

PRESS RELEASE

The Ocean Mapping Expedition **The Indian Ocean, an unexpected methane sink?** **Not even talking about noise and plastic pollution of the oceans...**

The expedition engaged in a 4-year journey (2015-2019) around the world in the wake of Magellan onboard Swiss sailboat *Fleur de Passion* to measure the human impact on the oceans and raise awareness about sustainable development issues docked at Royal Cape Yacht Club on 14 December 2018, coming from Durban after the crossing of the Indian Ocean.

During this 6,000 nautical miles (11,000 km) leg from Jakarta, the expedition performed the longest sailboat mounted longitudinal greenhouse gases monitoring at the ocean's surface. The initial results of this unprecedented transect carried out in partnership with the University of Geneva suggest that the Indian Ocean could be an important sink for atmospheric methane.

These intriguing results confirm the urgent need to obtain more reference field data in order to re-evaluate the role of the oceans in the carbon cycle in the context of changing global climate.

Besides greenhouse gases, the expedition carries out two other scientific programs on noise pollution (produced by human activity) and meso/micro-plastic pollution of the oceans.

Between Durban and Cape Town, *The Ocean Mapping Expedition* welcomed a marine biologist from KwaZulu-Natal University working on plastic debris as vector of migration for species, four learners from Cape Town schools and laureates of a competition organized by CapeNature, as well as South African cartoonist Anton Kannemayer.

From 3rd to 24th January 2019, 33m-long and former WWII minesweeper *Fleur de Passion* will berth at V&A Waterfront, Quay 6, where guided public visits on board, «*Our Spice Islands*» exhibition, workshops with Swiss cartoonist Alex Baladi and networking talks with the scientific community will be organized in a spirit of sharing experience.

Geneva/Cape Town, 18 December 2018 - Slowly but inexorably, *The Ocean Mapping Expedition* is completing its 4 and a half year journey around the world in the wake of Ferdinand de Magellan, some 500 years after the first ever circumnavigation. Swiss sailboat *Fleur de Passion*, the flagship and logistical platform of the expedition, arrived in Cape Town on Friday 14 December 2018 from Durban. The 33m-long ketch and biggest sailboat under Swiss flag docked at the Royal Cape Yacht Club (RCYC) almost four years after her departure from Seville where she set sail in April 2015 and where she is scheduled to be back on 6 September 2019.

« *Five hundred years ago, the Portuguese used to control the Eastern maritime routes towards India and South-East Asia. Therefore, the only boat that had survived Magellan's expedition had to make her way back from the Philippines to Spain hiding from the enemy fleet. On the contrary, we on board Fleur de Passion have the privilege to be warmly welcomed wherever we stop, yet again here in South Africa* », says **Pietro Godenzi**, board chairman of the Geneva-based and non-for-profit **Fondation Pacifique** leading the project, and skipper of the *Fleur de Passion* for the Durban-Cape Town leg of the expedition.

« It is rather fortunate because after the Strait of Magellan, the sailing conditions along the East coast from Durban to Cape Town have certainly been the most challenging we've ever had since the departure of the expedition, he adds. In case of sudden bad wind and sea conditions there's nowhere to find shelter. So when setting sail, you really have to choose the right window. »

It is also fortunate because as the very name of our foundation indicates (Pacifique means « peaceful »), the mission of *The Ocean Mapping Expedition* is both to assess the human impact on the oceans and help raising awareness about sustainable development issues in a spirit of bridging continents and people through a multidisciplinary approach combining science, education and culture. *« This is why we're very pleased our project offered new and unexpected opportunities to a few people from South Africa to join us in this human adventure »,* adds Pietro Godenzi.

South Africans on board to join the adventure

As a matter of fact between Durban where the expedition arrived in October and Cape Town, far from hiding, *Fleur de Passion* welcomed several South Africans from very different backgrounds, all eager to be part of the adventure in their own field:

- **Dr David Glassom from KwaZulu-Natal University** spent ten days from Durban to Knysna as part of his own research project on plastic debris as vector of migration for species. *« Juvenile fish are known to shelter under plastic debris. Species range shifts or range expansions are already evident as a consequence of rising sea surface temperature due to global warming and migrations could be facilitated by the availability of debris for shelter and possible nutrition from biofilms growing on the plastic, »* explains Dr Glassom.

- four teenagers (2 girls and 2 boys) and academically deserving learners with an interest in marine life spent a week on board at Mossel Bay as part of a project set up by CapeNature with the support of the Embassy of Switzerland. These learners - three from Gaansbaai Academia and one from Generation Schools Hermanus - were selected, based on their excellent academic performance in Science and Mathematics, to spend eight days at sea.

CapeNature CEO Dr Razeena Omar is positive that this opportunity has provided learners with the platform to shape their future careers and impact their young lives forever. *“Our hearts are full and it is inspiring to see the faces and hear the testimonies of how this experience has impacted their lives. The Ocean Mapping Expedition lead by Geneva-based non-profit Fondation Pacifique is doing exceptional work and we are honored to have partnered on this initiative. »*

“I am grateful for this trip as we learned about the ocean, we also had the opportunity to meet new amazing people that have been all over the world and who shared their vast knowledge with us », 17 years old **Kyle Saville from Generation Schools Hermanus**. *« I love the ocean because it is one of the most amazing communities with so many species in the ocean and still so many for us to learn about. It is up to us to preserve this wonderful example of biodiversity for future generations to come. »*

« CapeNature's community conservation teams work very closely with the schools and youth in the areas surrounding our nature reserves in the Western Cape. Therefore, this collaboration was an obvious fit as it is part of our core mandate to nurture the skills and passion in marine science from an early age and provide access to our marine protected areas, rivers and estuaries for educational purposes », Dr Razeena Omar adds.

- also in Mossel Bay, **cartoonist Anton Kannemayer** joined the expedition. He was the seventeenth such artist « in residence » to be part of the « *In the mirror of Magellan* » cultural program, after mainly Swiss authors.

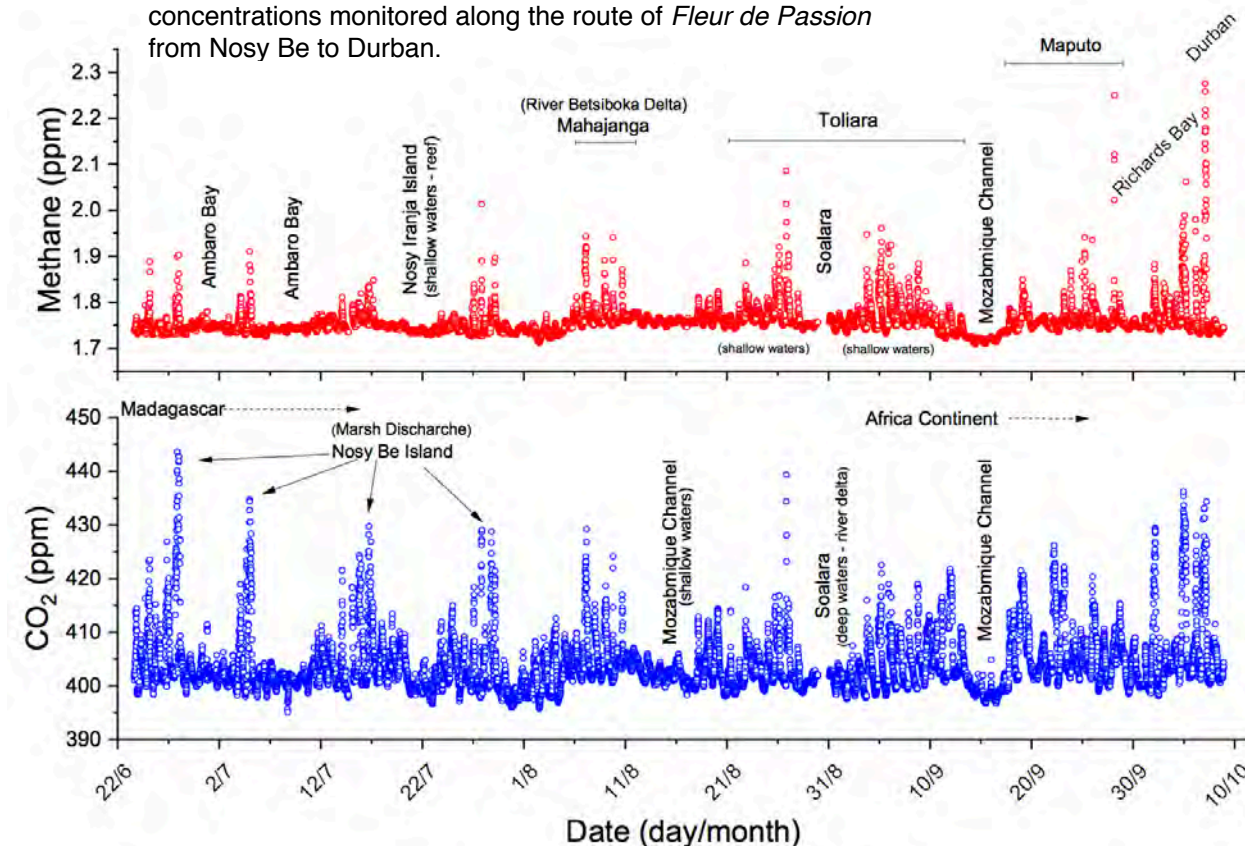
« *The Fleur de Passion* hosts an amazing and beautiful project in *The Ocean Mapping Expedition*, which englobes aspects that are important for our every day lives, says **H.E. Helene Budliger Artieda, Ambassador of Switzerland to South Africa**. *The holistic approach of the expedition that combines scientific, cultural and youth educational programmes to deliver its message of the importance of our oceans is tremendous. I also appreciate the historic aspect of the expedition, in terms of the ship's history and the fact that it is sailing on the same route travelled by Ferdinand de Magellan, but delivering a positive impact where ever it docks. I would like to offer a warm welcome to the Fleur de Passion and its intrepid crew to sunny Cape Town.* »

Along South African coastline, while offering such opportunities and at the same time opening up its own horizon to new perspective, *The Ocean Mapping Expedition* pursued its mission and its different scientific programs.

The Indian Ocean as a methane sink?

One year after it was launched from the Philippines in December 2017, the *Winds of Change* scientific program consisting in monitoring greenhouse gases at the surface of the oceans is revealing a first batch of spectacular and intriguing results. From Mactan in central Philippines and during her crossing of the Indian Ocean from Jakarta via Madagascar and Maputo, the onboard equipment continuously monitored the concentration of methane and carbon dioxide all along the track of the expedition. These results are providing reference field data both unprecedented and crucial to better understand the carbon cycle in the general context of climate change.

Time series of methane (top) and carbon dioxide (CO₂, bottom) concentrations monitored along the route of *Fleur de Passion* from Nosy Be to Durban.



« *For the first time ever, we've been able to assess and quantify the near-surface atmospheric methane and carbon dioxide concentrations while performing the longest longitudinal transect of an ocean, namely the Indian Ocean* », explains **Prof. Daniel McGinnis, Head of the Aquatic**

Physics Group at the Faculty of Science, University of Geneva, and responsible for the program in partnership with the expedition. From Jakarta where the sailboat left on 12 April to Durban, a total of 6,000 nautical miles (11,000 km) were continuously sampled by the expedition.

« *This unprecedented data-set shows us that the Indian Ocean continues to be an important CO₂ sink, though there are some intriguing peaks that need more investigation* », adds Prof. McGinnis.
« *More surprisingly, however, is that the Indian Ocean could be an unexpected sink of atmospheric methane. In general, it is thought that almost all oceans and inland freshwaters are sources of methane to the atmosphere. Over the Indian Ocean, the methane above the sea surface is consistently about 5-6% lower than atmospheric concentrations. Though more investigation is needed, it appears at first glance that the Indian Ocean may uptake atmospheric methane* », says the scientist.

These reference data collected by *The Winds of Change* program during the 5-week crossing of the Indian Ocean come in addition to those, equally unprecedented and spectacular, gathered during the first four months of the program between the Philippines and Jakarta through Brunei, Kuching and Singapore.

Between Mactan Island in January 2018 and the Indonesian capital, where *The Ocean Mapping Expedition* stopped in April, *The Winds of Change* program identified some first « hot spots », areas with very strong emissions of greenhouse gases deserving as such a closer assessment.

« *Methane and carbon dioxide concentrations clearly rise near cities, approaching islands and shallow seas, in other words in areas that are influenced by human activities or experience higher algal growth* », he says.

« *For example, methane was more than 6 times higher than background levels at Mactan where the Fleur de Passion was anchored during her stopover in December-January and almost 3 times higher in Jakarta where the boat docked at the beginning of April, suggesting substantial emissions in these areas. However, unexpectedly, in such an urbanized spot as Singapore main island, methane levels were not as high* », says Prof McGinnis.

A joint initiative from Fondation Pacifique and the University of Geneva

Jointly developed and carried out by Geneva-based Fondation Pacifique and the University of Geneva, Faculty of Science, *The Winds of Change* program is part of *The Ocean Mapping Expedition*, a 4-year journey (2015-2019) around the world in the wake of Magellan onboard Swiss sailboat *Fleur de Passion* to measure the human impact on the oceans and raise awareness about sustainable development issues, some 500 years after the first ever circumnavigation.

« *These exciting first results of the program present a huge step forward in the project and the overall issue of climate change, and prove our approach as a very effective method to track atmospheric gases over the sea* », also adds Prof McGinnis.

To perform *The Winds of Change* program, 33m-long *Fleur de Passion* - a former WWII minesweeper from the German Navy converted into a ketch and now the biggest sailboat under Swiss flag - is equipped with a ultraportable greenhouse gas analyzer with a sampling port positioned 16 meters above the sea surface on the aft mast and automatically collects methane and carbon dioxide readings every 1 minute. The boat will hence fulfill her mission for the climate until the return of the expedition back to Seville in September 2019.

« *We are very proud that The Winds of Change monitoring program for greenhouse gases on the surface of the oceans is producing its first field data, contributing to also keep the climate change*

issue on the agenda », says **Samuel Gardaz, Vice-President for Public Affairs of the Fondation Pacifique.**

« *Such a pioneering program, a pure initiative of the civil society, once again illustrates the potential, interest and relevancy of a sailboat like Fleur de Passion in terms of scientific research in addition to more conventional oceanographic vessels* », adds Gardaz.

« *It provides the opportunity to access essential information at a very large geographical scale to complement that available by satellite so far at a time when the global scientific community is specifically alarmed by the lack of data on this issue* », he also says.

An urgent need to revise our concepts on the global carbon cycle

The ambition of *The Winds of Change* monitoring program for greenhouse gases on the surface of the oceans is to provide the scientific community with unprecedented and reference field data and therefore to contribute to a better understanding of the role of the oceans in the current changing global climate. In view of the worrisome evolution of the climate and the resulting ocean acidification, it is becoming increasingly urgent to have baseline data available to revise our concepts on the global carbon cycle.

« *An outcome of The Winds of Change mission is that areas of research interest will become visible to a diverse audience of scientists, coastal areas managers and stakeholders, says Prof. McGinnis. We hope to raise interest especially in those areas where environmental research is insufficient and convey data and information to those who have the means to investigate issues linked to greenhouse gas emissions. Ultimately, we also wish to raise awareness within local communities met on the track of the Fleur de Passion and the global community.* »

As explained by the scientist of American origin, « *climate change scientists need to have a comprehensive and accurate view of the concentrations of greenhouse gases on the surface of the oceans and to be able to better understand their role not only as reservoirs of such gases, but also as emitters, of emission source.* »

« *The oceans and fresh water as a whole emit more greenhouse gases than previously estimated, according to the Intergovernmental Panel on Climate Change (IPCC)* », Prof McGinnis insists. *It is therefore urgent to re-evaluate the role of the oceans in the global carbon cycle for a better understanding of global warming issues.*».

Three other scientific programs on noise and micro-plastic pollution, and coral bleaching

Since it left Seville in April 2015, *The Ocean Mapping Expedition* has been leading three other programs unpublished by their scope.

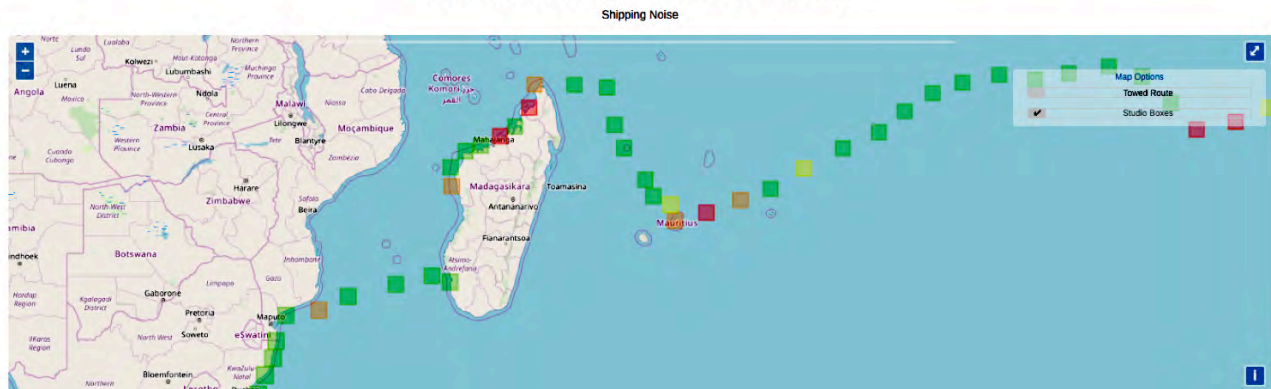
Exploring a little known threat using the latest technology

The **20,000 Sounds under the Sea** program on ocean noise pollution, in partnership with the Laboratory of Bioacoustic Applications (LAB) of the Polytechnic University of Catalonia in Barcelona, led by the **biologist and engineers Dr Michel André**, has collected more than 500 hours of sound recordings have been carried out between Seville and Cape Town.

« *Marine noise pollution is recognized today as one of the greatest disrupters of marine ecosystems that threaten the natural balance of the oceans. This pollution, little known to the general public because it is invisible and inaudible, for human ears, increases with the development of industrial activities at sea and spreads at high speeds in all the corners of the planet. Result: there is no more "end of the ocean" that is spared* », says Dr Michel André.

« The latest technological advances have enabled the scientific community to record underwater sounds and to measure the effects of this acoustic pollution in real time. And thus to contribute to the responsible management of the marine environment », he adds.

World Acoustic Ocean Noise Map



« The Laboratory of Applied Bioacoustic (LAB) of the Technical University of Catalonia, BarcelonaTech (UPC), in partnership with the Pacific Foundation, through the project 20,000 Sounds Under the Sea project, framed in The Ocean Mapping Expedition, is carrying out an acoustic mapping on a temporal and spatial scale up to 20,000 sounds under the sea, in a part of the planet, mostly in the Southern Hemisphere, that is very little known, acoustically speaking », explains André.

« As human activities at sea are concentrated mainly in the North, this mapping based on the latest technological developments, among other findings, is revealing areas where marine noise pollution is probably close to the levels that could be found before the oceanic industrial boom started. This will certainly help the scientific community to better understand (and hopefully correct) its advent in the last century. »

« In addition, 20,000 Sounds under the Sea carries a strong message of collective awareness: noise pollution at sea is a risk to the survival of the oceans. We must therefore collect critical baseline data to manage these future changes », insists Dr Michel André.

Some initial results are accessible on <http://omexpedition.listentothedeep.com/acoustics/>.

Plastic pollution almost in every samples

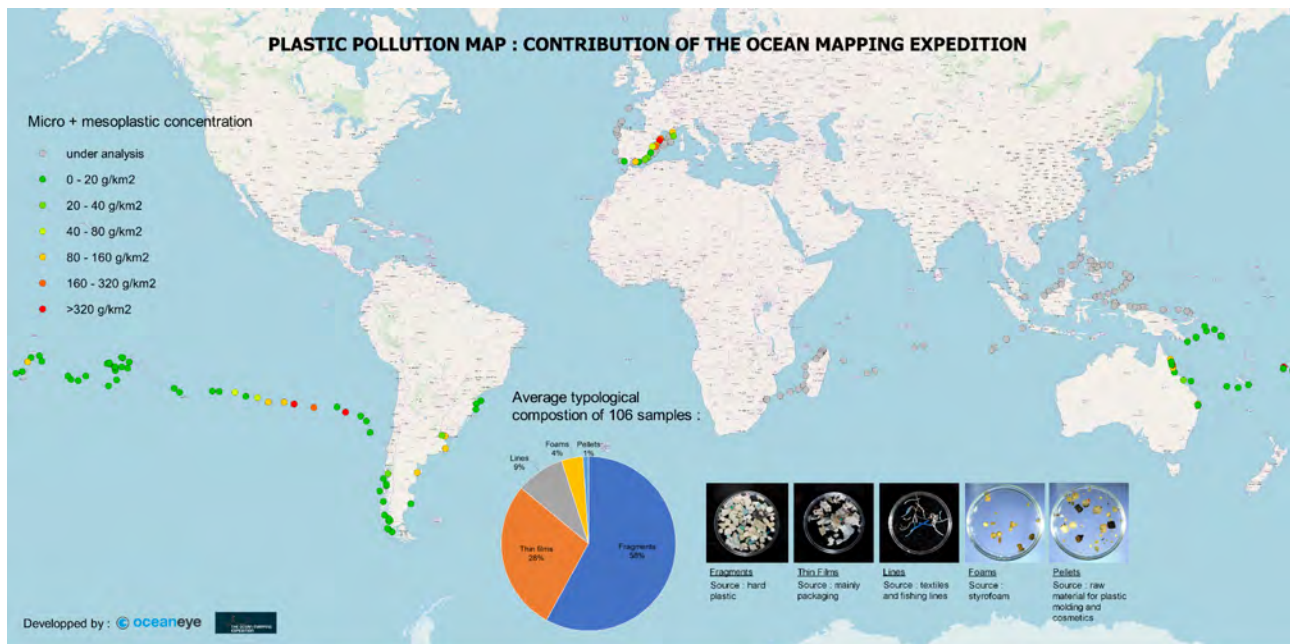
The **Micromegas** program in partnership with the Oceaneye association in Geneva consists in mapping micro and meso-plastic pollution on the surface of the oceans: particules between 1.0 mm and 5.0 mm for microplastics and bigger than 5.0 mm for meso-plastics. From Seville to Cape Town, a total of 187 surface water samples has been collected and are being analyzed by the biologists from Oceaneye.

« The Ocean Mapping Expedition is contributing massively to Oceaneye's participatory science project to establish a global mapping of micro- and meso-plastic pollution in surface ocean waters, providing a total of 187 samples to date since the departure of the expedition from Seville », says **Pascal Hagmann, executive director of the NGO Oceaneye in Geneva.**

« By mid-December 2018, 108 samples were analyzed. Among these 108 samples, more than 92% contained plastic polymers in the analyzed dimensions », explains Pascal Hagmann who

notes that « *the average pollution of all the samples is 27 g / km² in micro-plastics and 99 g / km² in meso-plastics, for a total average concentration of 126 g / km² ».*

« *The most polluted sample - 5'900 g / km² - was collected on the Great Barrier Reef. It should be noted, however, that this latter figure, while impressive, is by no means indicative of average pollution in this region »*, says Hagmann.



« *Chilean Patagonia and Polynesia are very poorly affected regions. Indeed, they are far from sources of pollution (densely populated areas) while not being under the influence of waste accumulation areas. On the contrary the South Pacific Gyre, although thousands of kilometers away from any human activity, is found to be particularly polluted with an average plastic concentration of 185 g / km². This is obviously due to the transport mechanisms. The Great Barrier Reef also appears to be heavily polluted with a mean concentration level of 855 g / km². This figure is nevertheless to be taken with caution because the number of samples is limited and a sample was extremely polluted »*, he adds.

« *It should be noted for comparison that the concentration in the South Pacific Gyre or the Great Barrier Reef is close to the level of pollution in the western Mediterranean Sea, a region considered highly polluted »*, Hagmann concludes.

For a first glance at the samples already analyzed: www.oceaneye.ch/cartographie/.

The future of coral reefs at stake

The **CoralWatch** program consists in observations on the health status of corals, victims of bleaching due to global warming, in partnership with the University of Queensland in Brisbane, Australia. So far, more than 1700 observations had been made in Australia, the Solomon Islands, Papua New Guinea, Indonesia, the Philippines and across the Indian Ocean. Transmitted to CoralWatch, they feed a large database managed by the project and covering 77 countries. Learn more on: www.coralwatch.com.

The Ocean Mapping Expedition at V&A Waterfront

From 3rd to 24th January 2019, *Fleur de Passion* will berth at V&A Waterfront where *The Expedition* will offer to the public several opportunities to learn more about the spirit of the expedition and its achievements, and to feel the thrill of adventure. They include:

- Free guided visits on board the vessel, at Quay 6
- Free visit of « *Our Spice Islands* » exhibition in Luggage Hall, on Jetty 2
- Workshops with Swiss cartoonist Alex Baladi and South African counterpart Anton Kannemayer
- Talks, meetings and networking sessions between the expedition' scientific partners and their local counterparts from academic institutions, NGOs.

Details and updates on: omexpedition.ch/index.php/en/cape-town-stopover

In late January 2019, *Fleur de Passion* will be lifted out of the water for annual maintenance in a local shipyard before she sets sails again from Cape Town to St Helena and Dakar by mid-February.

Additional media material

Additional media material is available on: <http://omexpedition.ch/index.php/en/cape-town-media>

Or hereafter (see contact next page)



Fondation Pacifique

9bis, rue de Veyrier, 1227 Carouge - Suisse
www.fondationpacifique.ch / www.omexpedition.ch
www.facebook.com/omexpedition

Media contact: Samuel Gardaz, Vice-president for Public Affairs, founding member
samuel@pacifique.ch / Swiss mobile +41 76 563 65 43 / South African mobile +27 (082) 526 84 63

The Winds of Change program

University of Geneva

www.unige.ch/forel/en/physique-aqua/

Media contact: Dr Daniel F. McGinnis, Head of the Aquatic Physics Group
daniel.mcginis@unige.ch / +41 78 848 38 02

20'000 Sounds Under The Seas program

Laboratory of Bioacoustic Applications

Polytechnic University of Catalonia

www.lab.upc.es / www.listentothedeep.net

Media contact: Dr Michel André, Director
michel.andre@upc.edu / +34 93 896 7299/ 7200

Micromégas program

Association Oceaneye

www.oceaneye.eu

Media contact: Pascal Hagmann, Executive Director
pascal.hagmann@oceaneye.ch / +41 78 637 16 73

The Ocean Mapping Expedition

In partnership with



Cape Town Stopover with the official support of

