU SERIOUS? *NEREUS*

THINGS DON'T ALWAYS GO WELL FOR UNMANNED DEEP-SEA NAVIGATORS THOUGH, UNDERSCORING JUST HOW DANGEROUS SUCH EXPLORATION CAN BE. RECENTLY, THE ROBOT *NEREUS* IMPLoded WHILE EXPLORING THE 10-KILOMETRE-DEEP KERMADEC TRENCH IN THE PACIFIC OCEAN. SHE COST US\$8 MILLION TO DEVELOP, AND HER DEMISE WAS LIKENED TO THAT OF A FRIEND. JAMES CAMERON NOTED THAT THE LOSS OF THIS VEHICLE "NOW DENIES US ACCESS TO AN AREA THE SIZE OF NORTH AMERICA"



sea floor depth in the 80 percent of the ocean that remains uncharted, or is buried beneath thick sediment,” says the report.

Remarkably, the work has identified many previously unseen undersea mountains, continental connections across South America and Africa, and evidence for sea floor spreading ridges at the Gulf of Mexico. The study says that it offers “a new window into the tectonics of the deep oceans.” It is also pitched as potentially improving safe navigation for the US Navy.

A video outlining the map begins with the introduction, “Today, we know the topography of Mars 100 times better than

IT'S BEEN HARDER TO VIEW WHAT'S BENEATH OUR SEA, THAN IT IS TO SPY ON ANOTHER PLANET WITH A SATELLITE

the topography of our own oceans.” In part, this is because it's been harder to view what's beneath our sea, than it is to spy on another planet with a satellite.

Surveying the sea floor has historically been the work of shipboard surveys, which provide high spatial resolution but are very slow. The Scripps video suggests that 125 to 200 ship years of survey time, costing billions of dollars, would be needed to do this job properly. But to an impressive degree of accuracy, this can also be done from satellite. Incidentally, neither of the two satellites involved in the recent project were actually designed to do this job; it is a fortunate side effect of their actual missions, such as monitoring Arctic sea ice.

The video though, offers a thought provoking fly-by simulation of a world with no water — which in turn

serves to demonstrate, among many other things, just how extraordinarily difficult it will be to find missing Flight MH370.

NEW DISCOVERIES AWAIT

If science won't necessarily physically transport us regularly to the ocean depths, there are still plenty of ideas for adventures that can be had, if people will back them. The clearest vault for great stories is likely to be the hunt for missing shipwrecks. “We're fascinated by the stories that they tell,” says McCallum, who was an expedition leader on dives to the *Titanic* and *Bismarck*, and was on the last dive on the *Titanic* in 2005, taking wealthy tourists deep down under.

“About 200 people have dived on the *Titanic*, and only about 22 or 23 have dived on the *Bismarck*. And what that tells you is that people want to dive on the *Titanic* because of the story that surrounds it — the classic Greek tragedy, the chivalry and bravery.”

On reflection, it's certainly not about the scale of the loss. If it was, everyone would want to dive the *Wilhelm Gustloff*, the deadliest single-ship sinking in history. The German passenger ship was sunk in the Baltic Sea in 1945 by a Soviet submarine, killing over 9,300 people, including 5,000 children. As a war grave, diving on the site is now prohibited.

“The *Titanic* is the poster girl of shipwrecks,” McCallum says. Yet following that logic, what's still out there to inspire us? One possibility, certainly, is the plane of Amelia Earhart, the pioneering aviator, who vanished in the Pacific Ocean near Howland Island in 1937.

People have been looking for the wreckage of Earhart's plane since the day she disappeared. McCallum, who says over US\$24 million has been spent on looking for the remains of the great aviation pioneer, says that he still gets queries from people wanting to continue searching. He for one would also like to get searching too.

“I think we've got a great shot at it,” he says. “I've been keeping track of where they have and haven't searched, and I think there is one good search



DON'T HASSLE THE HOFF

A species of hairy-chested deep-sea crab, known as the “Hoff” named after *Baywatch* actor David Hasselhoff, has been under the microscope recently. A team of researchers from the University of Southampton used a remotely operated vehicle to examine the private life of the deep-sea crustacean. “The life cycles of deep-sea animals have been largely hidden from us until now,” said lead researcher Dr Leigh Marsh, “but thanks to more frequent expeditions and advances in technology, we are getting a clearer picture of the natural history of the ocean depths that cover most of our world.”

PHOTOS: GETTY IMAGES

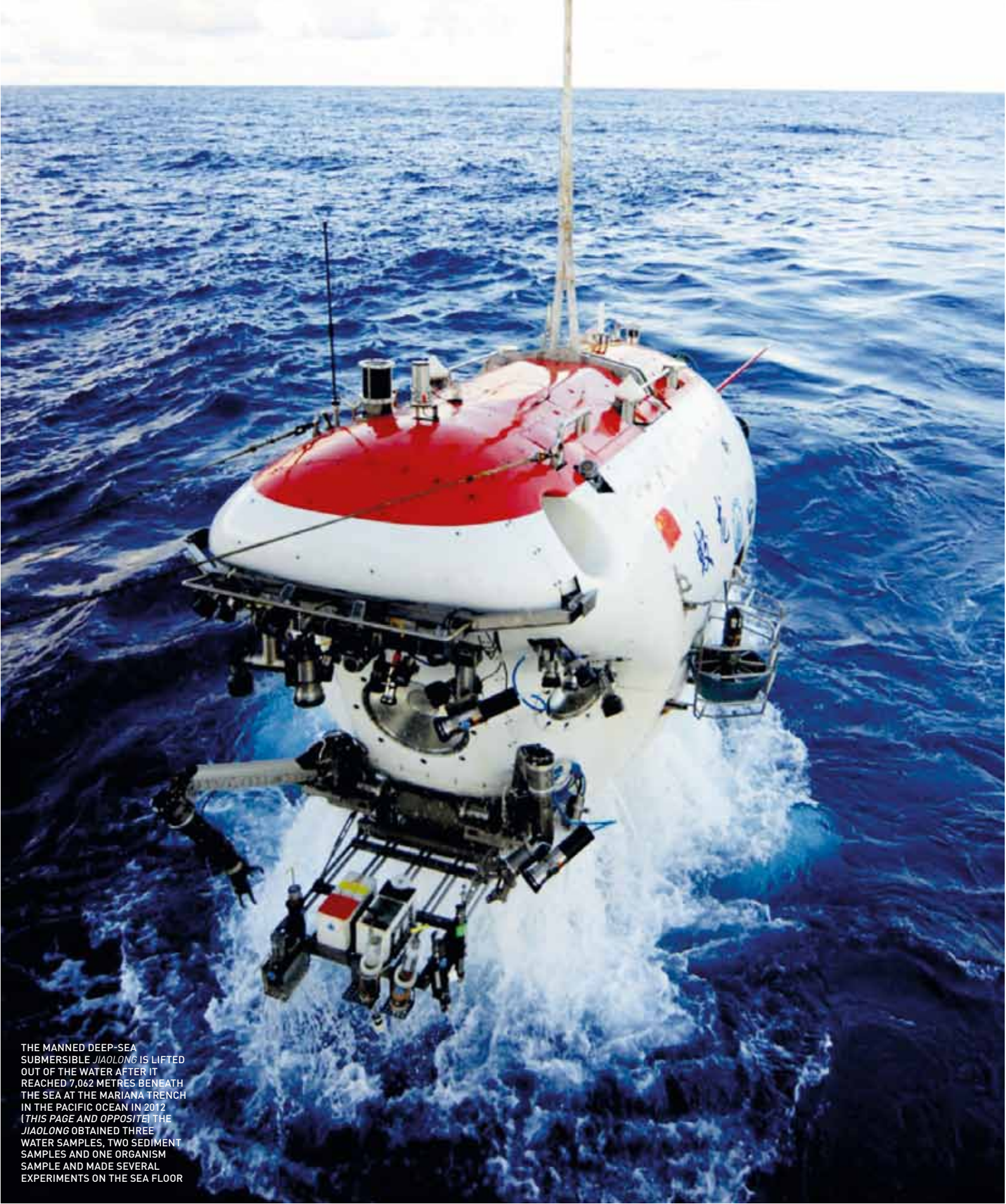
SWALLOWER (SACCOPHARYNX LAVENBERGI) IS A DEEP SEA SPECIES WITH A HINGED MOUTH THAT SWINGS WIDE OPEN TO ACCOMMODATE LARGE PREY NEAR GUADALUPE ISLAND OFF THE WEST COAST OF MEXICO'S BAJA CALIFORNIA PENINSULA

KEEP ON TICKING

How do you design a watch that can accompany you to the deepest point in the world’s ocean? You turn to Rolex, who designed the first waterproof watch in 1926. The company is justifiably proud of creating a Rolex “Deep Sea Special”, which in 1960 joined the bathyscape *Trieste* as it plunged the Mariana Trench, the deepest part of the world’s oceans in the western Pacific Ocean. Strapped to the outside of the craft, the ticker and the *Trieste* reached a depth of 10,911 metres. Together they survived pressures of seven tonnes per square inch unharmed. To withstand the depth, the Deep Sea Special featured a massive bubble face made of 18 millimetre-thick Plexiglass acrylic crystal. Jacques Piccard, who designed the *Trieste* and undertook the voyage, was no doubt happy to come out alive. Soon after, Rolex headquarters in Geneva received a telegram from Piccard: “Happy [to] announce to you your watch as precise at 11,000 metres as on surface.” Serendipitously, seven years earlier, Rolex had been to the highest point on Earth, too — Mount Everest.



THE MANNED DEEP-SEA SUBMERSIBLE JIAOLONG IS LIFTED OUT OF THE WATER AFTER IT REACHED 7,062 METRES BENEATH THE SEA AT THE MARIANA TRENCH IN THE PACIFIC OCEAN IN 2012 (THIS PAGE AND OPPOSITE) THE JIAOLONG OBTAINED THREE WATER SAMPLES, TWO SEDIMENT SAMPLES AND ONE ORGANISM SAMPLE AND MADE SEVERAL EXPERIMENTS ON THE SEA FLOOR



PHOTOS: GETTY IMAGES (ROLEX WATCH); CORBIS (TOP RIGHT); CORBIS (MAIN)

to do in the area where it’s most likely to be. If you imagine a whole square search area, everything’s been done except the last little bit, which is in the middle and to one side,” he outlines. “And that’s the bit we think the aircraft is in.”

SHACKLETON’S END

The other search, which is currently underway, is for the ship of the Antarctic explorer Earnest Shackleton. His ship, the *Endurance*, was trapped and crushed in the sea ice a hundred years ago this year, and currently lies at rest on the ocean’s floor near Antarctica.

Walsh, too, has followed this quest closely. “We know pretty well where it is, at 14,500 feet (4.4 kilometres). Shackleton’s captain, Frank Worsley, was considered a consummate navigator,” says Walsh. “He sat next to that ship for eight months, and every day took a celestial sighting,” he notes.

“Next to GPS, I don’t think any ship sank in a more well-known position,” says Walsh. Unlike the *Titanic* and *Bismarck*, which moved some distance underwater as they sank due to the shape of their hulls, the *Endurance* was crushed in ice — and presumably went straight down to the sea floor beneath it.

Walsh believes that a lot of useful science would also come out of such a mission, particularly sitting in the Weddell Sea and watching the biological ebb and flow of what happens there for an extended period of time.

Would Don Walsh want to go on such an expedition, even though he’s now 83 years of age? Latter years or otherwise, his response is classic hard-bitten explorer. “Does Pinocchio have wooden nuts?”

McCallum says he’d love to dive on the *USS Indianapolis*, the sinking of which also hits 70 years in July 2015. The *Indianapolis*, whose story is immortalized in Robert Shaw’s monologue in the movie *Jaws*, delivered parts for the first atomic bomb to the US air base at Tinian, before being torpedoed by a Japanese submarine shortly afterwards between Guam and the Philippines, causing the single

greatest loss of life at sea in the history of the US navy. Its wreckage has never been found despite at least two attempts. “It would be good to put that story to rest.”

McCallum would like to explore the Kermadec Trench, and dive to a hydrothermal



vent in Antarctic waters. It is thought that many of the species in each vent may be unique, and different to those at the next one.

And then there’s the understanding of sea life itself. McCallum says he used to think the sea was like consommé, “with some stuff on the top you can fish out, like fish and octopus and whale, and then a whole lot of clear-water nothingness all the way to the gunge on the bottom,” he notes. “But when I dived, I realized the sea was like a minestrone instead. There is life from the very top, to the very bottom. A huge part of our human future is in the ocean, be it in the water column or some kind of chemical compound at the bottom or under the surface.”

History will remember Walsh as an explorer, but he is also an avid, learned, highly qualified scholar. And the one subject that remains a particular passion is the sea. To him, a failure to learn more about it is a lamentable disappointment.

“We are getting awfully close to one of those tipping points where global warming could become very fast. The sea helps us to understand how and why,” he notes. “Collectively, the world is wealthy enough to pay to learn the fundamentals of how our planet works. And that comes down mostly to the research and exploration of the oceans.”

THE SEA FLOOR PIONEERS

ON JANUARY 23 1960, DON WALSH, THEN A 27-YEAR OLD NAVY LIEUTENANT, AND A SWISS SCIENTIST CALLED JACQUES PICCARD CLIMBED INTO A TOP-HEAVY SUBMERSIBLE CALLED THE *TRISTE*. IN IT, THEY SANK ALMOST 11 KILOMETRES TO THE BOTTOM OF THE MARIANA TRENCH, 400 KILOMETRES OFF GUAM IN THE WESTERN PACIFIC OCEAN. IT IS THE DEEPEST POINT IN THE WORLD'S SEAS AND THE LOWEST OPEN POINT IN THE EARTH'S CRUST. CHRIS WRIGHT SPOKE TO THE RETIRED OCEANOGRAPHER AT HIS HOME IN THE UNITED STATES



Dora, Oregon isn't much of a town. It is said to have an official population of 10 — though residents reckon it might just have cracked three figures by now — and boasts not a single shop. The town is less a conurbation than a loose affiliation of ranches, and in one of them, in a room surrounded by thousands of books, sipping tea from a mug emblazoned with the logo of the CIA, sits one of only three men to have been to the bottom of the ocean. The very, very bottom.

More than 50 years would pass before Walsh and Piccard's feat was repeated — by movie director James Cameron — and for a spell after Piccard's death in 2008, Walsh was the only man who could speak from experience about life on the floor of the world.

Walsh today, white-haired but utterly sharp, at first has a certain military cantankerousness rendered likeable by a dry wit. “SubMARiner?” he interjects when DCM pronounces the word in what we think is the correct way. “I'm not a subMARiner. A subMARiner is an inferior mariner. I'm a submarEENer.”

The journey really started for Walsh in 1958 when, as a submarine lieutenant, he volunteered to work on a programme leased by the US Navy from a family of Swiss scientists called the Piccards. The Piccards are a whole other story: pioneers of exploration so revered that *Star Trek: The Next Generation* named its captain, Jean-Luc Picard, after them. They had a submersible

called the *Trieste*, an ungainly contraption known as a bathyscaphe comprising a thick-walled spherical cabin for crew suspended beneath a thin metal shell, called a float, filled with gasoline.

The *Trieste's* premise was simple: vent the ballast tanks to sink; slow or stop the descent by releasing solid weights filled with small steel pellets; and then, because the gasoline in the float is lighter than the water around it, return to the surface. The sphere itself, which would have to protect the crew from pressure 1,100 times greater than at the surface, was made of three rings, 12 to 18 centimetres thick and glued together with epoxy at the joints. When the Admiral who ran the Navy's Bureau of Ships came to see the *Trieste* and asked how it was fastened together, Walsh told him about the epoxy. “Lieutenant Walsh,” he replied, “the Navy does not glue its ships together.”

Walsh's experience of extreme depth was at this stage rather limited. “You have to understand I came to this job as a submarine officer; as a navigator I was only concerned about making sure you had enough water under the keel so you don't run into the side of a continent. I had no clue, really, how deep the ocean was, or how people dive in it. I wasn't a diver, I was a submariner.”

He learned fast, and so did the *Trieste* team, running test dives in San Diego before taking the bathyscaphe apart and putting it on a commercial cargo ship to Guam, the nearest major island to the Mariana Trench, in the late summer of 1959. In November that year, Jacques Piccard and Navy chief scientist Andreas Rechnitzer broke the world depth record, reaching 18,150 feet (5,532 metres).

On January 19, 1960, Walsh and most of his team set off in a corvette to the dive site and set about trying to find the deepest point by dropping dynamite into the ocean and timing the echoes. “We didn't know exactly where the deepest place was: there were no maps or charts,” he says. “We didn't care about exact

depth measurement, only that 14 seconds was deeper than 12 seconds.”

At the same time a Navy tug pulled the bathyscaphe towards the dive site at five knots. It arrived on dive day, January 23, in “a pretty good sea state, six or seven on the Beaufort scale.” For a craft like the *Trieste*, that was a challenge, but Walsh said they never considered aborting; “If we'd towed it back in, our masters in San Diego would have said: that's it.” In fact, they did exactly that. But fortunately by the time the message reached them the *Trieste* had already dived.

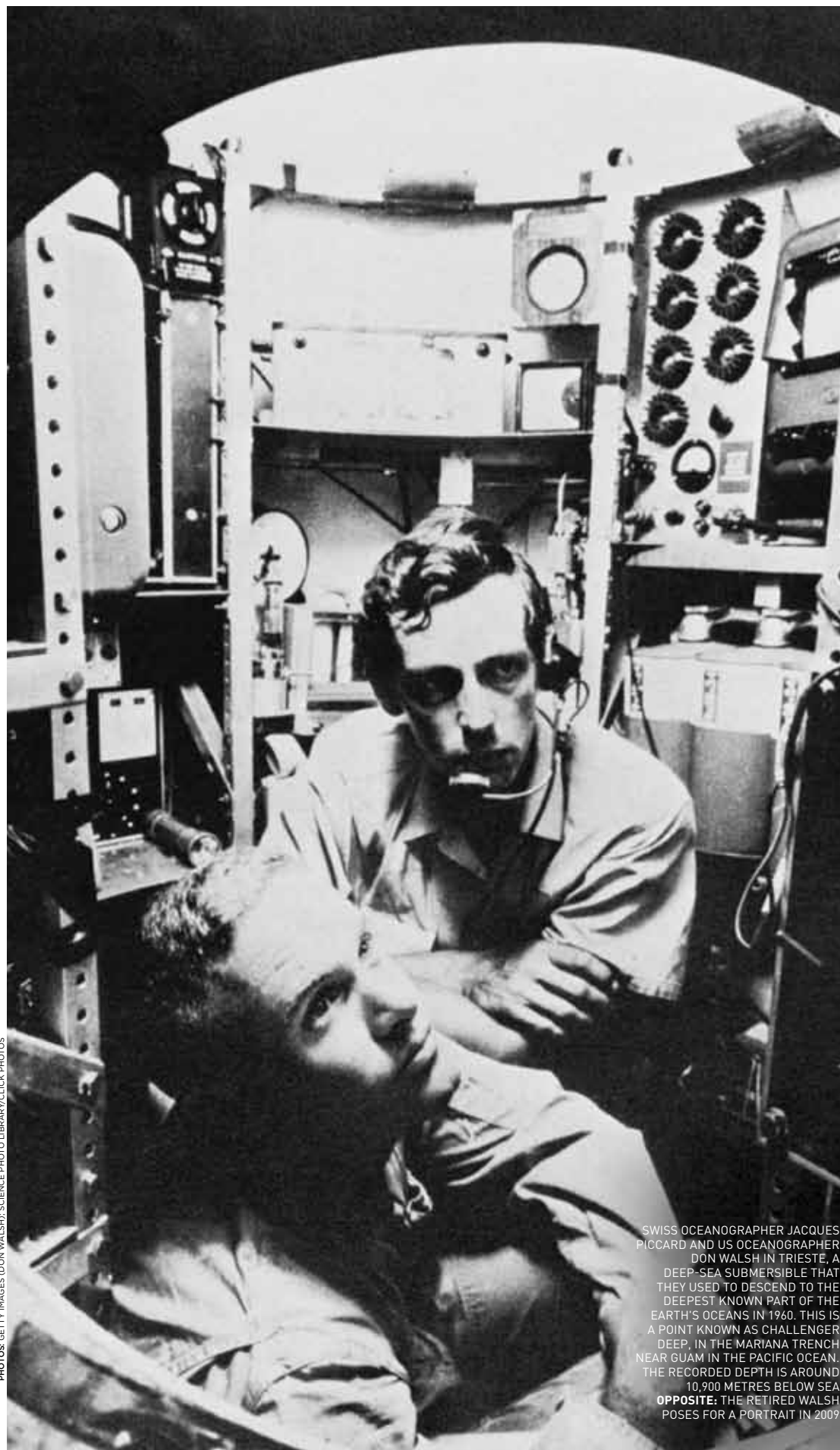
Walsh and Piccard were together in the snug sphere for nine hours. “It was close, and we had all our kit — equipment, instruments, cameras and stuff. We kind of coiled up inside it. But, shit, it's no more crowded than sitting back in peasant class on a trans-Pacific flight for 14 hours.”

The *Trieste* began descending at 8.30am and hit its first obstacle when it started bouncing along on the top of a thermocline at about 300 feet (91 metres) under. Eventually Piccard and Walsh valved off enough gasoline to break through and began sinking in earnest. It took five hours to get down.

It was dull in the main, but enlivened considerably at 31,000 feet (9,448 metres). “We heard and felt a giant bang.” All instruments looked fine — so they carried on.

From a distance this seems extraordinary: they were on a craft untested at this depth, deeper than anything had ever gone before, heard a bang clearly from the craft, yet they thought it was safe to proceed? “We didn't think it was okay to carry on. We knew it was okay to carry on because our readings were normal.”

The *Trieste* sank further and further, deeper than they had expected, until finally the loom of the lights was visible reflecting from the floor. Piccard ditched more shot to slow the descent and they made an easy landing at 10,911 metres. But this was to be



SWISS OCEANOGRAPHER JACQUES PICCARD AND US OCEANOGRAPHER DON WALSH IN TRIESTE, A DEEP-SEA SUBMERSIBLE THAT THEY USED TO DESCEND TO THE DEEPEST KNOWN PART OF THE EARTH'S OCEANS IN 1960. THIS IS A POINT KNOWN AS CHALLENGER DEEP, IN THE MARIANA TRENCH NEAR GUAM IN THE PACIFIC OCEAN. THE RECORDED DEPTH IS AROUND 10,900 METRES BELOW SEA OPPOSITE: THE RETIRED WALSH POSES FOR A PORTRAIT IN 2009

no “giant-leap-for-mankind” moment; the voice-modulated sonar system they used to communicate with the top had a slow data rate and wasn't built for sermons. “We shook hands, congratulated each other and called topside on the underwater telephone. We told Larry Schumacher we had reached the bottom, and it was good.” What did he reply? “He just acknowledged. You kept your messages pretty simple.”

There, it became clear what the bang was: a crack across the window in the entrance hatch. Bad as that sounds, it wasn't dangerous on the floor, since the entrance tube was always flooded during a dive, meaning the window was not a pressure boundary. It did, though, create a chance of being trapped at the surface. “If we couldn't get out we'd be stuck in there for a few days feasting on Hershey bars.”

There is a sense of anticlimax about the bottom. No photos were taken, since the landing had stirred up a cloud of sediment which didn't disperse; and only 20 minutes on the bottom since they needed to surface in daylight. “It was like being in a bowl of milk. We didn't get any pictures.” The highlight, instead, was Piccard sighting a foot-long flatfish, “like a sole or halibut”, which confounded oceanographers given the intense pressure on the ocean floor.

The journey back to the surface was smooth. Once there, Walsh fired off an emergency beacon transmitter common to the air force, and the support ships were quickly upon them. “There was a sense of achievement. And some celebration: we worked like hell for almost a year to get to this place. And we did what we said we'd do, pretty much on time. We kept our word.” There was little celebration, though, 320 kilometres out at sea. “After dinner I was ready to have a nap.”

Walsh's subsequent life has been extraordinary. He served in two wars, was commander of a submarine, founded a whole new Institute for Marine Studies at the University of Southern California with the rank of dean, dived in Mir submersibles on the wrecks of the *Titanic* and *Bismarck*, visited the Arctic and Antarctica so many times (at least 50) that there is a ridge, the Walsh Spur, named after him in Antarctica. Today, at 83 years of age, he continues to travel the world lecturing, educating and exploring.

Dora, Oregon seems a curious place to find this pioneer of the sea, but that's the way Walsh likes it. “I have bonded with my fellow man as much as I care to in this lifetime,” he says. “My nearest neighbour is a mile away. If more than half a dozen cars go by the front of the house during the day my wife starts to complain about the traffic.” Is he a recluse? “Not reclusive,” he says. “Just selective.” ●

To read more about Walsh and other pioneering adventurers, order *Chris Wright's No More Worlds to Conquer*, published by HarperCollins in May 2015