

PRESS RELEASE

The Ocean Mapping Expedition **The Indian Ocean, an unexpected methane sink?**

The Swiss expedition engaged in a 4-year journey (2015-2019) around the world in the wake of Magellan onboard sailboat *Fleur de Passion* to measure the human impact on the oceans and raise awareness about sustainable development issues achieved on 23rd May 2018 the crossing of the Indian Ocean from Jakarta.

During this leg of 4,300 miles (8,000 km), she 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, Faculty of Science, suggest that the Indian Ocean could be an important sink for atmospheric methane.

These intriguing results follow the identification of some first « hot spots », areas with very strong greenhouse gas emissions in South-East Asia, where the program was launched in the Philippines in Dec. 2017. They 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.

Geneva, 7 June 2018 - Six months after it was launched from the Philippines in December 2017 as part of *The Ocean Mapping Expedition*, 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. While Swiss sailboat *Fleur de Passion*, the platform of the expedition, has just achieved on 23rd May 2018 in Madagascar her crossing of the Indian Ocean from Jakarta, 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.

« 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 Nosy Be, a total of 4,300 Nautical miles (approximately 8,000 km) that 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.

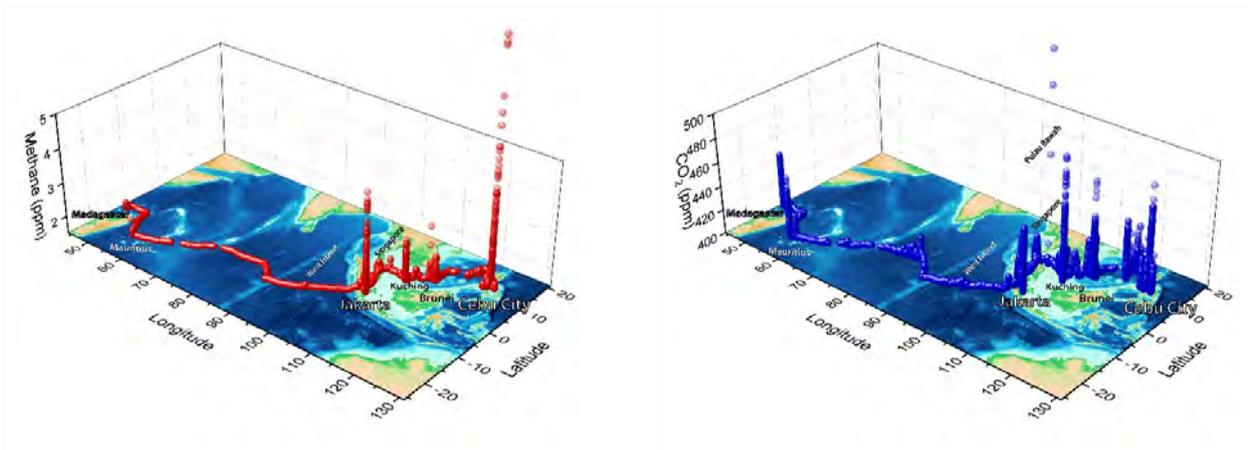
Between Mactan Island in January 2018 and the Indonesian capital, where *The Ocean Mapping Expedition* stopped in April, *The Winds of Change* program identified some first « hot spots », areas with very strong emissions of greenhouse gases deserving as such a closer assessment.

« 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.

Daphné Donis, co-responsible of the program, adds that « at the arrival of *Fleur de Passion* in the Northern coastline of Madagascar, low methane concentrations were observed (below 2 ppm), while carbon dioxide levels at about 460 ppm may need comparison with long term background time series ».

Although reflecting coastal environment, our methane data look very positive. Indeed the island's deforestation due to rice farming was longwise the largest source of greenhouse gases. But there has been some improvement, as from 2003 to 2013, Madagascar quadrupled the amount of protected forests from 3 to 12%, and aims to reduce its greenhouse gases emissions by 14% by 2030. »



Methane (CH₄ left) and carbon dioxide (CO₂ right) concentrations monitored along the route of *Fleur de Passion* from Mactan (Philippines) to Nosy Be (Madagascar), December 2017-May 2018), as part of *The Winds of Change* program. Atmospheric background of methane is about 1.6 ppm, and carbon dioxide is about 410 ppm.

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 *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

sailboat *Fleur de Passion* to measure the human impact on the oceans and raise awareness about sustainable development issues.

« 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 therefore to also keeping the climate change issue on the agenda, » says Samuel Gardaz, Vice-President for Public Affairs of the Fondation Pacifique, a non-profit organization based in Geneva and initiator of *The Ocean Mapping Expedition*.

« Such a pioneering program, as a pure initiative of civil society, once again illustrates the potential and interest 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. »

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. 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 Prof. McGinnis, « 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», adds Daphné Donis.

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

Since leaving Seville in April 2015, *The Ocean Mapping Expedition* already leads three other programs unpublished by their scope:

- The *20,000 Sounds under the Seas* 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 More than 450 hours of sound recordings have been carried out between Seville and Madagascar. Some initial results are accessible on <http://omexpedition.listentothedeep.com/acoustics/>.
- The *Micromegas* program for mapping micro and meso-plastic pollution on the surface of the oceans in partnership with the Oceaneye association in Geneva. From Seville to Madagascar, a total of 159 surface water samples has been collected and are being analyzed by the biologists from Oceaneye. For a first glance at the samples already analyzed: www.oceaneye.ch/cartographie/.
- The *CoralWatch* program consisting 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, some 1600 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.

Sharing the experience, awareness and culture

In parallel with scientific programs, *The Ocean Mapping Expedition* includes a sharing of experience. This translates into the welcome aboard *Fleur de Passion* of teenagers break in the framework of the socio-educational program *Young at Sea*, in partnership with the Geneva association Pacifique, but also passengers embarking as team members. Since April 2015, 49 teenagers and young adults have boarded by two-three or in groups, for two months on average as part of this program as well as some 62 passengers.

Dans le cadre de son volet culturel et du programme *Dans le miroir de Magellan*, *The Ocean Mapping Expedition* a accueilli treize illustrateurs et illustratrices « en résidence » à bord du voilier depuis le départ de de Séville: Zep, Matthieu Berthod, Tom Tirabosco, Pierre Wazem, Peggy Adam, Isabelle Pralong, Ambroise Héritier, Pierre Baumgart, Alex Baladi, Mirjana Farkas, Maurane Mazars, Cécile Koepfli et Aloys Lolo auxquels succèderont plusieurs autres jusqu'en septembre 2019.

As part of the « In the mirror of Magellan » cultural program, eleven cartoonists or illustrators - mainly Swiss and French - have already come on board « in residence » since the departure from Seville: Zep, Matthieu Berthod, Tom Tirabosco, Pierre Wazem, Peggy Adam, Isabelle Pralong, Ambroise Héritier, Pierre Baumgart, Alex Baladi, Mirjana Farkas, Maurane Mazars, Cécile Koepfli et Aloys Lolo, and many others until the return of the expedition to Seville un September 2019.

Fleur de Passion, a ship whose fate turned out to be ... “Pacific”

Flagship of the Foundation and logistic platform of *The Ocean Mapping Expedition*, the sailboat *Fleur de Passion* has a remarkable history. Originally a *Kriegsfischkutter* or KFK (a motor boat belonging to the Germany navy), she was built in 1941 and used for coastal defense, mine laying and as a submarine supply ship. Having survived the Second World War intact, she was handed over to the French navy, which used her for some 30 years before disarming her in the 1970s and selling her to a private individual, who converted her into a rigged vessel and gave her her current



name. Until the mid-1990s, *Fleur de Passion* travelled the Mediterranean and Atlantic as part of socio-educational and scientific programmes. In 2002 she was bought by the Geneva-based association *Pacifique*, which completely restored her over a period of six years, from 2003 to 2009, in the hope of extending her now peaceful existence under the aegis of the foundation.

About Fondation Pacifique

Fondation Pacifique is a Swiss, Geneva-based non-profit organization formally recognized as being of public utility. Since its establishment in 2007, it has been developing, organizing and carrying out theme-based expeditions combining a blend of scientific research programmes, and cultural, socio-educational and environmental awareness projects on its sailing ship *Fleur de Passion*, a 33-metre ketch. Its ambition is to contribute to a better understanding of human impact on the ocean, and to prompt us to think about man's place on "planet ocean" by enabling anyone with an interest to enlist as a member of the crew and take part in the expedition. Expeditions carried out on *Fleur de Passion* are marked by a multidisciplinary approach based on experience sharing, and are accompanied by projects designed to communicate with the wider public, especially at ports of call. Its most important project so far, *The Ocean Mapping Expedition*, a journey around the world following in the wake of Ferdinand Magellan, which is scheduled to take four years (2015-2019), will be an exceptional, one-of-a-kind opportunity to observe and map the state of the ocean today, echoing the spirit in which the Portuguese adventurer and his crew embarked on their journey almost 500 years ago.

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