Luis Ernesto Medina Faull

Luis Ernesto Medina Faull grew up with the ocean as his neighbor. He has considered himself a truly passionate person for the sea since he was a child. Coincidentally, in high school an aptitude test showed his skills to be that of a marine biologist. He first realized that passion when he participated in a field trip in a small boat and almost everyone was seasick while he was able to enjoy the work. At that point he started to get involved in several activities related to the ocean, like the scuba diving club and spear gun fishing club. He also volunteered for several groups in the field of beach and marine animal conservation.

He became a marine biologist in Venezuela. He obtained a Master's degree in Oceanography at the Oriente University (Venezuela) and graduated from the Center of Excellence in Observational Oceanography at the Bermuda Institute of Ocean Science (Bermuda). He obtained his Ph.D. Marine Sciences, at School of Marine and Atmospheric Sciences, Stony Brook University.

Abstract: Microplastics (MPs) have become an omnipresent component of the litter contaminating our oceans. These particles (0.001 to 5 mm diameters) are derived from the breakdown of larger plastic or are manufactured (e.g., personal care product microbeads). Oceanic MPs are problematic because they can bind toxic chemicals and enter the food chain. In addition, black carbon (BC) is a refractory organic residue produced by incomplete combustion of fossil fuels and vegetation and is also globally dispersed. After CO_2 and CH_4, MP and BC may be among the most important drivers of climate warming due to their light-absorbing properties which can contribute to heat-trapping and snow melting. In environmental samples, BC and MPs are often inadvertently analyzed with autochthonous carbon pools. In pyrolytic bulk sample analyses, carbon signals from these particles are indistinguishable from one another and from autochthonous materials. This complicates our understanding of MP's and BC's effects on global carbon budgets, especially if we consider that they are globally distributed. Using Raman microspectroscopy, I initially designed a protocol to detect and quantify MP particles on filters. This methodology also collects BC particles from the same sample, precluding the need to separate them prior instrumental analysis. This dissertation focuses on understanding oceanic distributions of MPs and BC and on determining the contribution of these particles to natural organic particle pools. The main goals were to establish the abundance and distribution of MPs and BC in different locations, compute realistic estimates of MP abundances to derive a mass balance of oceanic MPs, and evaluate how inclusion of MPs and BC in carbon cycling measurements might distort models of how the ocean processes natural carbon. Particles from seawater samples were in the 1 to 20 μm size range, which current

sampling and analytical methods omit. In addition, MP and BC particle sizes were measured and masses derived. This is critical because using the mass, more accurate oceanic plastic budgets can be calculated. If it is assumed that MPs are a component of POM in the ocean, contamination may have far-reaching impacts on current assessments of the ocean's POM pool and its apparent ages.