

# Macro and Micro Plastic Debris Adsorbed and Transport Endocrine Disruptors in the Ocean.

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## Overview

- Plastic materials have been found to absorb and concentrate persistent organic pollutants including PCBs and PAHs, leading to increased toxicity in seawater organisms and wildlife.
- Studies of plastic fragments in the ocean have established that these plastic materials can accumulate, transport and release persistent organic pollutants.
- Small plastic fragments can be ingested by seawater organisms and increase transfer of organic contaminants to organisms in the food chain

## Introduction

The amount of plastic debris increases every moment and degrades so slowly that it effectively never disappears, it is only dispersed. Accumulation of pollutants by plastic debris in marine environment is well established. Some studies show that small, less than 5 mm, pieces of plastic debris are often ingested by marine organisms. The pollution caused by microscopic plastic is a potential hazard to marine life and can affect the human race. Both water and plastic samples were collected from the North Pacific Central Gyre in September, 2007.

## Acknowledgements

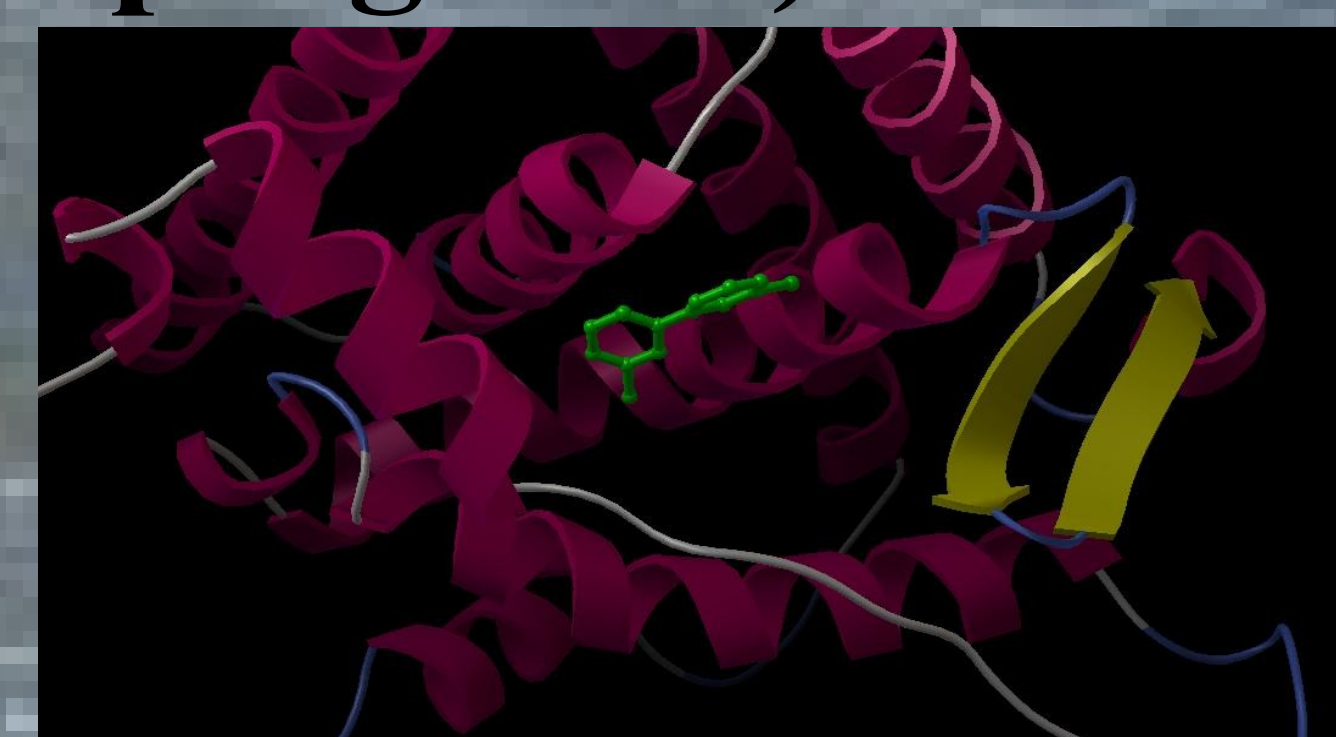
The University of Pacific Computational and Theoretical Chemistry Group. This study received financial support from Algalita Marine Research Foundation.

## Modeling

(Autodock 3.0 and sybyl programs)

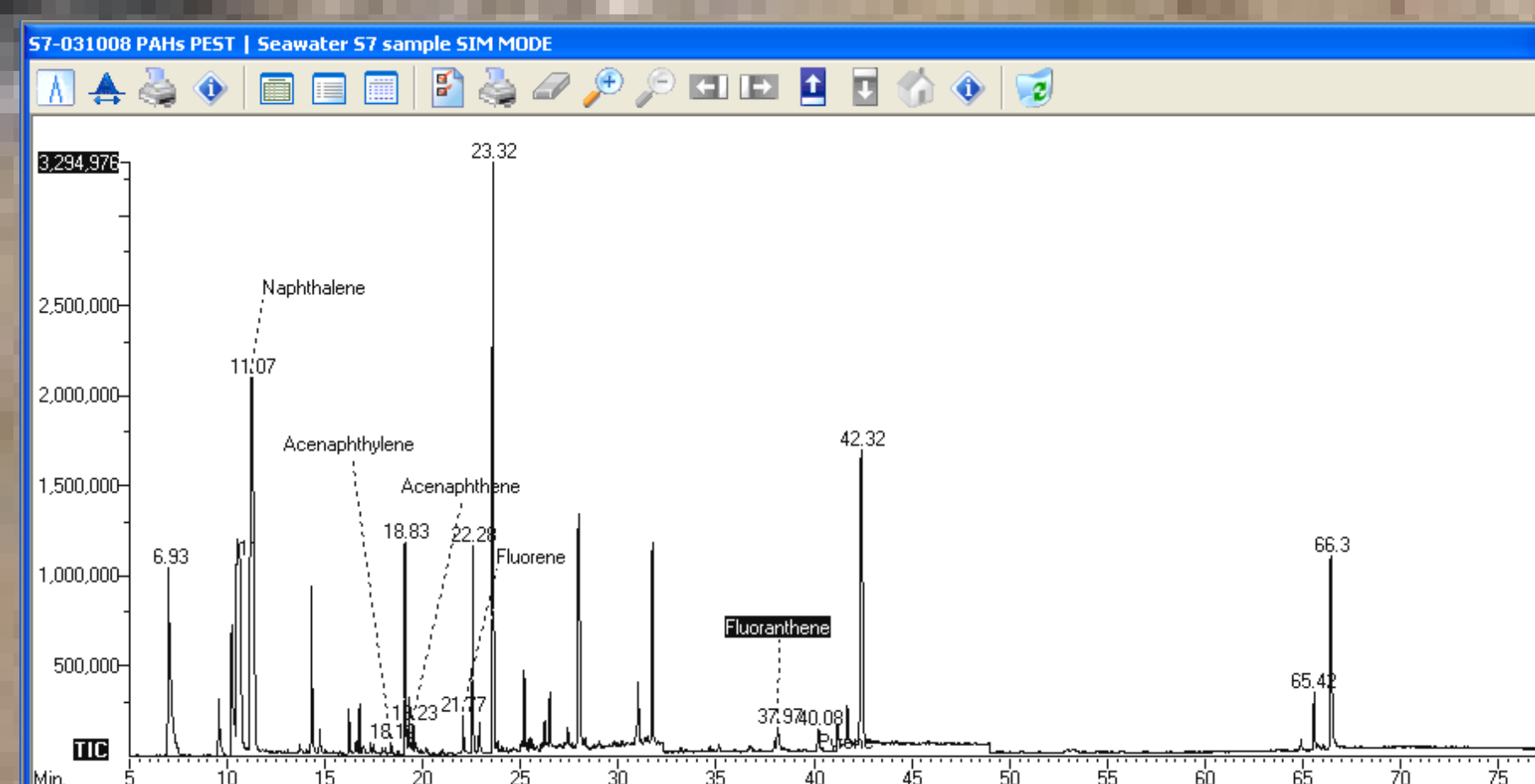
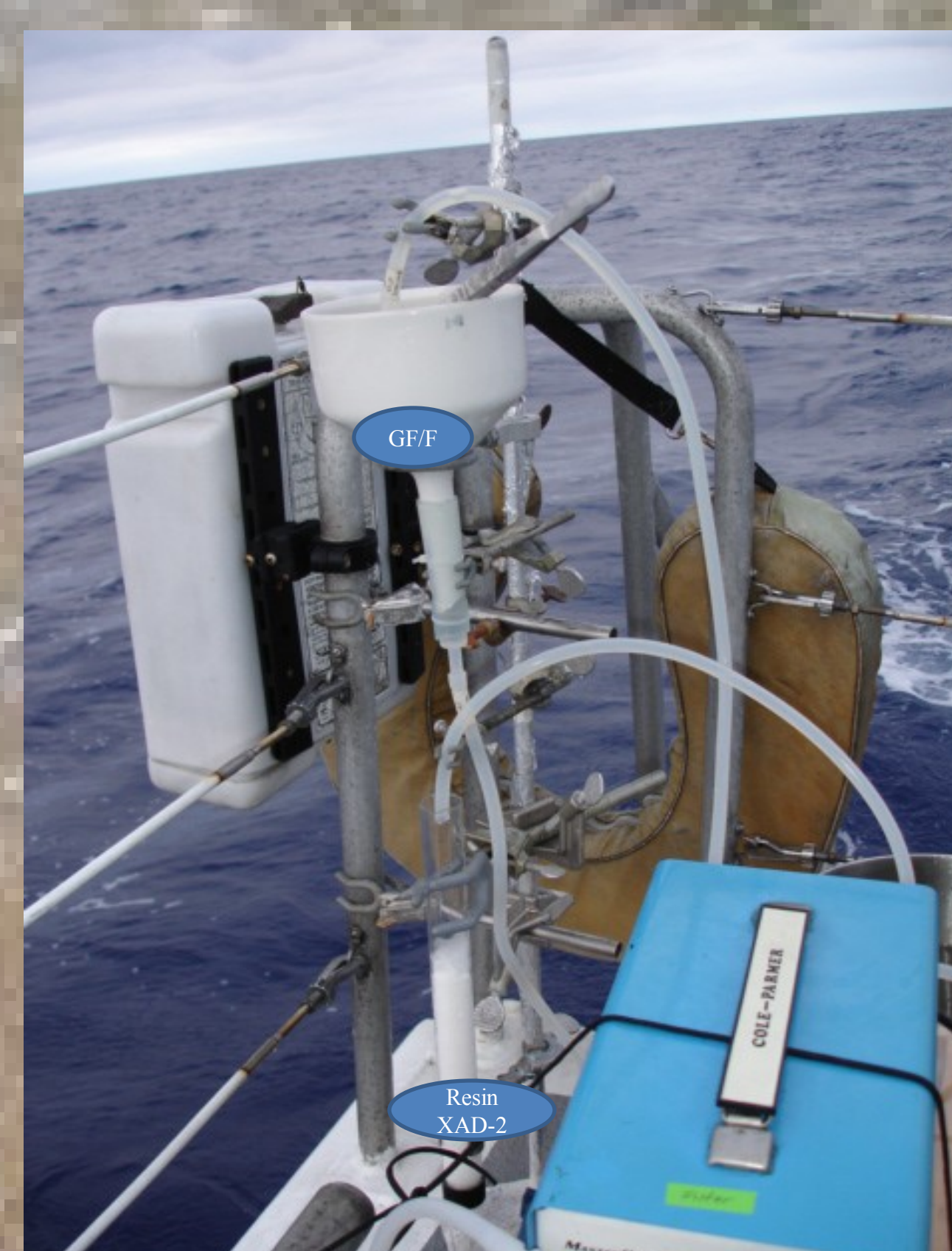
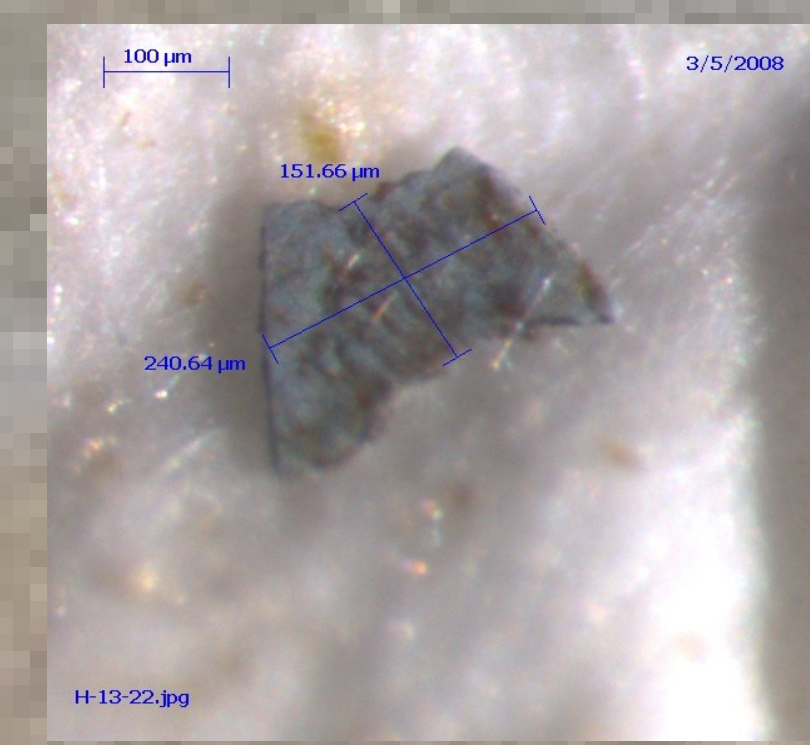
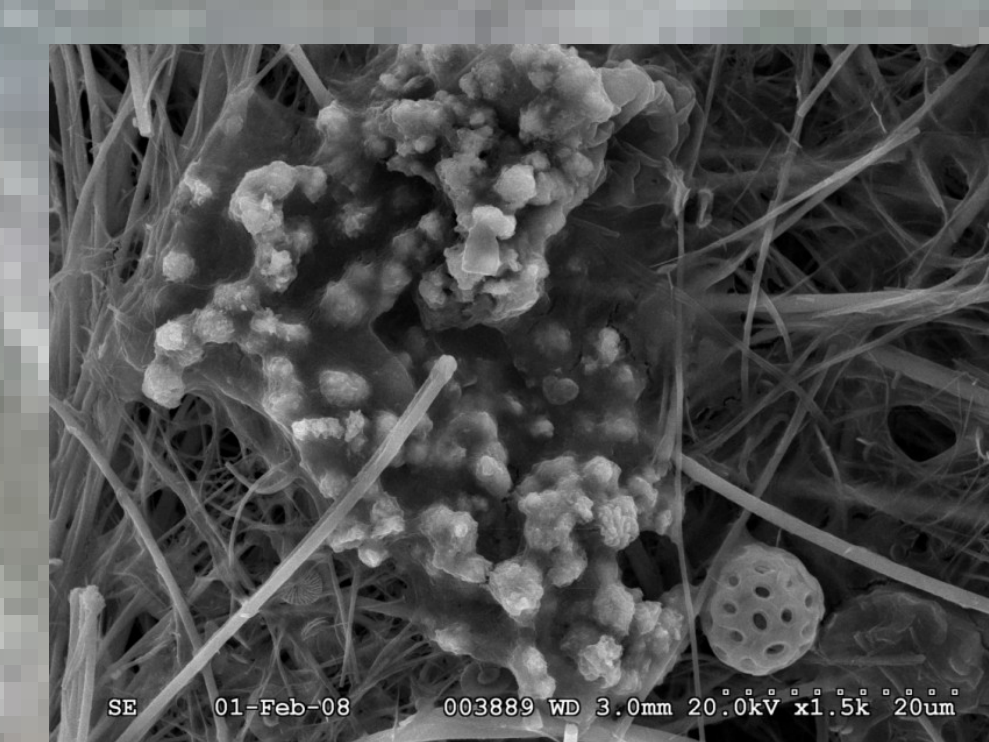
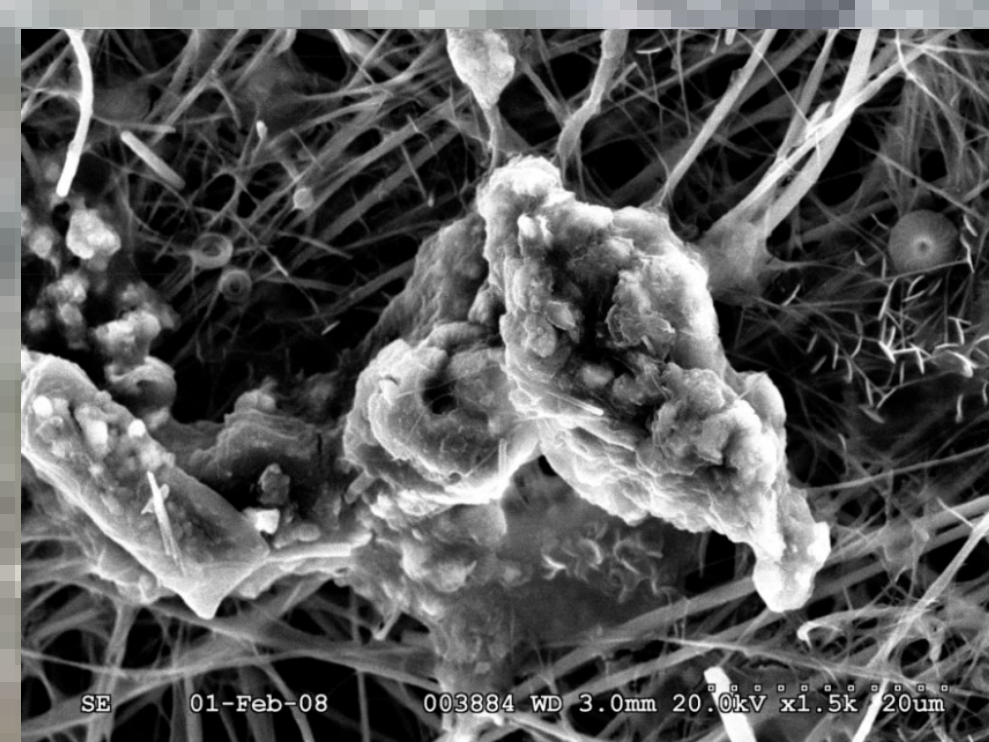


Secondary structure  
 Multichannels, and docked  
 ligand in the binding site

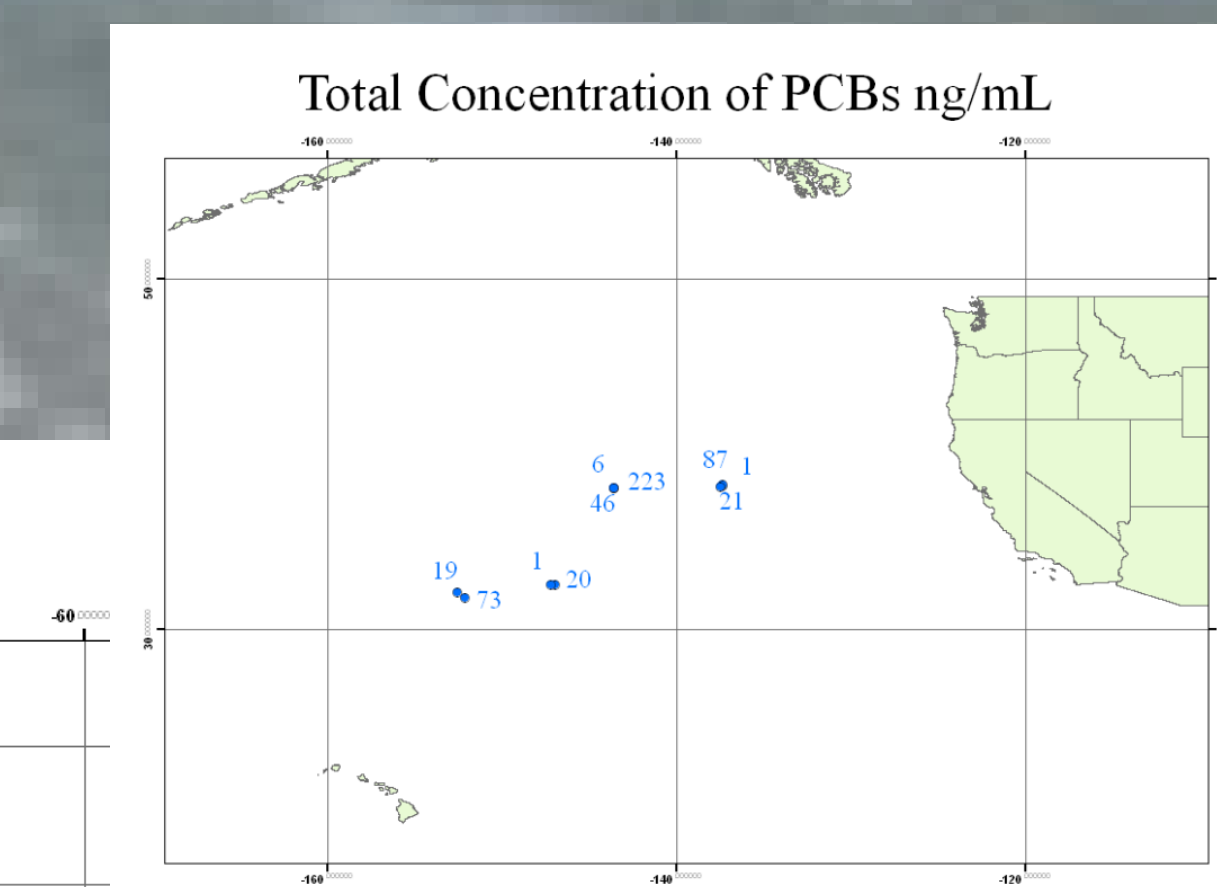
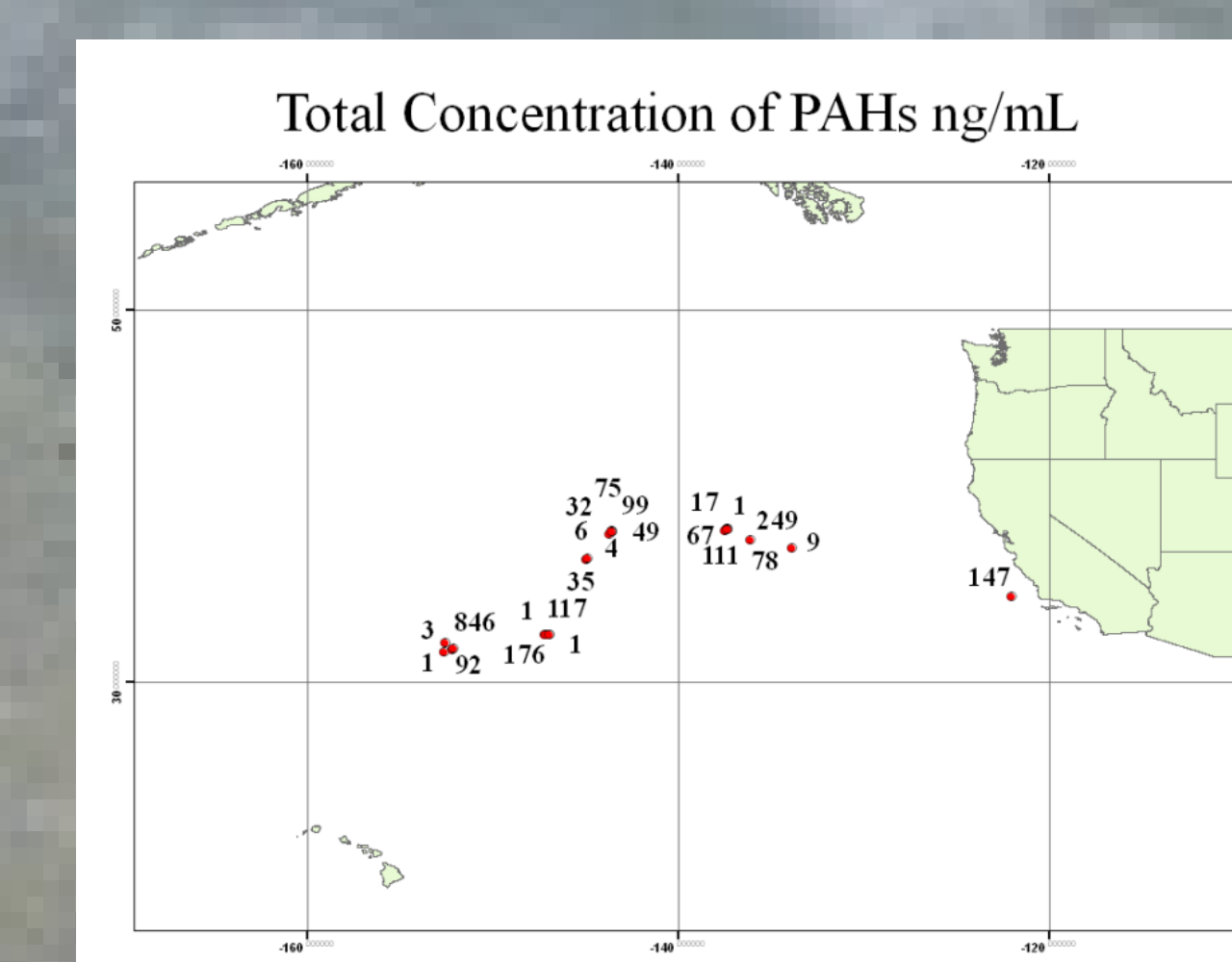
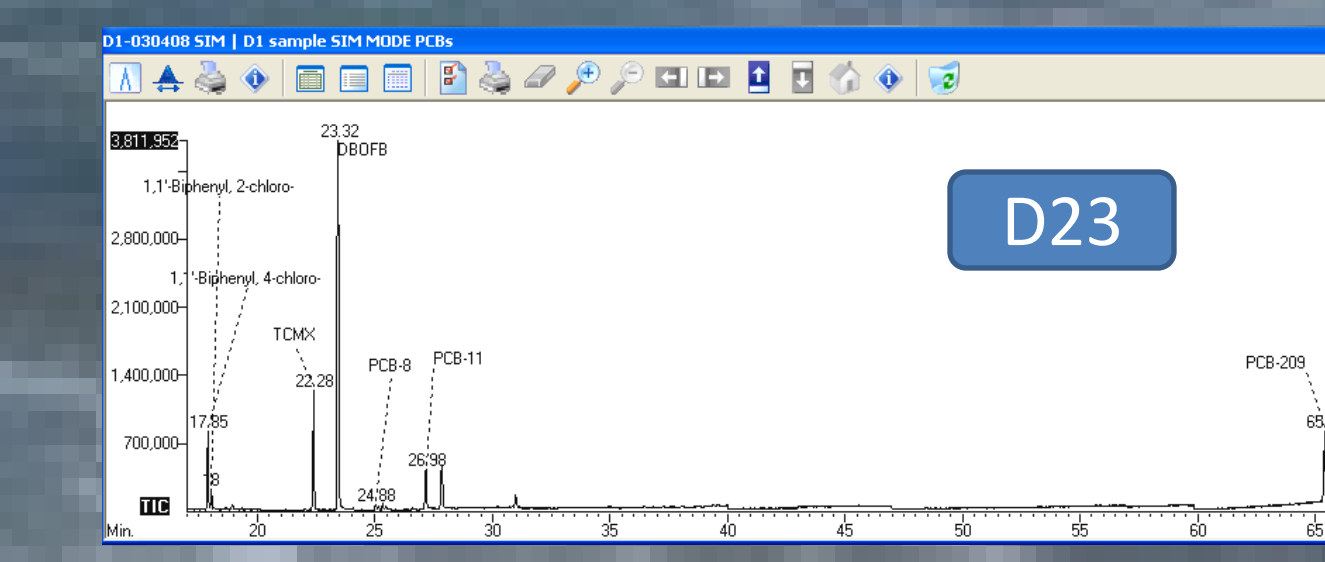
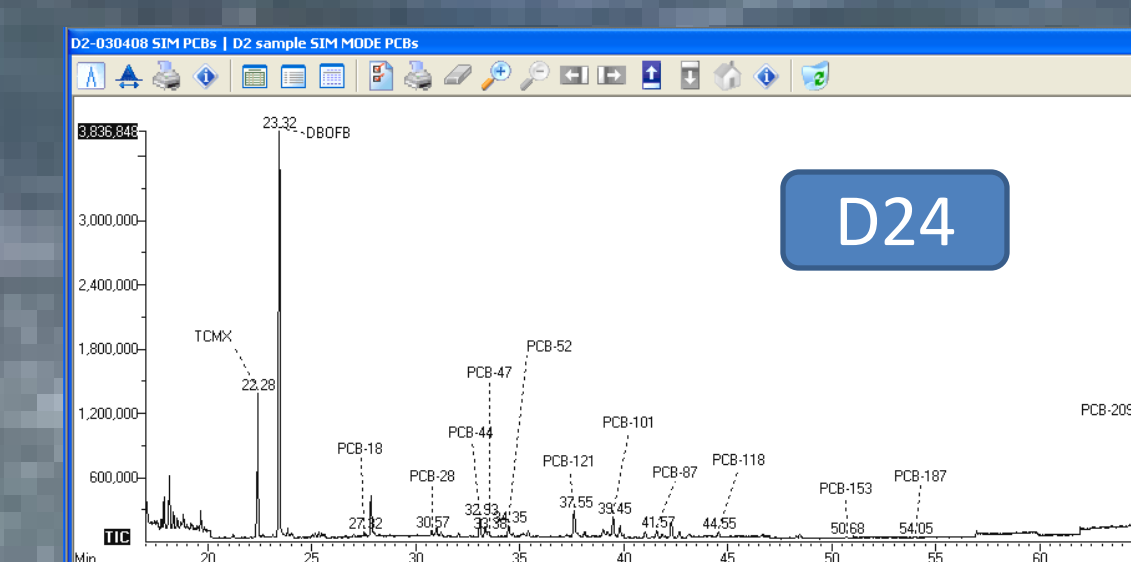


Docking  
 Ligand and secondary structure

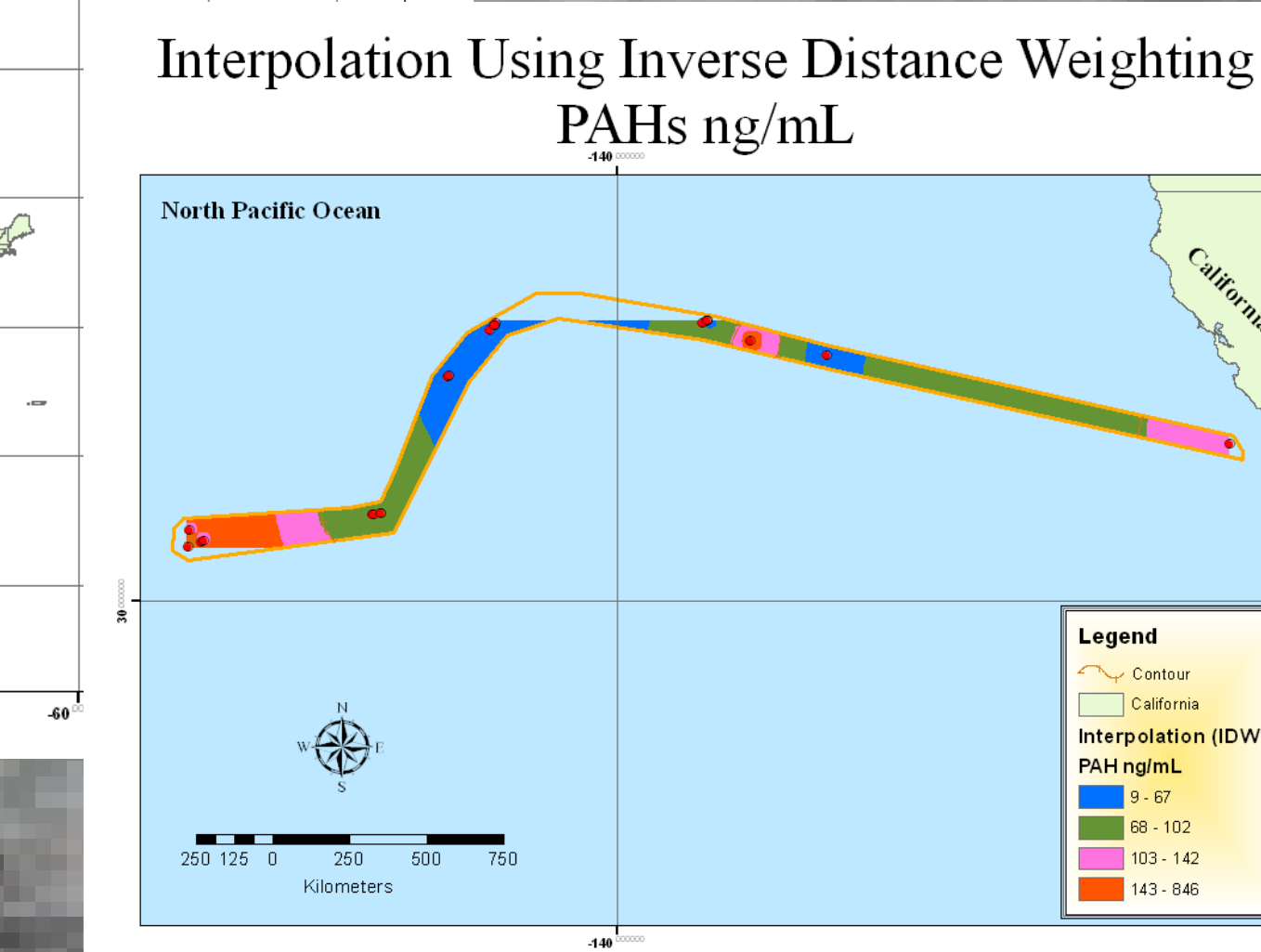
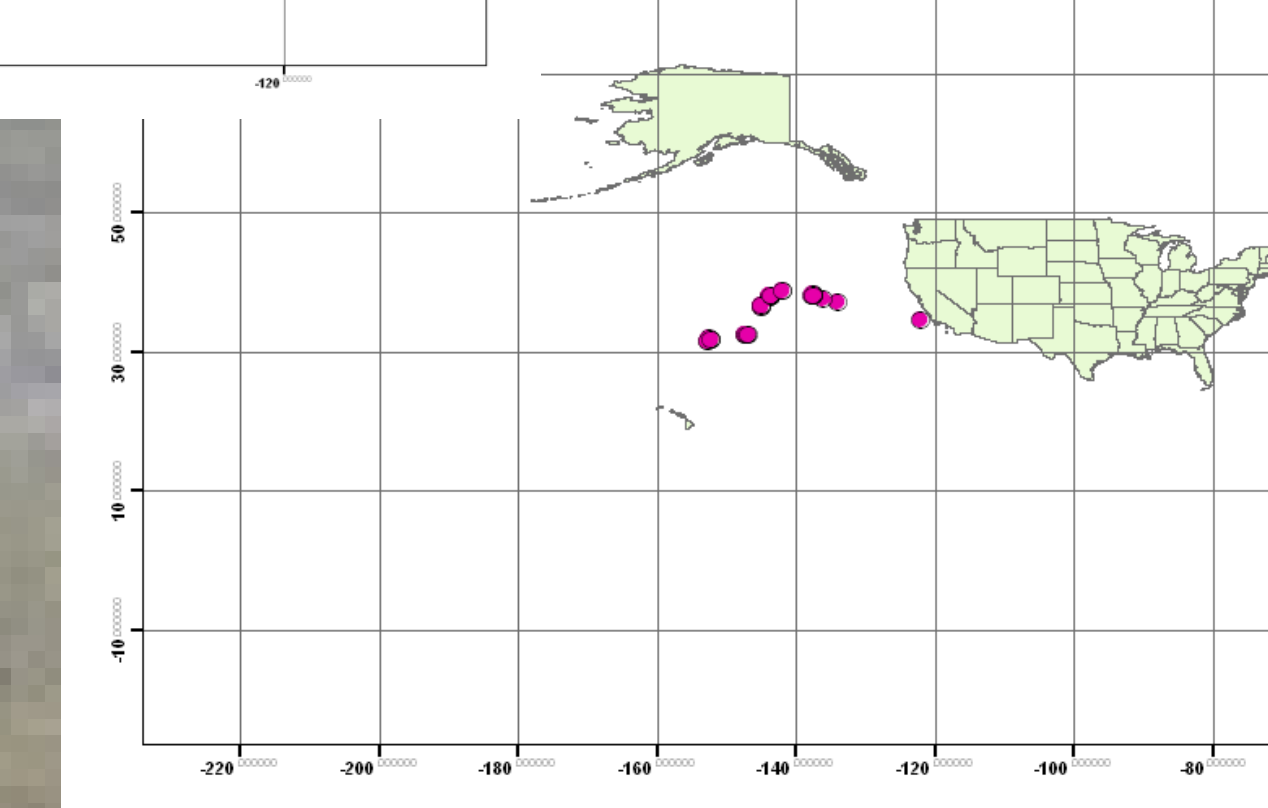
Microscopic plastic.  
 Types: fibers, fragments.



Colors: blues, black, green, white, orange  
 Sizes: 6µm d, 500 to 2000 µm long



Site Location



## Results

The ΣPCBs and ΣPAHs detected in plastic particles samples in NPCG are shown in the GIS maps. The most common detected pollutants on these plastic fragments were PAHs. Lower the ratio LPAHs/HPAHs, higher the possibility of pyrolytic (52% of the samples) source over the petrogenic (48% of the samples) source. However, the PAHs quantified could have mixed sources dominated by pyrolytic process. PCBs concentrations ranged from 1 to 223 ng/g. These results show that there are several sources of these pollutants. The main synthetic polymers found in fragments particles were PE and PP. These types of plastic are the most commonly used by society. Microscopic plastic particles were also discovered suspended in sea water.