

## RUTH PATRICK AWARD

# JEAN-PIERRE GATTUSO

### ASLO: Can you share a turning point or defining moment in your work as a scientist?

JPG: Around 1990, the role of coral reefs in the global carbon cycle became a hot topic. I was not fully familiar with the intricacies of the carbonate chemistry in seawater and was confused about the controversy: are coral reefs sources or sinks for atmospheric CO<sub>2</sub>? My friend and colleague Michel Frankignoulle from the University of Liège, Belgium, now deceased, myself and other collaborators performed concurrent measurements of community metabolism and air-sea CO<sub>2</sub> fluxes and obtained the first field evidence that coral reefs flats are sources of CO<sub>2</sub> to the atmosphere.

A defining moment occurred soon after when Bob Buddemeier, then at the Kansas Geological Survey, generously shared with me work that he performed with Steve Smith from the University of Hawaii which suggested that elevated CO<sub>2</sub> is detrimental to coral calcification. I was then at the Scientific Center of Monaco which was fully equipped to perform perturbation experiments on corals. This was the starting point of my work on ocean acidification and its impacts on marine organisms and ecosystems. Many collaborative projects followed, initially with M. Frankignoulle then Joanie Kleypas from the National Center for Atmospheric Research, USA, and many others, including a fantastic group of colleagues of the European Project on Ocean Acidification which I had the privilege to coordinate. I am immensely grateful to Bob for his unselfish collaboration and to many colleagues and students for their insight and leadership.

**ASLO: You've devoted substantial effort to developing what your colleagues called "an international research infrastructure for ocean acidification," including fundraising for the establishment of the International Coordination Centre for Ocean Acidification. What has been the most challenging and rewarding aspect of doing this?**

JPG: In 2008, I was approached by the international projects Integrated Marine Biogeochemistry and Ecological Research (IMBER, <http://www.imber.info>) and Surface Ocean Lower Atmosphere Study (SOLAS, <https://www.solas-int.org>) to launch and chair a working group on ocean acidification. Ocean acidification was then a burgeoning scientific field. I invited about eight colleagues to

join what became the SOLAS-IMBER Ocean acidification (SIOA) Working Group. We identified activities which were critical to assess the effects of ocean acidification but were, for the most part, not funded at the national or regional levels. These activities had to be carried out at the international level. We then put together a very ambitious program to communicate, promote and facilitate ocean acidification research. But we hit a wall in the sense that we were unable to find the financial and human resources needed to launch this program. Then, in 2011, I serendipitously discovered that there may be an opportunity to get support via the Peaceful Uses Initiative of the International Atomic Energy Agency (IAEA). The program that the SIOA WG had designed was shared with IAEA colleagues and was used to launch the Ocean Acidification International Coordination Center (OA-ICC, <https://www.iaea.org/services/oa-icc>) in 2012 at the Environmental Laboratory of the IAEA in Monaco. Almost 8 years later, the OA-ICC team is still providing fantastic services to the community under the scientific guidance of James Orr (Atomic Energy Commission, France), current chair of the SOLAS-IMBER Ocean acidification Working Group, and of the other experts of the group.

The challenging part of this process was to find the resources required to get the ball rolling. Working with enthusiastic colleagues sharing the common goal to build an international structure in order to help develop high quality ocean acidification research was extremely rewarding. The successful launch of the OA-ICC was very fulfilling.

**ASLO: You have been a pioneer in taking science to society. What words of advice do you have to early career scientists who aspire to have their science be relevant to society?**

JPG: They should go for it and dedicate some of their time and energy to such non-academic activities. It is essential that everyone understands the progress of science and that decision makers base policies on solid science. From my experience there are many ways scientists can contribute. First, by producing high quality and policy-relevant science. Second, by getting involved in scientific assessments because such collective exercises provide opportunities to move expert judgements further and come up with more synthetic, policy-oriented knowledge. One example is the Intergovernmental Panel on



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Climate Change (IPCC), which has an open and transparent process to get involved and is a very rewarding experience. Third, by producing short summaries of key scientific findings written in a language accessible to non-scientists, avoiding jargon and advocacy while providing actionable options. I have been involved in several such policy briefs. They were four pages long with a short (about a third of a page) list of 3–5 key messages. It forced me, a natural scientist, to closely work with social scientists and economists who know about policy processes, governance issues etc.... It considerably improves the policy relevance of what we do. My association with the Institute of Sustainable Development and International Relations, France, and Alexandre Magnan exemplifies the benefits of transdisciplinary research through *The Oceans 2015 Initiative* (<http://bit.ly/1M6YiS6>) and *The Ocean Solutions Initiative* (<http://bit.ly/2xJ3EV6>). Fourth, by disseminating the messages in person if one is given the opportunity. Several audiences are eager for tailored scientific information: pupils and students, the general public, and decision makers. Several media are available to reach these audiences (lectures, conferences, animated movies, documentaries...) and social media, such as Twitter, which is increasingly used by scientists. Also, there are often policy side events at meetings and the organizers are always keen to hear first-hand reports about science findings. In my case, I gave several presentations at UN climate change (COP) meetings. It gives the great feeling to bring our science in the policy arena.