IPRC Marine Debris Team Hosts Second Intern with
Brazil's *Science Without Borders* Program

As a third-year oceanography student at Rio de Janeiro State University (UERJ), I applied successfully to the Brazilian Government's program "Ciencia sem fronteiras" (Science without borders) for study abroad during my fourth year. I was accepted at California State University, Monterey Bay (CSUMB), which I chose because of its proximity to such oceanography research institutions as the Monterey Bay Aquarium Research Institution (MBARI) and the Hopkins Marine Station.

A requirement of my year at CSUMB is to do an internship. Since I had already come to Hawaii for vacations, I looked on the SOEST website for researchers who focus their research on physical oceanography and on my preferred research topics and found Nikolai

Joao at Kailua Beach Park measuring beam showing characteristic features of Japanese beams. It was probably swept into the ocean by the 2011 tsunami in Japan.

Maximenko's profile. I emailed him, got positive feedback, and decided it was a good opportunity.

It was my first time working with marine debris, a completely new experience for me. I went to such beaches as Makapuu, Waimanalo and Kailua. Depending on the ocean conditions, I was able to find a lot of marine debris. In general, the beaches here are clean, but when several waves hit the coast, ocean and coastal currents bring a lot of debris to shore.

I did coastline surveys and looked for special types of debris and took photos to add to the IPRC dataset. I found small-sized plastics in large quantities, but sometimes I found such unusual items as boxes (crates), fish traps and buoys. I learned about the different types of debris that are found on the island and learned ways to identify where they come from.

Under Nikolai's guidance, I developed a method for creating a marine debris photo database. We use a background paper with a printed frame that serves as a basis for comparison. First we take a photo of the frame with no debris samples inside, then we place the samples inside the frame and, with the same camera settings and light conditions, we take another photo; by subtracting the parts in both pictures that match (that is the background paper and the frame), the software MATLAB can recognize the debris sample; in other words, the software utilizes two different pictures to select just the items we want, and it does so by analyzing the light patterns in each pixel in the image. From this we can analyze samples by size and visual similarities, such as color, and add it to the IPRC database.

With some help from Jan Hafner who works with Nikolai, I also processed this data using MATLAB. Moreover, Nikolai taught me some background knowledge that could help me with the research, like ocean circulation and physics. He introduced me to some of the folks that work with him, so I learned about their work and personal experiences. He also taught me about the islands and local culture.

I would like to thank all the folks that helped me increasing my knowledge and added something to my experience. My time in Hawaii has been great and I will never forget this experience. I hope I can use all I learned here in the future and contribute to science with the knowledge I acquired.

Mahalo,

Joao Pedro Cardoso