



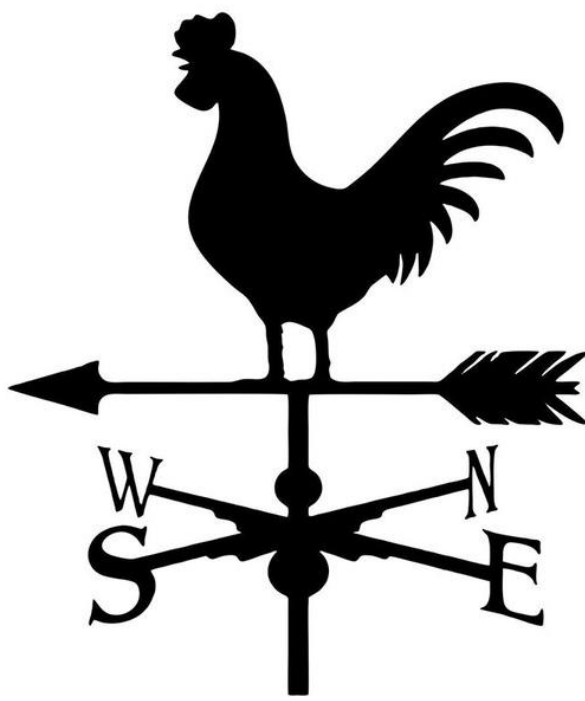
# The Correlation of Microplastic and Mesoplastic Debris under Extreme Weather Events: A Case Study at Gongliao Beach, Northeast Coast of Taiwan

Master Student: En-Yang Joshua Yang Advisor: Ludvig Löwemark, Ph.D., Jan-Alexander Kunz Ph.D.

In this study particles that are equal to or larger than 5 mm but smaller than 2.5 cm are defined as mesoplastic and particles that are equal to or larger than 1 mm but smaller than 5 mm are classified as microplastic.

The meteorological parameters that were considered in this research studies were:

1. Precipitation (mm)
2. Wave height (m)
3. Wind (m/s)
4. Typhoon distance (km)



## Microplastic Morphologies



Microplastic viewed under a microscope:

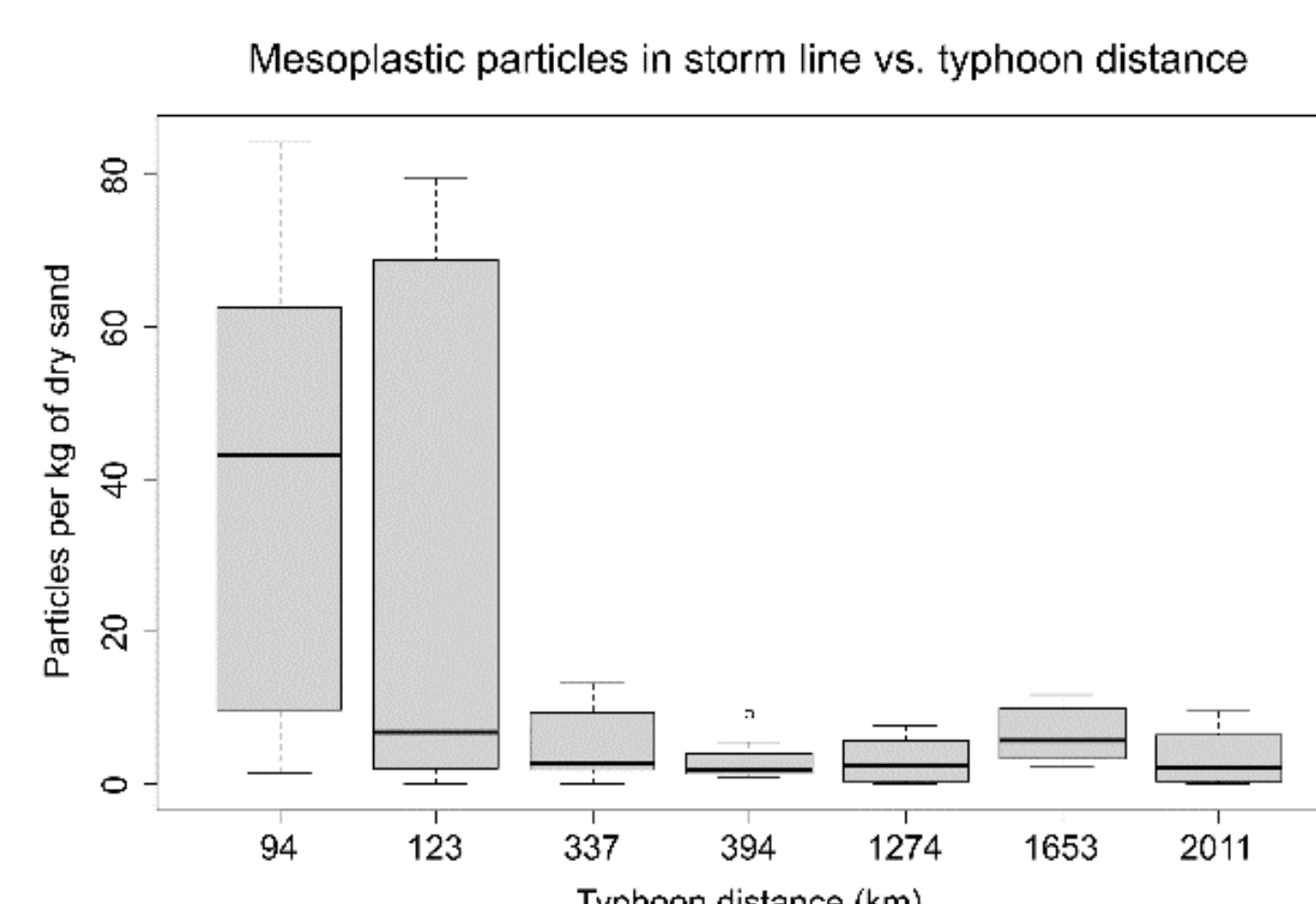
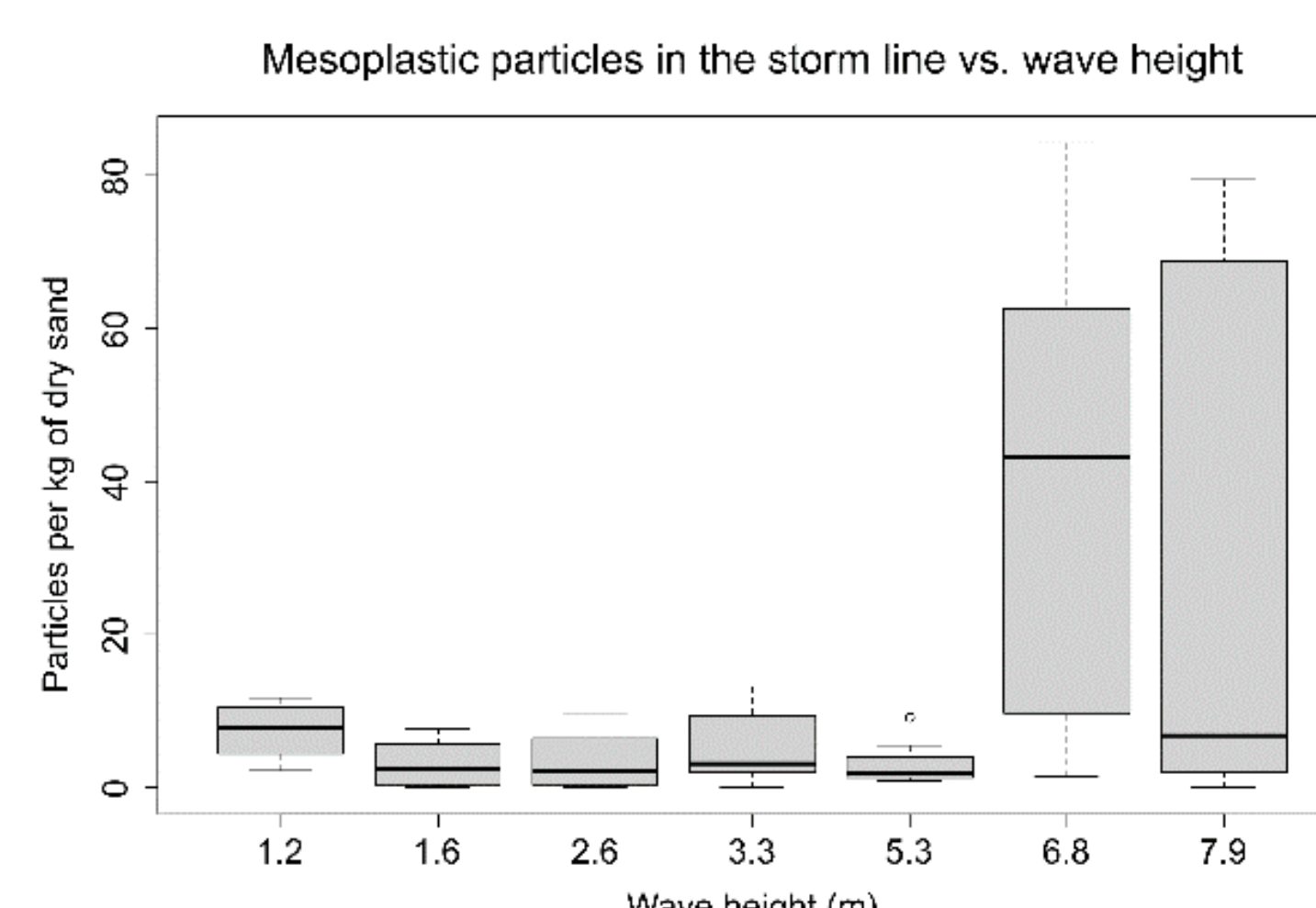
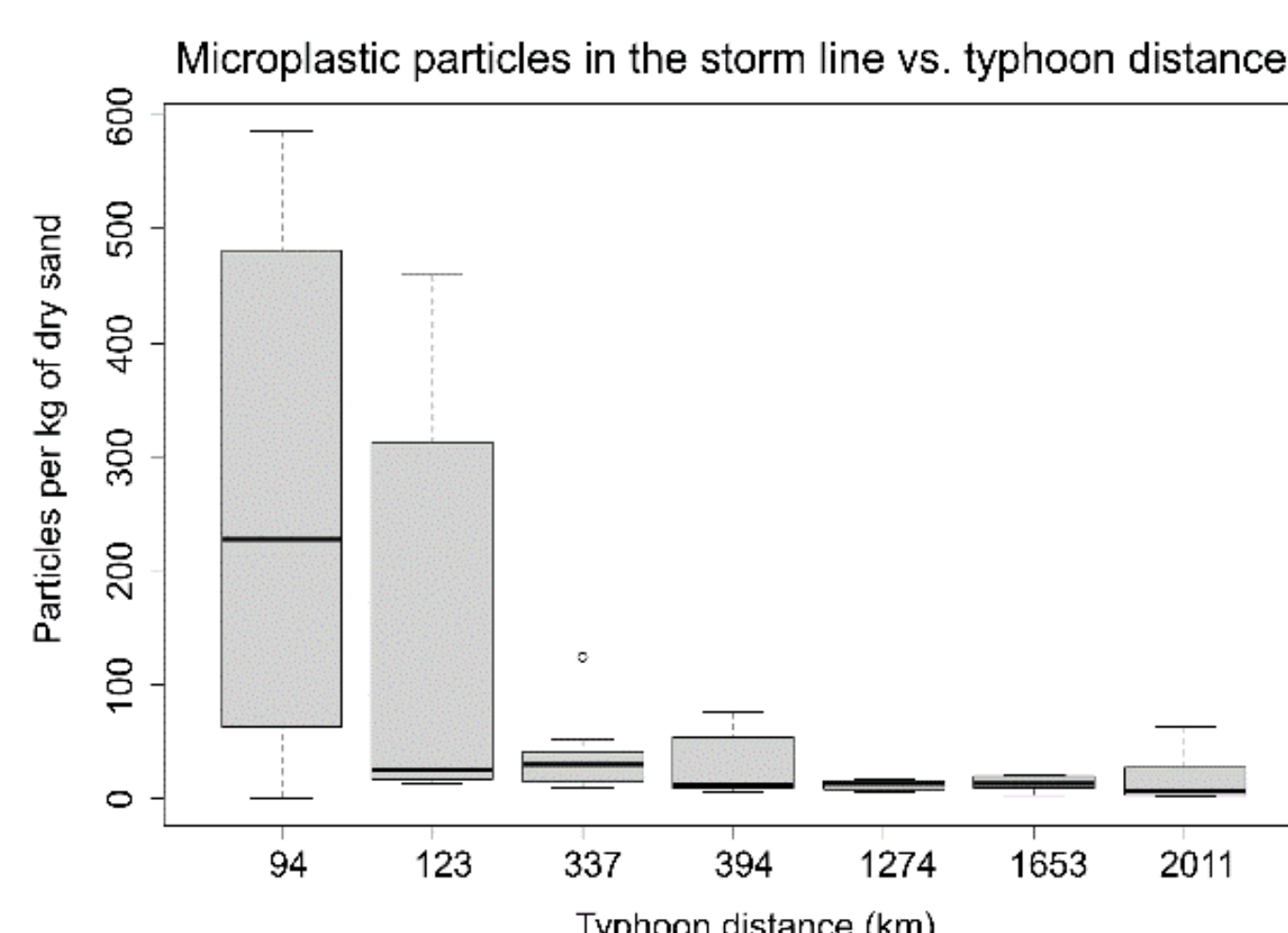
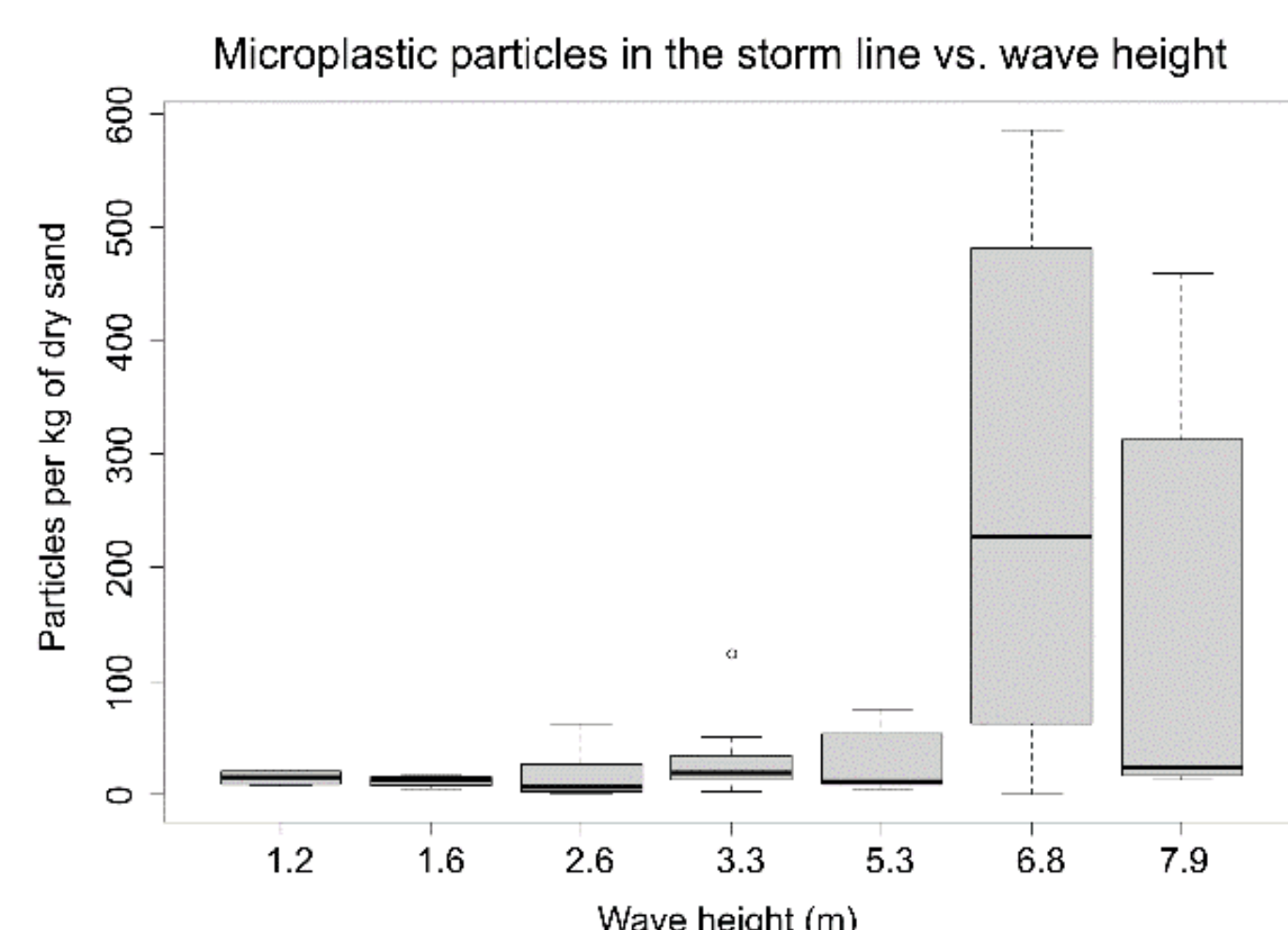
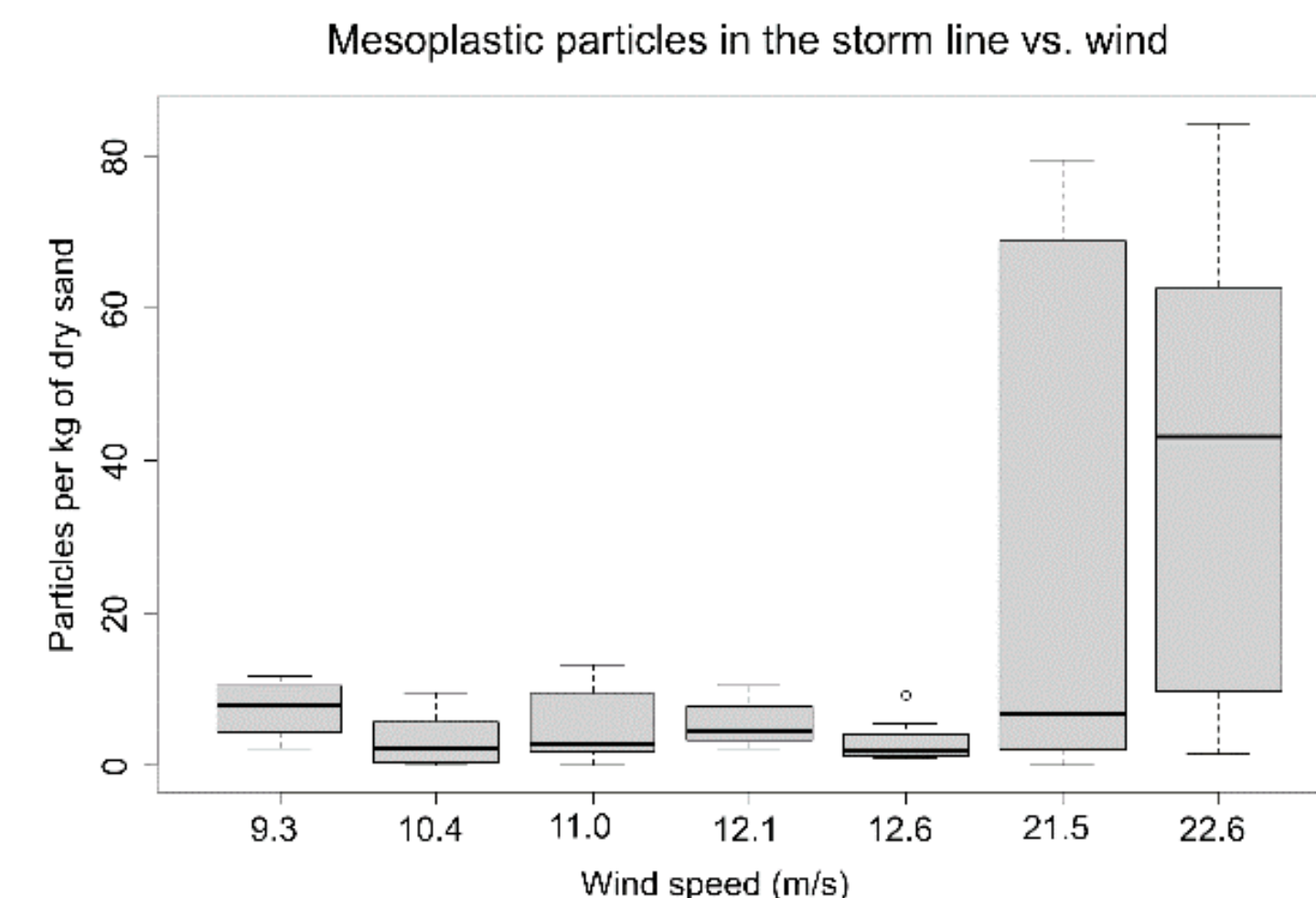
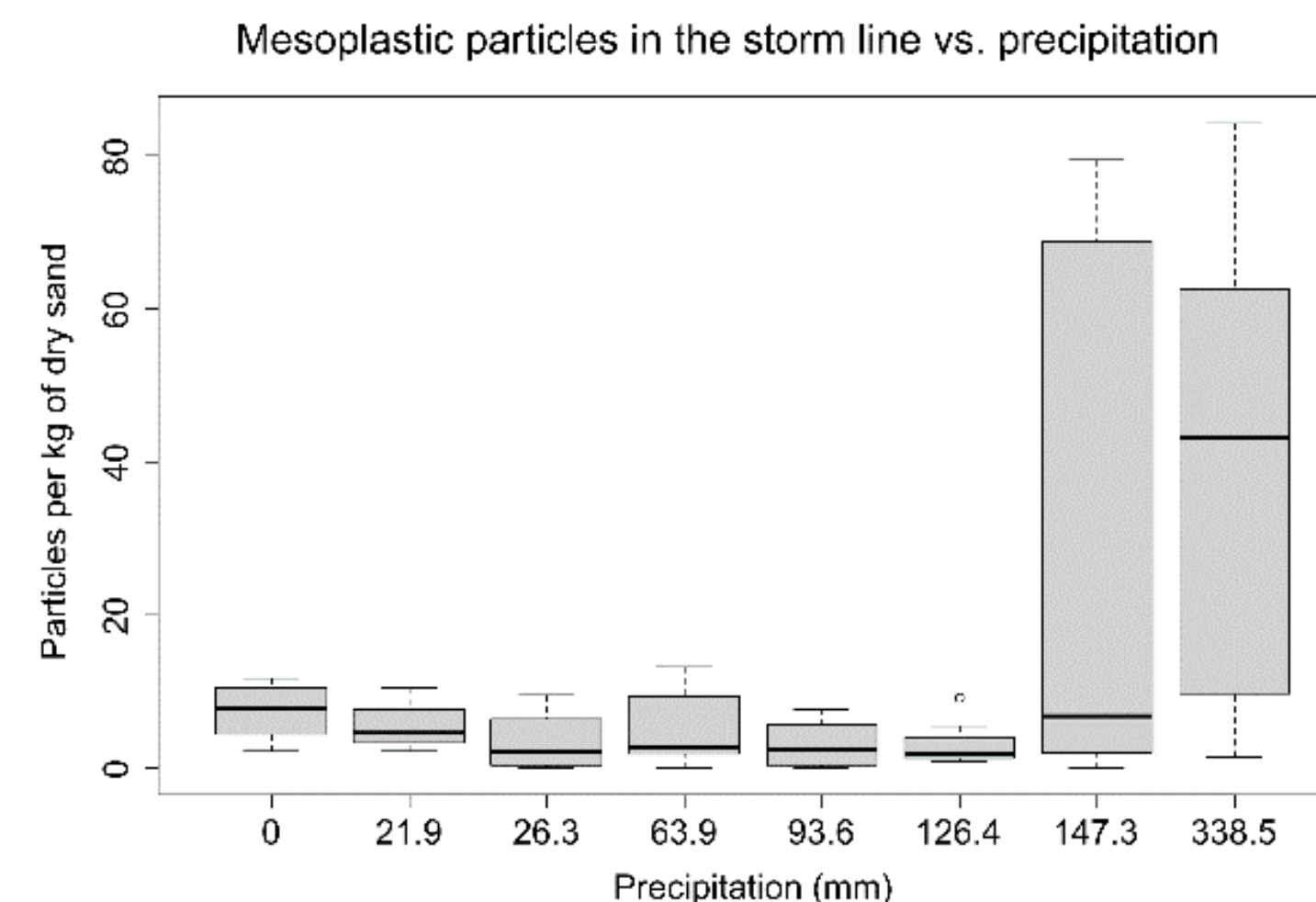
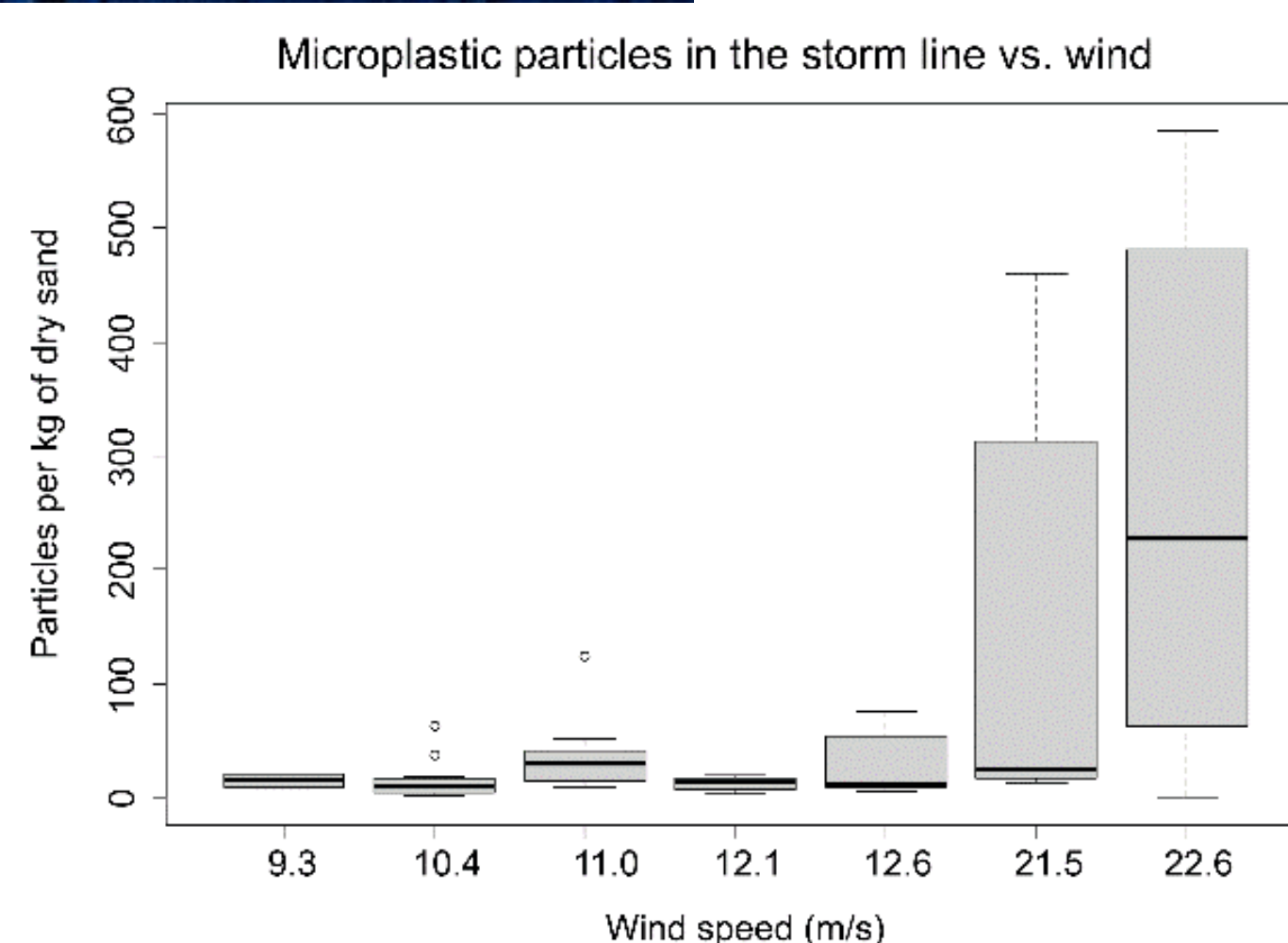
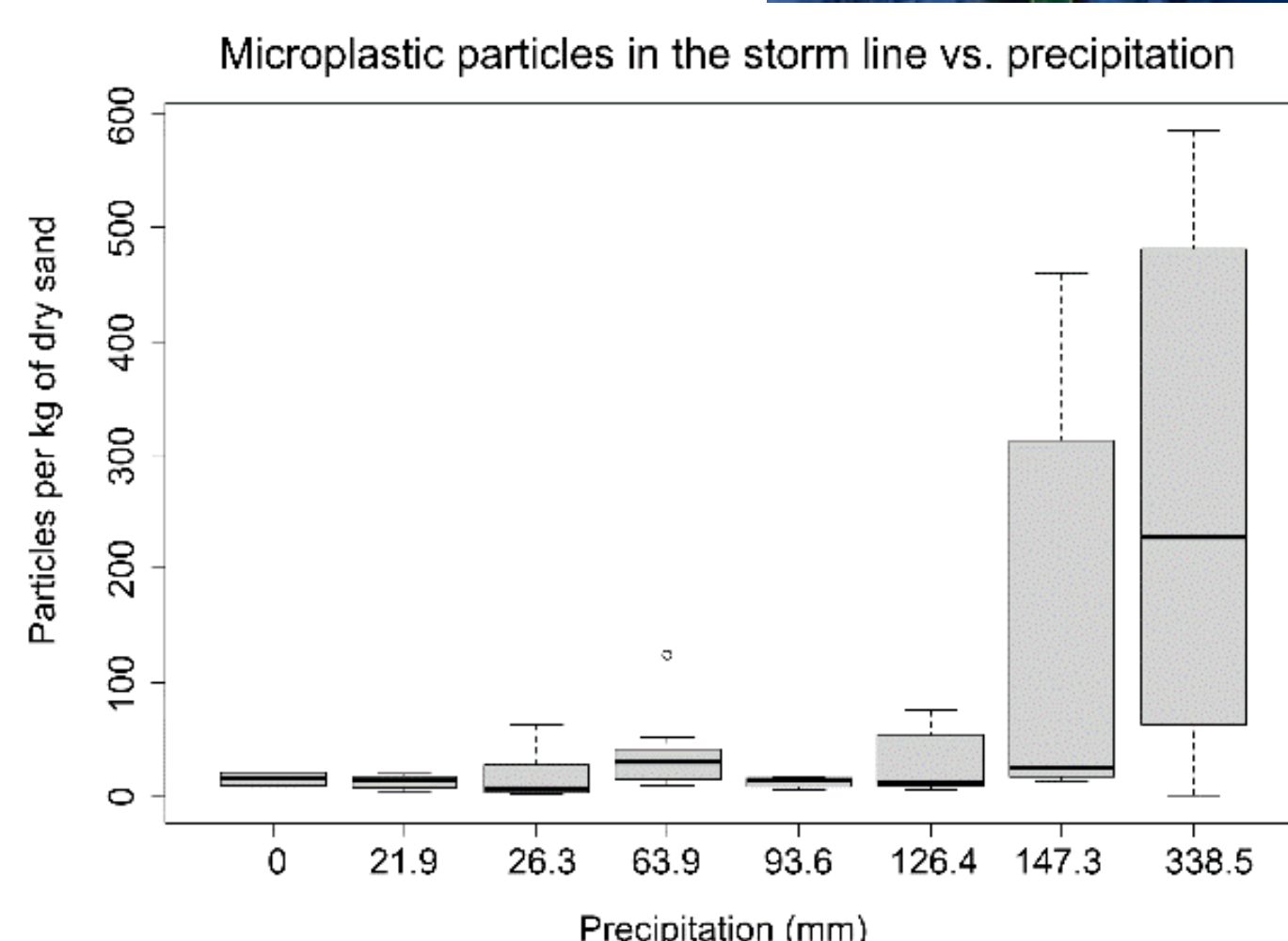
1. Spherical pellet
2. Fragment
3. Styrofoam
4. Cylindrical pellet
5. Other foam, PUR plastic



## Study Area: Gongliao Beach



Northeast coast of Taiwan



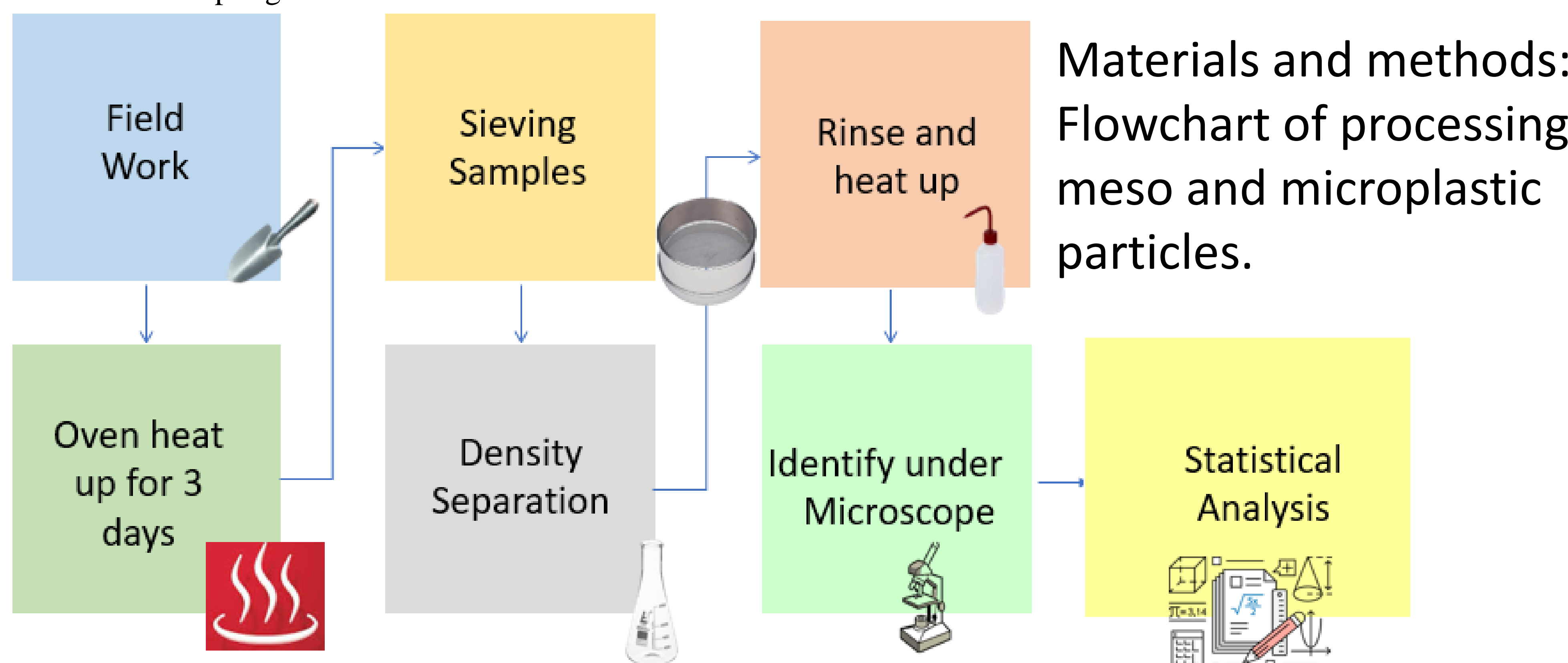
Conditional boxplots showing the amount of microplastic particles (left) and mesoplastic particles (right) found in the storm line for different weather parameters. It is very obvious that the amount of micro and mesoplastic particles in the storm line increases significantly when the amount of precipitation is higher than 147.3 mm, the wind speed higher than 21.5 m/s, the wave height larger than 6.8 m, and the distance of the typhoon closer than 123 km to the sampling area.



Gongliao Beach sampled before Typhoon Maria on April 27th 2018.

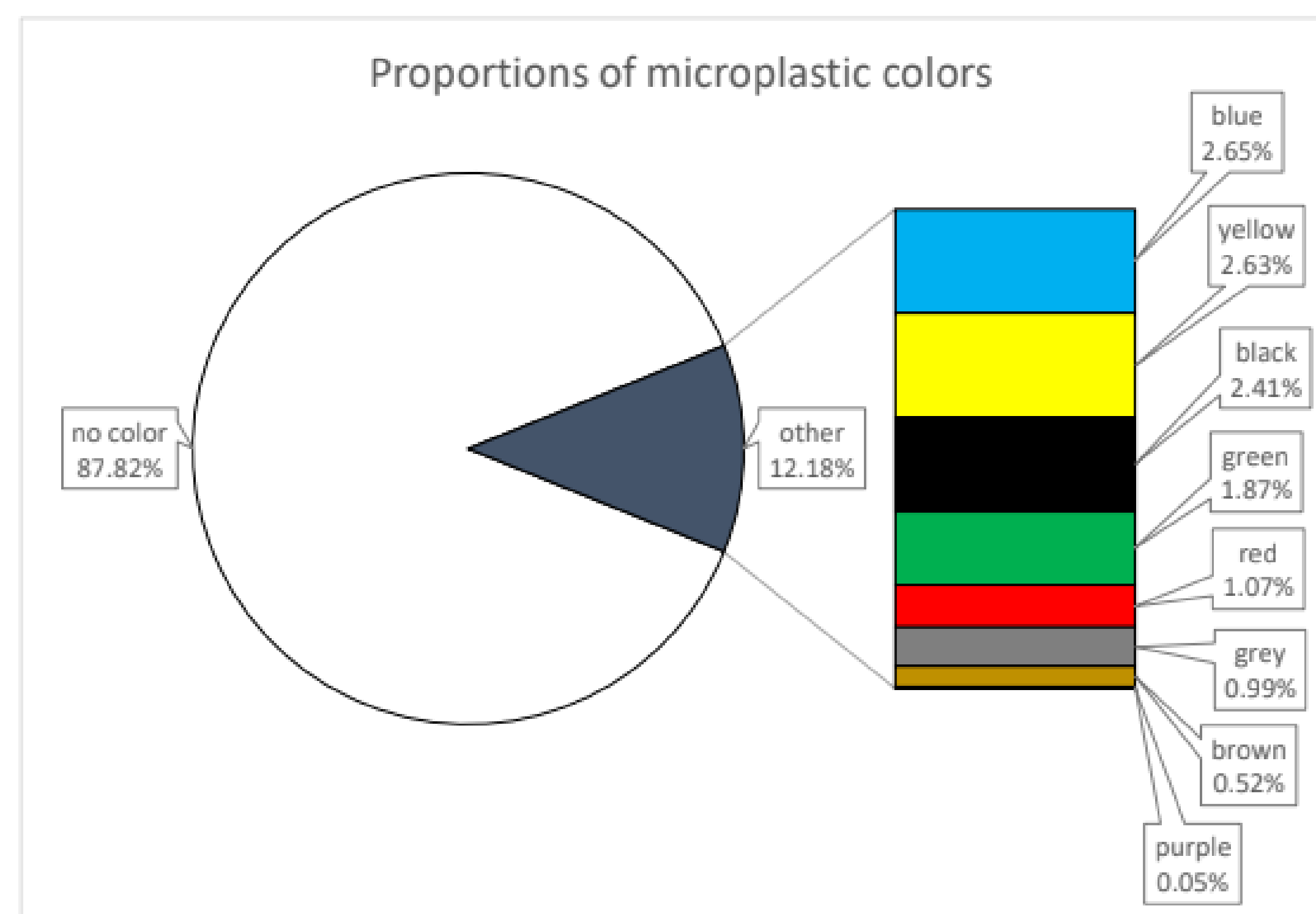
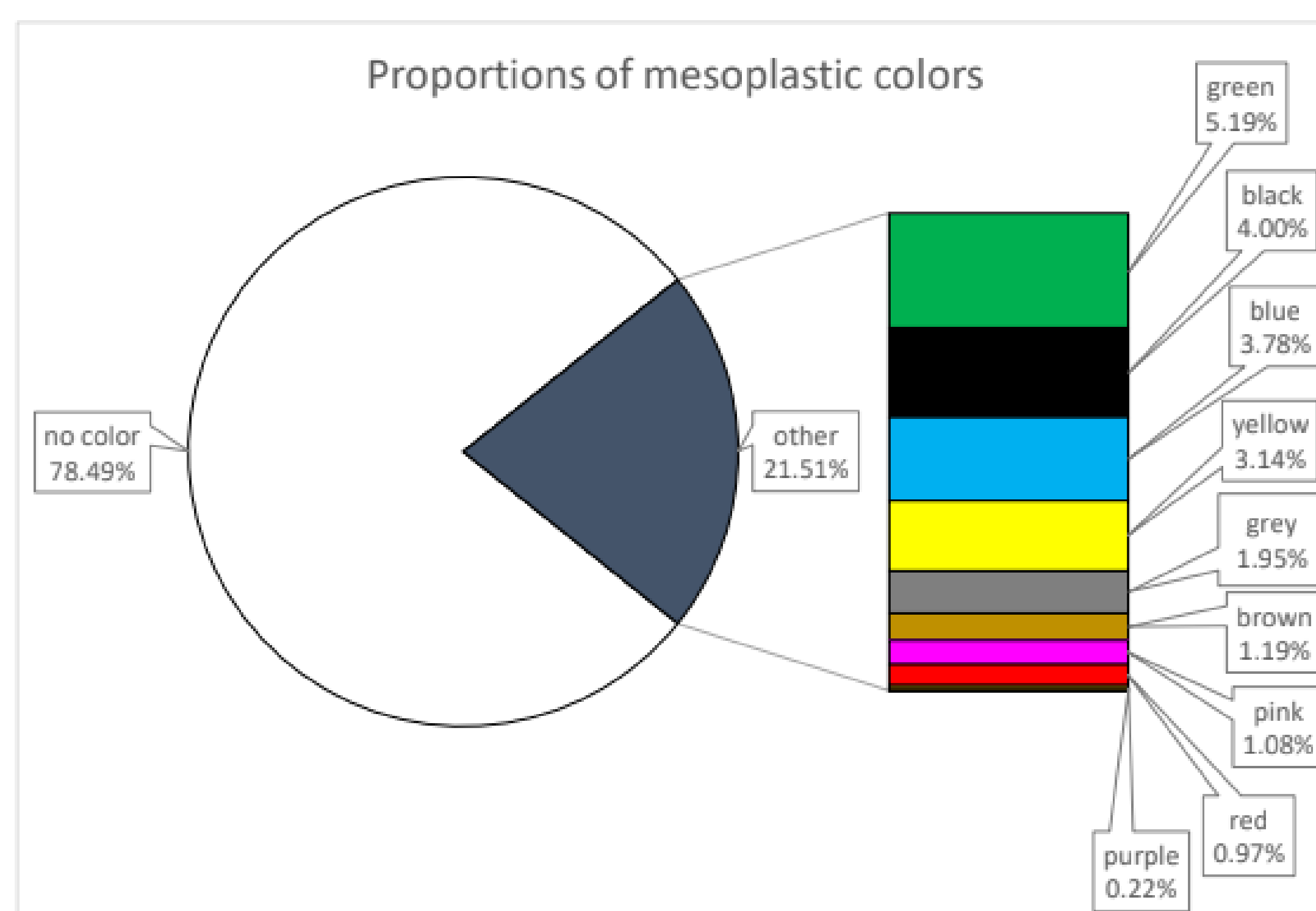


Gongliao Beach sampled after Typhoon Maria on July 16th 2018.



Materials and methods: Flowchart of processing meso and microplastic particles.

For both size groups the colorless particles were the dominating



The proportions of colors found are very similar to previous studies in Taiwan's beaches and other beaches worldwide. However, with more than 80 % of the particles found in this study being colorless, the ratio is larger than for particles reported in other studies from Taiwan. Kunz et al. (2016) mentions that 66 % of the 1097 particles found in beaches at the north-coast of Taiwan were colorless.

The study throughout 2018 to 2019 in Gongliao Beach (New Taipei City) provides an overview of the microplastic and mesoplastic pollution in this area; aiming to set a baseline indicator for future references, especially for those who are looking for relations between meteorological variations and plastic waste.